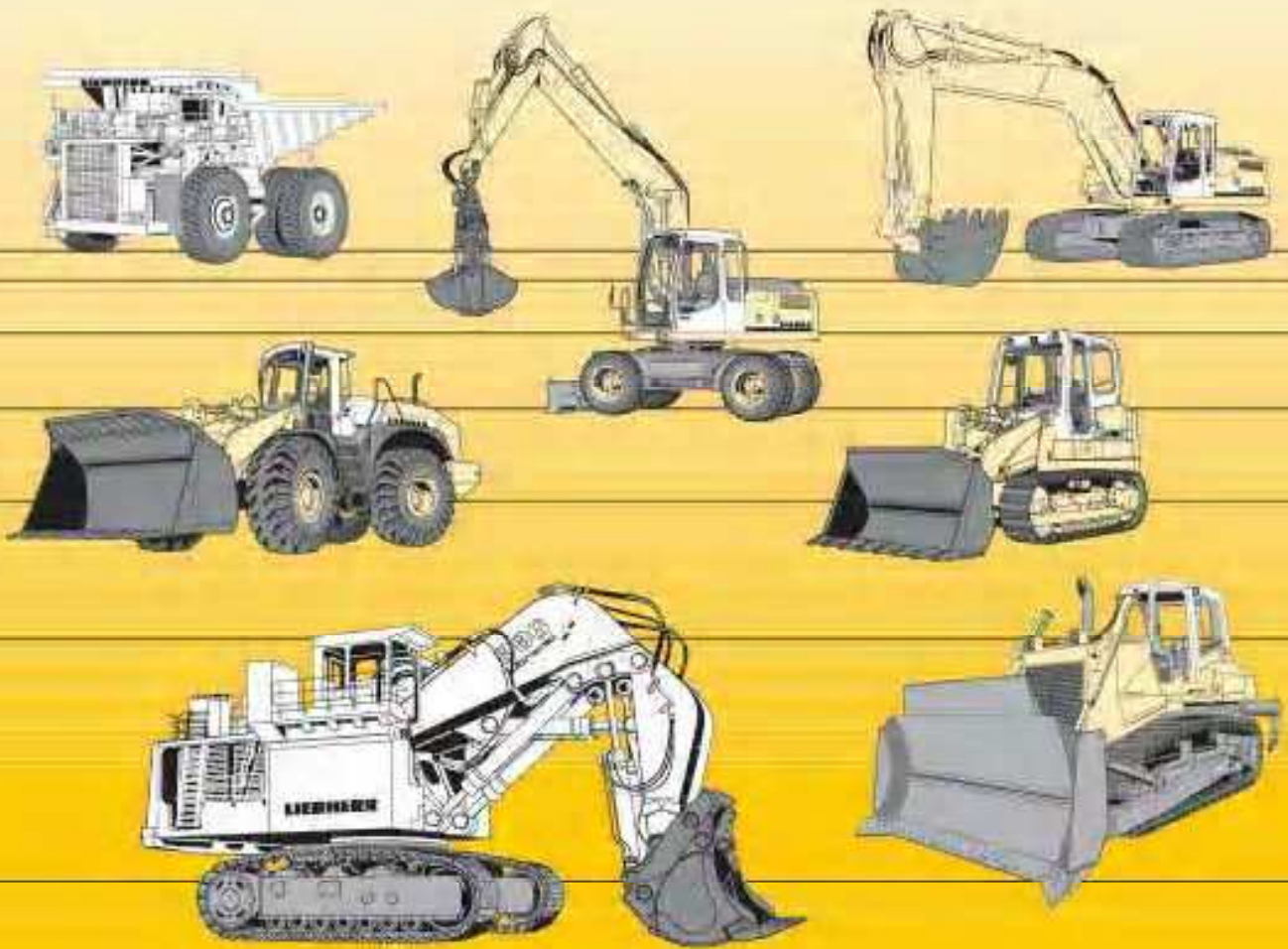


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Operating Manual

Crawler Dozer
PR 754 Litronic



LIEBHERR

en

Operating manual

Crawler dozer
PR 754 Litronic

from S/N 6924

Document identification

Id. No.: 9085100
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Author: LWT / Technical Documentation Dept.

Product identification

Manufacturer: LIEBHERR Werk Telfs GMBH
Model: PR 754
Model No.: 990
Conformity: CE

Address

Address: LIEBHERR Werk Telfs GMBH
Hans Liebherr - Straße 35,
A - 6410 TELFS Austria

Machine data

We recommend that you fill in the following information in the space provided as soon as you receive your machine:
This information will also be helpful when ordering parts.

Vehicle Id. No.: VAUZ ZT *

Year: CE *

Delivery date: . . / . . / . .

* This information is found on the data tag of your machine, on the left front of the main frame.

Noise level

Sound pressure level LpA PR 754 max. 82 dB(A) at the work station, according to ISO 6396

Sound emission level LWA PR 754 max. 113 dB(A) emitted to the surrounding area, according to guidelines 2000/14/EG

Foreword

This operating manual has been written for the **operator** and for the **maintenance personnel** of this machine.

This manual contains descriptions for:

- Technical Data
- Safety information
- Operating instructions and guidelines
- Maintenance
- Instructions for special / optional equipment

This operating manual should be given to the operator and the maintenance personnel and any other person who works on the machine, who should read it carefully at regular intervals and before operating or servicing the machine.

Work with or on the machine is, for example:

- **Operation**, including set up, trouble shooting during operation, removal of debris, service, removal of oil, lubricants, fuels and operating fluids.
- **Maintenance**, including inspection, upkeep and / or repair.
- **Transportation** or loading the machine.

Reading this manual will familiarize the operator with the machine and prevent problems due to improper operation.

Following the operation and maintenance guidelines by maintenance personnel will:

- increase reliable service,
- increase the service life expectancy of your machine,
- reduce repair costs and downtime.

The Operating Manual is part of the machine. Keep a copy of this manual in the glove compartment in the operator's cab to assure that it can be consulted and referred to at any time.

Any existing federal, state and local safety requirements governing accident prevention and environmental safety must be added to this Operating Manual, in addition to safety and accident prevention regulations applicable to the country and job site you operate in, including any technical rules and regulations to assure safe and proper operation must be followed.

This Operating Manual includes the necessary information to operate and maintain your machine.

- Some illustrations in this manual might show details and machines which differ from your machine.
- For some illustrations, covers and protective devices were removed to provide a better view.
- Continuing improvements on our machines might result in changes, which are not reflected in this Operation and Maintenance Manual.

If you need any additional information and / or clarification, please don't hesitate to contact LIEBHERR's Technical Documentation Department, Customer Service School or Service Department.

We hope you understand that LIEBHERR cannot honor warranty claims resulting from improper operation, inadequate maintenance, use of wrong and unauthorized oils, lubricants, fuels and operating fluids and / or from disregard of safety information and guidelines.

LIEBHERR reserves the right to reject any warranty claims, service contracts or agreements established by **LIEBHERR** and / or any of its dealers without prior notice if any other than Original **LIEBHERR** parts or parts sold by **LIEBHERR** are being or have been used for maintenance and repair.

Under extreme conditions, it might be necessary to increase maintenance intervals as compared to those listed in the inspection schedule.

Changes, conditions, copyright:

- We reserve the right to make changes of technical details on the machine which differ from the wording and illustrations in this manual.
- No part of this manual, technical or otherwise, may be reproduced nor copied in any form or used for competitive purposes in the market place. All rights reserved.
- Above and the following remarks will not expand LIEBHERR's general business conditions regarding warranties and liability.

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To: Liebherr Werk Telfs GmbH
 Hans Liebherrstraße 35
 A- 6410 Telfs / Austria

Fax: 0043 5262 600 66

E-mail: info.lwt@liebherr.com

Ideas, comments (please note page number):

Overall, how would you rate this publication?

Excellent	
Very good	
Good	
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Unsatisfactory	

Your information:

Machine S/N: _____

Company: _____

Name: _____

Address: _____

Telephone number: _____

Dealer: _____

Thank you very much for your assistance!

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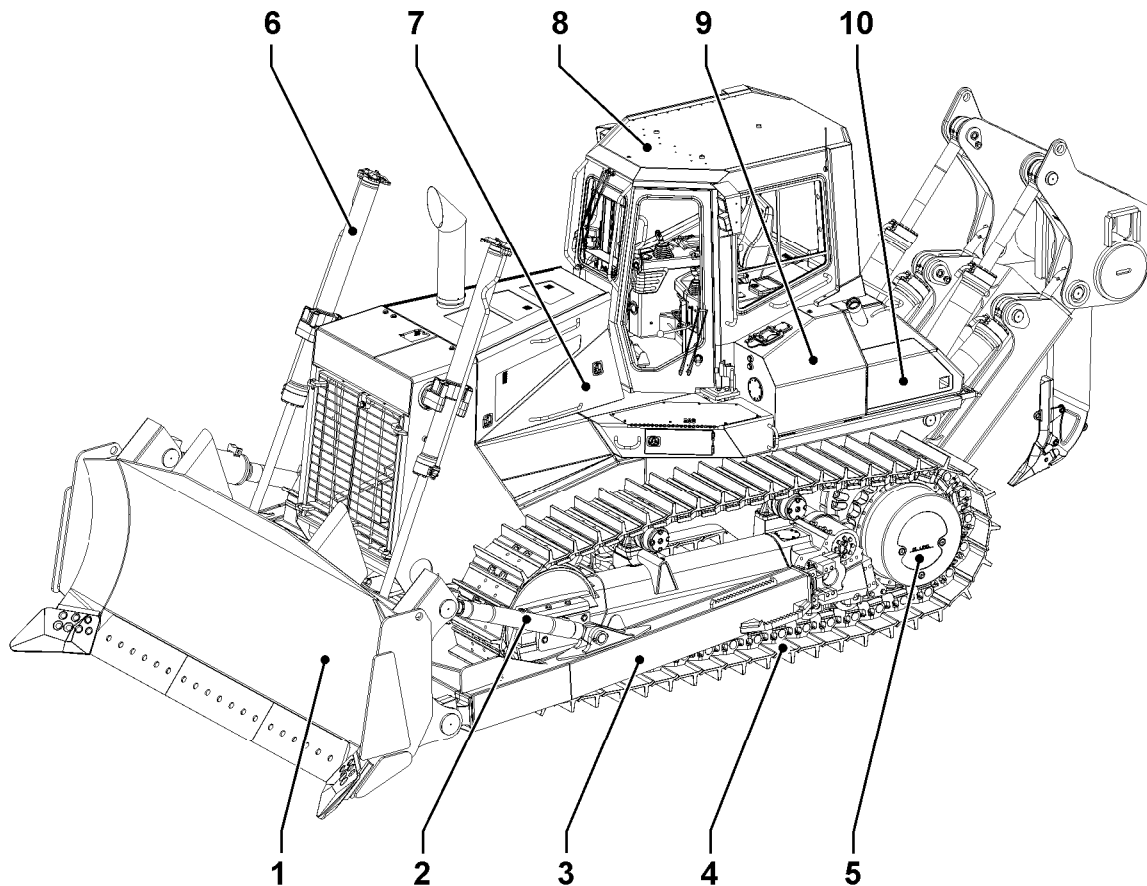
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1. Product description

Design - Overview

This section contains an overview of the machine and descriptions of the components shown.



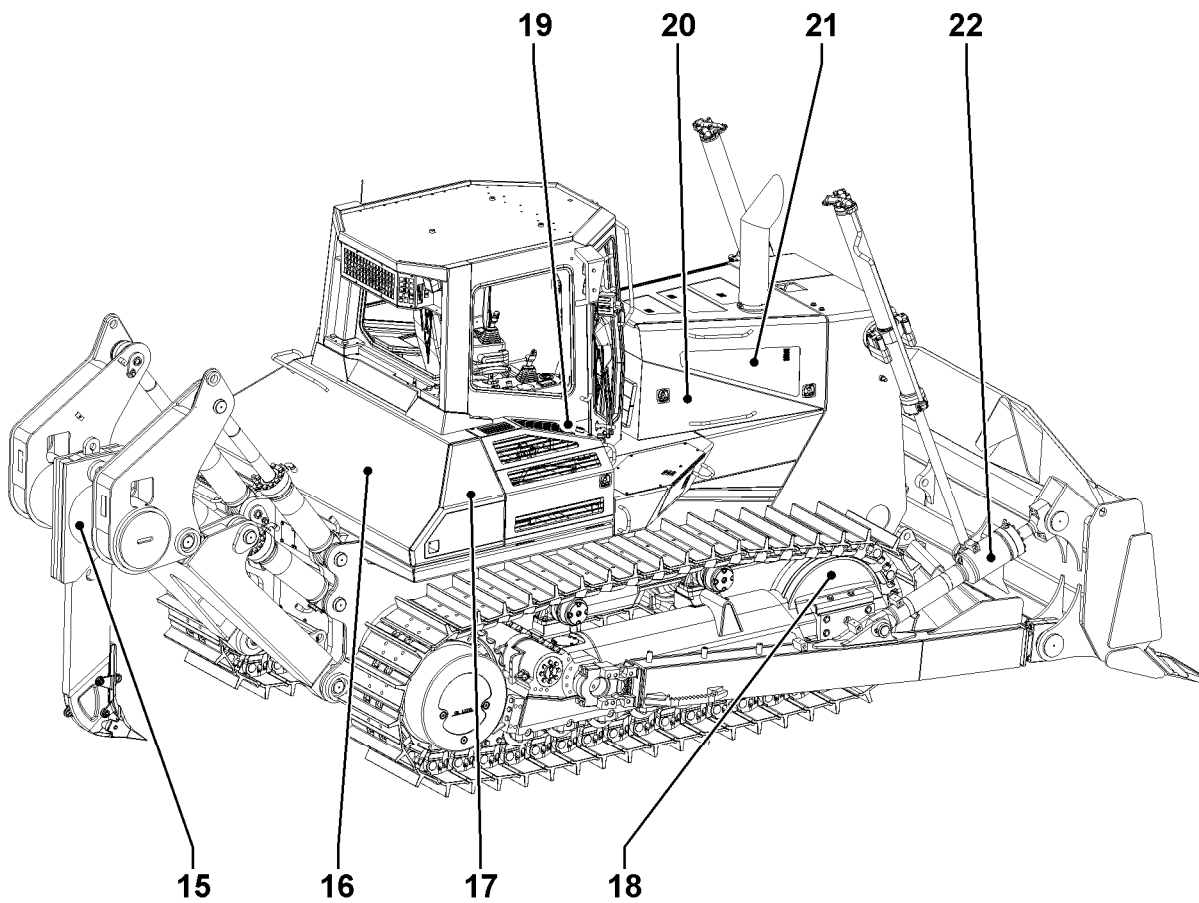
Overall machine – front view

404814

1 Dozer blade
2 Screw jack
3 Push frame
4 Track

5 Travel gear
6 Lift cylinder
7 Engine compartment door, left
8 Operator's cab

9 Hydraulic tank
10 Central electrical box



404831

Overall machine – rear view

15 Ripper (optional equipment)
16 Fuel tank
17 Battery compartment
18 Idler

19 Oil reservoir – seal area
20 Engine compartment door,
right

21 Diesel engine with pump in-
stallation
22 Tilt cylinder

1.1 Technical Data

The most important technical data can be found in the enclosed technical description.

Maximum operating weight

The maximum permissible operating weight of the machine may not be exceeded to retain machine safety and operating suitability.

- If the maximum operating weight is exceeded due to special retrofit installations (for example for land clearing work), then previous written approval has to be requested from Liebherr.
- The maximum permissible operating weight of the machine is:
PR 754 = 41.000 kg

Technical Description Crawler Tractor

PR 754
Litronic®

Engine Output 243 kW/330 hp

Operating Weight 34,990 - 40,815 kg/77,140 - 98,982 lb



LIEBHERR

Basic machine



Engine

Liebherr diesel engine	D 936 T
	Emission regulations according to 2004/26/EEC Stage III, EPA/CARB Tier 3
Rating (ISO 9249)	243 kW / 330 hp
Rating (SAE J1349)	243 kW / 326 hp
Rated speed	1,600 1/min
Displacement	12 l / 733 in ³
Design	6 cylinder in-line engine (wet-sleeve), water-cooled, turbocharged, intercooled
Injection system	Direct fuel injection, pump-line-nozzle system
Lubrication	Pressurized lube system, deep oil pan for inclination up to 45-degree
Operating voltage	24 V
Alternator	DC / 80 A
Starter	7.8 kW / 11 hp
Batteries	2 x 170 Ah / 12V
Air cleaner	Dry-type air cleaner with safety element, aspirated pre-cleaner with automatic dust ejector and dash-mounted restriction indicator
Cooling system	Water cooler hydrostatically driven and thermostatically controlled



Travel drive, control

Transmission system	Closed-loop hydrostatic travel drive, each track is driven independently
Travel speed*	Ininitely variable Speed range 1: 0-4.0 km/h / 0-2.48 mph Speed range 1 (4.8 km/h / 2.9 mph reverse) Speed range 2: 0-6.5 km/h / 0-4.0 mph Speed range 1 (7.8 km/h / 4.8 mph reverse) Speed range 3: 0-11.0 km/h / 0-6.8 mph * Travel speed ranges can be set with the programmable control (memory function)
Drawbar pull at 1.5 km/h / 0.9 mph	520 kN / 116,860 lb
Electronic control	Electronic engine speed sensing control automatically adjusts travel speed and drawbar pull to match changing load conditions
Steering	Hydrostatic, infinitely variable track speeds provide unlimited maneuverability and optimum control for full power turns and counterrotation
Service brake	Wear-free, hydrostatic (dynamic braking)
Automatic park brake	Wear-free, wet multiple-disc brakes
Cooling system	Separate oil cooler, hydrostatically driven and thermostatically controlled
Filter system	Micro cartridge filters
Final drive	Heavy-duty combination spur gear with double-reduction planetary final drives, double sealed with electronic seal-integrity indicator
Control	Single-lever steering allows for full power turns and counterrotation



Refill capacities

Fuel tank	650 l (143.0 gallons)
Cooling system	74 l (16.3 gallons)
Engine oil with oil filters	43 l (9.5 gallons)
Splitter box	5.5 l (1.2 gallons)
Hydraulic tank	240 l (52.8 gallons)
Final drive, each	18.5 l (4.1 gallons)



Operator's cab

Cab	Resiliently mounted cab with positive pressure ventilation, can be tilted with the hand pump 40° to the rear. With integral ROPS Rollover Protective Structure (ISO 3471) and FOPS Falling Objects Protective Structure (ISO 3449)
Operator's seat	Fully adjustable, suspended swivel seat adjustable to operator's weight
Monitoring	Combination of LCD and analog instrument panel
Sound-pressure level	L _{PA} (inside cab) = 79 dB(A) ISO 6396:1992 L _{WA} (surround noise) = 113 dB(A) 2000/14/EEC



Undercarriage

Mount	Via separate pivot shafts and an oscillating equaliser bar
Chains	Sealed and lubricated chains, single-bar grouser shoes SESS*, track chain tension via grease tensioner and hydraulic cylinders
Links	40 each side
Track rollers/ carrier rollers	7/2 each side
Sprocket segments	5 each side
Track shoes standard	560 mm/22" SESS
Track shoes optional	610 mm/24" SESS 660 mm/26" SESS 710 mm/28" SESS

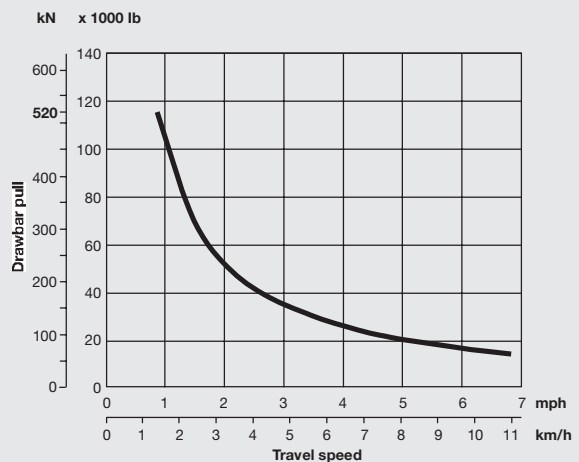


Hydraulic system

System type	Load Sensing proportional pump flow control
Pump type	Swash plate variable displacement piston pump
Pump flow max.	261 l/min / 57.4 gpm
Pressure limitation	260 bar / 3,770 PSI
Control valve	2 segments, expandable to 4
Filter system	Return filter with magnetic rod in the hydraulic tank
Control	Single joystick lever for all blade functions

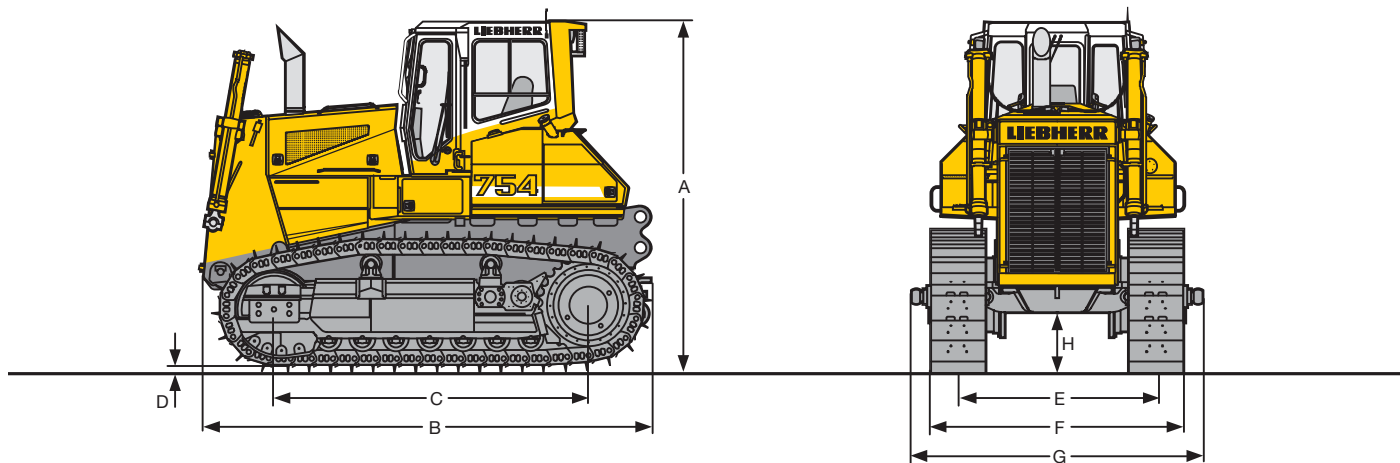


Drawbar pull PR 754



Usable drawbar pull will depend on traction and weight of tractor
* SESS Super Extrem Service Shoes

Dimensions



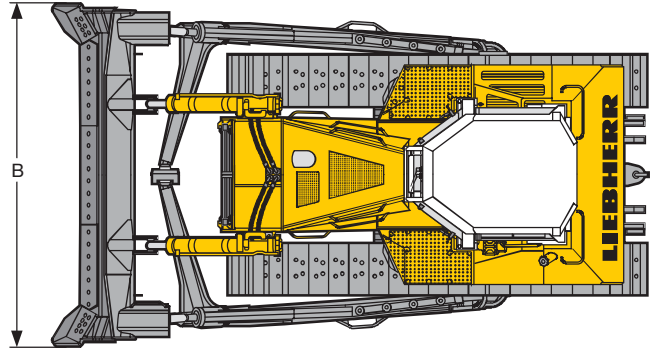
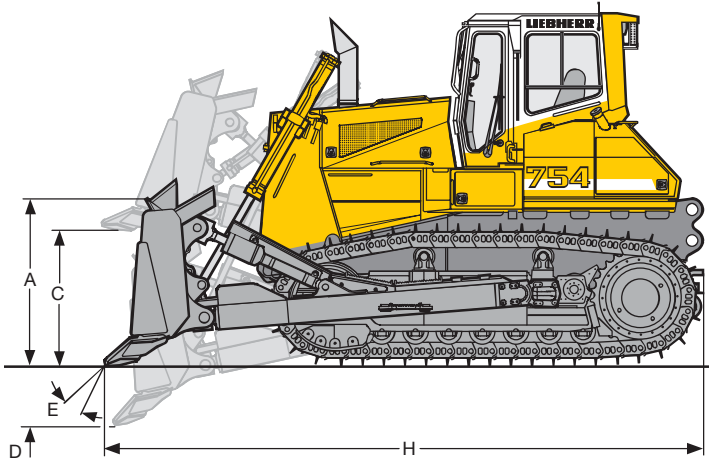
Dimensions

PR 754

A	Height over cab	mm	3,630
		ft-in	11'11"
B	Overall length without attachments	mm	4,875
		ft-in	16'0"
C	Distance idler/sprocket centre	mm	3,174
		ft-in	10'5"
D	Height of grousers	mm	84
		inch	3.31"
E	Track gauge	mm	2,180
		ft-in	7'2"
H	Ground clearance	mm	630
		ft-in	2'1"
G	Total width over blade-mounting trunnions	mm	3,145
		ft-in	10'4"
F	Total width without trunnions (standard shoe width)	mm	2,740
		ft-in	9'0"
	Tractor shipping weight ¹	kg	28,947
		lb	63,817

¹ Includes coolant, lubricants, 20% fuel, ROPS/FOPS cab and track pads 560 mm/22"

