en **Operator's manual**

Hydraulic excavator

Document ID

ORIGINAL OPERATOR'S MANUAL
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Product ID

Manufacturer: Liebherr Machinery (Dalian) Co. Ltd.
Type: R 924
Type no.: 1444, 1445
From Serial no.: 42836

Contact

Liebherr Machinery (Dalian) Co. Ltd.
No.30, Wanli Street
Dalian

LMD/11824096/01/2020-02-03/en

Crawler Excavator

R 924

Litronic®

Engine:
125 kW / 170 HP

Stage IIIA / Tier 3

Operating Weight:
23,650 – 24,600 kg

Bucket Capacity:
0.80 – 1.65 m³

LIEBHERR

A first class work space
In this cab, the operator benefits from a high-quality mechanical suspension seat, an enlarged space and a very comfortable working environment. Depending on the operator's needs, the "Comfort" seat can be selected as an option. This seat offers maximum comfort thanks to its air suspension, several horizontal and vertical settings, as well as its adjustable pneumatic lumbar support. It is especially designed to meet the most challenging comfort requirements of operators, in all working situations.

Low noise level and vibrations
To diminish fatigue at work and increase productivity, the acoustic power inside the operator's cab is one of the lowest on the market. The cab is mounted on viscoelastic rivets to fully absorb the excavator's vibrations. Furthermore, rubber flanges support the pipes and actively participate in reducing external noise.

Uncompromised visibility
The very large glazed surface area and minimal area of frames guarantee optimal visibility from the operator's platform, as well as a wide emergency exit from the rear window for the operator's safety and peace of mind.

Ergonomic proportional joysticks
The proportional joysticks are very finely tuned controls for the sensitive, accurate and fluid operation of the machine. This type of control is ideal for a machine used in a variety of applications.

Touch-screen display
- 7-inch touch-screen with colour display
- Wide range of adjustment, check, and monitoring possibilities
- Tough, reliable design (sealing tightness class IP 65)

Heightened visibility
- Optional rear view monitoring camera, for optimal visibility and heightened operating safety
- Optimized design of the whole uppercarriage providing the operator with an improved field of vision
- Front windshield fully retractable into the roof, with or without lower glass panel
- Secure emergency exit through the rear window

Optimal temperature
- Enhanced air-conditioning system, providing improved cooling performances
- Optional dark tinted windows

Lift Capacities

with Mono Boom 5.90 m and Counterweight 4.5 t

Stick 2.00 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m				m
7.5	S									6.6	6.7*	5.4
	LC									6.7*	6.7*	
6.0	S					5.6	6.5*			4.7	6.5*	6.7
	LC					6.2	6.5*			5.2	6.5*	
4.5	S			8.3	8.8*	5.4	7.1*			4.0	5.9	7.4
	LC			8.8*	8.8*	6.0	7.1*			4.4	6.4	
3.0	S			7.6	11.0*	5.2	7.9	3.8	5.7	3.6	5.4	7.8
	LC			8.6	11.0*	5.8	8.0*	4.2	6.1	4.0	5.8	
1.5	S			7.2	10.9*	5.0	7.7	3.7	5.6	3.5	5.2	7.8
	LC			8.2	10.9*	5.5	8.3	4.1	6.0	3.9	5.6	
0	S			7.2	11.8	4.8	7.5	3.6	5.5	3.6	5.4	7.6
	LC			8.1	12.5*	5.4	8.2	4.1	6.0	4.0	5.8	
−1.5	S	9.3*	9.3*	7.2	11.9	4.8	7.5			3.9	6.0	7.1
	LC	9.3*	9.3*	8.1	11.9*	5.4	8.2			4.4	6.5	
−3.0	S	13.8*	13.8*	7.3	10.5*	5.0	7.7			4.9	7.5	6.1
	LC	13.8*	13.8*	8.3	10.5*	5.5	7.8*			5.5	7.6*	
−4.5	S											
	LC											

Stick 2.50 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m				m
7.5	S					5.7	6.0*			5.6	6.0*	6.1
	LC					6.0*	6.0*			6.0*	6.0*	
6.0	S					5.7	6.0*			4.2	6.0*	7.2
	LC					6.0*	6.0*			4.7	6.0*	
4.5	S	11.6*	11.6*	7.9*	7.9*	5.5	6.6*	3.9	5.8	3.6	5.3	7.9
	LC	11.6*	11.6*	7.9*	7.9*	6.1	6.6*	4.3	6.1*	4.0	5.8	
3.0	S			7.8	10.1*	5.2	7.6*	3.8	5.7	3.3	4.9	8.2
	LC			8.7	10.1*	5.8	7.6*	4.2	6.1	3.6	5.3	
1.5	S			7.3	11.8*	4.9	7.6	3.6	5.5	3.2	4.8	8.3
	LC			8.2	11.8*	5.5	8.3	4.1	6.0	3.5	5.2	
0	S			7.1	11.7	4.8	7.5	3.6	5.4	3.2	4.9	8.1
	LC			8.0	12.4*	5.4	8.2	4.0	5.9	3.6	5.3	
−1.5	S	9.3*	9.3*	7.1	11.7	4.7	7.4	3.6	5.4	3.5	5.4	7.6
	LC	9.3*	9.3*	8.0	12.1*	5.3	8.1	4.0	5.9	3.9	5.8	
−3.0	S	13.9	15.2*	7.2	11.1*	4.8	7.5			4.2	6.5	6.7
	LC	15.2*	15.2*	8.1	11.1*	5.4	8.2			4.7	7.1	
−4.5	S	11.7*	11.7*	7.5	8.6*					6.2	7.2*	5.2
	LC	11.7*	11.7*	8.4	8.6*					6.9	7.2*	

Stick 3.00 m

m	Undercarriage	3.0 m		4.5 m		6.0 m		7.5 m				m
7.5	S									4.8	5.2*	6.7
	LC									5.2*	5.2*	
6.0	S					5.4*	5.4*	4.0	5.4*	3.8	4.9*	7.7
	LC					5.4*	5.4*	4.4	5.4*	4.2	4.9*	
4.5	S					5.5	6.1*	3.9	5.6*	3.3	4.9	8.4
	LC					6.1*	6.1*	4.3	5.6*	3.6	4.9*	
3.0	S			7.9	9.3*	5.2	7.1*	3.8	5.7	3.0	4.5	8.7
	LC			8.8	9.3*	5.8	7.1*	4.2	6.1*	3.3	4.9	
1.5	S			7.3	11.2*	4.9	7.6	3.6	5.5	2.9	4.4	8.8
	LC			8.3	11.2*	5.5	8.1*	4.0	6.0	3.2	4.7	
0	S	4.1*	4.1*	7.0	11.7	4.7	7.4	3.5	5.4	2.9	4.5	8.6
	LC	4.1*	4.1*	8.0	12.2*	5.3	8.1	3.9	5.8	3.3	4.9	
−1.5	S	8.9*	8.9*	6.9	11.6	4.6	7.3	3.5	5.3	3.2	4.8	8.1
	LC	8.9*	8.9*	7.9	12.2*	5.2	8.0	3.9	5.8	3.5	5.3	
−3.0	S	13.6	15.0*	7.0	11.5*	4.7	7.4			3.7	5.7	7.2
	LC	15.0*	15.0*	8.0	11.5*	5.3	8.1			4.1	6.2	
−4.5	S	13.3*	13.3*	7.2	9.6*					5.0	7.0*	5.9
	LC	13.3*	13.3*	8.2	9.6*					5.6	7.0*	