Front attachment



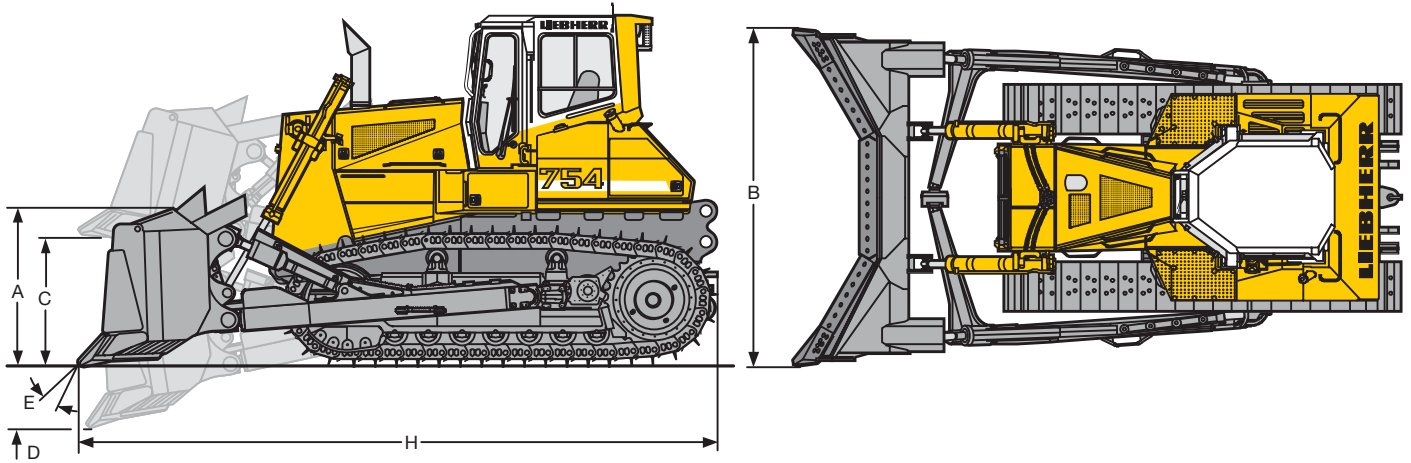
Semi-U blade

PR 754

Blade capacity according to ISO 9246	m ³	8.9
	yd ³	11.6
A Height of blade	mm	1,650
	ft-in	5'5"
B Width of blade	mm	4,030
	ft-in	13'3"
C Lifting height	mm	1,400
	ft-in	4'7"
D Depth below ground	mm	570
	ft-in	1'10"
E Max. blade pitch		10°
Max. blade tilt	mm	972
	ft-in	3'2"
H Overall length	mm	6,448
	ft-in	21'2"
Operating weight ¹	kg	34,990
	lb	77,139
Ground pressure ¹	kg/cm ²	0.98
	PSI	13.94

¹ Includes coolant, lubricants, full fuel tank, ROPS/FOPS cab, semi-U blade, operator and track pads 560 mm/22"

Front attachment

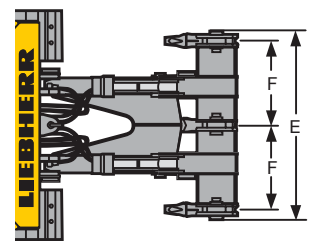
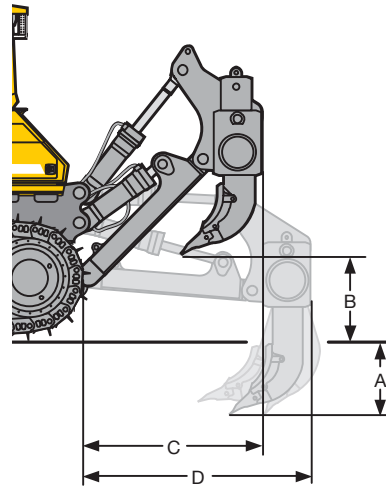
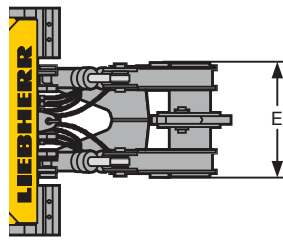
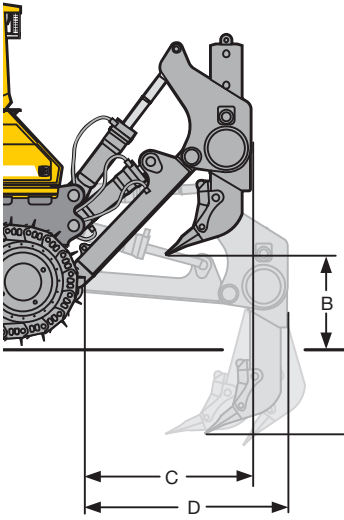



	U blade	PR 754
Blade capacity according to ISO 9246	m ³ yd ³	11.7 15.3
A Height of blade	mm ft-in	1,650 5'5"
B Width of blade	mm ft-in	4,325 14'2"
C Lifting height	mm ft-in	1,400 4'7"
D Depth below ground	mm ft-in	570 1'10"
E Max. blade pitch		10°
Max. blade tilt	mm ft-in	1,043 3'5"
H Overall length	mm ft-in	6,915 22'8"
Operating weight ¹	kg lb	36,090 79,564
Ground pressure ¹	kg/cm ² PSI	1.02 14.51


* Counterweight or rear attachment is recommended for improved performance and balance

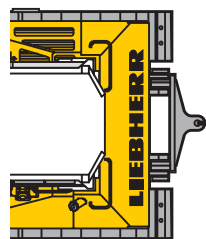
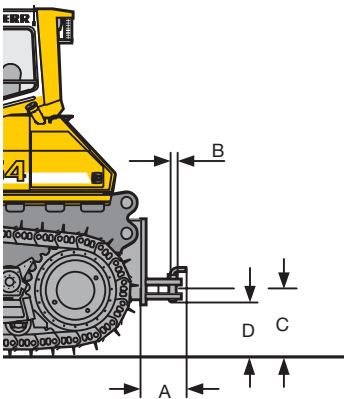
¹ Includes coolant, lubricants, full fuel tank, ROPS/FOPS cab, U blade, operator and track pads 560 mm/22"

Rear attachment



	Ripper single-shank	Parallelogram with hydraulic pitch adjustment
A	Ripping depth (max./min.)	mm ft-in
B	Lifting height (max./min.)	mm ft-in
C	Overall length, attachment raised	mm ft-in
D	Overall length, attachment lowered	mm ft-in
E	Ripper width	mm ft-in
	Max. shank pitch	31°
	Maximum penetration force	kN lb
	Pryout force	kN lb
	Weight	kg lb

	Ripper multi-shank	Parallelogram with hydraulic pitch adjustment
A	Ripping depth (max./min.)	mm ft-in
B	Lifting height (max./min.)	mm ft-in
C	Overall length, attachment raised	mm ft-in
D	Overall length, attachment lowered	mm ft-in
E	Toolbar width	mm ft-in
F	Distance between teeth	mm ft-in
	Max. shank pitch	31°
	Maximum penetration force	kN lb
	Pryout force	kN lb
	Weight	kg lb



	Drawbar	Rigid
A	Additional length	mm ft-in
B	Socket pin diameter	mm inch
C	Height of jaw	mm ft-in
D	Ground clearance	mm ft-in
E	Jaw opening	mm ft-in
	Weight	kg lb

Equipment



Basic machine

	s	o
Tow switch	•	
Towing hitch rear	•	
Towing lug front	•	
Forestry equipment	•	
Landfill equipment	•	
Battery compartment, lockable	•	
Filling with environmental-friendly oil	•	
Filling with oil SAE 30	•	
Filling with oil SAE 10	•	
Tank guard, complete	•	
Refuelling pump, electric	•	
Belly pans, heavy-duty	•	
Cold start device, glow plug	•	
Radiator, wide-meshed	•	
Radiator guard, heavy-duty	•	
Radiator guard, hinged	•	
Liebherr diesel engine	•	
Fan, hydraulically driven	•	
Fan guard	•	
Engine cover, perforated	•	
Engine doors, perforated	•	
Engine doors, hinged, lockable	•	
Lugs for crane lifting	•	
Special paint		•
Fuel water separator	•	
Fuel water separator with electric heater		•
Air filter, dry-type, dual step	•	
Pre-cleaner with automatic dust ejector		•
Toolkit	•	



Travel drive

	s	o
Parking brake, automatic	•	
Function control, automatic	•	
Control, single joystick	•	
Load limit control, electronic	•	
Electronic control	•	
Travel control, 3-speed	•	
Hydrostatic travel drive	•	
Inching brake pedal	•	
Emergency stop	•	
Oil cooler	•	
Final drives planetary gear	•	
Safety lever	•	



Undercarriage

	s	o
Track frame, closed	•	
Sprocket segments, bolted	•	
Master link, two-piece	•	
Track shoes with mud hole track pads	•	
Track guide centre part	•	
Tracks oil lubricated	•	
Track guard	•	
Undercarriage, rigid	•	
Track frames, oscillating	•	
Pivot shaft, separate	•	
Sprocket segments with recesses		•



Electrical

	s	o
Starter motor 7.8 kW	•	
Working lights, front, 6 units	•	
Working lights, rear, 2 units	•	
Batteries, cold start, 2 units	•	
Battery main switch, mechanical	•	
On-board system 24 V	•	
Alternator 80 A	•	
Back-up alarm		•
Beacon		•
Horn		•
Start lock, electronic	•	
Additional lights, rear		•



Operator's cab

	s	o
Storage compartment	•	
Armrest 3D adjustable	•	
Ash tray	•	
Pressurised air filter	•	
Operator's seat, 6-way adjustable	•	
Operator's seat, air-suspended		•
Fire extinguisher		•
Dome light	•	
Coat hook	•	
Air conditioner	•	
FM radio	•	
Radio installation kit	•	
ROPS/FOPS	•	
Rear mirror, inside	•	
Safety glass, tinted	•	
Windshield, washer system with intermittent function	•	
Windshield wipers front, rear	•	
Sliding windows, left	•	
Sliding windows, right		•
Protective grids for windows	•	
Extension, seat back		•
Sun visor	•	
Socket 12 V	•	
Warm water heating		•



Instruments - indicators

	s	o
Battery charging	•	
Engine-hour meter	•	
Electronic travel control	•	
Electronic engine control	•	
Speed range	•	
Cooling water temperature	•	
Oil pressure cooling circuit	•	
Oil level final drives	•	
Float position blade	•	
Fuel level	•	
Contamination hydraulic filter	•	
Contamination air filter	•	
Cold start Diesel engine	•	
Oil temperature warning indicator		•
Water contamination fuel system	•	



Hydraulic system

	s	o
Hydraulic control ripper		•
Hydraulic control winch		•
Variable flow pump, load sensing	•	
Oil filter with strainer in hydraulic tank	•	
Blade quick drop	•	
Control valve for 2 circuits	•	
Float position blade	•	
Hydraulic servo control	•	
Hydraulic tank oil level control		•



Attachments

	s	o
Mounting plate for external tools		•
Drawbar rear, rigid		•
Counterweight, rear		•
Ripper, 1 shank		•
Ripper, 3 shanks		•
U blade		•
Semi-U blade		•
Winch		•
Spill plate for blade		•

S = Standard, O = Option

Subject to changes.

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr to retain warranty.

The Liebherr Group of Companies

Wide product range

The Liebherr Group is one of the largest construction equipment manufacturers in the world. Liebherr's high-value products and services enjoy a high reputation in many other fields, too. The wide range includes domestic appliances, aerospace and transportation systems, machine tools and maritime cranes.

Exceptional customer benefit

Every product line provides a complete range of models in many different versions. With both its technical excellence and acknowledged quality, Liebherr-products offer a maximum of customer benefits in practical application.

State-of-the-art technology

To provide consistent, top quality products, Liebherr attaches great importance to each product area, its components and core technologies. Important modules and components are developed and manufactured in-house, for instance the entire drive and control technology for construction equipment.

Worldwide and independent

Hans Liebherr founded the Liebherr family company in 1949. Since that time, the enterprise has steadily grown to a Group of 100 companies with over 23,000 employees located on all continents. The corporate headquarters of the Group is Liebherr-International AG in Bulle, Switzerland. The Liebherr family is the sole owner of the company.

www.liebherr.com



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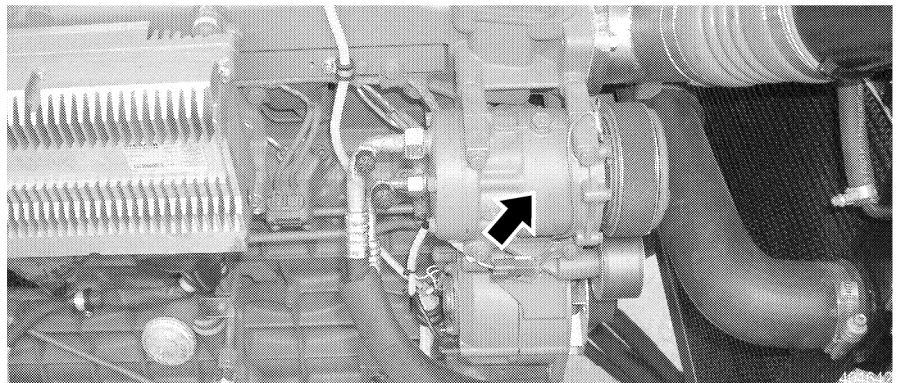
1.1.1 Air conditioning system

The especially robust air conditioning system installed in LIEBHERR machines has the task to handle the air conditioning in the operator's cab.

Technical data

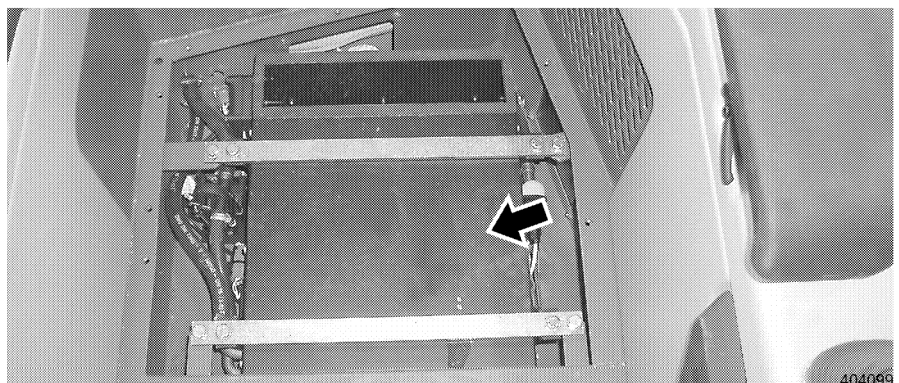
Refrigerant	R134a
Nominal voltage	24 V
Operating voltage	24 V
Blower	3-stage
Fill quantity in complete system	Refrigerant R134a = 1700g
Oil quantity - air compressor	200 ccm

Components of air conditioning system



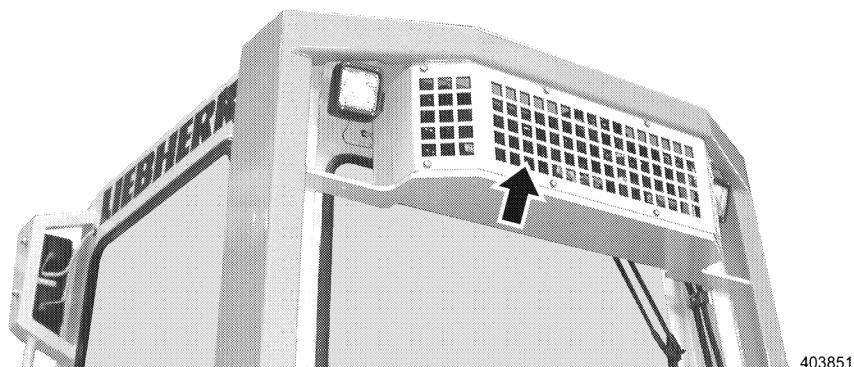
Air compressor

Air compressor The air compressor is installed in the engine compartment.



Heater unit

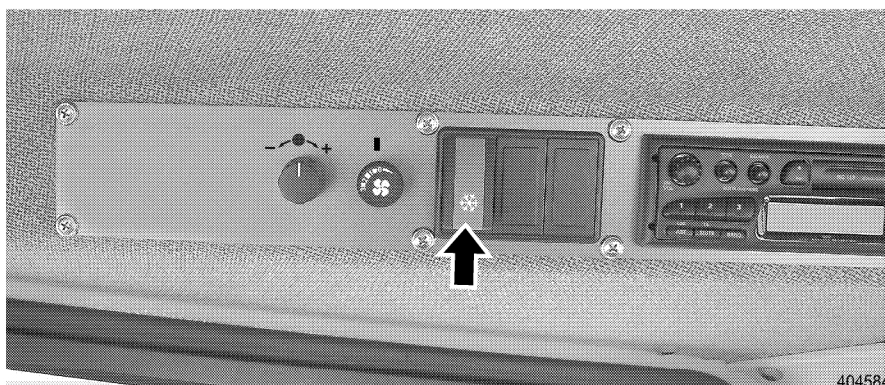
Heater unit The heater unit is installed underneath the seat console in the floorboard area of the operator's cab.



Evaporator unit

Evaporator unit

The evaporator unit is installed on the rear on the roof of the operator's cab.



Main air conditioner switch

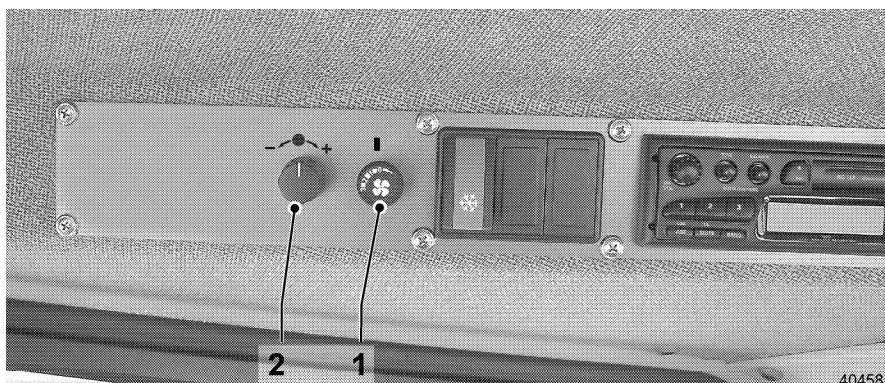
Control elements of air conditioning system

Main switch

The main air conditioner switch is installed on the roof console, on the left hand side (recognizable on the air conditioner start).

Control

The control is installed on the left hand side in the roof console.



Control

- 1 Blower switch 3-stage
- 2 Turn regulator - heater

1.2 Tightening torques

Installation preload F_M and tightening torques M_A for shank screws with metric standard or fine threads according to DIN ISO 262 and DIN ISO 965 T2 (replacement for DIN 13 part 13) and head dimensions of hex head screws with shank DIN EN 24014 (replacement for DIN 931 part 1) or Allan head screws DIN EN ISO 4762 (replacement for DIN 912)

The chart values apply for screws with surface:

- black treated or phosphated - oiled
- galvanic zinc plated - oiled
- flZn according to LH-Norm 10021432 - dry

Medium friction value $\mu_G = 0,12$.

Any tightening torque values given in drawings / parts lists, instructions or component descriptions and / or tightening procedures must always be used and observed before using the factory standard values.

Beginning with grade 10.9, the use of lock washers does no longer provide any safety action.

Always use a torque wrench with the correct measuring range – upper third of the range should include the listed torque value.

When using impact wrenches, care must be taken that the given torque values are retained – use a torque wrench for prechecks and intermediate checks.

1. Product description

1.2 Tightening torques

1.2.1 Preload values and tightening torques for screws with standard metric threads according to factory standard WN 4037 I

Standard metric thread	Preload value F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size for hex head screws		Wrench size for socket head screws	
	8.8	10.9	12.9	8.8	10.9	12.9	mm	inch	mm	inch
M 4 x 0,7	4 050	6 000	7 000	2,8	4,1	4,8	7	9/32	3	--
M 5 x 0,8	6 600	9 700	11 400	5,5	8,1	9,5	8	5/16	4	5/32
M 6 x 1	9 400	13 700	16 100	9,5	14	16,5	10	--	5	--
M 7 x 1	13 700	20 100	23 500	15,5	23	27	11	--	--	--
M 8 x 1,25	17 200	25 000	29 500	23	34	40	13	1/2	6	--
M 10 x 1,5	27 500	40 000	47 000	46	68	79	(17)16	(11/16)	8	5/16
M 12 x 1,75	40 000	59 000	69 000	79	117	135	(19) 18	(3/4)	10	--
M 14 x 2	55 000	80 000	94 000	125	185	215	(22) 21	(7/8)	12	--
M 16 x 2	75 000	111 000	130 000	195	280	330	24	--	14	9/16
M 18 x 2,5	94 000	135 000	157 000	280	390	460	27	1 - 1/16	14	9/16
M 20 x 2,5	121 000	173 000	202 000	390	560	650	30	1 - 3/16	17	--
M 22 x 2,5	152 000	216 000	250 000	530	750	880	(32) 34	--	17	--
M 24 x 3	175 000	249 000	290 000	670	960	1 120	36	1 - 7/16	19	3/4
M 27 x 3	230 000	330 000	385 000	1 000	1 400	1 650	41	1 - 5/8	19	3/4
M 30 x 3,5	280 000	400 000	465 000	1 350	1 900	2 250	46	1 - 13/16	22	7/8
M 33 x 3,5	350 000	495 000	580 000	1 850	2 600	3 000	50	2	24	--
M 36 x 4	410 000	580 000	680 000	2 350	3 300	3 900	55	2 - 3/16	27	1 - 1/16
M 39 x 4	490 000	700 000	820 000	3 000	4 300	5 100	60	2 - 3/8	27	1 - 1/16

1.2.2 Preload and tightening torques for screws with fine metric thread according to factory standard WN 4037 I

Fine metric thread	Preload value F_M based on grades in N			Tightening torques M_A based on grades in Nm			Wrench size for hex head screws		Wrench size for socket head screws	
	8.8	10.9	12.9	8.8	10.9	12.9	mm	inch	mm	inch
M 8 x 1	18 800	27 500	32 500	24,5	36	43	13	1/2	6	--
M 9 x 1	24 800	36 500	42 500	36	53	62	--	--	--	--
M 10 x 1	31 500	46 500	54 000	52	76	89	17	11/16	8	5/16
M 10 x 1,25	29 500	43 000	51 000	49	72	84	17	11/16	8	5/16
M 12 x 1,25	45 000	66 000	77 000	87	125	150	19	3/4	10	--
M 12 x 1,5	42 500	62 000	73 000	83	122	145	19	3/4	10	--
M 14 x 1,5	61 000	89 000	104 000	135	200	235	22	7/8	12	--
M 16 x 1,5	82 000	121 000	141 000	205	300	360	24	--	14	9/16
M 18 x 1,5	110 000	157 000	184 000	310	440	520	27	1 - 1/16	14	9/16
M 18 x 2	102 000	146 000	170 000	290	420	490	27	1 - 1/16	14	9/16
M 20 x 1,5	139 000	199 000	232 000	430	620	720	30	1 - 3/16	17	--
M 22 x 1,5	171 000	245 000	285 000	580	820	960	32	--	17	--
M 24 x 1,5	207 000	295 000	346 000	760	1 090	1 270	36	1 - 7/16	19	3/4
M 24 x 2	196 000	280 000	325 000	730	1 040	1 220	36	1 - 7/16	19	3/4
M 27 x 1,5	267 000	381 000	445 000	1 110	1 580	1 850	41	1 - 5/8	19	3/4
M 27 x 2	255 000	365 000	425 000	1 070	1 500	1 800	41	1 - 5/8	19	3/4
M 30 x 1,5	335 000	477 000	558 000	1 540	2 190	2 560	46	1 - 13/16	22	7/8
M 30 x 2	321 000	457 000	534 000	1 490	2 120	2 480	46	1 - 13/16	22	7/8
M 33 x 1,5	410 000	584 000	683 000	2 050	2 920	3 420	50	2	24	--
M 33 x 2	395 000	560 000	660 000	2 000	2 800	3 300	50	2	24	--
M 36 x 1,5	492 000	701 000	820 000	2 680	3 820	4 470	55	2 - 3/16	27	1 - 1/16
M 36 x 3	440 000	630 000	740 000	2 500	3 500	4 100	55	2 - 3/16	27	1 - 1/16
M 39 x 1,5	582 000	830 000	971 000	3 430	4 890	5 720	60	2 - 3/8	27	1 - 1/16
M 39 x 3	530 000	750 000	880 000	3 200	4 600	5 300	60	2 - 3/8	27	1 - 1/16

2. Safety guidelines, decals

Working on earth moving machinery can be dangerous, it could result in injury or death for operator, driver or maintenance personnel. We urge you to read these safety notes repeatedly and carefully and to observe them to prevent danger and accidents.

This is especially important for any personnel that works on the machine only occasionally, such as during set up and / or maintenance on the machine.

Careful adherence to the below listed safety information will insure safe operation and maintenance and potentially prevent personal injury to yourself and others and possible damage to your machine.

Important safety notes are used throughout this manual when describing tasks, which could endanger personnel or machine.

They are marked with the notes - **Danger** or **Caution**.

2.1 Introduction

In this Operation and Maintenance Manual, the notes are defined as follows:



"Danger"

Denotes an extreme intrinsic hazard, which could result in a high probability of death or serious injury if proper precautions are not taken.



"Caution"

Denotes a reminder of safety practices or directs attention to unsafe practices if proper precaution are not taken, which could result in personal injury and / or damage or destruction of the machine.

Following these notes does not relieve you of your obligation to observe all additional regulations and guidelines!

In addition, the following must be observed:

- all safety regulations which are valid at the job site,
- any federal, state, and local governing travel on public highways,
- any guidelines issued by trade and professional associations.

2.2 Proper and intended use

1. With the standard dozer attachment, the machine may only be used to loosen, move and dump dirt, gravel, broken rocks or other similar material.
2. Other usage, for which this machine is not designed, such as breaking rocks, demolishing buildings, driving piles, transporting personnel, etc. is considered to be improper and unsafe use. Neither the manufacturer nor the dealer can be held responsible for any damage or accident resulting from such unauthorized use of the machine. Any risk in improperly using this machine is the sole responsibility of the user.
3. Machines used in special applications are subject to special conditions, among others, they must be equipped with the appropriate safety devices.

4. The proper and intended use also includes the strict adherence to the operating and maintenance guidelines issued in this Operation and Maintenance manual and careful adherence to the inspection and maintenance schedules and guidelines.