Height **Can be slewed though 360°** **In longitudinal position of undercarriage** **Max. reach** *** Limited by hydr. capacity**

The load values are quoted in tons (t) at stick end (without bucket), and may be swung 360° on firm and even ground. Adjacent values are valid for the undercarriage when in the longitudinal position. Capacities are valid for 600 mm wide track pads. Indicated loads are based on ISO 10567 standard and do not exceed 75 % of tipping or 87 % of hydraulic capacity (indicated via *). Without bucket cylinder, link and lever the lift capacities will increase by 320 kg. Lifting capacity of the excavator is limited by machine stability and hydraulic capacity. According to European Standard, EN 474-5: In the European Union excavators have to be equipped with an overload warning device, a load diagram and automatic safety check valves on hoist cylinders and stick cylinder(s), when they are used for lifting operations which require the use of lifting accessories.

– Adhere to safety regulations at place of use.
– Report all changes to machine that affect safety to operating company.
– If it is no longer possible to work safely: Immediately stop operating machine.
– Exclusively perform retrofittings of machine after consultation with manufacturer.
– Use original Liebherr spare parts wherever possible.

Requirement

The operator has following qualification and skills:
– Has completed the legally specified minimum age.
– Is physically and mentally capable of operating the machine safely.
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.
– Has the necessary authorisation for operation of machine.
– The operator has the necessary education (theoretical and practical) for the following:
  • Handling the machine type
  • Attaching
  • Spotting
  • Handling fire extinguishing equipment
– Knows all means of escape in an emergency.
– Is not under any physical or mental impairment that limits one of the prescribed requirements.
– Is not under the influence of alcohol.
– Is not under the influence of drugs.

2.3.5 Maintenance staff

Responsibility

The maintenance staff are responsible for the following:
– Read operator's manual.
– Read supplied documentation.
  • Operator's manuals for components
  • Operator's manuals from third party manufacturers
  • Additional instructions
– Maintain machine for safe and reliable function.
– Execute all maintenance tasks specified for maintenance staff in the maintenance and inspection schedule.
– Wear personal protective equipment.
– Adhere to safety regulations at place of use.
– Report all changes to machine that affect safety to operating company.
– Exclusively perform retrofittings of machine after consultation with manufacturer.
– Use original Liebherr spare parts wherever possible.

Requirement

The maintenance staff has following qualification and skills:
– Has completed the legally specified minimum age.
– Is physically and mentally capable of maintaining the machine.
  • Satisfactory eyesight
  • Satisfactory hearing ability
  • Quick reactions
  • Is able to estimate distance, height and gaps.

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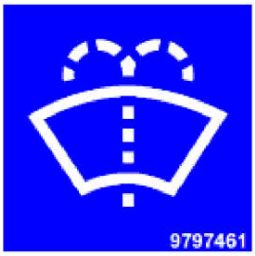
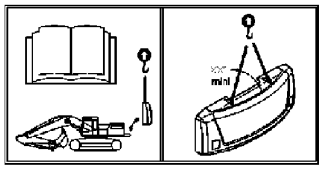
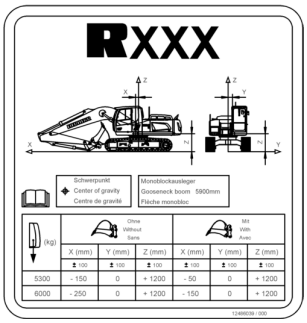
	Sign	Description
42		**Windscreen washer tank** Shows position of the windscreen washer tank.
44		**Coolant** Shows that the cooling system is filled with Liebherr Antifreeze OS coolant. For more information see operator's manual.
46		**Disassembling the counter-weight** Indicates the minimum angle between lifting tackle and bolts of the lifting eyelets.
48		**Centre of gravity** Indicates the location of the machine's centre of gravity. For more information see operator's manual.
49		**Refrigerant** Contains the following information: - Refrigerant - Global warming potential - Quantity at 25 °C (g) - CO_2 equivalent (t)

Tab. 7: Information signs

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2.7.8 Operation of machine

Danger to life

Incorrect place of use

- Make sure that load capacity value of ground is sufficient.
- Do not exceed maximum inclination angle of machine while working.
- Do not exceed maximum inclination angle of machine when driving on ramps (side inclination).
- Make sure that ground offers sufficient grip.
- Adhere to safety gap from live overhead cables.

Incorrect use

- When working in following areas, adhere to the laws, regulations and rules applicable at the place of use.
  - Explosive area
  - Flammable area
  - Areas with underground lines (gas, electricity)
- Make sure that machine is equipped with components for exhaust gas reduction when in closed spaces (for example tunnel, hall) in non-explosive environment.
- Clean machine regularly to remove flammable residues (for example dust, wood scraps).

Incorrect handling of electrical system

- Make sure there are no persons with a pacemaker in the vicinity of the running diesel engine.
- Before working on electrical system, make sure that affected parts are voltage-free.
- Before working on electrical system, make sure that neighbouring parts are isolated.
- Have work on electrical systems performed exclusively by a qualified electrician.

Injuries

Incorrect protection

- If there is a risk of falling objects (particularly during log clamp operation): Exclusively use machines with suitable protective structures.
- If there is a risk of objects penetrating the operator's cab (particularly during log clamp operation): Exclusively use machines with suitable protective structures.
- If machine is used in toxic environment: Insert filters approved for the use in air conditioning.
- If machine is used in dust-intensive environment: Insert filters approved for the use in air conditioning.

Incorrect refuelling

- Do not touch fuels with your skin.
- Do not inhale fuel vapours.

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Symbol	Meaning
	Safety element defective; strongly restricted operation of machine
	Element defective; restricted operation of machine
	Maintenance due
	Emergency mode of servo control active
	Unlocking with PIN code required

Tab. 9: General status symbols

Working attachment and working tools

Symbol	Meaning
	Overload warning
	Overload warning system not available
	Reversing control direction for opening and closing working tool
	Reversing control direction for turning working tool

Tab. 10: Status symbols of working attachment and working tool

Slewing brake

Symbol	Meaning
	Slewing brake released

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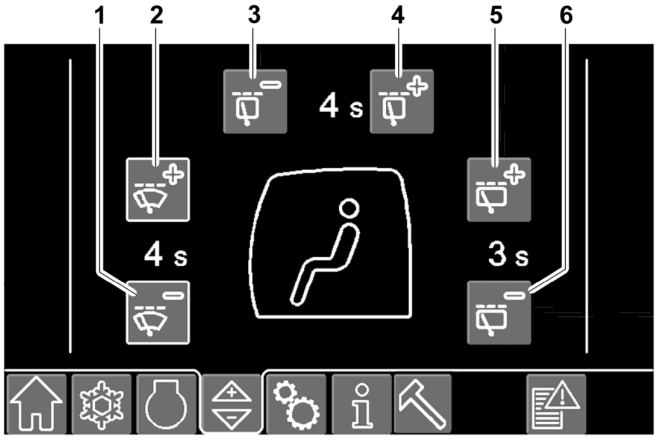

Fig. 100: Windscreen wiper interval submenu[10)]

1	*Reducing windscreen wiper interval* button	**4**	*Increasing roof glass panel windscreen wiper interval* button
2	*Increasing windscreen wiper interval* button	**5**	*Increasing rear windscreen wiper interval* button
3	*Reducing roof glass panel windscreen wiper interval* button	**6**	*Reducing rear windscreen wiper interval* button

3.2.11 *Display brightness and display volume* submenu

Menu call: > or > >

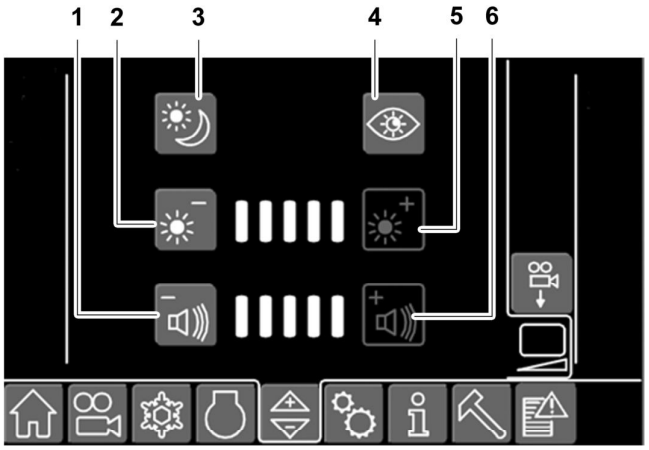

Fig. 101: Display brightness and display volume submenu

1	*Reducing display volume* button [11)]	**4**	*Night Shift mode button*[11)]
2	*Reducing display brightness* button	**5**	*Increasing display brightness* button
3	*Day/night mode* button [11)]	**6**	*Increase display volume* button[11)]

[10)] Quantity of windscreen wipers depending on machine type and equipment
[11)] Available depending on machine type

Sensitivity of mini-joysticks submenu

Menu call: > or > >

The display of this submenu varies depending on machine configuration.

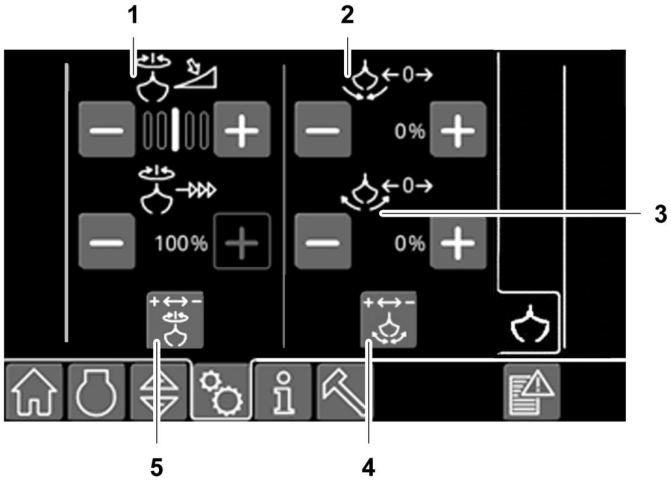

Fig. 134: Sensitivity of mini-joysticks for controlling working tool submenu

1 Turning working tool

2 Closing working tool

3 Opening working tool

4 Reversing control direction for opening working tool

5 Reversing control direction for turning direction of working tool

Setting start of movement of working attachment

Setting maximum speed for movement of working attachment

Setting progressivity of control for working attachment

Menu buttons on the display vary by machine configuration.

Menu button	Fine adjustment
	Turning working tool Closing working tool Opening working tool
	Laterally adjustable boom
	Height-adjustable boom

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The fire extinguisher is in the operator's cab.

- ▶ Have fire extinguisher inspected according to the regulations in force where the machine is used.
- ▶ Observe operating instructions on fire extinguisher.

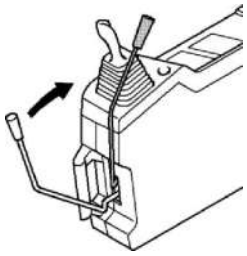
Note
The operator is responsible for installing the fire extinguisher.

- ▶ Observe regulations in force where machine is used.
- ▶ Estimate requirement in relation to operational conditions.
- ▶ Order fire extinguisher and holder: Contact Liebherr customer service.

3.3.5 Safety lever

The safety lever:
– interrupts all hydraulic functions,
– makes it possible to avoid all unintentional movements of the machine.

The engine can only be started when the safety lever is in the upper position.



Before starting work:
- ▶ Sit in the operator seat.
- ▶ Start the engine.
- ▶ Move the safety lever to the down position.
  - ▷ The joysticks and the pedals are working.
  - ▷ The slewing gear break returns to its previous state.

Before you stand up:
- ▶ Move the safety lever to the upper position.
  - ▷ The joysticks and the pedals are not working any more.
  - ▷ The slewing gear brake is activated and locked.

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3.3.8 Horn

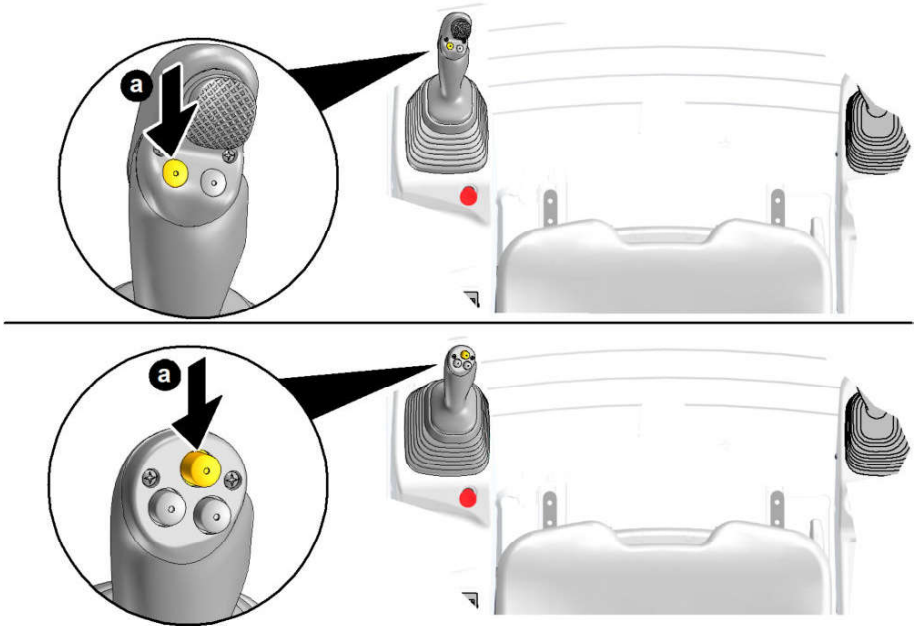

Fig. 184: Horn

Activating horn

▶ Press and hold button **a**.