2.3 Signs on the machine

1. Your machine is equipped with several types of signs.

Types of signs:

- Safety signs
- Reference signs
- Data tags

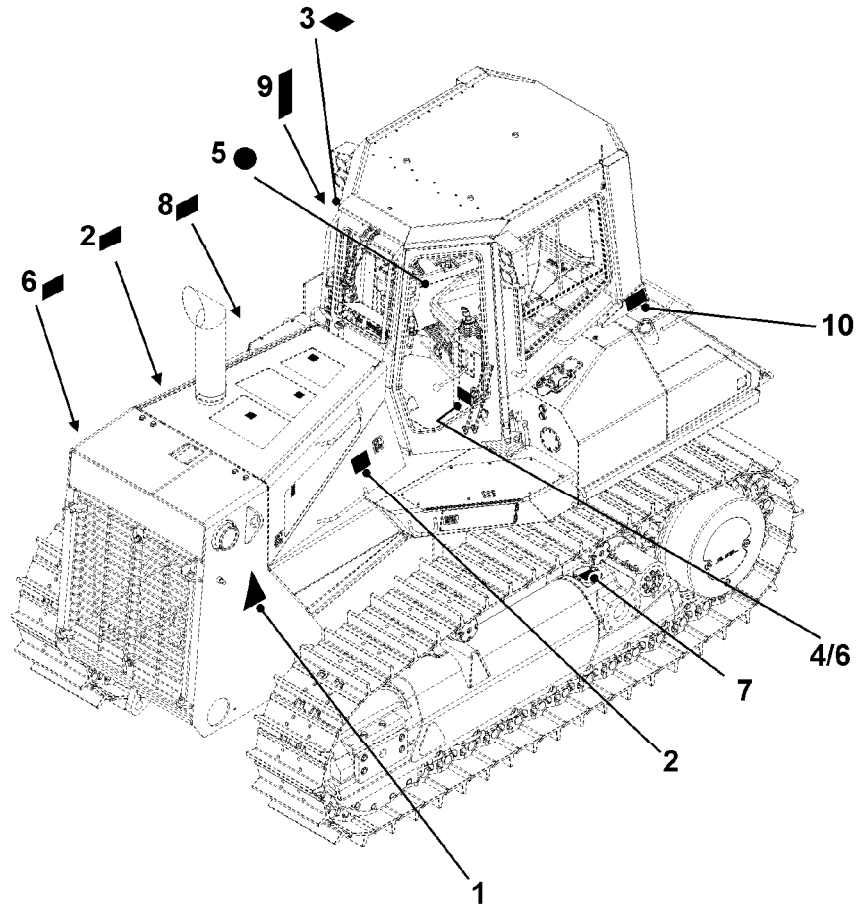
Contents and location are described below.

The Id. Numbers are noted in the spare parts list.

2.3.1 Safety signs

1. Non-observance of safety signs can result in serious injury or death. Check the safety signs regularly to ensure they are complete and legible. Missing or illegible safety signs must be replaced immediately.

Location of safety signs



Location of safety signs

404832

- | | |
|-----------------------------|------------------------------|
| 1 Warning sign – Stay clear | 6 Sign – Accident prevention |
| 2 Sign – Engine standstill | 7 Sign – Chain tension |
| 3 Sign - Battery | 8 Sign – Cab tilt device |
| 4 Sign – Safety lever | 9 Sign – Cab support |
| 5 Sign – Seatbelt | 10 Sign - Bio Hydraulic oil |



Warning sign – Stay clear

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2. Safety guidelines, decals

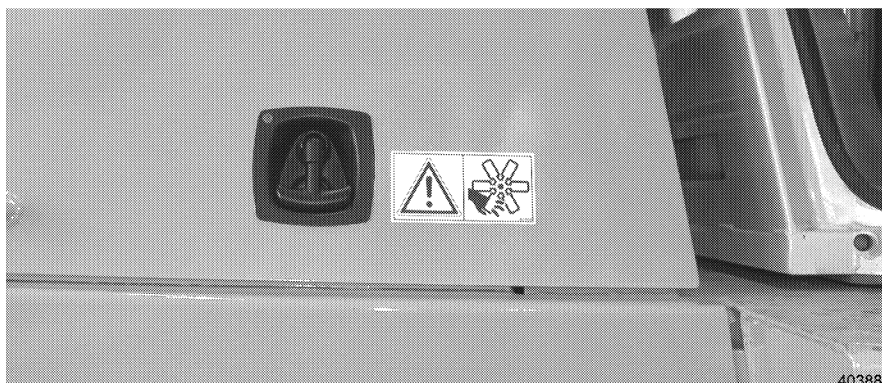
2.3 Signs on the machine

Warning sign – Stay clear

The sign is installed on the outside, on the left and right hand side of the machine.

Warns that a dangerous accident could result in death or severe injury.

Meaning: It is prohibited for anyone to remain in the danger zone!



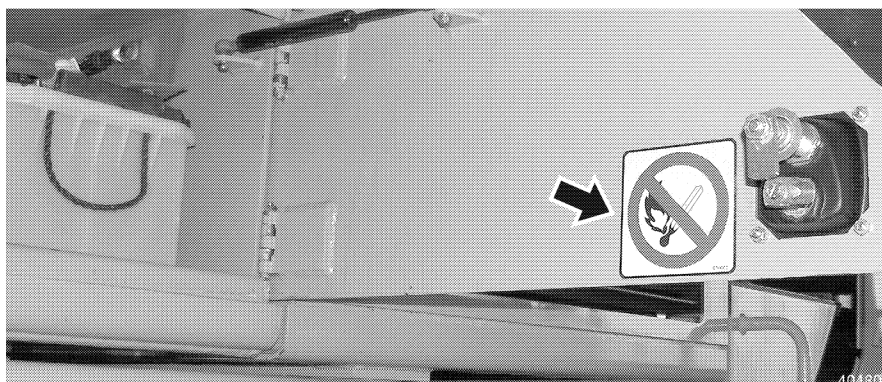
Sign – Engine standstill

Sign – Engine standstill

The sign is installed on the left and right hand side on the engine compartment doors.

Warns that a dangerous accident could result in death or severe injury.

Meaning: Open only if the engine is not running!



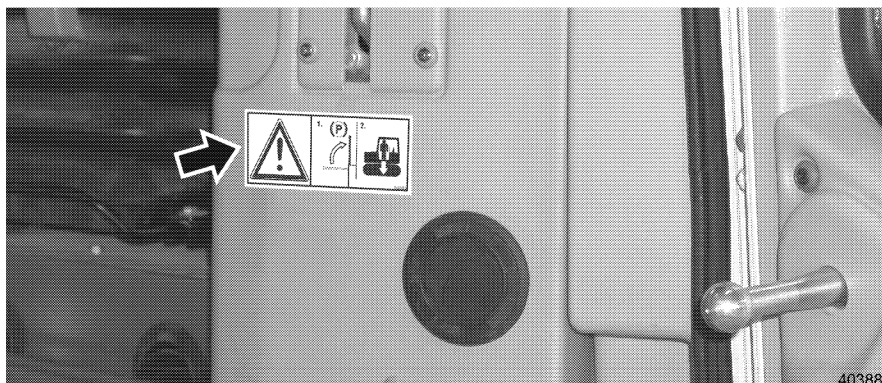
Sign - Battery

Sign - Battery

The sign is installed on the battery box.

Warns that a dangerous accident could result in death or severe injury.

Meaning: Do not smoke and avoid an open flame near batteries.



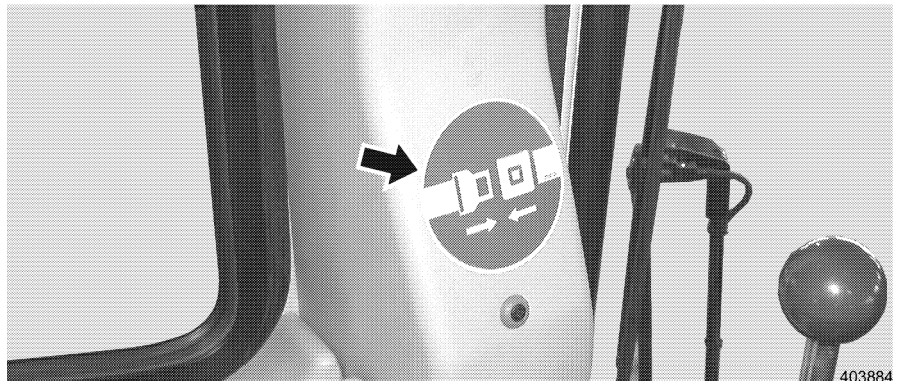
Sign – Safety lever

Sign – Safety lever

The sign is installed on the front on the operator's platform.

Warns that a dangerous accident could result in death or severe injury.

Meaning: Before leaving the cab, raise the safety lever. In dangerous situations, lower the attachment immediately, then raise the safety lever.



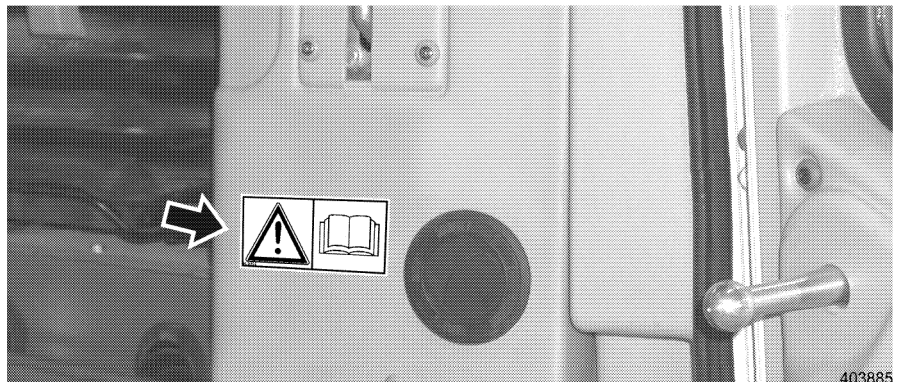
Sign – Seat belt

Sign – Seat belt

The sign is installed on the left on the operator's platform.

Notes the importance of wearing the seat belt.

Meaning: Always wear the seat belt before operating the machine.



Sign – Accident prevention

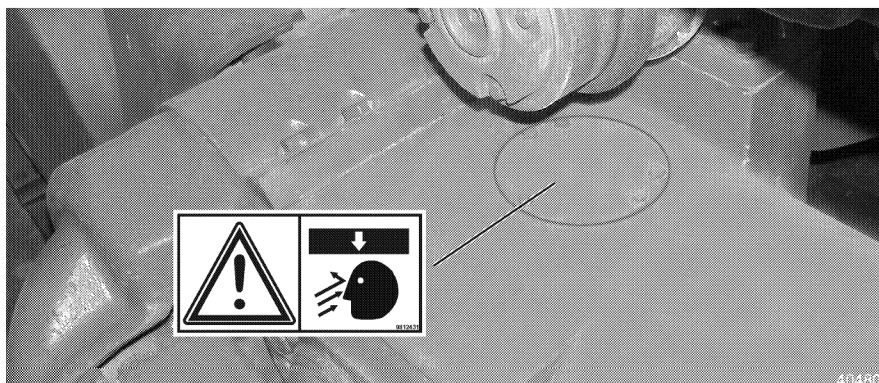
Sign – Accident prevention

The sign is installed on the front on the operator's platform.

Shows the importance of reading the operating manual and the printed safety regulations for accident prevention.

Meaning: Operate the machine only if you have read and understand the operating manual.

When operating the machine, the accident prevention guidelines printed in the operating manual must be strictly observed!



Sign – Chain tension

Sign – Chain tension

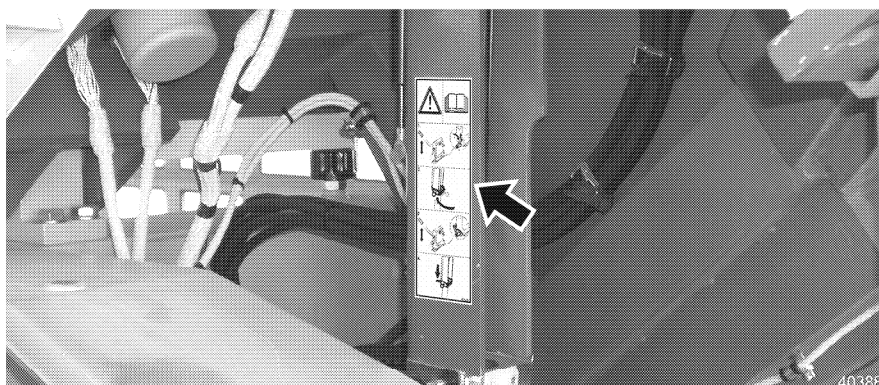
The sign is installed on the left and right hand side in the track roller frame, on the underside of the cover, at the grease cylinder. Warns that a dangerous accident could result in death or severe injury. Meaning: When releasing the chain tension, keep your head clear of the track roller frame – the chain might drop and the grease can squirt out.



Sign – operator's platform – tilt device

Sign – operator's platform – tilt device

The sign is installed in the engine compartment area near the hydraulic hand pump. Warns that a dangerous accident could result in death or severe injury. Meaning: Do not stand under the cab unless the safety bar is placed to secure the tilted cab. The machine may not be started or driven if the operator's platform is tilted, leave the safety lever in the uppermost position (safety lever up).

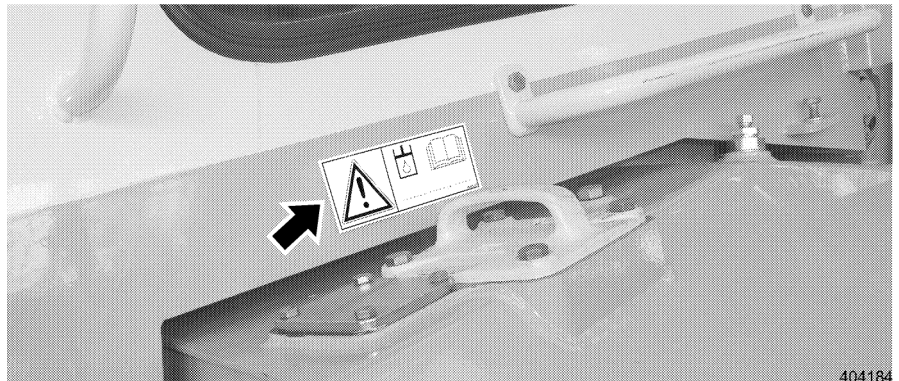


Sign – Cab support

Sign – Cab support

The sign is installed on the safety support on the operator's platform tilt cylinder.

Warns that a dangerous accident could result in death or severe injury.
Shows the correct procedure for tilting the operator's platform.
The instructions on the sign as well as in the operating instructions must be strictly observed.



Sign - Bio Hydraulic oil

Sign - Bio Hydraulic oil

If the hydraulic system is filled with bio oil, then this sign is installed near the hydraulic tank - filler neck.

The sign shows the type of hydraulic oil in the hydraulic tank.

Meaning: Danger of damage for the hydraulic system of the machine!

When mixing "environmentally friendly hydraulic fluids" with "mineral oils", an aggressive reaction occurs, which in turn will damage the hydraulic system.

Avoid mixing "environmentally hydraulic fluids" with "mineral oils".

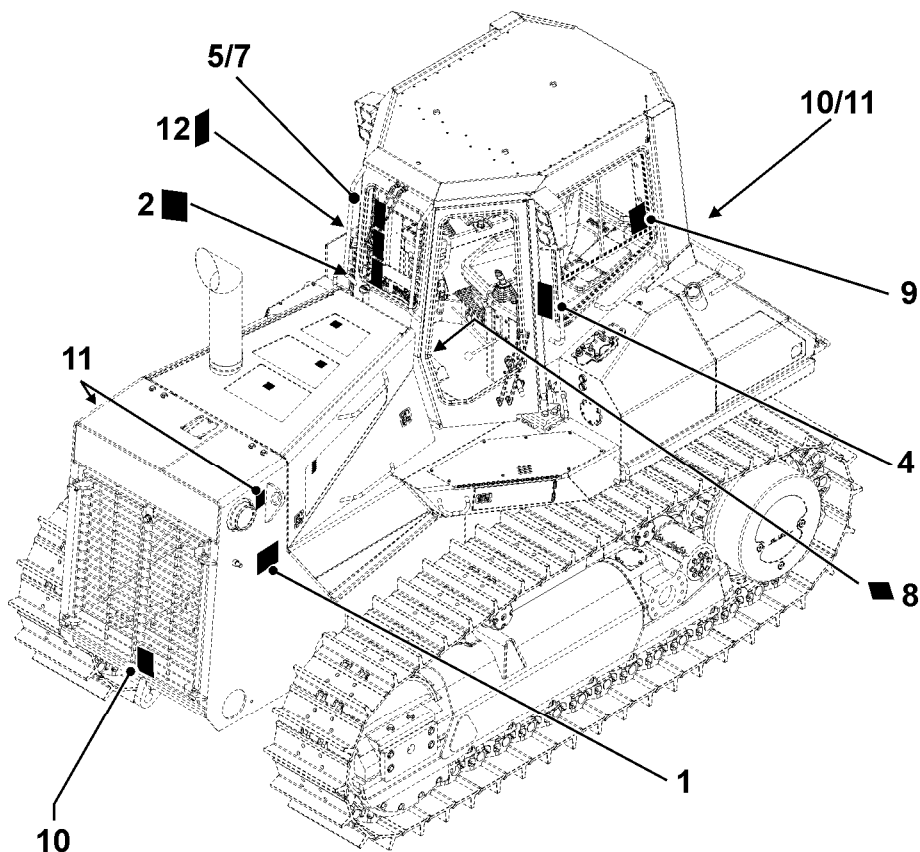
2.3.2 Reference signs

The reference signs indicate specific points relating to the operation, maintenance and characteristics of the machine.

Location of reference signs

2. Safety guidelines, decals

2.3 Signs on the machine



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Location of reference signs

- | | |
|----------------------------|---------------------------|
| 1 Data tag /CE mark | 8 Sign - Rops / Fops |
| 2 Lubrication chart | 9 Sign – sound protection |
| 4 Sign – travel hydraulic | 10 Sign – rigging point |
| 5 Sign – working hydraulic | 11 Sign – lifting point |
| 7 Sign - ripper | 12 Sign – emergency exit |

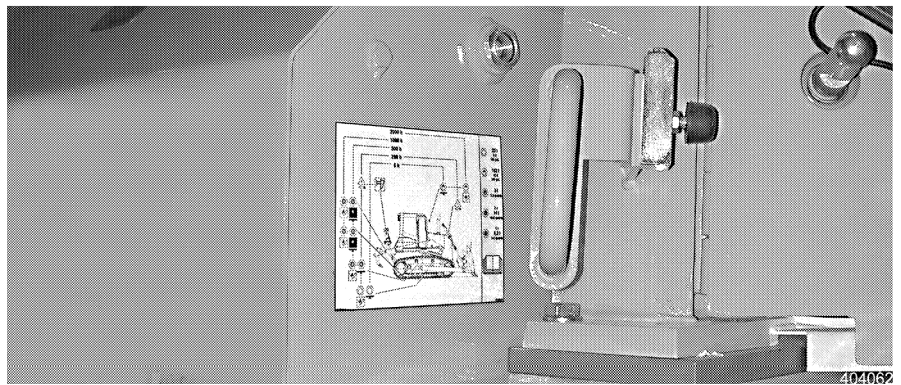


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CE mark

Sign – conformity mark - CE

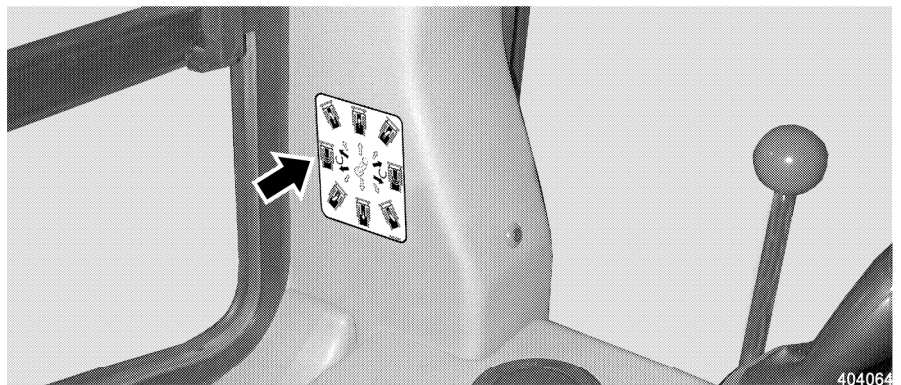
The sign is included in the data tag on the left hand side on the main frame.
Shows the conformity to EU machine regulations.



Sign – lubrication chart

Sign – lubrication chart

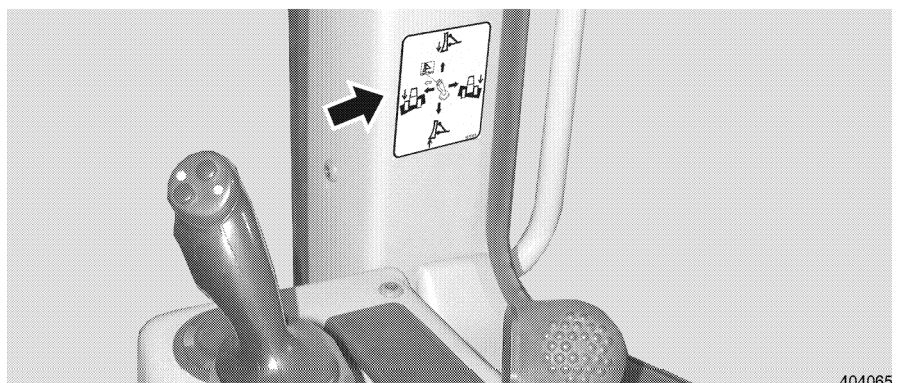
The sign is installed on the battery box.
The lubrication chart shows all components which use oil or grease as well as the inspection and change intervals for these parts.



Sign – travel hydraulic

Sign – travel hydraulic

The sign is installed on the left on the operator's platform.
Shows the operation of the travel joystick for the travel functions of the machine.



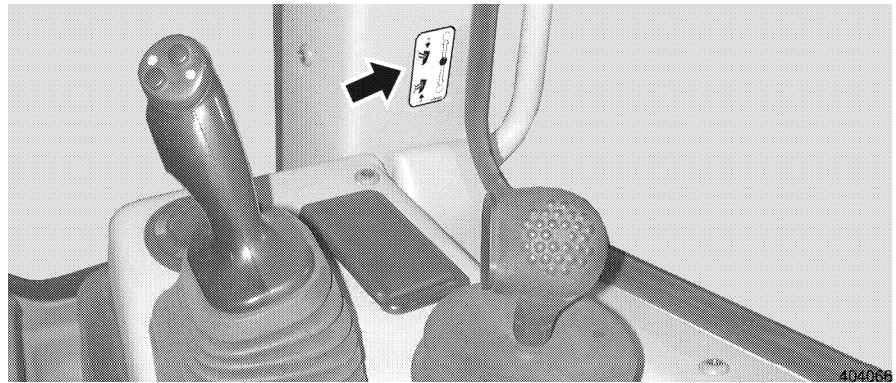
Sign – working hydraulic

Sign – working hydraulic

The sign is installed on the right on the operator's platform.
Shows the operation of the dozing attachment of the machine.

2. Safety guidelines, decals

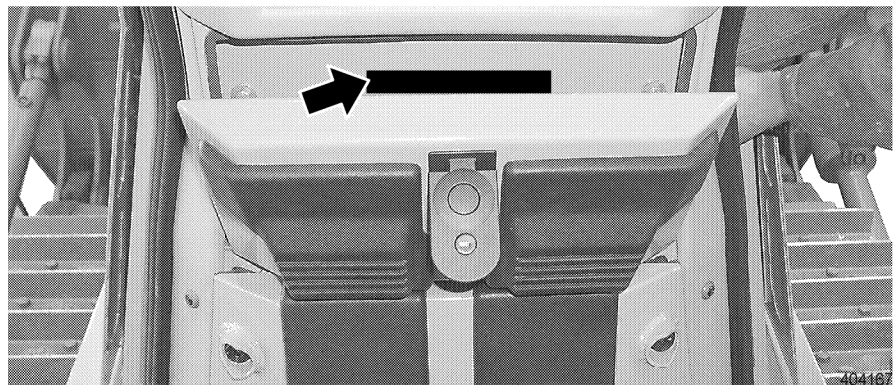
2.3 Signs on the machine



Sign - ripper

Sign - ripper

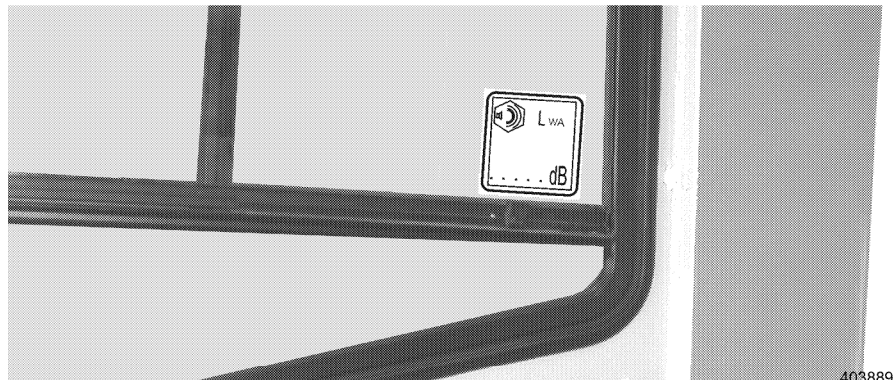
The sign is installed on the right on the operator's platform. Shows the operation of the ripper.