Deactivating horn

▶ Release button **a**.

3.3.9 Windscreen

DANGER
Limited visibility!
Injuries.

▶ Make sure that windscreen is not in intermediate position during work.

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Travel gear

- ▶ Check track tension. (For more information see: 5.12.1 Checking track tension, page 251) Re-tighten if necessary.

Working attachment

- ▶ Lubricate working tool.
- ▶ Check pin connections.
- ▶ Check steel components for cracks.

If quick coupler is installed:

- ▶ Check that warning sound sounds and display status symbols appear.
- ▶ Check condition of locking pins, hydraulic hoses, electric cables and safety flaps.

3.4.2 Refuelling

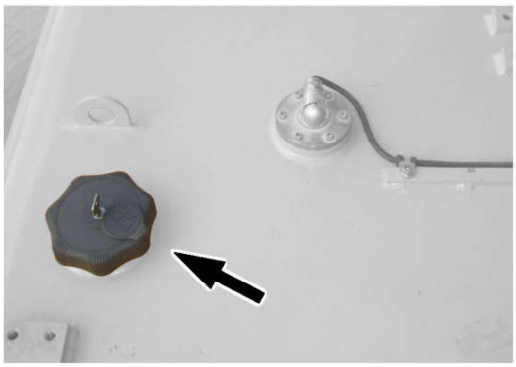

Fig. 207: Fuel tank cap

DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Avoid naked flames.
- ▶ Do not smoke.

NOTICE
Penetration by moisture into fuel tank cap!
Damage to fuel system.

- ▶ Remove key from fuel tank cap.
- ▶ Put on protective cap of fuel tank cap.

Make sure the following preconditions are met:

- ❑ Diesel engine is shut off.
- ❑ Fuel used is approved.

- ▶ Unlock fuel tank cap.
- ▶ Unscrew fuel tank cap.
- ▶ Check condition of strainer and replace strainer if necessary.

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Turning on the spot

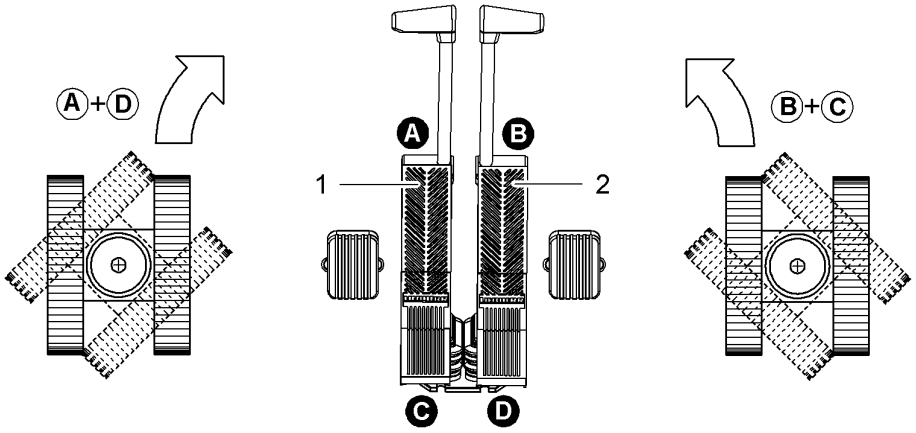

Fig. 226: Turning on the spot

1 Left accelerator pedal **2** Right accelerator pedal

▶ Turn right: Press left accelerator pedal **1** forwards **A** and simultaneously press right accelerator pedal **2** backwards **D**.

▶ Turn left: Press right accelerator pedal **2** forwards **B** and simultaneously press left accelerator pedal **1** backwards **C**.

Travelling sensitively

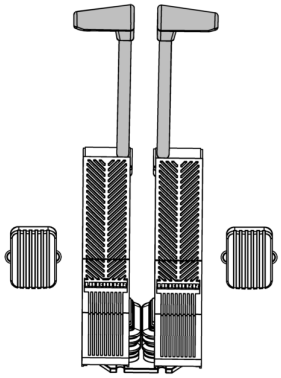

Fig. 227: Driving lever

When sensitive travel is required:

▶ Apply driving lever to accelerator pedals.

At the end of work:

▶ Pull out driving levers and stow in operator's cab.

Travelling in creeper gear and in automatic travel mode

The creeper gear permits sensitive travelling and improves travelling behaviour on difficult ground.

In automatic travel mode, the travel speed is adjusted to the ground conditions.

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Controlling special working attachment with right mini-joystick

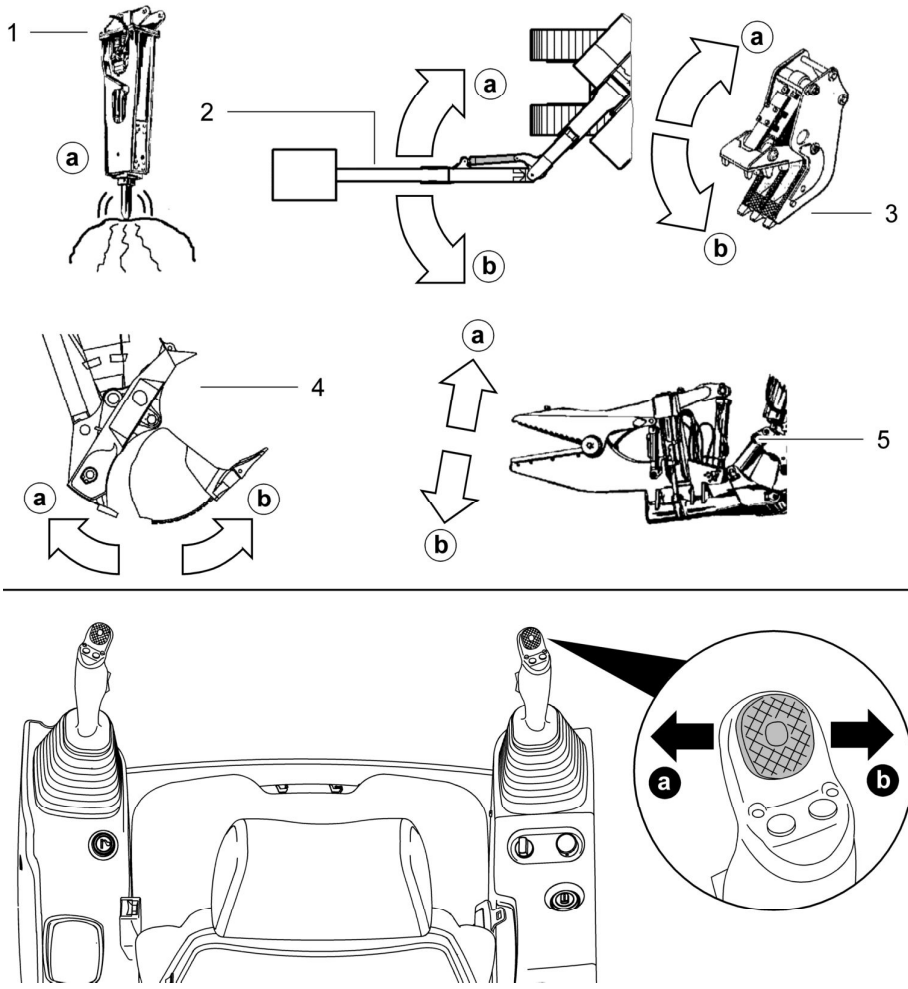

Fig. 255: Controlling special working attachment with right mini-joystick

1 Hydraulic hammer
2 Laterally adjustable boom
3 Concrete shear or pulveriser
4 Bottom dump shovel
5 Scrap shear

Controlling cylinder of the special working attachment

- ▶ Retract cylinder of special working attachment: Move right mini-joystick in direction **a**.
- ▶ Extend cylinder of special working attachment: Move right mini-joystick in direction **b**.

Controlling hydraulic hammer

- ▶ Move right mini-joystick in direction **a**.

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WARNING
Incorrect or unintentional movements of working attachment!
Danger to life.

- ▶ Make sure that no-one is in the hazard zone.
- ▶ Before working with machine, check assignment of controls.
- ▶ Perform slow and steady movements.
- ▶ Do not move bucket near operator's cab.

WARNING
Machine tipping over!
Danger to life.

- ▶ Make sure that no-one is in the hazard zone.
- ▶ Read load lift chart of machine before lifting work.

If boom and stick are extended too far:
- ▶ Do not lift any heavy loads.

WARNING
Falling load!
Danger to life.

- ▶ Make sure there is nobody in hazard zone under load.

Make sure the following preconditions are met:
- ❑ Machine is in working position. (For more information see: 3.6.2 Putting machine in working position, page 134)

Grabbing digging material

- ▶ Align inside surface of stick approximately 45° to the ground.
- ▶ Align backhoe bucket teeth approximately 90° to the ground.
- ▶ Slowly and steadily retract stick and simultaneously close backhoe bucket.

When stick is at right angle to the ground:
- ▶ Slowly and steadily lift boom and simultaneously continue retracting stick and closing backhoe bucket.

When backhoe bucket is full or stick cannot be retracted any further:
- ▶ Lift boom and swivel backhoe bucket until filling surface is aligned parallel to the ground.

Dumping digging material

- ▶ Position working attachment above dumping point.
- ▶ Fully open backhoe bucket.

If parts of digging material remain in backhoe bucket:
- ▶ Close and open backhoe bucket.

3.6.7 Ground surface grading

A backhoe bucket or a dozer blade can be used for grading the ground surface.

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3.7 Installing and removing working attachment

3.7.1 Installing and removing working attachment pins

Introduction

▶ Never align bores in working attachment with bare hands.

Removing working attachment pins

▶ Remove working attachment pins: Use hydraulic pin press.

If no hydraulic pin press is available:
▶ Use sledgehammer and mandrel held firmly by helper.

Installing working attachment pins

▶ Screw drive head supplied in tool box into threaded bore of pin of working attachment.

▶ Insert working attachment pin in bore of working attachment.

▶ Insert working attachment pins to the stop: Exclusively strike driver head.

▶ Screw in knurled nut until there is contact.

▶ Tighten knurled nut until roll pin can be inserted.

3.7.2 Installing and removing bucket

The affected working tools are:
– Backhoe bucket
– Ditch-cleaning bucket
– Ripper teeth

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3.9 Transport

3.9.1 Driving machine onto low-loader

Preparing loading ramp

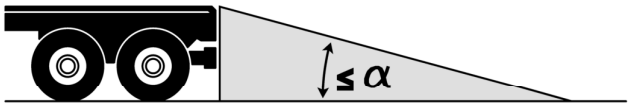

Fig. 282: Preparing loading ramp

Make sure the following preconditions are met:
- ❑ Loading ramp is designed for required load capacity.
- ❑ Inclination angle α of loading ramp is smaller than 15°.
- ❑ Loading ramp is clean, free from snow and free from ice.
- ❑ Loading surface of low-loader is clean, free from snow and free from ice.

▶ Contain danger zone.

▶ Place blocks under loading ramp.

If loading ramp is smooth and made of metal:
▶ Attach anti-slip device to loading ramp.

Driving machine onto low-loader

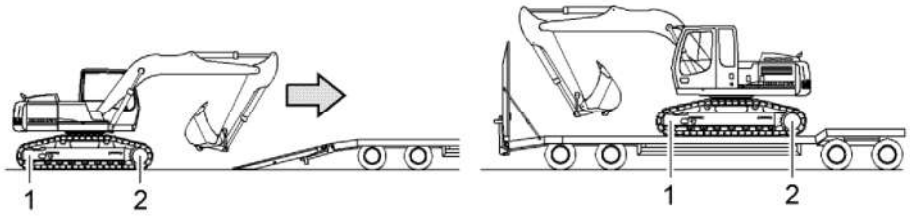

Fig. 283: Driving machine onto low-loader

1 Idler-wheel **2** Sprocket wheel

DANGER
Steering directions reversed!
Danger to life.

If sprocket wheels are at front of the machine:
▶ Drive carefully.

Make sure the following preconditions are met:
- ❑ Travel gear is clean, free from snow and free from ice.
- ❑ Spotter is in eye contact with operator or speaking contact with operator is possible.
- ❑ The loading zone of the machine contains no persons.

▶ Place on tear-resistant, non-slip straps with a friction coefficient μ over 0.6 in accordance with standard EN 12195-1 on low-loader platform.