Sign - Rops / Fops

Sign - Rops / Fops

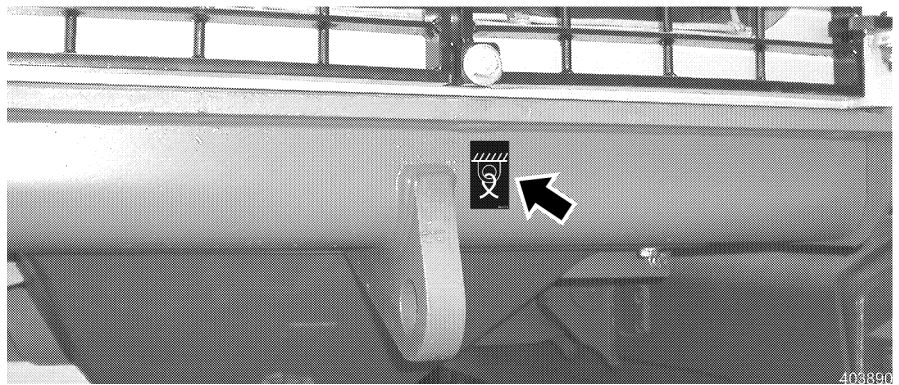
The sign is installed in the compartment for the machine documentation. Shows the maximum load for roll over protective structure.



Sign – sound protection

Sign – sound protection

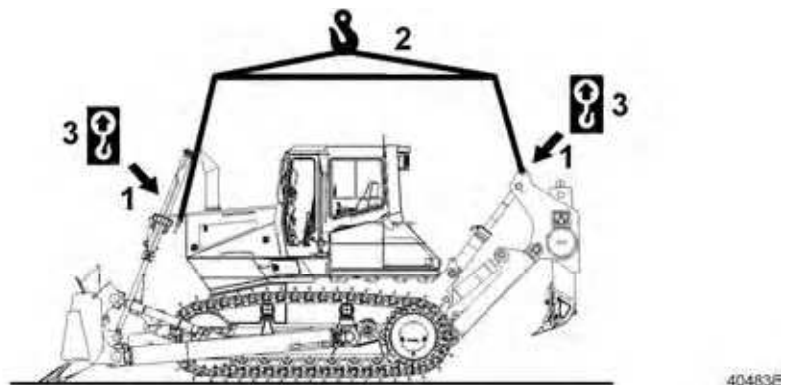
The sound protection sign is installed inside on the operator's cab windshield.
LWA = Sound output level (sound output level emitted to the surrounding area).



Sign – rigging point

Sign – rigging point

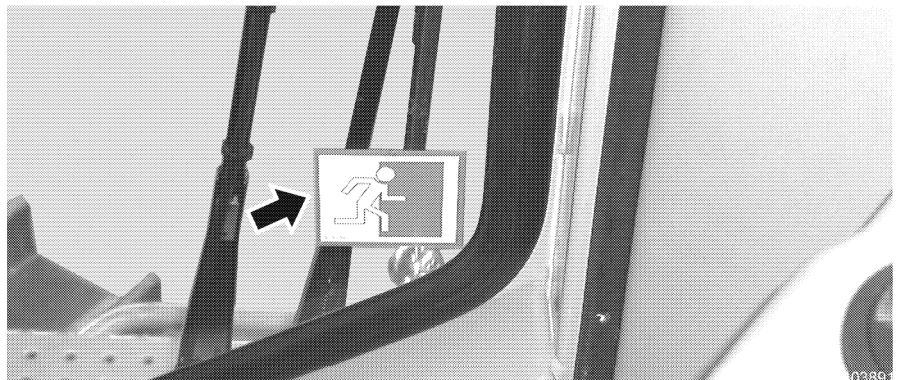
The sign is located on the rigging points of the machine. Shows the machine's rigging points.



Sign – lifting point

Sign – lifting point

The sign is located on the lifting points of the machine. Shows the machine's lifting points.



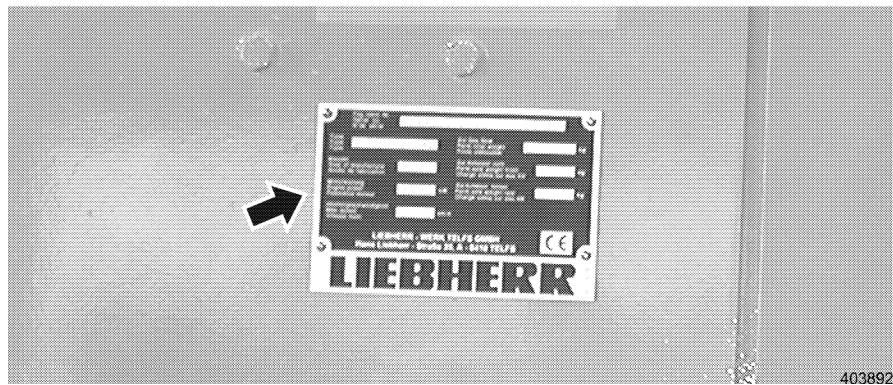
Sign – emergency exit

Sign – emergency exit

The sign is installed on the right operator's cab door. Shows the emergency exit.

2.3.3 Data tags

The machine and components, such as the Diesel engine, gear, pumps etc. are marked with a data tag. The serial numbers for the individual components are shown on the data tags.



Data tag - machine

Data tag - machine

The tag is installed on the left front on the main frame.

Data on the data tag:

- Type
- Vehicle Id. No.
- Permissible total weight
- Year
- Engine output
- Maximum speed

2.4 Safety regulations

2.4.1 General safety regulations

1. Study the Operation Manual before operating the machine.
 - Make sure that you have additional information for special attachments on your machine, that you have read it and that you understand it.
2. Allow only trained and authorized personnel to operate the machine, to maintain, service or repair it.
 - Be aware of the minimum age requirements for machine operators.
3. Allow only trained and authorized personnel to operate, set up, maintain and repair the machine, make sure all personnel have specific job assignments.
4. Determine the responsibility of the machine operator (also regarding the traffic regulations) and allow him to refuse to follow unsafe instructions given by a third party.
5. Always have an experienced person on the machine to supervise personnel still in training.
6. Periodically observe and check if all persons working on the machine observe the safety and danger notes and instructions given in the **"Operating Manual"** .
7. Wear proper work clothing when operating or working on the machine.
 - Rings, watches, bracelets and loose clothing such as ties, scarves, unbuttoned or unzipped shirts or jackets are dangerous and could cause serious injury!
 - Utilize proper safety equipment for certain tasks: safety glasses, hard hat, gloves, reflector vest, ear protection or respirator,
8. Consult your employer or site supervisor for specific safety equipment requirements and safety regulations on the jobsite.

9. When entering or leaving the machine, never use the safety lever, control levers or joysticks as handholds. This could cause the machine to move inadvertently, which could lead to a serious accident.
10. Never jump off the machine. Climb on and off the machine using only the steps, ladders, rails and handles provided. Use both hands for support and face the machine.
11. Keep steps, ladders, handrails and handles free of oil, grease, mud, snow and ice. These precautions will minimize the danger of slipping, stumbling or falling.
12. Make yourself familiar with the emergency exit through the right cab door.
13. If no other instructions are given, proceed as follows for maintenance and repairs:

Procedure:

- Park the machine on firm and level ground and lower the attachment to the ground.
 - Bring all control levers into neutral position.
 - Turn the engine off, leave the starter key in contact position.
 - Actuate the control levers several times to relieve the pressure in the system.
 - Bring all control levers into neutral position.
 - Before leaving the machine, move the safety lever up.
 - Remove the starter key.
14. Before accessing the hydraulic circuit, with the engine turned off and the starter key in contact position, actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and back pressures in the working circuits. Then relieve the pressure in the hydraulic tanks.
 15. Always place the safety lever up before leaving the operator's seat.
 16. Secure all loose parts on the machine.
 17. Never operate a machine until you have performed a complete walk around inspection. Check if all warning decals are on the machine and are legible.
 18. Observe the instructions on all danger and safety labels and decals.
 19. For certain applications, the machine must be equipped with specific safety devices. Never utilize the machine if they are not installed or fully functioning.
 20. Do not make any changes on the machine, add or remove items which could reduce the safety, without permission of the manufacturer. This also applies to the installation and adjustment of safety devices and valves as well as to welding on load carrying parts.

2.4.2 Crushing and burn prevention

1. Never work underneath the attachment unless it is placed on the ground or properly supported.
2. Never use damaged or insufficient load tackle (such as ropes, chains, ...). Always wear gloves when handling wire ropes.
3. When working on the attachment, never align bores with your fingers or hands. Use proper alignment tools when installing, changing or servicing attachments.

4. When the engine is running, make sure to keep objects away from the radiator fan. Rotating fans will swirl and throw out objects, which can become very dangerous and cause severe injury to yourself and others and damage the fan.
5. At or near operating temperature, the engine cooling system is hot and under pressure. Avoid contact with components containing coolant, it could cause severe burns.
6. Check the coolant level only after the cap on the expansion tank is cool enough to touch. Remove the cover carefully and slowly to relieve pressure.
7. At or near operating temperature, the engine and hydraulic oil is hot. Do not allow your skin to come into contact with hot oil or components containing hot oil.
8. Always wear safety glasses and gloves when handling batteries. Keep sparks and open flames away.
9. Never permit anyone to hand guide the attachment into position.
10. Check if the engine compartment door is held in open position by the safety strut.
 - If the function is not ensured, find the problem and remedy it immediately.
11. Make sure that all engine compartment doors and covers are closed and locked before operating the machine.
12. Never work or lay underneath the machine if it is raised with the attachment, the machine must always be properly blocked and supported.

2.4.3 Fire and explosion prevention

1. Always shut the engine off before refueling.
 - In addition, the heater must also be turned off before refueling.
2. Never smoke or allow an open flame in refueling areas and / or where batteries or flammable materials are being charged or stored.
3. Always use the proper engine starting procedure, as described in the **"Operating Manual"**.
4. Check the electrical system frequently. Correct any defects, such as loose connections, chafed wiring, or burnt out fuses and bulbs immediately.
5. Never store or carry any flammable fluids on the machine, except in the storage tank intended for machine operation.
6. Regularly check all components, lines, tubes, and hoses for oil and fuel leaks and / or damage. Replace or repair damaged components immediately.
 - Oil and fuel leaks can cause fires.
7. Be certain that all clamps, guards and heat shields are installed. These components prevent vibration, rubbing and heat build up. Install tie wraps to fasten hoses and wires, as required.
8. Cold start ether is extremely flammable! Never use cold start ether near heat sources, open flames, or near anyone who is smoking cigarettes. Use only in well ventilated area and as directed.
9. Never use the flame glow plug or preheat system when you use an ether cold start aid. Danger of explosion!

10. Know the location of the fire extinguishers, make sure you know how to use them properly. Check out the location of where to report a fire and inform yourself about fire fighting capabilities on the job site before you start to work.

2.4.4 Machine start up safety

1. Before starting the machine, perform a thorough walk-around inspection.
2. Check the machine for loose bolts, cracks, wear, leaks and any evidence of vandalism.
3. Never start or operate an unsafe or damaged machine.
4. Be certain that all defects are taken care of immediately.
5. Make sure that all covers and doors are closed and locked. Check if all warning and safety decals are on the machine, make sure that all of them are legible.
6. Clean all windows and mirrors, secure all doors and windows to prevent any inadvertent movement.
7. Always enter and leave the cab through the left door. Use the right door only in emergencies.
8. Make sure that no one is on or under the machine. Warn all personnel in the surrounding area on the job site before operating the machine.
9. After entering the operator's cab, adjust the operator's seat, the mirrors, the arm rests and the seat belt so you can work comfortably.
10. All noise level protection devices on the machine must be operational when operating the machine.
11. Never operate the machine without a cab or canopy.

2.4.5 Engine start up safety

1. Before starting the engine, check all indicator lights and instruments for proper function. Place all operating and control levers into neutral position.
2. Before starting the engine, warn any personnel in the surrounding area by sounding the horn.
3. Start the machine only while seated in the operator's seat.
4. If no other instructions were given, follow the engine starting instructions are outlined in the "**Operating Manual**".
5. Start the engine and check all indicator lights, gauges, instruments and controls.
6. Start the engine only in a well ventilated area. If necessary, open doors and windows to assure a sufficient fresh air supply
7. Warm up the engine and hydraulic system to bring the engine and hydraulic oil to operating temperature, as low oil temperatures cause the machine to be unresponsive.
8. Check that all attachment functions are operating properly.
9. Move the machine slowly and carefully into an open area and check the travel and brake functions, the steering function as well as the turn signals and lights.

2.4.6 Machine operating safety

1. Make sure that you are aware of any special circumstances on the jobsite, make sure you are familiar with any special guidelines and warning signals. The working environment includes, for example, any obstacles in the working and traffic area, the load carrying capacity of the ground and necessary protection to secure the jobsite in public highway traffic.
2. Always keep a safe distance to overhangs, edges, drop offs and unstable ground.
3. Make sure that you are especially aware of changing ground conditions, reduced visibility and changing weather conditions.
4. Make sure you know the location of utility lines at the jobsite and be especially careful when working in their vicinity. If necessary, inform the responsible authorities.
5. Keep sufficient distance from electrical lines. Working in the vicinity of electrical lines, keep a sufficient distance with the attachment.
 - There is a **DANGER OF LOSS OF LIFE!**
 - Inform yourself about required safety distances.
6. **If you do touch an electrical line, proceed as follows:**
 - Do not leave the machine!
 - If possible, move the machine a sufficient distance from the danger area.
 - Warn all personnel in the surrounding area not to come too close to the machine and / or touch the machine.
 - Instruct someone to turn the electrical power off.
 - Do not leave the machine until you are assured that the electrical line, which has been touched or damaged, is no longer energized and that the power has been turned off.
7. Before moving or working, make sure you always check that the attachments are installed safely.
8. When traveling or moving the machine on public roads, highways or properties, make sure to observe all applicable laws, rules and regulations and bring the machine into the required condition for highway travel.
9. Always turn on the lights if visibility is poor or as dusk approaches.
10. Never allow another person to ride along on the machine.
11. Operate the machine only when seated and with the seatbelt fastened.
12. In the event the machine should tip, remain seated with the seatbelt securely fastened. Experience has shown that it is safer to remain in the cab in the event of an overturn.
13. Report any functional problems or defects immediately and make sure that all necessary repairs are completed immediately.
14. Be certain that no one is endangered by moving the machine.
15. Do not get up from the operator's seat as long as the machine is still moving.
16. Never leave the machine unattended while the engine is running.
17. When traveling, make sure that the attachment is in transport position and keep the load as close to the ground as possible.
18. The maximum permissible incline / cross slope which the machine can handle depends on the installed attachment as well as on the ground conditions!

19. Avoid any working movements, which could cause the machine to tip over or overturn. However, if the machine does begin to tip or slide or slip on a grade, immediately lower the attachment and load to the ground and turn the machine downhill. If possible, work downhill or uphill, never sideways on a slope.
20. Always move slowly on rocky, rough or slippery ground or on a slope.
21. Always adapt the travel speed to working condition.
22. Never travel on slopes that exceed the maximum permissible gradeability of the machine.
23. Always travel downhill only at low speed, at max. 4 km/hr., to prevent loss of control over the machine. The engine must be at high idle and the speed must be reduced by preselecting the low speed range. Always change to low speed range before reaching the slope, never move onto a slope and then change the speed range.
24. When loading a truck, insist that the driver leaves the cab, even if the cab is FOPS protected.
25. The machine must be equipped with the proper safety protection when it is utilized for demolition work, land clearing, crane operation, etc.
26. Always have another person guide you if visibility is restricted. Always take signals from one person only.
27. Utilize only experienced personnel to attach loads and direct crane operators. The person giving signals must be visible to the operator or be in direct voice contact with the operator.

2.4.7 Machine parking safety

1. Park the machine only on firm and level ground. If it becomes necessary to park the machine on a grade, it must be properly blocked with wedges to secure it and prevent any unintentional movement.
2. Lower the attachment to the ground and lightly anchor it in the ground.
3. Bring all operating levers and controls into neutral position, place the safety lever up and turn the engine off, as outlined in the Operating Manual, before you leave the operator's seat.
4. Lock the machine, remove all keys and secure the machine against vandalism and unauthorized use.
5. Never park the machine in such a way as to block access to entrances, exits, ramps, fire hydrants, etc.

2.4.8 Machine transporting safety

1. Use only safe transportation and lifting devices with adequate carrying load capacity.
2. Park the machine on level ground and use wedges to hold chains or wheels.
3. If necessary, remove part of the attachment of the machine for transport.
4. Never use a ramp that is steeper than 30° to move the machine onto the transporting vehicle, the ramp should be covered with wooden planks to prevent slipping.
5. Before moving onto the ramp, remove any snow, ice and / or mud from chains or wheels.
6. Align the machine with the ramp.

7. Use another person as a guide to signal you, the operator. Move very slowly and carefully towards the ramp and the transporting vehicle.
8. Raise the attachment and move onto the ramp. Hold the attachment as close as possible to the loading platform.
9. After the loading procedure, lower the attachment onto the trailer platform.
10. Secure the machine and all remaining parts with chains and wedges to prevent any slipping or movement during transport.
11. Relieve pressures from hydraulic lines and hoses, remove the ignition key, lock the operator's cab and covers before leaving the machine.
12. Carefully check out the transporting route beforehand, check any regulations regarding width, height and weight.
13. Make sure that there is enough clearance underneath all bridges and underpasses, utility lines and tunnels.
14. During off loading, use the same care and caution as during the loading procedure.
Proceed as follows:
 - Remove all chains, wedges and blocks. Start the engine as noted in the Operating Manual.
 - Carefully move from the trailer platform down the ramp.
 - Hold the attachment as close as possible above the ground.
 - Use a guide to signal you.

2.4.9 Machine towing safety

1. Always follow the correct procedure as noted in the "**Operating Manual**", see "Towing the machine".
2. Tow the machine only in exceptional cases, such as removing the machine from a dangerous area to have the machine repaired.
3. Be sure that all towing and pulling devices, such as cables, hooks, etc. are safe and adequate.
4. The cable or towing bar, which is used to tow the machine, must be adequate to pull the machine and must be connected to the appropriate bores or couplers. Any damage or accident which is the direct result of towing this machine is expressly excluded from the manufacturer's and / or LIEBHERR warranty.

Notes for towing with a cable:

- Make sure that no one is near the tensioned cable when pulling or towing the machine.
 - Keep the cable tight and free of kinks.
 - Carefully pull the cable tight, do not jerk!
 - A sudden jerk can cause a slack cable to snap.
5. When towing, keep the machine in the correct transport position, and maintain the permissible speed and route.
 6. When returning the machine to operation, proceed as noted in the Operating Manual.
 7. After towing the machine, and before continuing operation, be certain to return the machine to a safe operating condition.

2.4.10 Machine maintenance safety

1. Never perform any maintenance or repairs for which you are not qualified or which you do not understand.

2. Any maintenance / inspection should be performed in the intervals noted in the Operating Manual.
To perform any repairs, you must have the proper tools.
3. Maintenance work should be performed according to the chart in this Operating Manual, it is also noted who should or may perform what type of work. The operator should only perform items marked OM on the Maintenance and Inspection Schedule, the remaining work should be performed only by especially trained personnel.
4. All spare parts must conform to the technical requirements set forth by the manufacturer. This is only assured by using original spare parts.
5. Always wear proper and safe work clothing. For certain jobs, in addition to hard hats and safety shoes, additional safety equipment is required, such as safety glasses and gloves.
6. Keep unauthorized personnel from the machine during maintenance and repair work.
7. Secure the maintenance area, as necessary.
8. Inform operators if any special task or maintenance work is required. Appoint one supervisory person to assure that this work has been done properly.
9. If not otherwise noted in this Operating Manual, perform all maintenance work on the machine on firm and level ground, with the engine turned off.
10. The cab may only be tilted if the machine is parked on firm and level ground and with the engine turned off! When tilting the cab, make sure that there is no one within the danger zone! Always secure the raised cab with the safety bar before working under the raised cab! The machine may **NEVER** be started or moved when the cab is raised. The safety lever must remain in the fully raised position!
11. After any maintenance and repair work, make sure that all screw connections or fittings, which had to be loosened, are retightened.
12. If it becomes necessary to remove any safety devices during maintenance and repair, the safety devices, which were removed must be reinstalled immediately and then be inspected for proper function.
13. Before servicing the machine, especially when working underneath the machine, attach an easily visible warning sign **DO NOT OPERATE** to the ignition switch. Remove the ignition key.
14. Before any maintenance or repair, clean off any oil, fuel or service fluids from connections and couplings. Do not use any harsh cleaning fluids. Use only lint free cleaning rags to clean the machine.
15. Never use flammable fluids to clean the machine!
16. Before any welding, cutting or grinding, clean the machine and surrounding area of dust and remove flammable fluids, assure adequate ventilation.
– Otherwise, there is a **DANGER OF EXPLOSION!**
17. Before cleaning the machine with water, steam (high pressure cleaning) or other cleaning fluids, cover or tape all openings. Make sure no water, steam or cleaning fluid enters these openings for safety and functional reasons.
Electrical motors, switch boxes and battery compartments are especially endangered.

In addition:

- Make sure that during cleaning, the temperature sensors of the fire warning and sprinkler system do not come in contact with the hot cleaning fluid or the sprinkler system could be activated.

- After the clearing procedure, remove all covers and tape.
 - After cleaning the machine, check all fuel, engine oil, and hydraulic lines for leaks, loose connections and for chafed and damaged areas.
 - All problems must be remedied immediately.
18. Adhere to product safety instructions issued for handling oils, greases and other chemical substances.
 19. Make sure to dispose of any operating and service fluids as well as replacement parts properly and in an environmentally sound manner.
 20. Be very careful when handling any hot components or fluids on the machine as there is a danger of burns and scalding!
 21. Use combustion motors and fuel operated heaters only in areas with adequate ventilation. Before start up, make sure that the ventilation is adequate. Follow and adhere to any local guidelines, regulations and special instructions pertaining to the present jobsite.
 22. Perform any welding, cutting and grinding work on the machine only if this work has been explicitly authorized, as there can be danger of fire and explosion!
 23. The windows in the operator's cab are made of safety glass. Always replace damaged window panes immediately.
 - Only safety glass may be used for the window panes in the operator's cab.
 - Use only Original Liebherr spare parts.
 24. Never try to lift heavy parts. Always use appropriate lifting devices with sufficient carrying capacity.

Procedure:

 - To lift spare parts and component assemblies for replacement on the machine, they must be securely mounted and secured onto the lifting devices, to prevent accidents.
 - Use only suitable and technically flawless lifting devices as well as tackle with sufficient load lifting capacity.
 - **Do not allow anyone to work or remain underneath the lifted load!**
 25. Do not use damaged or insufficient wire ropes. Always wear gloves when handling wire ropes and cables.
 26. Only experienced personnel may attach loads and signal the operator. The person used as a guide must be visible by the operator or be in direct voice contact with the operator via a two way radio.
 27. When installing parts higher up or when working overhead, always use safe scaffolding, ladders or working platforms suited for this purpose. Do not step on any machine parts or components to get closer to the working area. Always wear safety harnesses or similar safety equipment when working higher up. Make sure all handles, steps, walkways, cat-walks, ladders etc. are always free of dirt, snow and ice.
 28. When working or changing any part of the attachment (for example when changing the teeth) make sure that the attachment is properly supported. Never use metal on metal supports!
 29. Never work underneath the machine if the machine has been raised with its attachment. The machine and / or its attachment must always be properly blocked and supported with wooden blocks or beams.
 30. Always block the machine in such a way that any change in the center of gravity will not endanger its stability. Never use metal on metal supports!
 31. Only authorized, specially trained personnel may work on the travel gear, brake and steering system.

32. If the machine must be repaired while parked on a slope, the track chains or wheels must be blocked with wedges to prevent any movement. Bring the attachment into maintenance position.
33. Only authorized, especially trained and experienced personnel may work on the hydraulic system.
34. Always wear gloves when checking for leaks. A thin stream of fluid escaping from a small hole can have enough force to penetrate the skin.
35. Do not release any hydraulic oil lines or fittings before the attachment has been lowered and the engine has been turned off. Then – with the starter key in contact position and the safety lever in operating position - actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and the back pressures in the working circuits. In addition, relieve the hydraulic tank pressure by backing out the bleeder screw.
36. Regularly check all hydraulic lines, hoses and connections for any leaks or external damage. Any defects must be repaired immediately. Any escaping fluid can cause serious injury and fire.
37. Before beginning any repairs, you must also ensure that all air pressures are relieved in any of the systems you need to gain access to. To be certain refer to the description of the various component groups and assemblies.
38. Route and install all hydraulic and air pressure lines properly. Mark and check all connections to prevent any mix-ups. All fittings, including length and quality or type of hoses must match the requirements set forth by the manufacturer.
Use only LIEBHERR spare parts.
39. Replace hydraulic hoses and lines in regular intervals, as stated, even if no defects can be seen.
40. Work on electrical components of the machine may only be performed by a certified electrician or by a person working under the guidance and supervision of such an electrician, and according to electro-technical procedures, rules and regulations.
41. Use only Original fuses with the same amperage. In case of problems in the electrical power supply, turn the machine off immediately.
42. Inspect / check the electronic components of the machine regularly. Repair any problems or defects, such as loose connections or chafed wires and replace any burnt out fuses and bulbs immediately.
43. If any work is necessary on energized, voltage carrying parts, a second person must be utilized to disconnect the main battery switch or emergency off switch in case a problem should arise. Rope the work area off with a red / white safety chain and a warning sign. Use only insulated tools!
44. When working on high voltage carrying components or sections, turn off the power supply, then connect the supply cable to the ground wire and use the grounding rod to ground these parts, such as condensers, etc.
45. Check the disconnected parts first to see if they are really voltage free, ground them and then short circuit them. Insulate neighboring voltage carrying parts.