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Towing small loads with machine

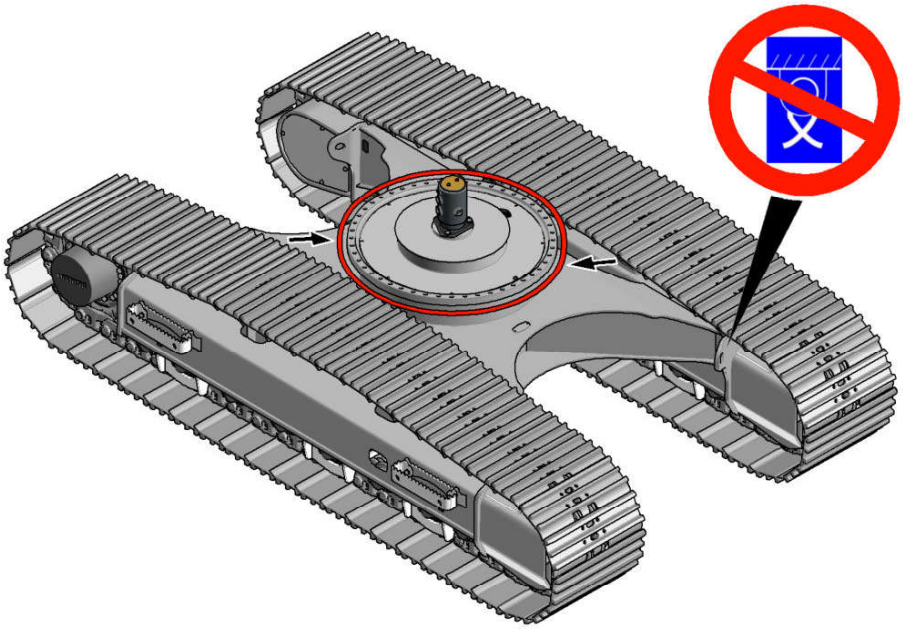

Fig. 300: Bottom part of slewing ring for towing small loads

WARNING
Incorrect towing!
Danger to life.

- ▶ Use faultless and adequately dimensioned towing device.
- ▶ Make sure there are no persons in danger area.
- ▶ Adhere to applicable traffic regulations and safety regulations.

NOTICE
Incorrect towing!
Damage.

- ▶ Exclusively use bottom part of slewing ring.
- ▶ Exclusively tow small loads (compressor, generator or welding machine).
- ▶ Prevent towing device from getting tangled.
- ▶ Travel exclusively in a straight line.

- ▶ Depending on the towing device used, position protection between bottom part of slewing ring and towing device.
- ▶ Place towing device around bottom part of slewing ring.
- ▶ Pretension towing device: Start slowly.
- ▶ Drive smoothly to the destination.

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Malfunction / error	Cause	Remedy
Diesel engine oil pressure too low	Oil level in oil pan too low	Fill with oil up to mark on dipstick.
	Oil too thin (oil diluted with fuel)	Drain oil and fill with prescribed oil.
	Oil pressure switch defective	Check oil pressure and replace defective oil pressure switch. Contact Liebherr customer service.
	Oil pressure regulating valve defective or contaminated	Contact Liebherr customer service.
	Excessive play or damages of bearings caused by worn bearings	Contact Liebherr customer service.
Engine oil in cooling system	Engine oil cooler or engine oil cooler housing leaking	Contact Liebherr customer service.
Coolant in diesel engine oil	O-rings of cylinder liner leaking	Contact Liebherr customer service.
	Diesel engine oil cooler or diesel engine oil cooler housing leaking	Contact Liebherr customer service.

4.2.2 Hydraulic system

Malfunction / error	Cause	Remedy
Unusual noises or noise emissions can be heard. Hydraulic pumps draw in air.	Stop valve on hydraulic tank is closed. Hydraulic oil level is too low.	Shut off diesel engine or electric motor immediately. Check stop valve and fill level.
Machine movements are too slow.	Selected speed step too low.	Select higher speed step or different operating mode.
Power modes do not achieve required performance.	Control is defective.	Contact Liebherr customer service.
Hydraulic oil temperature is too high.	Radiator is contaminated.	Clean radiator.
	Fan drive is defective.	Shut off diesel engine or electric motor. Contact Liebherr customer service.
Hydraulic oil level is too low.	Hydraulic system is leaking and losing oil.	Contact Liebherr customer service.
No function assigned to control elements.	Servo control is switched off. Safety lever is in upper position.	Switch on servo control. Lower safety lever.
	Block ball valves on energy recuperation cylinder (option) are closed.	Open block ball valves slowly and carefully.
	Brake (slewing gear, travel drive) is engaged.	Release brake.
	Control is defective.	Contact Liebherr customer service.

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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
			❍	❍	❍	✦		Fuel fine filter: Replace filter element (at least every 6 months).		237
						✧		Bleed fuel system.		
		●	❍	❍	❍	✦		Air filter: Emptying dust collecting tank.		238
			❍	❍	❍	✦		Air filter: Replace main filter cartridge (at least once a year).		238
					❍			Air filter: Replace safety filter cartridge (at least once a year).		
Cooling system										
☐	●	●	❍	❍	❍	✦		Check coolant level.		240
					❍	❄		Coolant: Check concentration (at least once a year).		241
					❍			Cooling system: Change coolant (at least every 2 years).		
						✧		Grease cooling system.		
Working hydraulics										
☐		●	❍	❍	❍	✦		Hydraulic tank: Check oil level.		246
			❍	❍	❍	✦		Hydraulic tank: Drain water and sediments.		248
						❍3000 h ✧		Hydraulic tank: Change oil. (For more information see: 5.3.7 Hydraulic oils, page 199)		
					❍			Hydraulic tank: Replace breather filter.		
☐		■	❍	❍	❍			Return filter: Check and clean magnetic rod (once a week for the first 300 operating hours).		249
			☐	❍	❍	✧		Return filter: Replace filter cartridge (in dust intensive applications, replace filter cartridge every 500 hours and whenever oil in hydraulic tank is changed). (For more information see: 5.3.7 Hydraulic oils, page 199)		
			☐	❍	❍	✧		Return leakage oil filter: Replace filter cartridge (in dust intensive applications, replace filter cartridge every 500 hours and whenever oil in hydraulic tank is changed). (For more information see: 5.3.7 Hydraulic oils, page 199)		
			❍	❍	❍			Control oil unit: Replace filter cartridge.		
			☐	❍	❍			Hydraulic hammer return filter (option): Check contamination level, replace filter cartridge if necessary.		
		●	❍	❍	❍			Hydraulic hoses: Check condition and tightness.		249
						✧		Replace hydraulic hoses.		
Electrical system										
			❍	❍	❍			Check lighting of machine.		

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Minimum quality requirements

Specification
LH-00–ENG3A
ACEA E4, ACEA E5, ACEA E7, API CH-4, API CI-4

Tab. 47: Minimum quality requirements

If engine oils from other manufacturers are used, information on change intervals must be obtained from respective manufacturer or supplier.

Difficulty factors

Difficulty factors have influence on the change interval of engine oil.

Adapt change interval of engine oil.

Difficulty factors are:
- Frequent cold starts
- Sulphur content in fuel
- Environmental influences
  - Operating temperature
  - Dust
  - High humidity

The sulphur content in the fuel determines the change interval in dependence on the quality of the engine oil.