2.4.11 Safety guidelines to be observed when welding on the machine

1. Disconnect the battery first, when working on the electrical system or before any arc welding on the machine.
 - Always disconnect the negative (- minus) terminal first, and reconnect it last.
 - **In addition, before any welding, always unplug the plugs on the electronic boxes.**

2.4.12 Safety guidelines to be observed when working on the attachment

1. Never work underneath the attachment unless it is securely placed on the ground or is properly supported.
2. When replacing or changing any part of the attachment, such as blade, cutting edges, teeth, ...) never use metal on metal support.
3. Never try to lift heavy parts. Always select and use appropriate lifting devices with sufficient lifting capacity.
4. When handling wire ropes, always wear gloves!
5. Do not release any hydraulic oil lines or fittings before the attachment has been lowered and the engine has been turned off. Then – with the starter key in contact position and the safety lever in operating position - actuate all pilot controls (joysticks and pedals) in both directions to relieve the servo pressure and the back pressures in the working circuits. In addition, relieve the hydraulic tank pressure by backing out the bleeder screw.
6. After completion of all maintenance and repairs, make sure that all lines and hoses and fittings are properly connected and retightened.
7. Removing and installing the steel pins with a hammer can be very dangerous. Metal chips can cause injury.
 - Always wear gloves and safety glasses.If possible, use appropriate tools for the job, such as pin pullers, punches, etc.).

2.4.13 Safety guidelines to be observed when loading the machine with a crane

1. Lower the attachment to the ground.
2. Bring all control levers into neutral position.
3. Turn the engine off, as described in the Operating Manual and place the safety lever in the up position before you leave the operator's seat.
4. Securely close all doors, covers and hoods on the machine.
5. Utilize only experienced personnel to attach loads and direct the crane operator. The person giving signals must be visible by the operator or be equipped with a two way radio.
6. Install the shackles and hooks to the appropriate and designated brackets / bore holes on the machine.
7. Make sure the length of the lifting device or tackle is sufficient.
8. Carefully lift the machine.
9. **DANGER! Make sure no one is near or underneath the raised machine.**
10. When the machine is placed back in service, proceed according to the guidelines given in the Operating Manual.

2.4.14 Safe maintenance of hydraulic hoses and lines

1. Hydraulic hoses and lines may never be repaired!
2. All hoses, lines and fittings must be checked regularly, but at least once a year for leaks and any externally visible damage! Any damaged sections must be replaced immediately! Escaping oil can cause injuries and fire.
3. Even if hoses and lines are stored and used properly, they undergo a natural aging process. For that reason, their service life is limited.
4. Improper storage, mechanical damage and improper use are the most frequent causes of hose failures.
5. The service life of a hose may not exceed six years, including a storage period of no more than two years (always check the manufacturing date on the hoses).
6. Using hoses and lines close to the limit ranges of permitted use can shorten the service life (for example at high temperatures, frequent working cycles, extremely high impulse frequencies, multi-shift or around the clock operation).
7. Hoses and lines must be replaced if any of the following points are found during an inspection:
Criteria:
 - Damage on the external layer into the inner layer (such as chafing, cuts and rips);
 - Brittle outer layers (crack formation of the hose material);
 - Changes in shape, which differ from the natural shape of the hose or line, when under pressure or when not under pressure, or in bends or curves, such as separation of layers, blisters or bubble formation;
 - Leaks;
 - Non-observance of installation requirements;
 - Damage or deformation of hose fittings, which might reduce the strength of the fitting or the connection between the hose and the fitting;
 - Any movement of the hose away from the fitting;
 - Corrosion on the fittings, which might reduce the function or the strength of the fitting;
 - Storage or service life has been exceeded.
8. When replacing hoses or lines, use only Original replacement parts.
9. Route and install the hoses and lines properly. Do not mix up the connections.

2.4.15 Safety guidelines for maintenance work on machine with hydro accumulators

1. Any work on hydro accumulators may be carried out only by especially trained personnel.
2. Improper installation and operation of hydro accumulators can cause severe accidents.
3. Never operate damaged hydro accumulators.
4. Before working on a hydro accumulator, the pressure in the hydraulic system (hydraulic system, including hydraulic tank) must be relieved as described in this operating manual.

5. Welding or soldering is not permitted on the hydro accumulator, never carry out any mechanical work!
The hydro accumulator can be damaged through heat exposure and it can burst if any mechanical work is done on the unit. THERE IS A DANGER OF EXPLOSION!
6. Fill the hydro accumulator only with nitrogen! If oxygen or air is used, there is a DANGER OF EXPLOSION!
7. The accumulator housing can get hot during operation, there is a danger of burns.
8. New hydro accumulators must be filled with the required pressure to suit the application.
9. The operating data (minimum and maximum pressure) is permanently marked on the hydro accumulators. Make sure that the labeling remains clearly visible!

2.4.16 Roll over protection (ROPS) and falling object protection (FOPS)

These are protective devices, which are integrated in the operator's cab. To reduce a weakening of the roll over or falling object protection, always check with your LIEBHERR dealer or Service Department before making any changes.

- Do not attach fire extinguishers, first aid kits, floodlights or similar objects to these protective structures.
- Welding points or drilling of holes could weaken the structure.
For similar work, always consult with your LIEBHERR dealer.

1. Any changes, which have not been explicitly approved by LIEBHERR would invalidate the roll over or falling object protection permit.
 - Damage to the structure can also be caused by a roll over accident or falling objects, etc.

2.4.17 Attachments and installations

1. Attachments and installations from other sources or parts which have not been approved by LIEBHERR for installation may not be installed on the machine without prior written permission by LIEBHERR.
2. The necessary technical documentation must be forwarded to LIEBHERR.

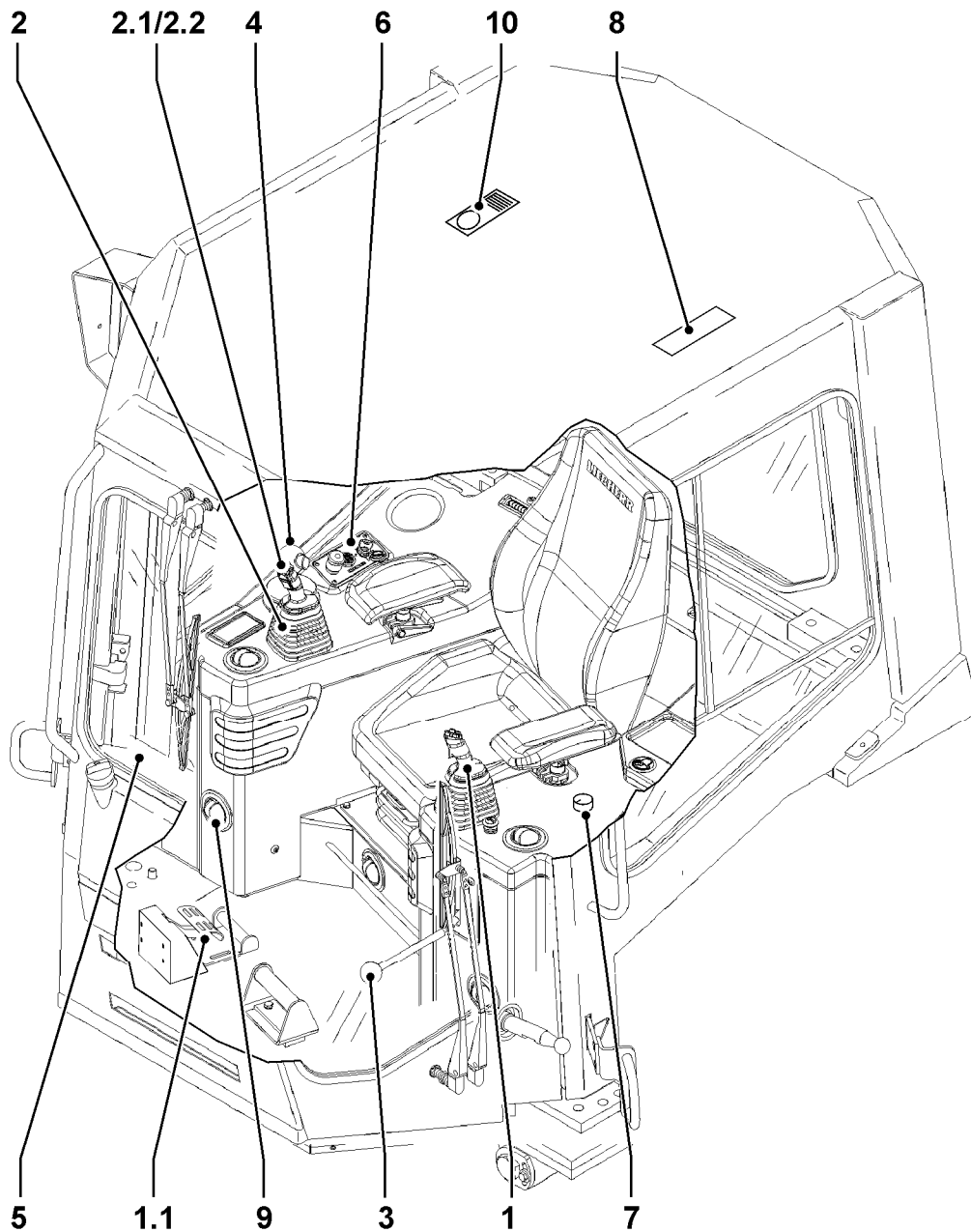
3. Control, instrumentation

3.1 Location of controls and instrumentation

3. Control, instrumentation

3.1 Location of controls and instrumentation

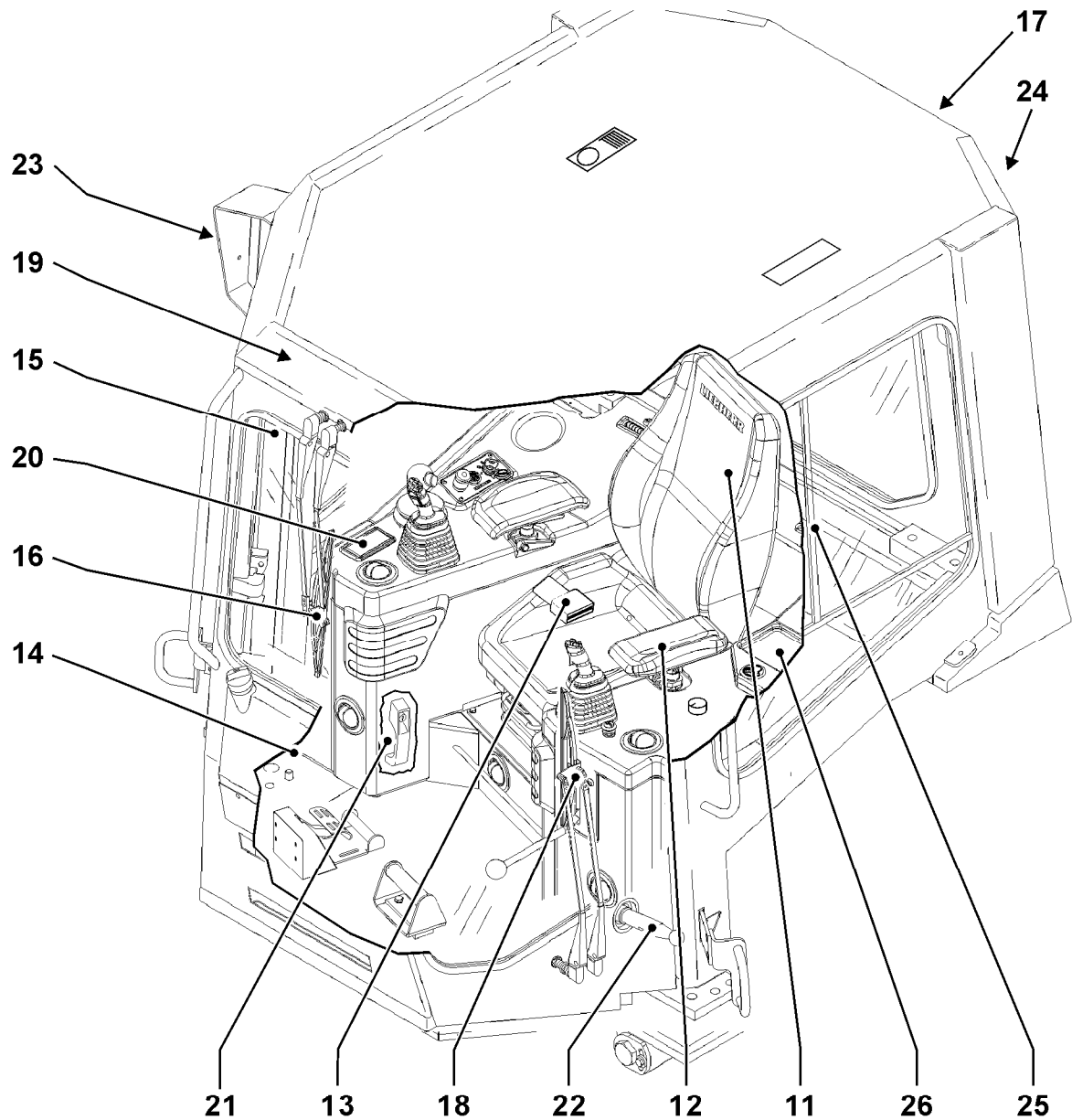
3.1.1 Operator's cab



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Interior view - Operator's cab

- | | | |
|--|--|--|
| 1 Travel joystick | 2.2 Button – Cutting angle adjustment (optional equipment from PR 754) | 6 Start panel |
| 1.1 Speed reduction pedal (optional equipment) | 3 Safety lever | 7 Throttle control |
| 2 Blade control lever | 4 Ripper control lever | 8 Control elements - heater/ air conditioning system |
| 2.1 Button – Float position | 5 Instrument panel, front | 9 Heater nozzles |
| | | 10 Interior lighting |

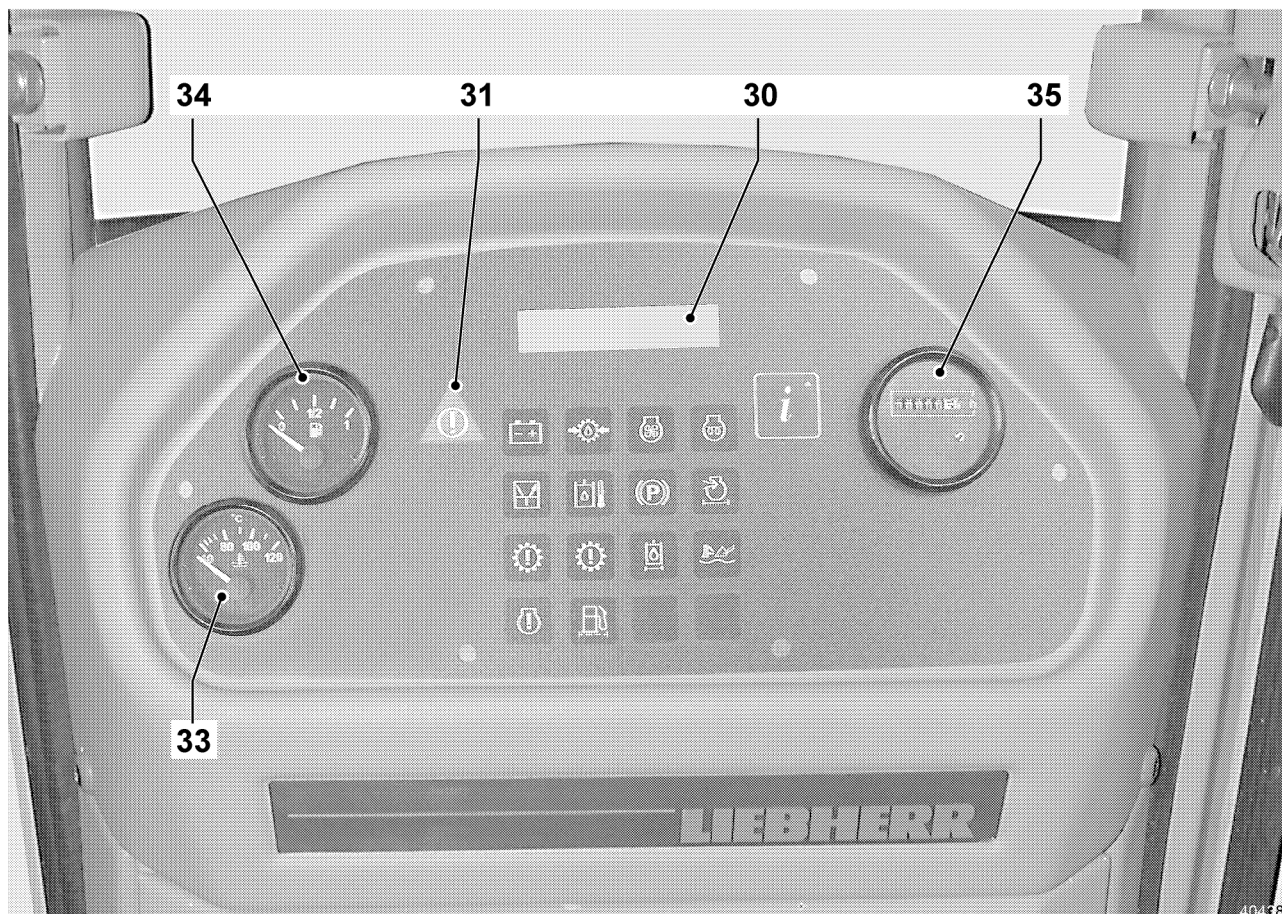


Interior view - Operator's cab

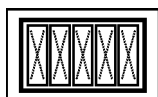
404727

- | | | |
|-------------------------------------|------------------------------------|----------------------|
| 11 Operator's seat | 16 Windshield wiper - Front window | 21 Door lock |
| 12 Arm rests | 17 Windshield wiper - Rear window | 22 Door latch |
| 13 Seatbelt | 18 Windshield wiper - Doors | 23 Headlight - front |
| 14 Compartment for Operating manual | 19 Rear view mirror | 24 Headlight - rear |
| 15 Sun shade | 20 Ashtray | 25 Window lock |
| | | 26 Glove compartment |

3.1.2 Indicator elements on the operator's platform



Indicator elements on the instrument panel



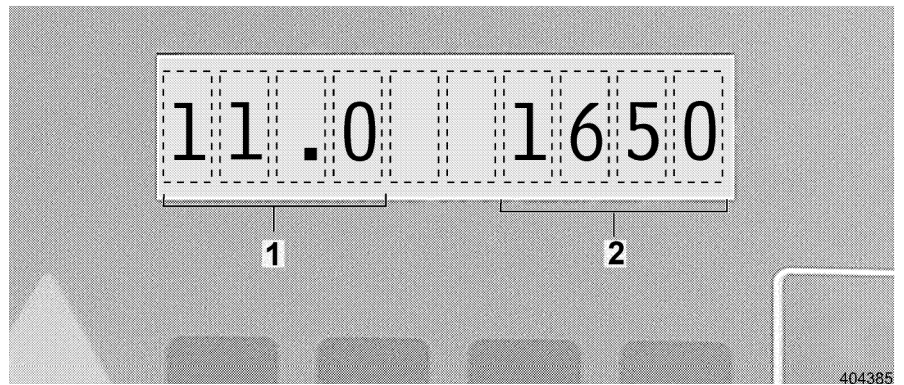
30 LC displays

show:

- the travel speed,
- the Diesel engine RPM,
- the Service codes,
- the towing mode.

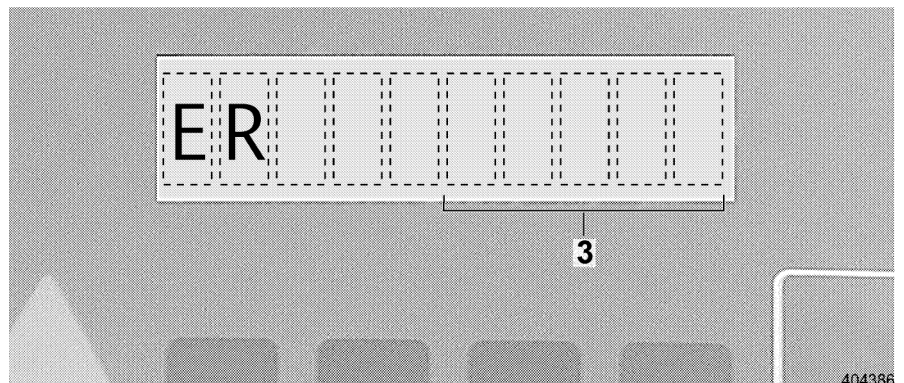
In case of an error, the LC-display changes the RPM display to the Service code.

- If a Service code lights up, the machine must be taken out of service properly and put back into service. If the Service code in the LC-display does not disappear, then Liebherr Service must be contacted immediately.



LC - display / Travel speed - RPM

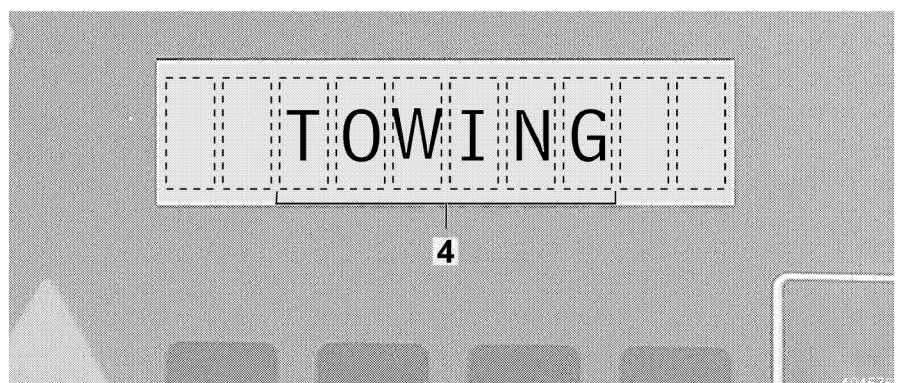
- 1 Display of travel speed in km/hr.
- 2 RPM display



LC – display Service codes

- 3 Display Service code

If a Service code appears, the display of the speed stage display and the RPM disappears.



LC – display Towing mode

- 4 Display towing mode "TOWING"

In towing mode, the LC – display "TOWING" appears.



31 Warning light – Operator’s cab

Warning light lights up / blinks:

- at increased Diesel engine coolant temperature
- in case of a drop in engine oil pressure
- in case of a drop in pump replenishing pressure
- when ignition switch is in contact position as long as the Diesel engine is not running

If the warning light – operator’s cab lights up, turn the Diesel engine off and remedy the problem.



33 Coolant temperature display

Shows the coolant temperature of the Diesel engine.

If the coolant temperature is constantly above 100°C, turn the Diesel engine off and remedy the problem (e.g. clean the radiator, add coolant, check for leaks or check the water pump).



34 Fuel gauge

Shows the contents of the Diesel fuel tank.

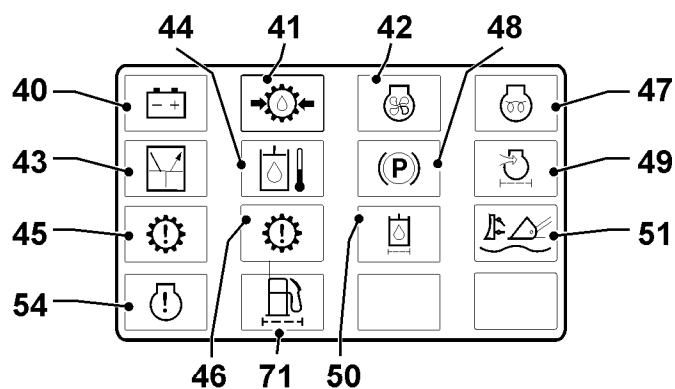
To reduce the condensation in the tank, keep the fuel level in the tank as high as possible.



35 Hour meter

Displays the operating hours.

The hour meter is the basis for the timely adherence to the inspection schedule.



Indicator lights

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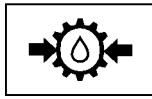


40 Indicator light – battery charge

Color: red

Turns off after the Diesel engine is running.

- Lights up, for example, if the V-belt for the alternator is broken. If the indicator light lights up, turn the Diesel engine off and remedy the problem.



41 Indicator light – pump replenishing pressure

Color: red

- Lights up in case of a drop in pump replenishing pressure. If the indicator light lights up, turn the Diesel engine off immediately and remedy the problem.



42 Indicator light - fan control

Color: red

- Blinks from a charge air temperature of 75°C. Turn the Diesel engine off immediately and remedy the problem.
- Light up from a charge air temperature of 80°C. If the indicator light lights up, turn the Diesel engine off immediately and remedy the problem. If the indicator light does not turn off or if the indicator light lights up again, contact Liebherr Service.
- Blinks from a hydraulic oil temperature of 90°C. Turn the machine off and clean the hydraulic oil cooler.
- Lights up from a hydraulic oil temperature of 95°C. If the indicator light lights up, turn the Diesel engine off immediately and remedy the problem. If the indicator light does not turn off or if the indicator light lights up again, contact Liebherr Service.
- Blinks from a coolant temperature of 100°C. Turn the Diesel engine off immediately and remedy the problem. (e.g. clean the radiator, add coolant, check for leaks or check the water pump).
- Light up from a coolant temperature of 105°C. If the indicator light lights up, turn the Diesel engine off immediately and remedy the problem. If the indicator light does not turn off or if the indicator light lights up again, contact Liebherr Service.



43 Indicator light - electronic

Color: red

- Lights up in case of problems in the electronic system. In addition, a Service code is issued in the LCD display. Depending on the error the machine is switched to emergency operation and the travel drive is stopped. If the indicator light lights up, turn the machine off and put it back into service properly. If the indicator light does not turn off or if it lights up again, contact Liebherr Service.
- Blinks if an error occurs in travel operation. In addition, a Service code is issued in the LCD display. Depending on the error, the machine is switched to emergency operation. In that case, the machine is operational only on a limited basis. The machine may be operated in the meantime. Contact Liebherr Service.

- Blinks in case of failure of the speed reduction pedal.
- In case of failure of the speed reduction pedal, the indicator light - electronic blinks as well as the warning light - operator's cab. The machine may be operated in the meantime. Contact Liebherr Service and repair the speed reduction pedal immediately.



44 Indicator light – hydraulic oil temperature

Color: red

- Lights up in case of excessive hydraulic oil temperature.
- If the indicator light lights up, turn the machine off.
Clean the hydraulic oil cooler.