Sulphur content of fuel	LH-00-ENG3A
Up to 5000 ppm	500 h
Up to 10000 ppm	200 h

Tab. 48: Change interval of engine oil

5.3.5 Refrigerant

The air conditioning contains fluorinated greenhouse gases.

Designation	Air conditioning unit
Refrigerant	R134a
Global warming potential	1430
CO_2 equivalent of 1 kg R134a at 25 °C	1.43 t

Tab. 49: Refrigerant

Adhere to machine-specific filling quantity of air conditioning.

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Objectives of visual inspection

If conducted correctly as per the specifications of the maintenance manual, the visual inspection prevents longer and unplanned outage times through early detection and removal of defects.

Advantages of a correctly performed visual inspection are:
– Conservation of value of machine.
– Quality assurance of maintenance process.
– Preventing subsequent damage
– Safe operation of machine

Make sure that following defects are detected:
– Contamination
– Damage
– Cracks
– Warping
– Leaks
– Loosened connections
– Chafe marks
– Wear
– Incorrect changes to the machine.

Requirements for staff and operating company

▶ Make sure that the staff is familiar with the design of the complete machine and components.

▶ Make sure that the staff is familiar with the prescribed inspection technology.

▶ Make sure that the staff has sufficient visual ability.

Application of visual inspection

Make sure the following preconditions are met:
❑ Complete machine has been cleaned carefully.
❑ Lighting conditions are sufficient.
❑ Accessibility and field of vision of complete machine is present.
❑ Inspection position and suitable distance assumed.

▶ Perform intervals and inspection scope as per maintenance and inspection schedule.

▶ Evaluate visual inspection.

▶ Create defect report if necessary.

5.5.2 Safety instructions

▶ Make sure that no one is standing near the machine during maintenance or repair.

▶ If necessary, secure a large area.

▶ Inform operating before starting maintenance and repair work.

▶ Appoint a supervisor.

If no other instructions have been made:
▶ Maintain machine on even, firm ground with working attachment lowered and diesel engine or electric motor switched off.

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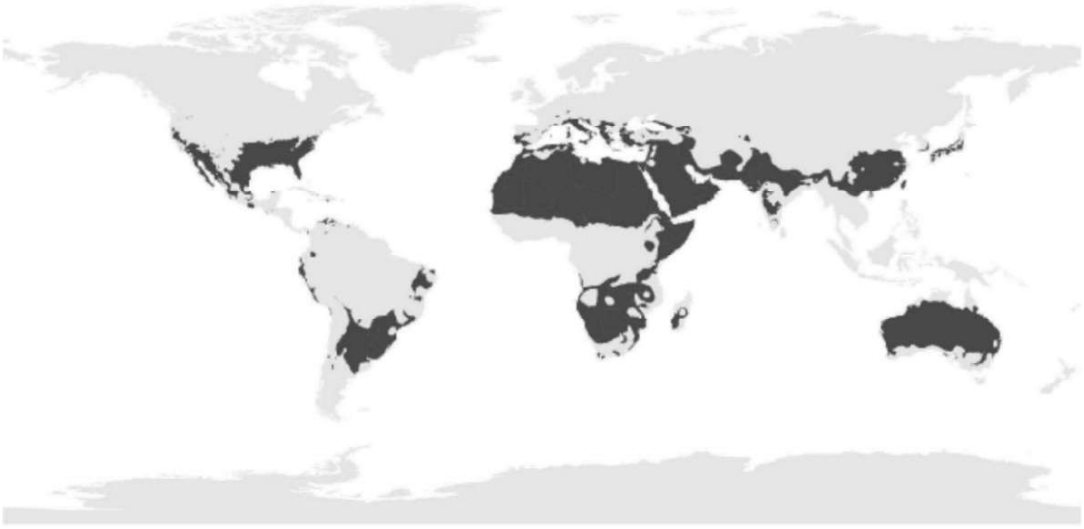

Fig. 382: Subtropical climate

Fig. 383: Tropical climate

Reference documents

Note

▶ Adhere to technical data sheets and safety data sheets of products.

Requirements and description

Conserving corrosion protection

The corrosion protection of the entire machine must be checked. In case of defects in the protection it must be renewed. The inspection interval must be specified according to following table.

Unprotected areas must be cleaned before treatment with protection products.

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5.7.4 Checking components for cracks

NOTICE
Incorrect check!
Damage to machine.

- ▶ Perform visual inspections as per maintenance and inspection schedule.
- ▶ Check components for cracks.

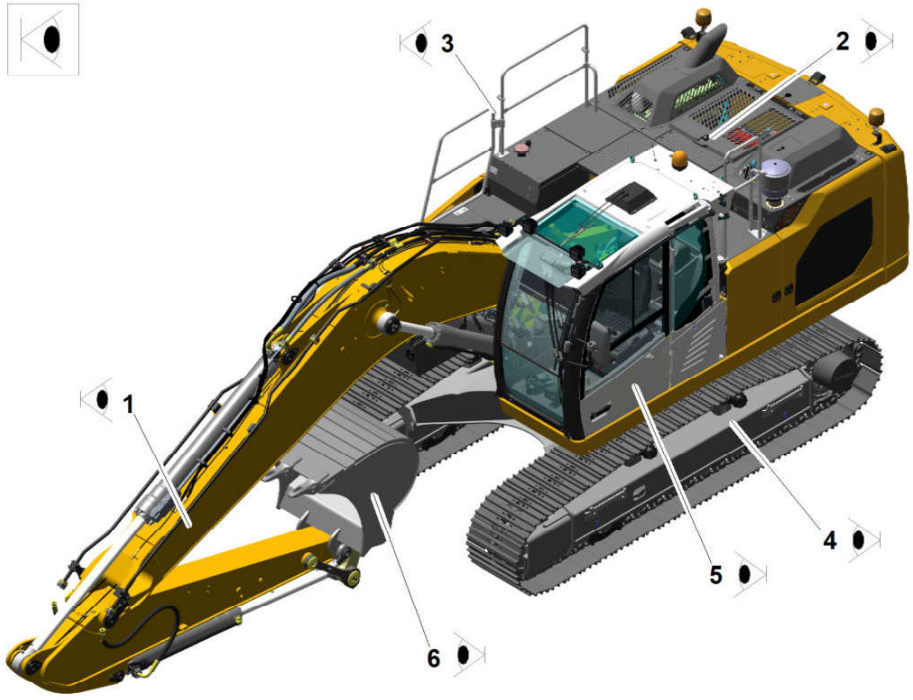

Fig. 385: Checking components for cracks

Position	Assembly	Visual inspection for defects
1	Steel frame of working attachment	Check bearing points, supports, holders, fastening elements, connections for damage, warping and cracks.
2	Steel frame of uppercarriage	
3	Steel frame of climbing aids and hand rails	
4	Steel frame of undercarriage	
5	Steel frame of operator's cab	
6	Steel frame of quick coupler and working tool	

Tab. 80: Visual inspection for defects

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5.8.5 Fuel fine filter: Replacing filter element

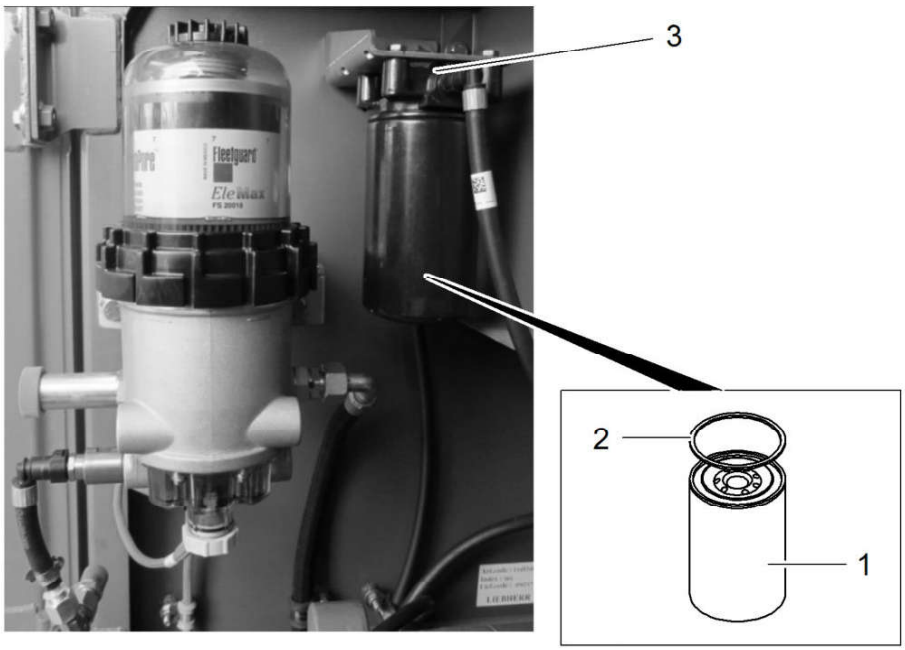

Fig. 394: Fuel fine filter: Replacing filter element

1 Filter element
2 Sealing ring
3 Holder

DANGER
Explosion of highly flammable fuel!
Danger to life.

- ▶ Avoid naked flames.
- ▶ Do not smoke.

Make sure the following preconditions are met:
- ❑ Diesel engine is shut off.

Removing filter element

- ▶ Put suitable receptacle under fuel fine filter.
- ▶ Clean fuel fine filter and surrounding area.
- ▶ Loosen filter element **1** with strap wrench or other suitable tool.
- ▶ Unscrew filter element **1**.

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Recommended hydraulic oil temperature for checking hydraulic oil level is approximately 20 °C.

▶ Check hydraulic oil temperature shown on display. (For more information see: 3.2.7 *Measurement displays* submenu, page 63)

▶ Check that hydraulic oil level in oil sight glass **1** corresponds to required hydraulic oil level. (see: tab. 84, page 246)

If hydraulic oil level does not correspond to required hydraulic oil level:

▶ Fill with hydraulic oil.

Filling with hydraulic oil

NOTICE
Incorrect filling with hydraulic oil!
Damage.

▶ Fill hydraulic tank via return filter.

Make sure the following preconditions are met:

❑ Machine is in maintenance position.

❑ Hydraulic oil used is approved. (For more information see: 5.3.7 Hydraulic oils, page 199)

▶ Check hydraulic oil temperature shown on display.

▶ Depressurise hydraulic system. (For more information see: 5.10.1 Depressurising hydraulic system, page 245)

▶ Remove cover of return filter **3**.

▶ Fill hydraulic tank via return filter **3** until required hydraulic oil level is reached. (see: tab. 84, page 246)

▶ Screw in breather filter **2**.

▶ Fill return filter **3** to the brim.

▶ Put on cover of return filter **3**.

If hydraulic oil is approximately 20 °C:

▶ Check hydraulic oil level.

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Installing tooth

- ▶ Insert pin retention **2**.
- ▶ Place new tooth **5** on tooth adapter **1**.
- ▶ Push securing pin **3** all the way in.
- ▶ Turn securing pin **3** with a square wrench approximately 30° towards bucket.
  ▷ Nose of securing pin **3** engages in pin retention **2**.
- ▶ Insert protection plug **4** onto head of securing pin **3**.

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6 Appendix

If your machine has special attachments, you can find relevant information on the subsequent pages.

6.1 Pre-tightening torque and turning angle

The mounting bolts of the following components are tightened with a precisely defined turning angle:
- Track pads of the travel gear
- Sprocket wheels
- Travel gearboxes
- Travel motors

6.1.1 Procedure

The values of the pre-tightening torque and the turning angle are specified in the operator's manual.

▶ Tighten mounting bolt with the specified pre-tightening torque.

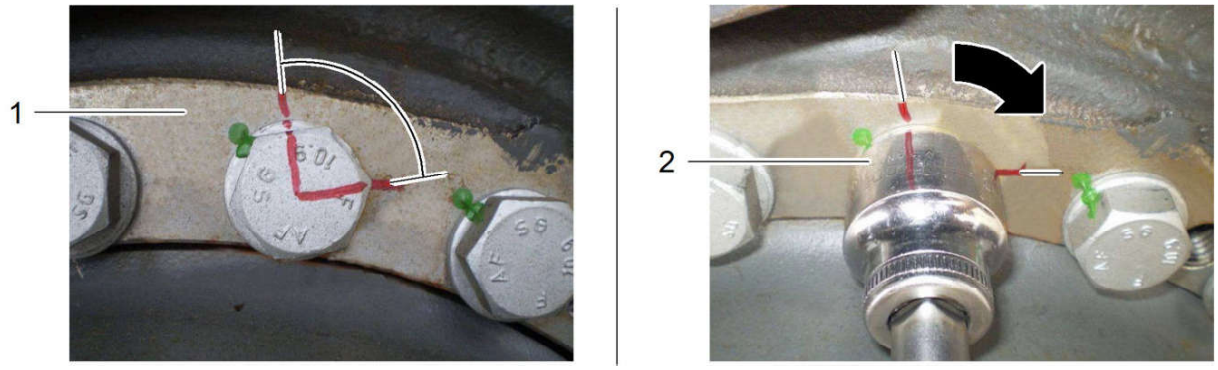

Fig. 421: Turning angle

1 Component

2 Socket key of the torque wrench

▶ Mark the specified turning angle on the screw head and on the component **1**. One edge of screw corresponds to 60°.

▶ On the socket key of the torque wrench **2**, mark the initial position with a line that is aligned with the line on the component **1**.

▶ Use the torque wrench to tighten in clockwise direction until the line of the initial position is aligned with the second line on the component **1**.

▶ Repeat process for the other screws. Tighten screws crosswise.

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