45 Indicator light travel gear – seal area, left

Color: red

- Lights up if the oil level in the seal area is too low.
- Lights up if the ignition key is in contact position for approx. 3 sec. (Self-check).

If the indicator light lights up, turn the machine off, check the travel gear externally for leaks.

Contact Liebherr Service.

- For continued operation in the meantime, bring the oil level to normal level.



46 Indicator light travel gear – seal area, right

Color: red

- Lights up if the oil level in the seal area is too low.
- Lights up if the ignition key is in contact position for approx. 3 sec. (Self-check).

If the indicator light lights up, turn the machine off, check the travel gear externally for leaks.

Contact Liebherr Service.

- For continued operation in the meantime, bring the oil level to normal level.



47 Indicator light – preheat system

Color: yellow

- Lights up if the ignition key is in preheat position for approx. 20 sec.
- When the Diesel engine is ready to start, the indicator light – preheat system blinks.

The preheat time depends on the fuel temperature and can last from 1 second to maximum 20 seconds.

After the indicator light turns off, the Diesel engine can be started by turning the ignition key to starting position.



48 Indicator light – parking brake

Color: yellow

- Lights up if the parking brake is applied.
- Lights up if the safety lever is raised.
- Lights up in case of a drop of replenishing pressure.



49 Indicator light – air filter contamination

Color: yellow

- Lights up if the air filter is very dirty.
- Perform air filter maintenance.



50 Indicator light – return filter

Color: yellow

- Lights up if the hydraulic oil return filter element is dirty (hydraulic oil at operating temperature).

Perform hydraulic oil return filter element maintenance.



51 Indicator light – float position

Color: yellow

- Lights up if the float position is preselected.



54 Indicator light – Diesel engine problem

Color: red

- Lights up in case of problems with the Diesel engine.

At the same time, a service code is shown in the display in the area of ER-8xxx.

If the indicator light lights up, turn the machine off and put it back into service properly. If the indicator light does not turn off or if it lights up again, contact Liebherr Service.

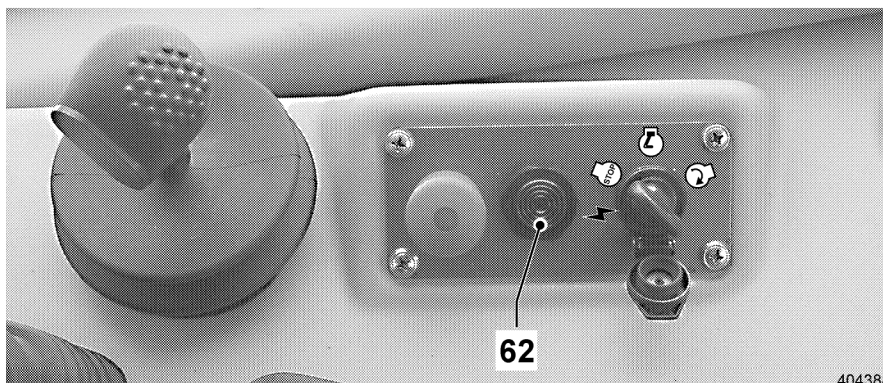
! Do not operate the machine in the meantime.

Error code ER-8002 indicates insufficient engine oil pressure.

- Turn the Diesel engine off immediately and remedy the problem.

3. Control, instrumentation

3.1 Location of controls and instrumentation



Buzzer



62 Buzzer

Buzzer sounds:

- at increased Diesel engine coolant temperature,
- in case of a drop in engine oil pressure,
- in case of a drop in pump replenishing pressure,
- if the ignition switch is in contact position for approx. 1 - 2 sec. (Self test - buzzer)

If the buzzer sounds, turn the Diesel engine off and remedy the problem.

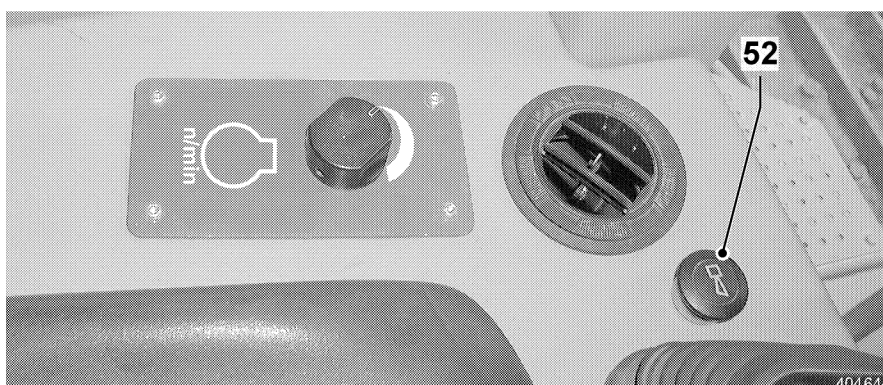


71 Indicator light – fuel water separator

Color: yellow

- Lights up if the water ratio in the fuel water separator is too high, service the water separator!

3.1.3 Control elements on the operator's platform



Horn - button



52 Horn - button

- The horn is activated by pressing the button.

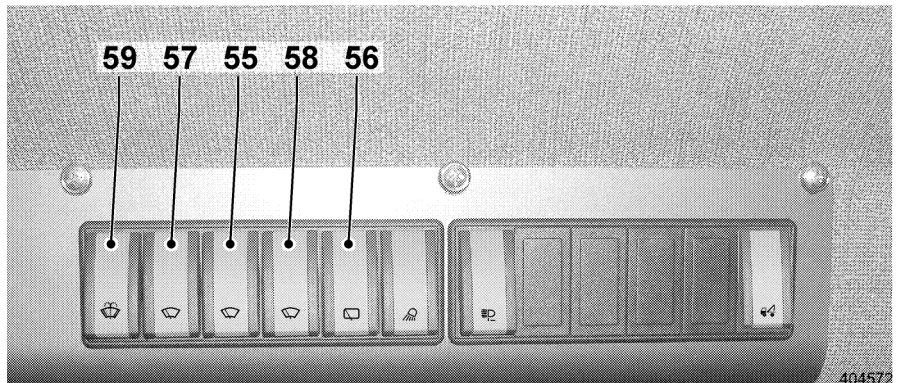


Scroll key



53 Scroll key

- By pressing the scroll key with the starter key in contact position, Service codes can be called up. The Service codes are shown in the LC – display. The display shows maximum 10 Service codes. The current Service code moves the previous code back by one space. After 30 seconds, the display changes automatically to standard display (speed stage / RPM), or it can be switched to standard display manually by pressing the scroll key for 3 seconds.



Roof console - right



55 Switch - Windshield wiper, front



56 Switch - Windshield wiper, rear

turn on / off



57 Switch - Windshield wiper, door, left

turn on / off



58 Switch - Windshield wiper, door, right

turn on / off

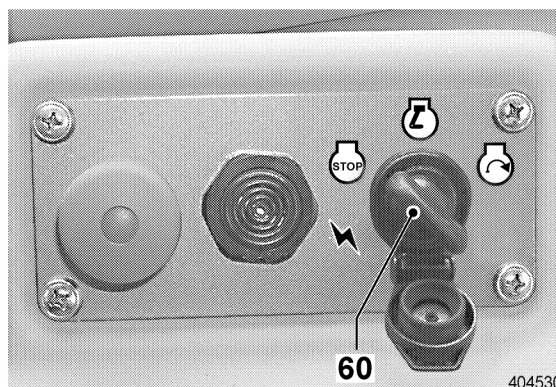


59 Switch - Windshield wiper – Intermittent / washer system

Stage 1: Continuous wipe

– The windshield wiper, which was turned on with switches 55, 56, 57 and 58 is changed from intermittent wipe to continuous wipe.

Stage 2: Button – Windshield washer system and dry wipe



Starter switch

60 Starter switch



Off position



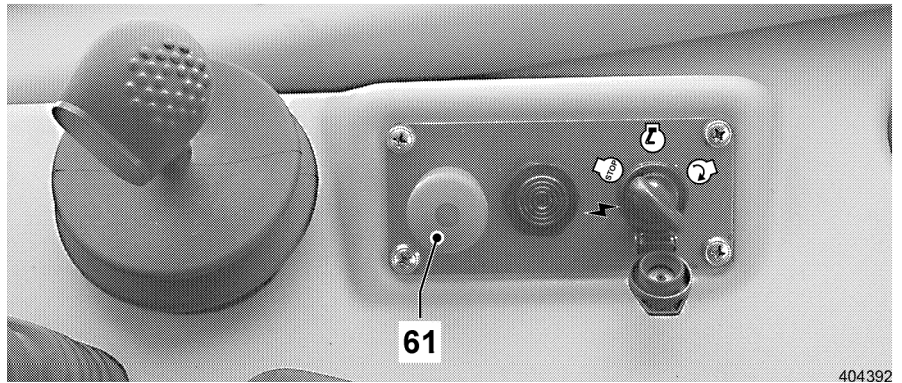
Contact position



Starting position



Parking position

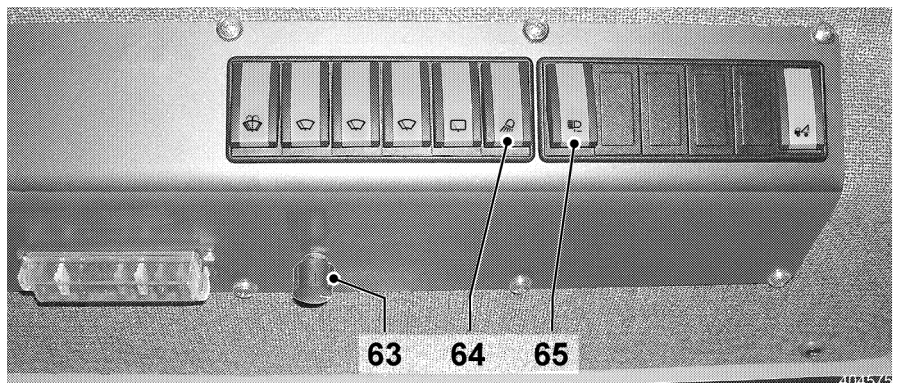


Emergency off button



61 Emergency off button

- The machine stops immediately if the emergency off button is pressed.
The working attachment can still be operated.



Roof console, right

63 Knob - Windshield wiper, intermittent control

- The timing for intermittent wipe can be regulated with the knob (3-stage control).



64 Switch - Headlights

turn on / off

The headlights on the engine hood and on the rear of the operator's cab can be turned on / off via this switch.



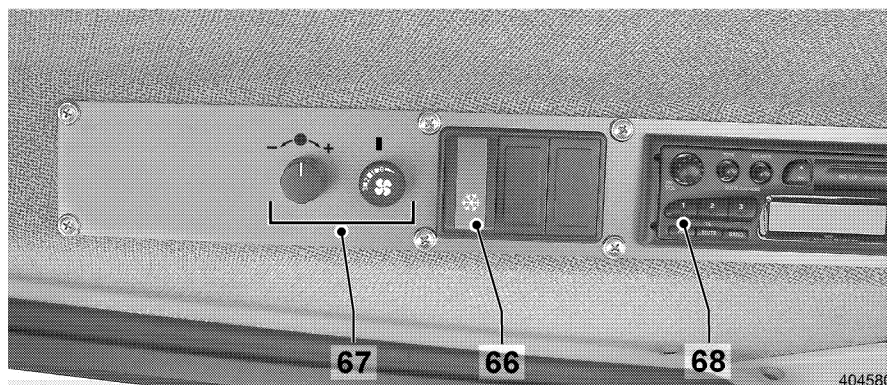
65 Switch - Headlights

turn on / off

The headlights on the front of the operator's cab can be turned on / off via this switch.

3. Control, instrumentation

3.1 Location of controls and instrumentation



Roof console, left

66 Air conditioner master switch

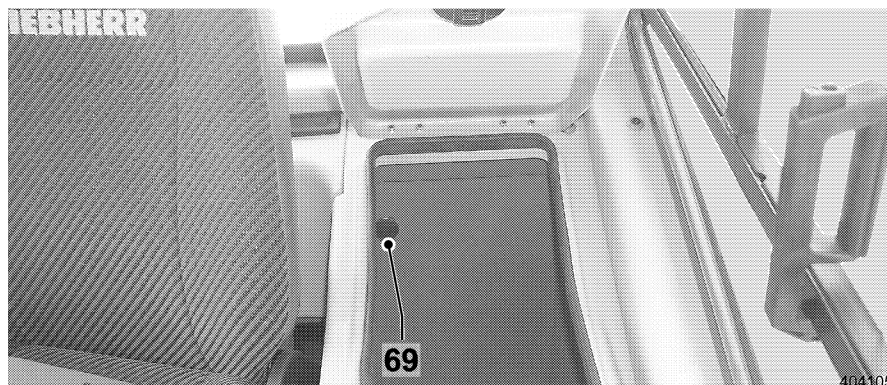
- The air conditioning system is turned on / off by pressing this switch.

67 Control heater / air conditioner

- For location of control elements, operation, see section "Heater, ventilation" or "Air conditioning system".

68 Radio

- Refer to the separate radio operation manual for details.

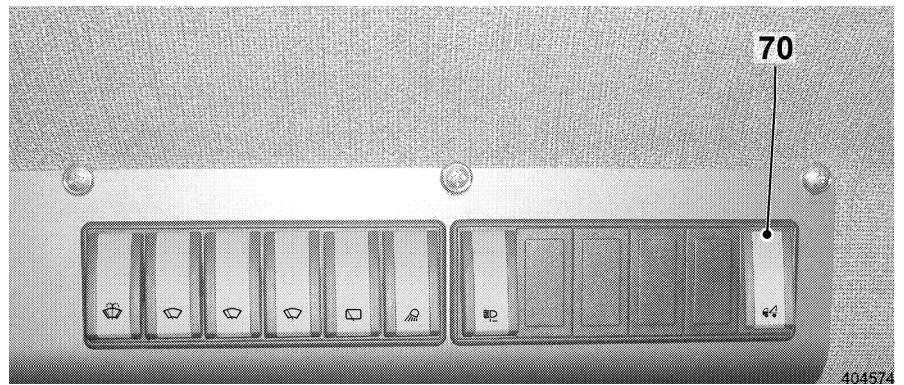


Electrical socket



69 Electrical socket 12 V

- The 12 V electrical socket is installed to the left of the operator's seat in the glove compartment.
- Additional items (max. load 10A) can be connected via this integrated 12 V electrical socket.
- Can only be used if the starter key is in contact position.



Button – Towing mode

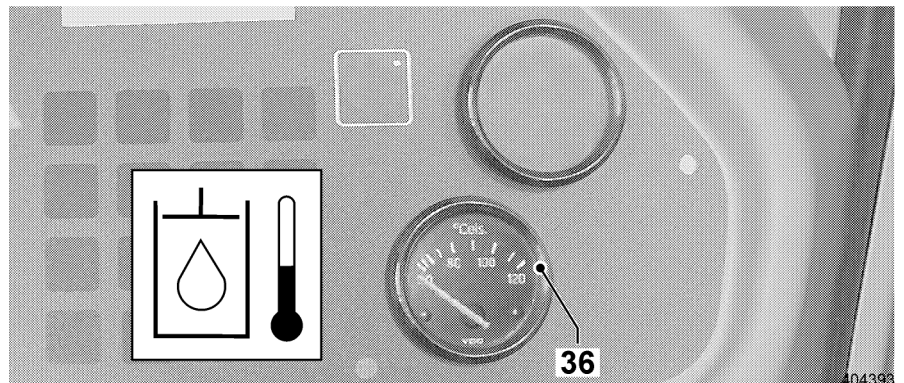


70 Button – Towing mode

– To activate the towing mode.

3.1.4 Hydraulic oil temperature display

(Optional installation)



Display – Hydraulic oil temperature

36 Hydraulic oil temperature display

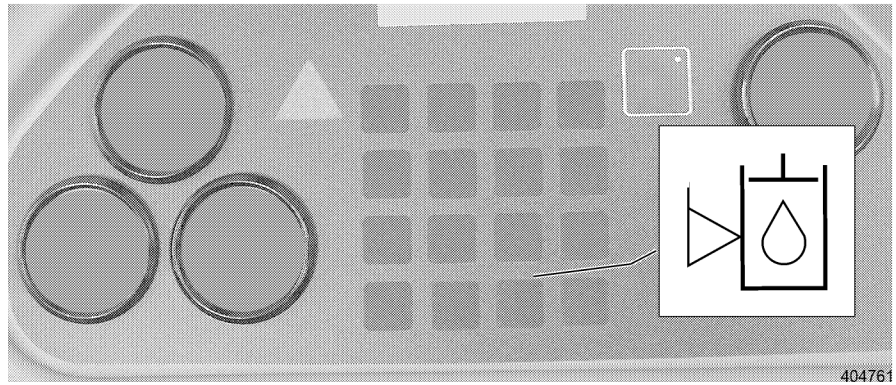
– Shows the hydraulic oil temperature of the machine.

If the oil temperature of the machine is constantly above 110°C, turn the Diesel engine off and find and remedy the problem (for example clean the oil cooler).

3.1.5 Hydraulic oil level monitor

(Optional equipment)

The hydraulic oil level monitor electronically monitors the hydraulic oil level.



Indicator light - Hydraulic oil level

LED color: red

– Lights up if the hydraulic oil level is too low. In addition, the warning light - operator's cab lights up and a buzzer will sound a warning.

If the indicator light lights up, turn the Diesel engine off immediately and remedy the problem.

– Check the hydraulic system for leaks.

The electrical system for the hydraulic oil level monitor is protected by fuse F29.

Fuse	Rating	Unit	Description / function
F 29	3	A	Hydraulic oil level monitor (SA)

3.2 Operation

3.2.1 Entry

Entering and leaving the operator's cab

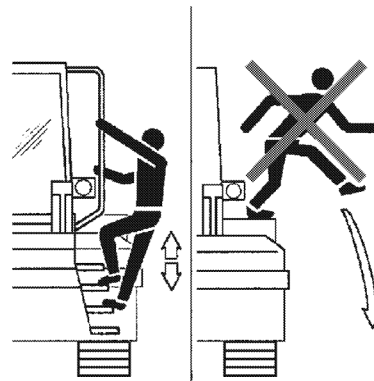
Always use the steps, rails and handles provided to enter and leave the cab.

Make sure the steps and chains are cleaned before stepping on them.

Always enter and leave the operator's cab through the left door of the operator's cab.


Make yourself familiar with the emergency exit through the right door in the operator's cab.


See also "Emergency exit".



Entering and leaving the operator's cab

403132

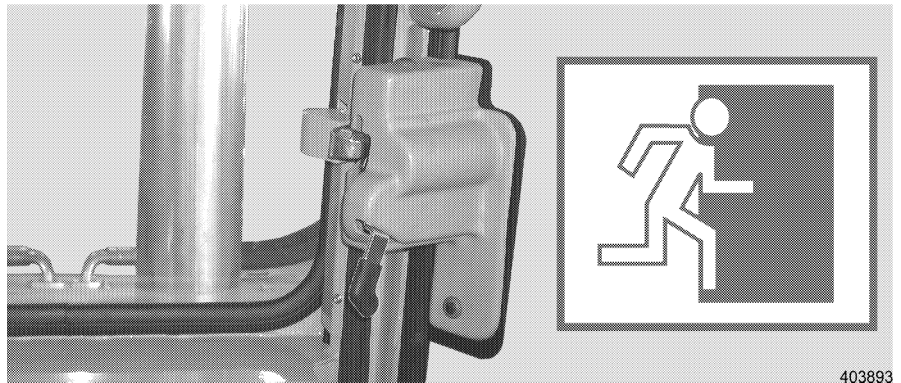
- Caution**  Do not jump off the machine, danger of injuries due to falling or jumping off the machine!
- ! Always use the steps, ladders or rails provided to enter or leave the cab.
 - ! Never jump off the machine.

- Caution**  Danger of injuries due to inadvertent movement of the machine!
- ! When entering or leaving the machine, never grasp the safety lever or the control levers and use them as handholds.

- Enter the machine only via the left side.

3.2.2 Emergency exit

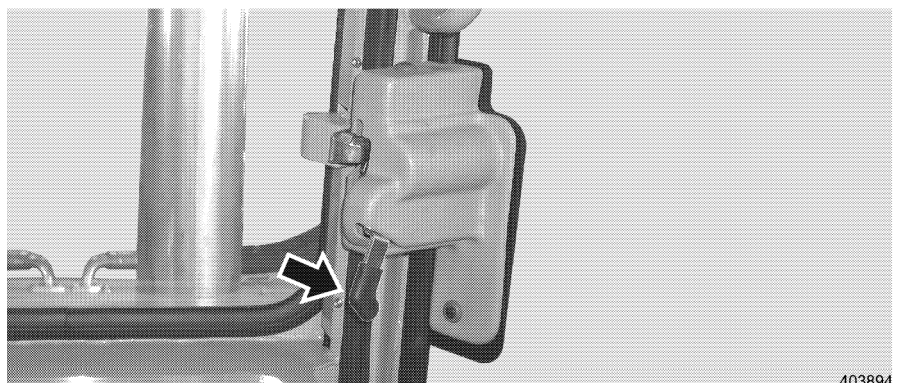
The operator's cab must be entered or exited always through the left door in the operator's cab.



Emergency exit

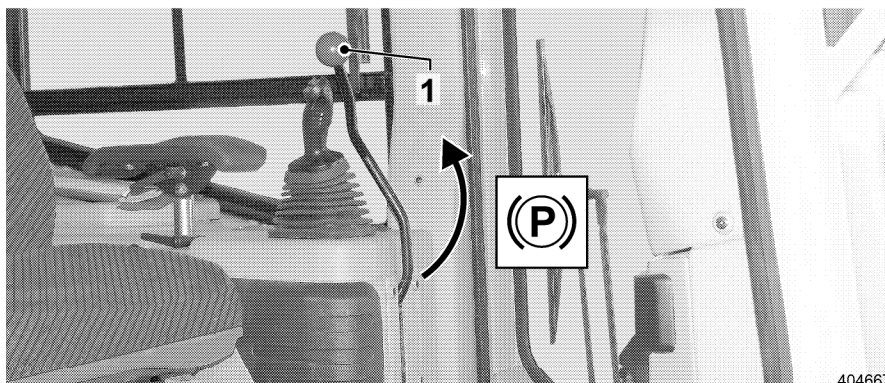
Leaving the operator's cab through the emergency exit

The right door of the operator's cab is intended as the emergency exit and should therefore only be used in emergency situations.



Open the right operator's cab door

- Before operating the machine, check if the operator's cab can be exited without a problem from the inside through the right operator's cab door.
- To open the operator's cab door: Push the lever on the door lock upward.

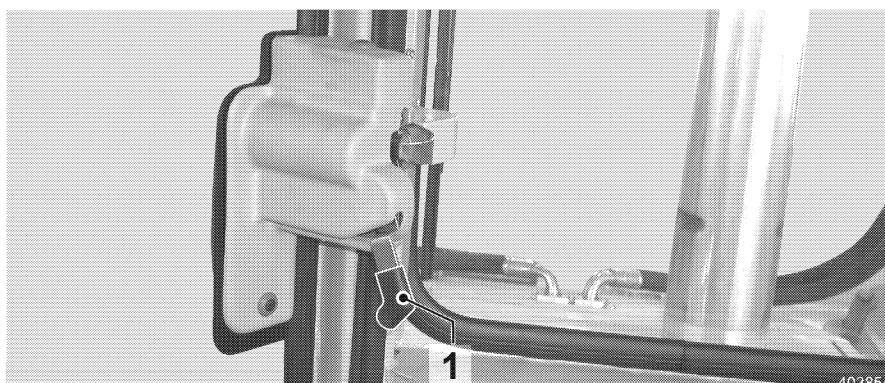


Safety lever up

- Before leaving the operator's cab, move the safety lever 1 up.
 - The indicator light – travel brake must light up.

3.2.3 Door lock

The doors of the operator's cab are held in closed position by the door lock.



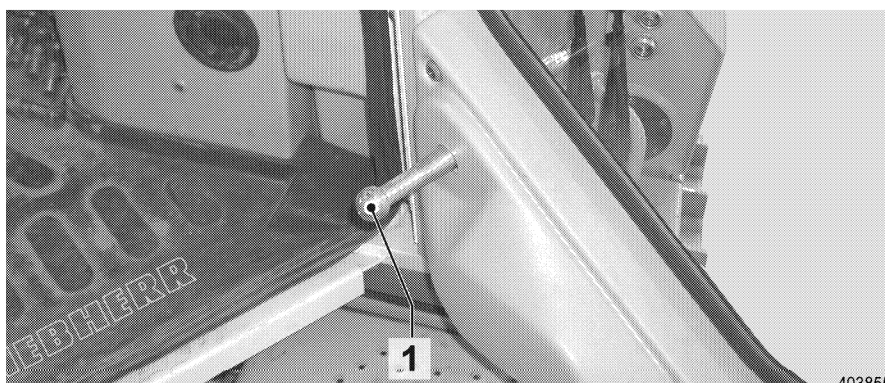
Open the operator's cab door

To open the door from the inside

- Push the lever 1 on the door lock up.

Door latch

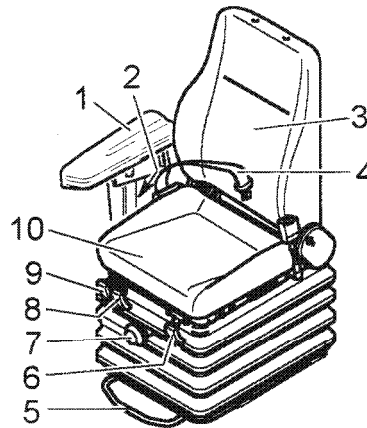
The fully opened cab doors are held in this position by the door latch 1.



Release the door latch

- To release the door latch: Push lever 1 down.

3.2.4 Operator's seat



403034

Operator's seat - main components and control elements

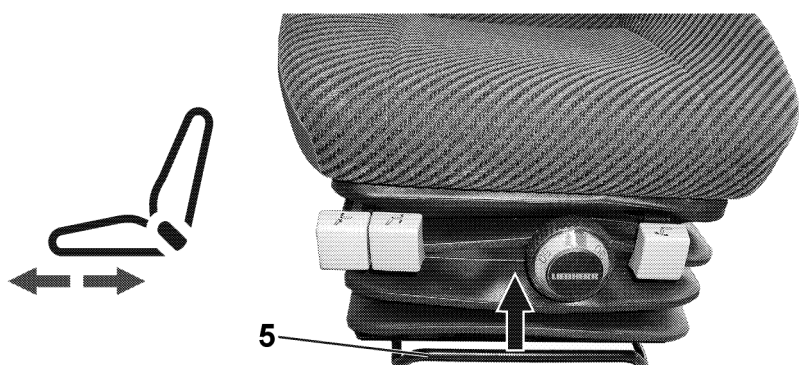
- | | |
|---------------------------------|---------------------------------------|
| 1 Armrest | 7 Knob - seat suspension |
| 2 Arm rest adjustment | 8 Lever - incline adjustment forward |
| 3 Backrest | 9 Lever - incline adjustment backward |
| 4 Seat belt | 10 Seat surface |
| 5 Lever - horizontal adjustment | |
| 6 Lever - backrest adjustment | |

Individual adjustment for ergonomic seat position

The operator's seat can be adjusted for optimum operator comfort.

Horizontal adjustment

The seat can be moved forward or backward with the lever 5 on the front of the operator's seat.



403030

Horizontal adjustment

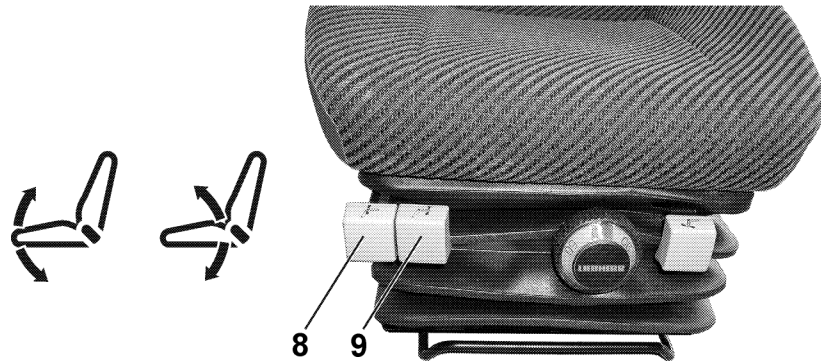
- 5 Lever - Horizontal adjustment

- Pull the lever 5 in direction of the arrow.

- Bring the operator's seat to the desired horizontal position and release the lever.

**Adjustment of seat surface in-
cline**

The adjustment can be made with lever 8 and lever 9 on the right front of the operator's seat.



403032

Adjustment of seat surface, height

8 Lever - incline adjustment to the rear

9 Lever - incline adjustment to the front

- Incline adjustment, rear: Lift lever 8 in direction of the arrow, adjust the incline and release the lever.
- Incline adjustment, front: Lift lever 9 in direction of the arrow, adjust the incline and release the lever.

Adjustment of seat height

The height of the seat can be adjusted with lever 8 and lever 9 on the right side of the operator's seat.

- Lift lever 8 and lever 9 at the same time.
- Raise the seat to the desired height and release both levers.

Backrest adjustment

The incline of the backrest can be adjusted with lever 3 on the left hand side of the operator's seat.



403033

Adjustment - backrest

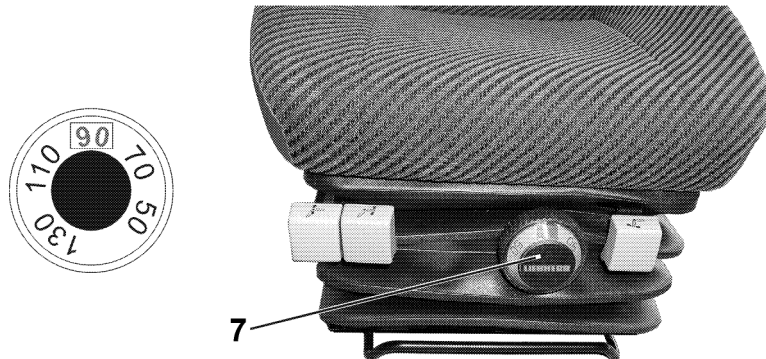
3 Lever - backrest adjustment

- Lift lever 3.

- Bring the backrest to the desired incline and release the lever.

Adjustment of seat suspension

The seat suspension can be set to the bodyweight of the operator. The adjustment is made via the knob on the front of the operator's seat. The knob shows the adjusted weight in kg.



Adjustment - seat suspension

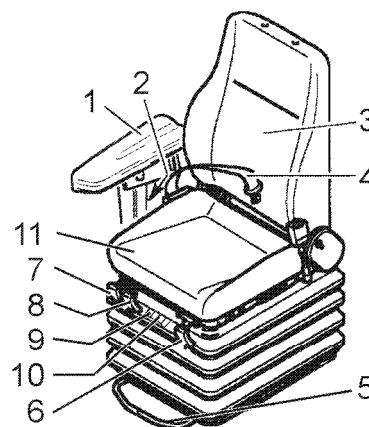
403031

7 Knob - Seat suspension

- Set the body weight of the operator with knob 7.

3.2.5 Operator's seat - air cushioned

(Optional equipment)



Operator's seat - main components and control elements

403040

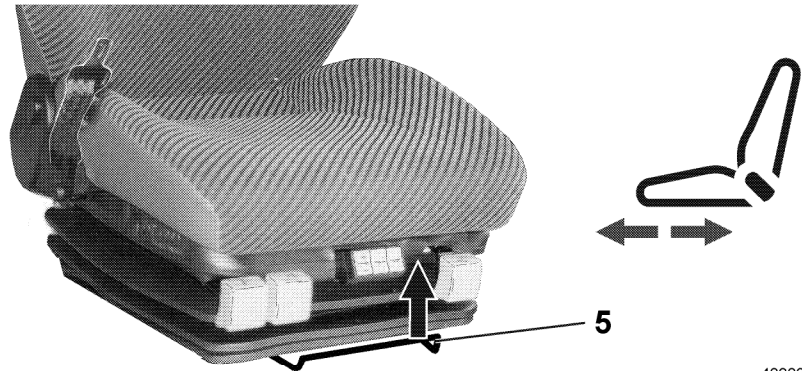
- | | |
|---------------------------------|------------------------------------|
| 1 Armrest | 7 Lever - incline position - front |
| 2 Adjustment - armrest | 8 Lever - incline position- rear |
| 3 Backrest | 9 Button - seat suspension |
| 4 Seatbelt | 10 Button - back support |
| 5 Lever - horizontal adjustment | 11 Seat surface |
| 6 Lever - adjustment - backrest | |

Individual adjustment for ergonomic seat position

The operator's seat can be adjusted for optimum operator comfort.

Horizontal adjustment

The seat can be moved forward or backward with the lever 5 on the front of the operator's seat.



403035

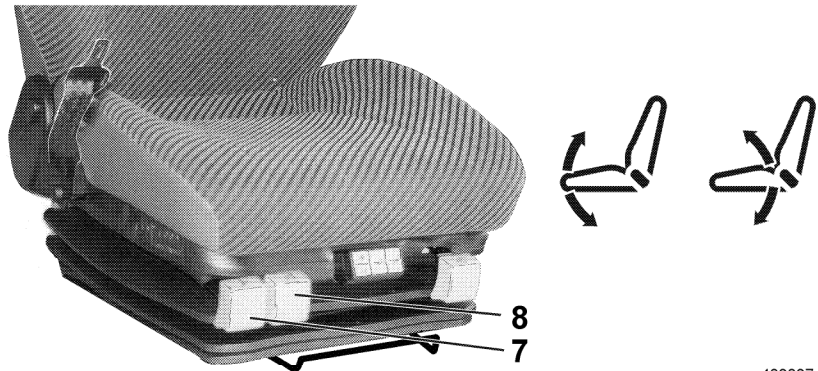
Horizontal adjustment

5 Lever - Horizontal adjustment

- Pull lever 5 in direction of the arrow,
- Set the operator's seat in horizontal position and release the lever.

Seat surface incline

The adjustment can be made with lever 7 and lever 8 on the right front of the operator's seat.



403037

Adjustment - seat surface, height

7 Lever - incline position on the rear

8 Lever - incline position on the front

- Incline adjustment on the rear: Lift lever 7 in direction of the arrow, set the incline and release the lever.
- Incline adjustment on the front: Lift the lever 8 in direction of the arrow, set the incline and release the lever.

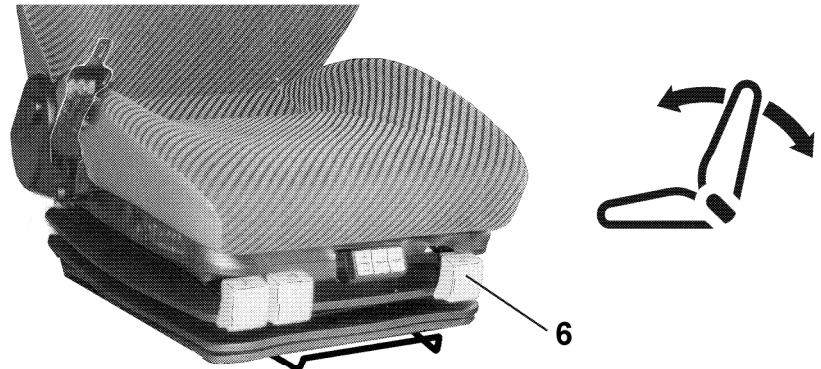
Adjustment of seat height

The height of the seat can be adjusted with lever 7 and lever 8 on the right hand side of the operator's seat.

- Lift lever 7 and lever 8 at the same time.
- Move the seat to the desired height and release both levers.

Backrest adjustment

The incline of the backrest can be set with lever 6 on the left side of the operator's seat.



Adjustment - backrest

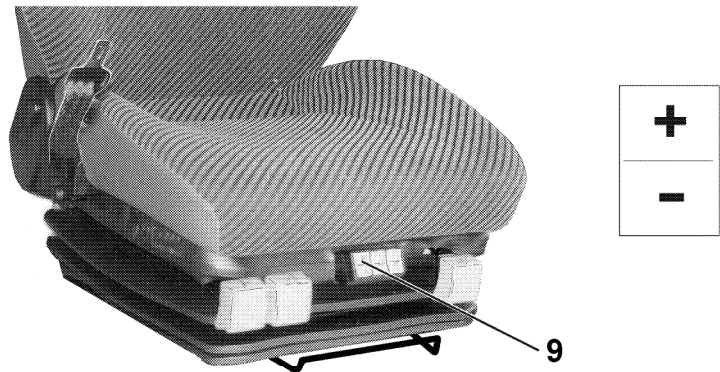
403038

6 Lever - adjustment - backrest

- Lift lever 6.
- Bring the backrest into the desired incline and release the lever.

Adjust the seat suspension

The seat suspension can be set to the bodyweight of the operator. The adjustment is made with the button on the front side of the operator's seat. Press the button in "+" or "-" direction until the desired seat suspension is set.



Adjustment - seat suspension

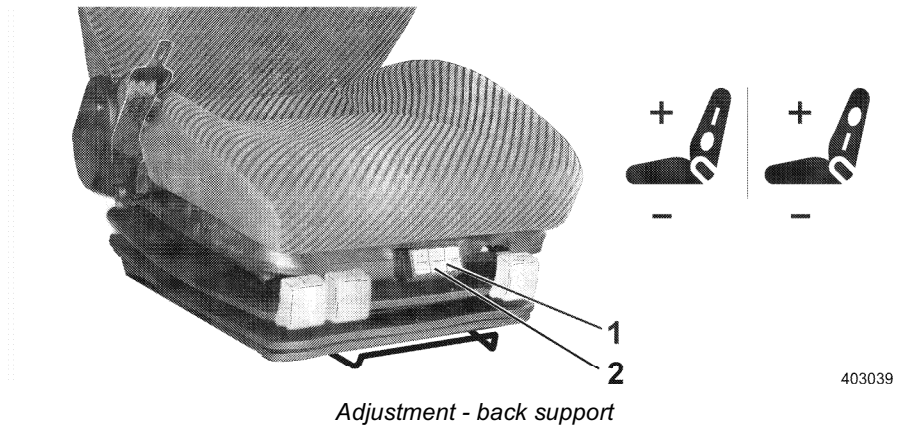
403036

9 Button - seat suspension

- Press button 9 to set the corresponding bodyweight.

Adjustment of back support

The lower back supports in the backrest can be individually adjusted. Two lower back supports are installed in the backrest: one in the upper and one in the lower area of the backrest. The adjustment is made via buttons 1 and 2.



Adjustment - back support

- Adjust the back support with buttons 1 and 2.

3.2.6 Vibration absorber

The installed seat conforms to ISO 7096.

If the machine is used as intended, the values of the vibration load are smaller or the same as the test exciter vibration for the corresponding machine class according to ISO 7096.

The values of the vibration accelerations a_{zw} , measured according to ISO 2631-1, therefore meet the requirements for full body vibration protection according to EN 474-1.

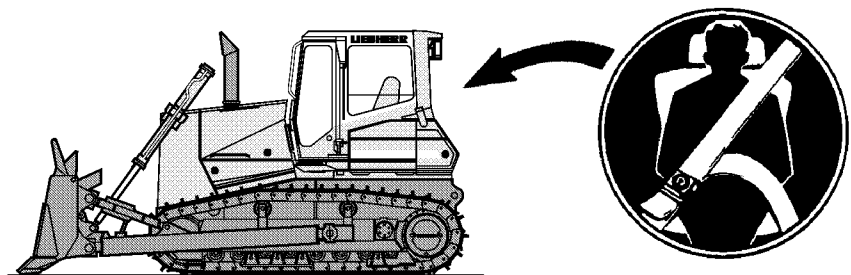
3.2.7 Seatbelt

Observation of safety aspects

The operator's cab of the machine is equipped with a rollover protection - ROPS .

The roll over protection - ROPS is only a safety device for the operator, if he wears the seatbelt.

The safety aspects of the seatbelt are described as follows.



Fasten the seatbelt

404009

Caution



There is a danger of injuries if the seatbelt is not fastened! If the machine is suddenly slowed down or stopped and the operator did not fasten the seatbelt, he can be seriously injured!

! The operator must always fasten the seatbelt before operating the machine.

Danger

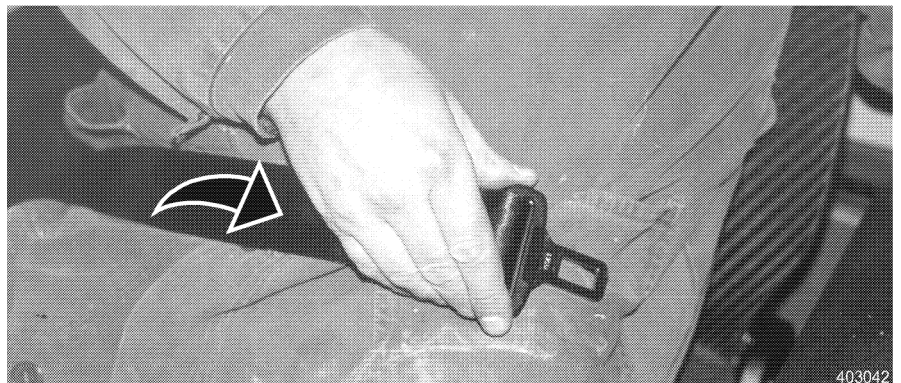
There is a danger of injuries if the seatbelt is not fastened! If the machine tips or rolls over, death or serious injury may occur if the seatbelt is not fastened!

! Always fasten the seatbelt before operating the machine!

- To ensure safety: check the condition, function and mounting of the belt frequently and replace worn, damaged or defective parts immediately.
- Make sure that the seatbelt is not twisted when in use.

Place the seatbelt

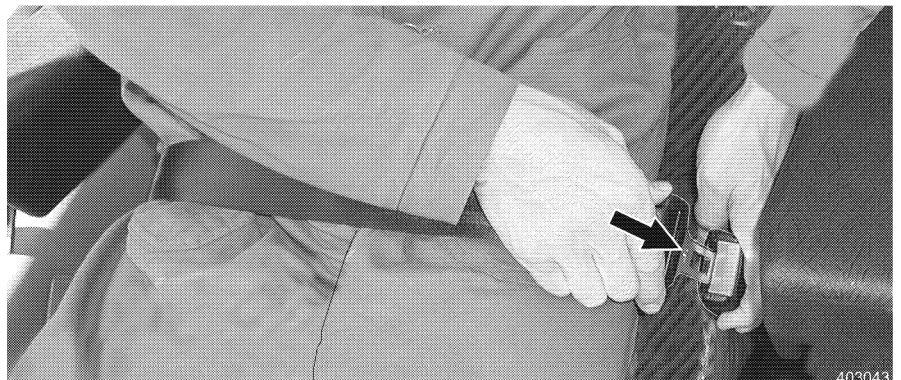
The seatbelt adjusts automatically. The length of the belt does not need to be adjusted.



Place the seatbelt

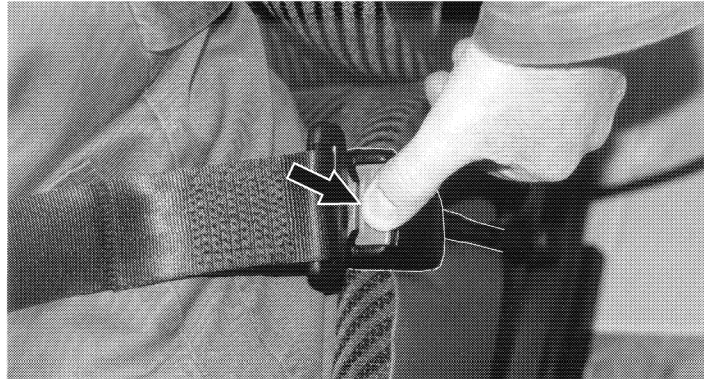
- Hold the belt with the right hand and slowly pull the belt from the housing.

NOTE: If the seatbelt is pulled out too quickly, the retainer will lock up the belt.



Close the seatbelt

- Hold the snap lock with the left hand and pull the belt over your lap.
- Insert the belt into the lock to engage. Pull the belt to make sure it is locked.



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Release the seatbelt

Release the seatbelt

- To release the seatbelt: push the button on the lock downward with your thumb.

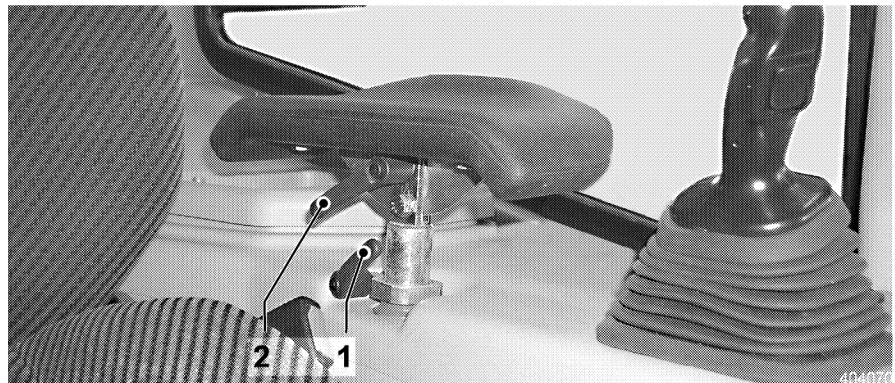
Adjustment of armrest

The height and incline of the armrest can be adjusted individually.

- Adjustment: Loosen handle 1, adjust height and incline and lock in place.

3.2.8 Armrests

The height and the horizontal position of the armrest can be adjusted individually.



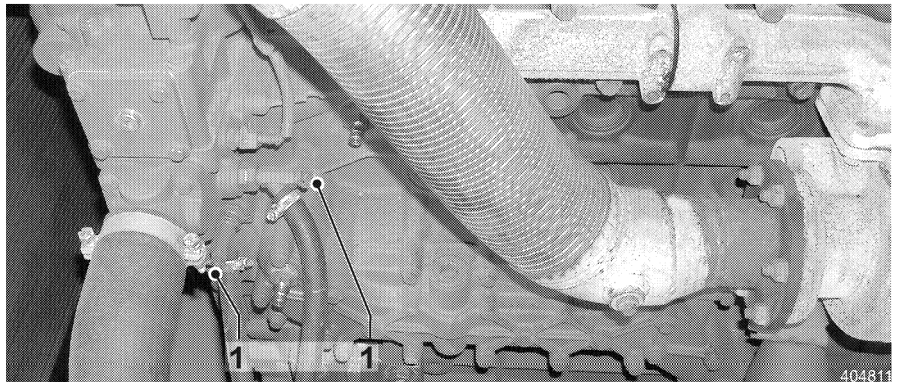
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Adjustment - arm rest

- To adjust the height: loosen handle 1, set the height and the horizontal position and lock in place.
- To adjust the incline: loosen handle 2, set the incline and lock in place.

3.2.9 Heater, ventilation

The operator's cab is equipped with a warm water heater. The operator's cab can also be equipped with an optional air conditioning system.



Shut off valves

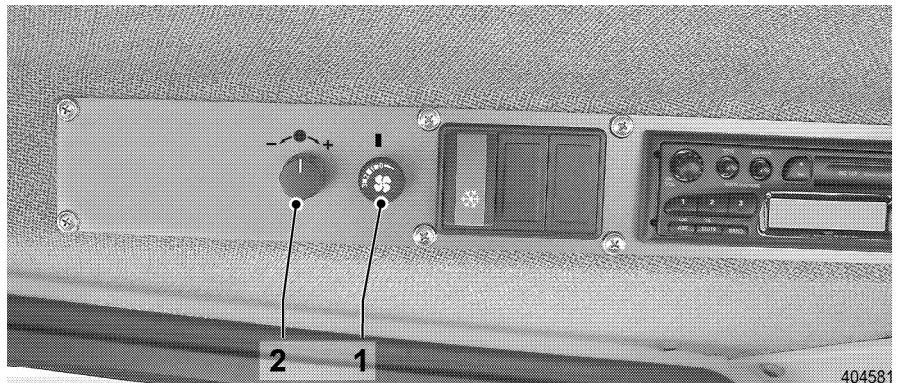
The operator's cab can only be heated if the Diesel engine is at operating temperature and the shut off valves 1 are open.

- The shut off valves are located on the left front on the Diesel engine.

Turn the heater on / off

Control elements of heater:

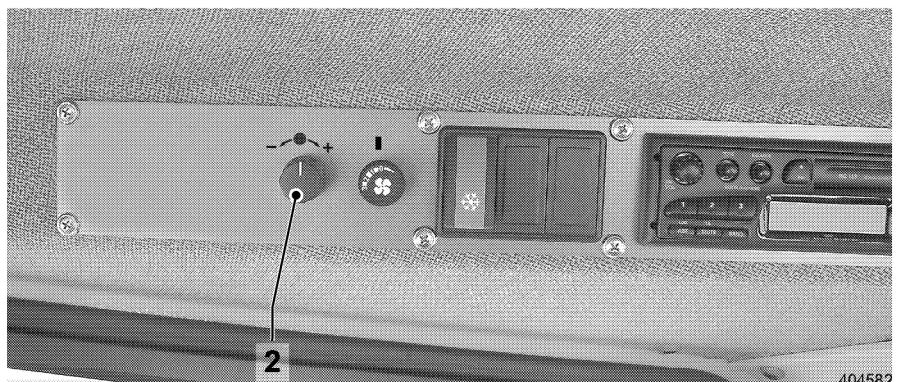
- 1 - Knob - blower
- 2 - Knob - temperature



Heater control elements

Make sure that:

- the electrical system of the machine is turned on,
- the vents for the desired air flow are open. For example to the body, to the front window, to the rear window.
- Turn the heater on: Move the switch 1 to stage 1. The air flow is blown via vents into the operator's cab.



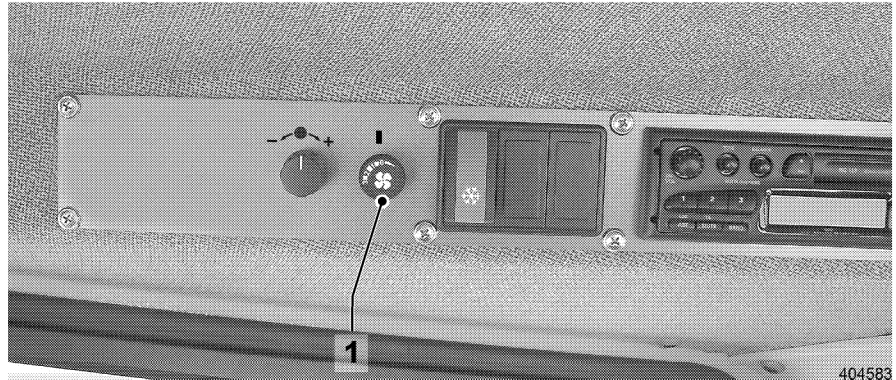
Temperature regulator

The temperature regulation is stepless: Turn the regulator 2 in clockwise direction for warm, in counterclockwise direction for cold.

- Regulate the temperature: Turn the regulator 2 into the desired position.

Regulate the blower

Turn the blower on or off with the knob 1 for the blower.



Blower knob

Blower stages:

Stage 0 – OFF position

Stage 1 – weak air flow

Stage 2 – medium air flow

Stage 3 – strong air flow

- Turn knob 1 to the desired stage.

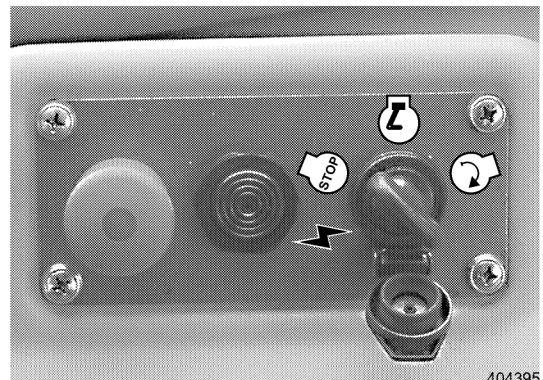
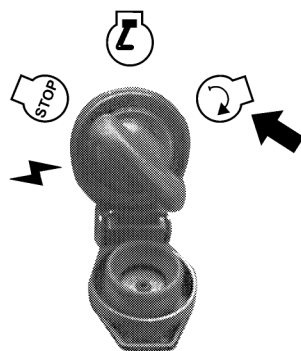
The air flow is blown via vents into the operator's cab.

3.2.10 Air conditioning system

To ensure the long-term function of the air conditioning system, we recommend to turn on the air conditioner at least once every two weeks. During the operation of the air conditioning system, the shaft seal ring in the compressor is lubricated. This prevents loss of refrigerant from the compressor.

On damp days, the air conditioner can also be used to dehumidify the air in the cab.

This improves the cab climate and prevents the windows from fogging up.

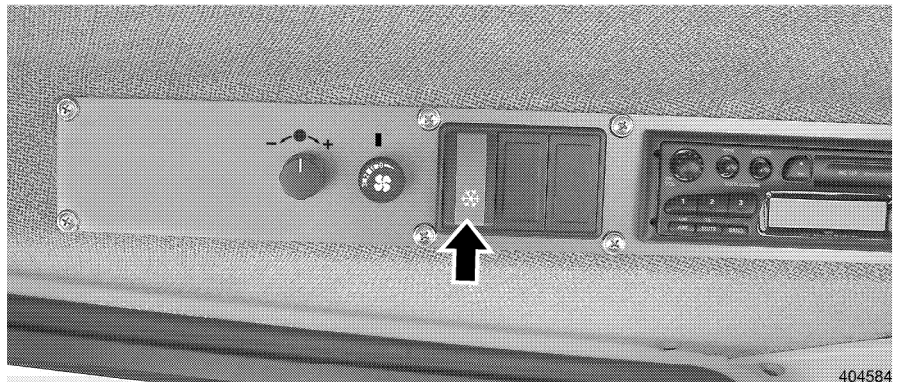


Start the Diesel engine

Turn on the air conditioning system

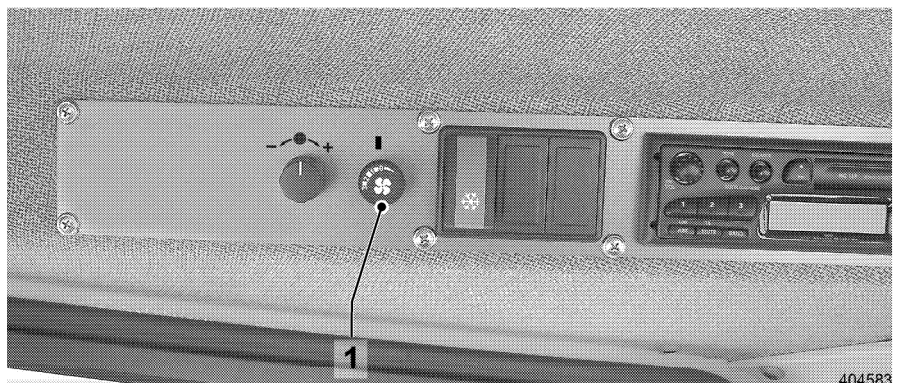
The air conditioner only operates if the Diesel engine is running.

- Start the Diesel engine.



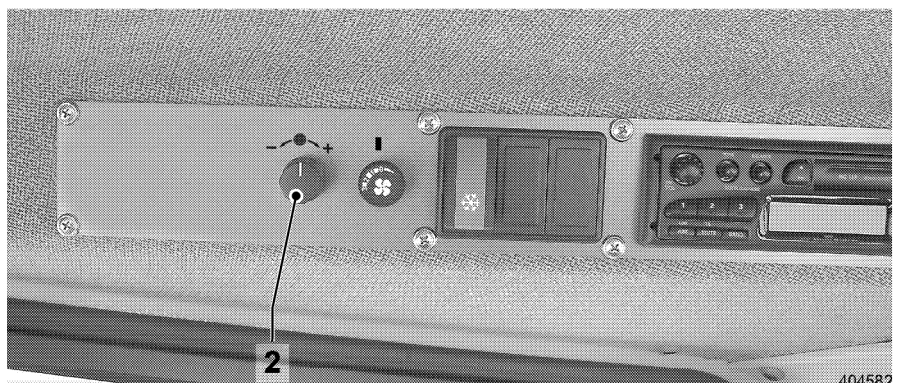
Air conditioner master switch

- Press the air conditioner master switch in the instrument panel.



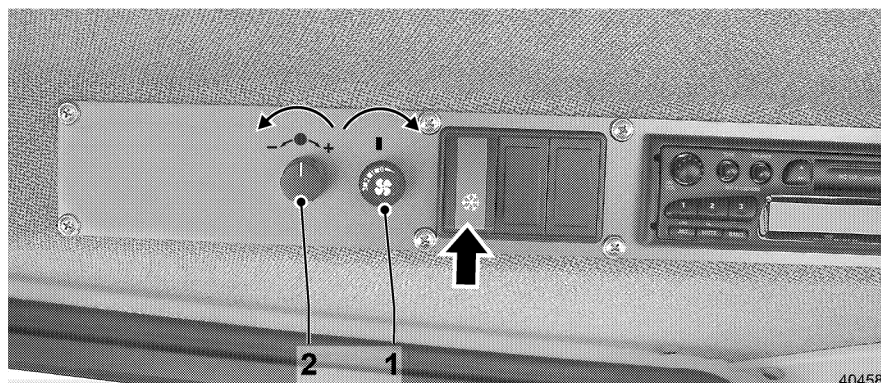
Blower - Knob

- Set the blower knob 1 at least to stage 1.



Temperature regulator

- With knob 2, select the desired temperature.
By turning the knob in counterclockwise direction, the temperature in the operator's cab is reduced.
Due to the integrated ice up protection, the evaporator will not ice up.



Air conditioning system – full power

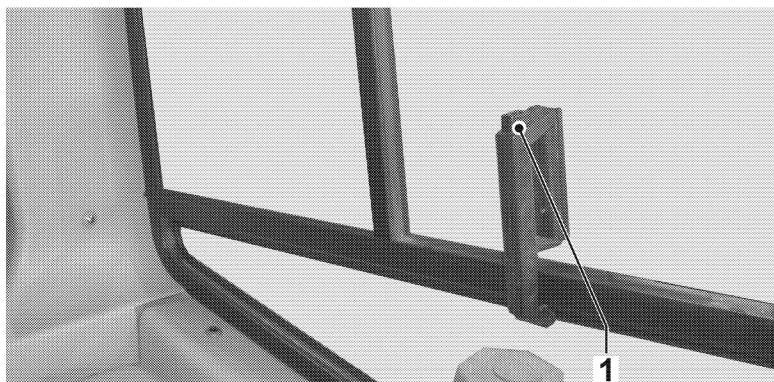
Air conditioning system – full power

The greatest cooling effect in the cab is obtained:

- by turning knob 2 in counterclockwise direction to the stop.
- by setting the highest blower stage.
- by closing the windows.

3.2.11 Sliding window

The sliding windows in the operator's cab can be opened by pulling the handle and locked in position at several points.



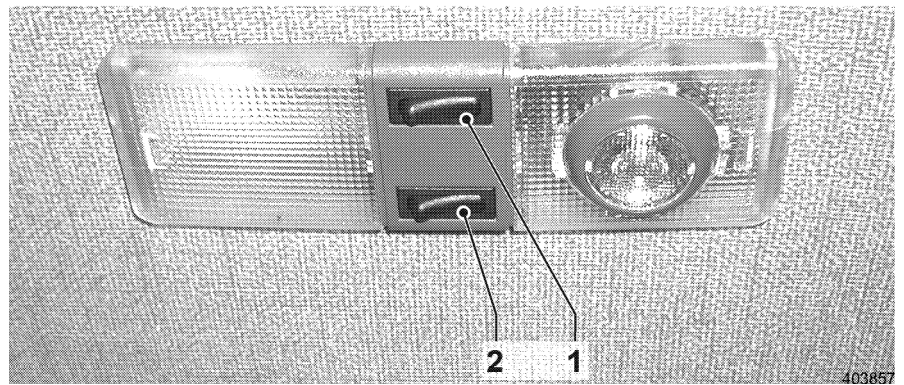
Open / close the sliding window

- Push the button 1 on the handle and move the sliding window to the desired position.

3.2.12 Cab interior light - reading lamp

Turn the light on / off

The interior light and the reading lamp are located in the roof of the operator's cab.



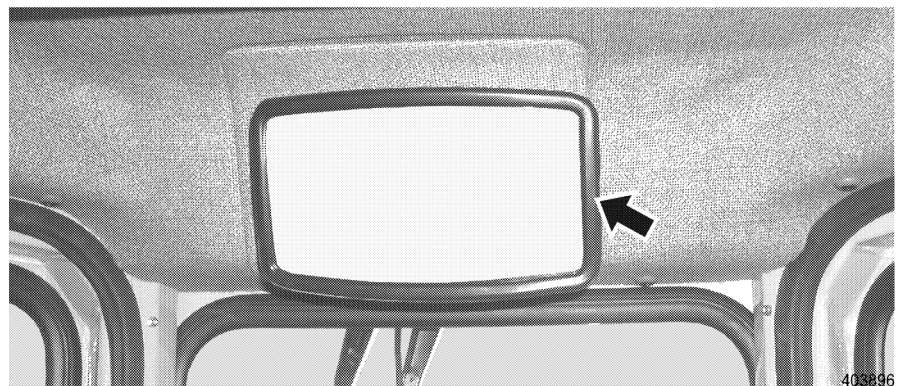
Interior light - reading lamp

- Interior light: Turn on / off with switch 1.
- Reading lamp: Turn on / off with switch 2.

3.2.13 Rear view mirror

Adjustment of mirror

The operator's cab is equipped with a rear view mirror.



Adjustment - mirror

- Adjust the mirror before operating the machine.

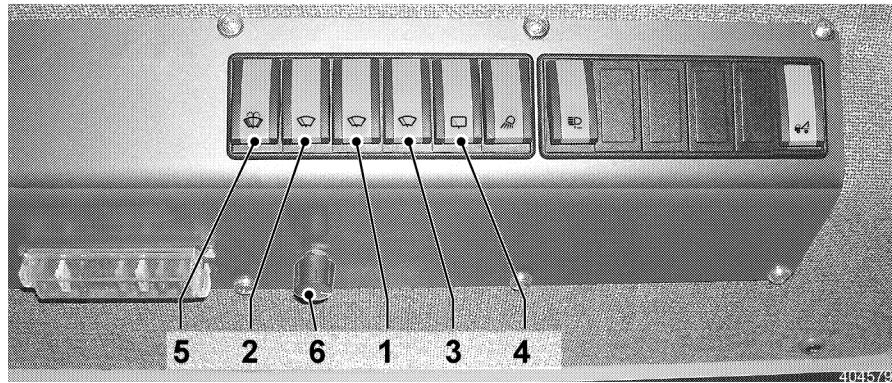
3.2.14 Electric windshield wiper and washer system

The machine is equipped with an electric windshield washer system for the front and rear window as well as for the doors.

It consists mainly of the control elements, the windshield wipers, the reservoir and the nozzles for the window washer fluid.

Make sure that the electrical system of the machine is turned on before operating the windshield wiper and washer system.

If freezing temperatures, check to make sure that the wiper blades are not frozen to the window before turning the system on initially.

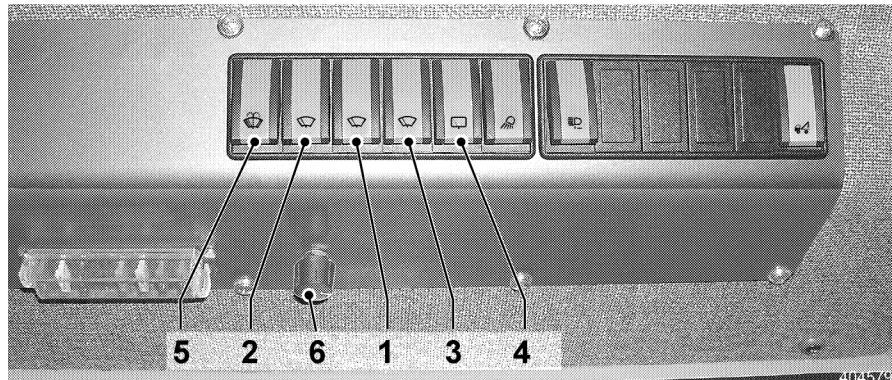


Switch - Windshield wiper and washer system

Control of windshield wiper and washer system

The windshield wiper system is operated via switch 1, 2, 3, and 4.

The windshield washer system and intermittent control is actuated via switch 5. The timing for intermittent wipe can be regulated with knob 6.



Switch - Windshield wiper and washer system

- | | |
|---|--|
| 1 Switch - Windshield wiper system - front window | 4 Switch - Windshield wiper system - rear window |
| 2 Switch - Windshield wiper system - left door | 5 Switch - Intermittent control / windshield washer system |
| 3 Switch - Windshield wiper system - right door | 6 Knob - Intermittent control |

Wipe window

- Press switch 1, 2, 3 or 4. The selected windshield wiper is activated.

Intermittent wipe / continuous wipe

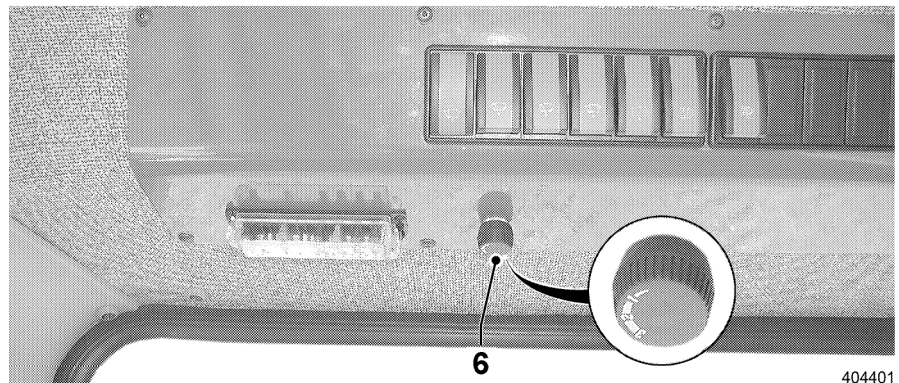
Functions Switch 5:

- Press switch on top: Intermittent wipe
- Switch center position: Continuous wipe
- Press switch on the bottom: Wipe / wash function

- Windshield wiper continuous wipe: Turn switch 5 to stage 1 (center position). The windshield wiper, which was turned on with switch 1, 2, 3 or 4 is changed from intermittent wipe to continuous wipe.

Timing – intermittent wipe

The time interval for intermittent wipe can be adjusted in stages with knob 6.



6

404401

Knob – Intermittent wipe

- Set the knob 6 to the desired stage.

Wash window

- Press switch 5 and hold it down.

The window washer fluid is sprayed onto the windows.

3.2.15 Compartment for documentation

A compartment for the machine documentation has been installed on the front in the operator's cab.



1

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Compartment

Open the compartment for the machine documentation

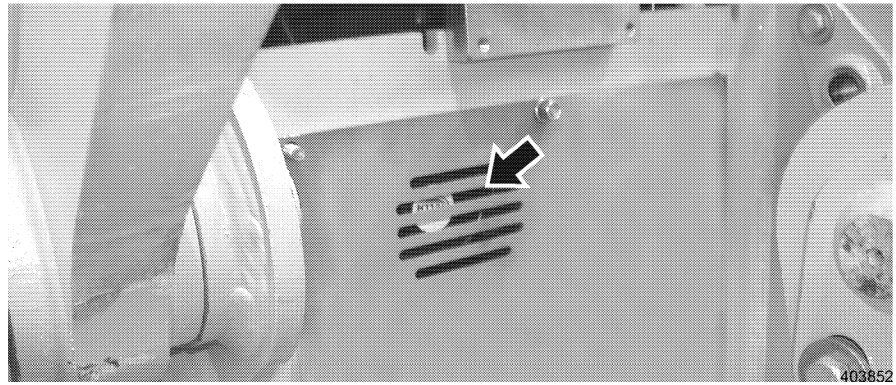
- Push the button 1 on the lock and open the cover.

The Operating manual for the machine should always be available in the compartment.

The Operating Manual is part of the machine!

3.2.16 Back-up alarm

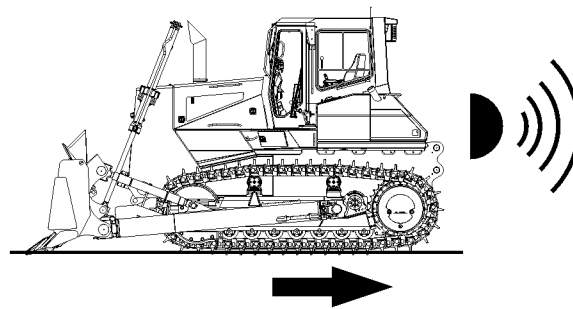
(Option)



Back-up alarm

The back-up alarm sounds when the travel lever is moved into position for "Reverse travel".

- With the horn, persons behind the machine are warned.
- The back-up alarm is in the rear of the machine. The volume is automatically set.
- Before operating the machine, check the function of the back-up alarm by moving the travel lever into the position for "reverse travel".



Check the back-up alarm

- Start the machine.
- Move the safety lever down.
- Pull the travel joystick backward.
- The back-up alarm must sound.

Danger

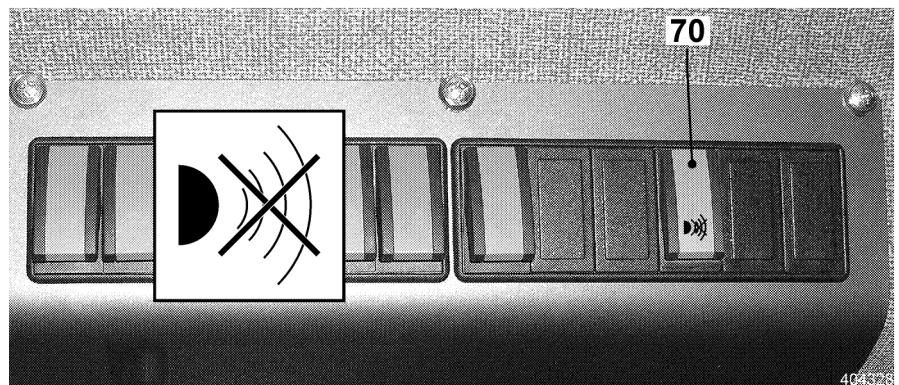


! Danger of accident!

Make sure that no one is endangered when moving the machine, even though a back-up alarm is installed.

3.2.17 Back-up alarm - disengageable

(Special equipment)

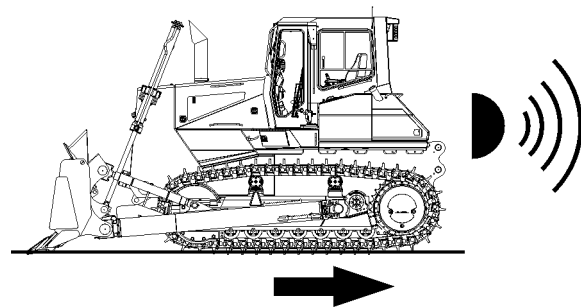


Switch – back-up alarm

70 Back-up alarm - disengagable

The acoustical signal for the „back-up alarm“ can be turned off via the switch 70 on the right roof console.

- The back-up alarm is a safety device, which warns personnel acoustically as soon as the machine moves backward.
- ! The back-up alarm should only be turned off in exceptional cases.
- Before operating the machine, check the function of the back-up alarm by moving the travel lever into the position for “reverse travel”.



Check the back-up alarm

404884

- Start the machine.
- Move the safety lever down.
- Pull the travel joystick backward.
- The back-up alarm must sound.

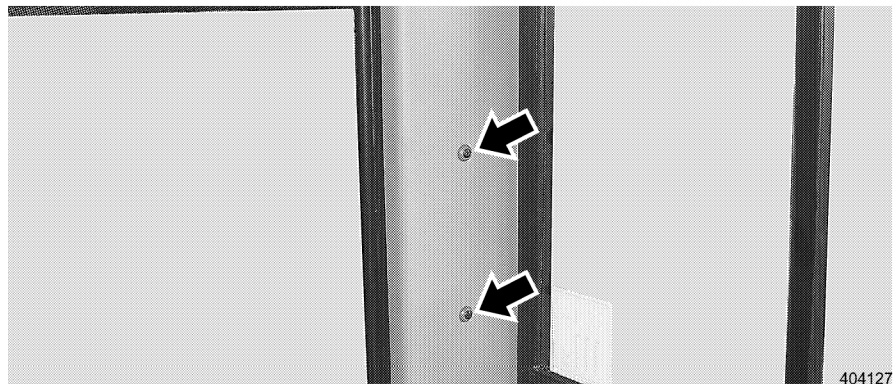
Danger

! Danger of accident!

Make sure that no one is endangered when moving the machine, even though a back-up alarm is installed.

3.2.18 Fire extinguisher

(Optional equipment)



Location of fire extinguisher

Location of fire extinguisher

A mounting location is available for retrofit installation of a fire extinguishers on the left hand side behind the operator's seat.

- Contact your Liebherr dealer to order the fire extinguisher installation kit.

3.2.19 Beacon

(Optional equipment)

Your machine is also prepared for the retrofit installation of a beacon.

- For the installation kit of the beacon, contact your LIEBHERR dealer.

3.3 Operation

3.3.1 Daily operational tasks

Before daily operation of the machine, the "Maintenance tasks for 8 - 10 operating hours" must be carried out. See "Maintenance and Inspection schedule".

After completion of the "Maintenance tasks for every 8 - 10 operating hours", the machine must be brought into operating position. See section "Operating position".

Make sure that:

- Before putting the machine into daily service, the "Maintenance tasks for every 8 - 10 operating hours" have been carried out.
- Sufficient Diesel fuel is available for the daily task. See section "Add Diesel fuel".

Operating position

To bring the machine into operating position, proceed as follows.

Turn the battery master switch on

The battery master switch is on the right hand side in the battery compartment.



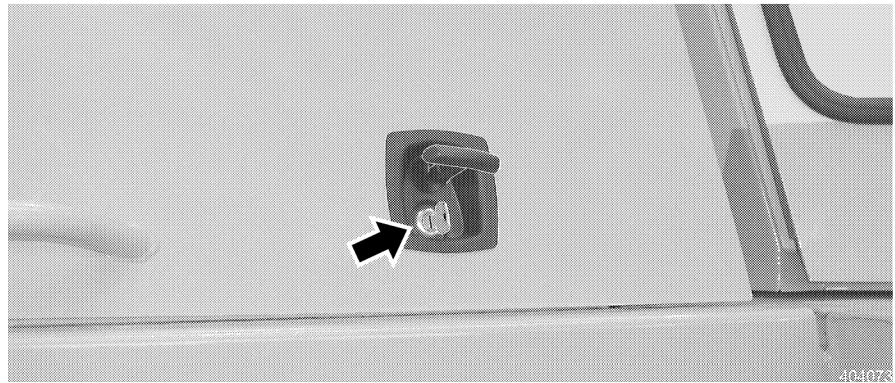
Battery compartment

- Open the battery compartment door



Battery master switch

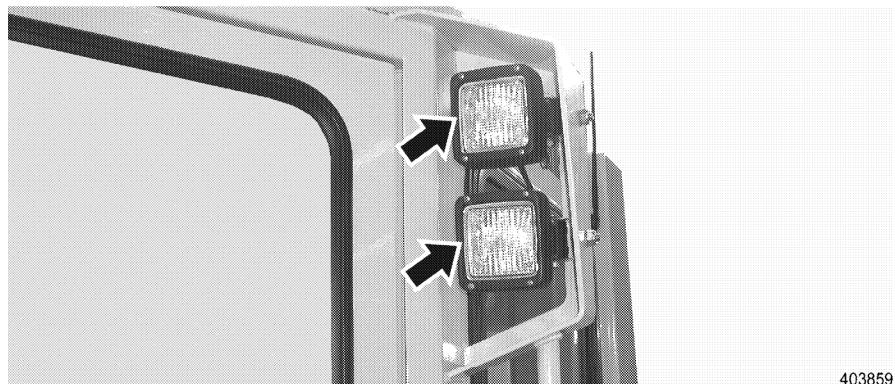
- Turn the battery master switch on.
 - Set the switch to position " I " .



Lock all doors

Close the service doors, flaps and hoods

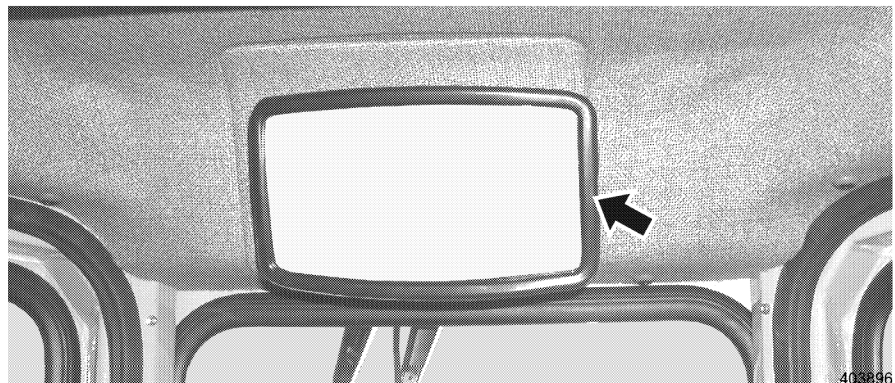
- Close all service doors, flaps and hoods and lock, if possible.



Headlight adjustment

Check the lighting system

- Check the lighting system.
- If necessary, adjust the headlights.

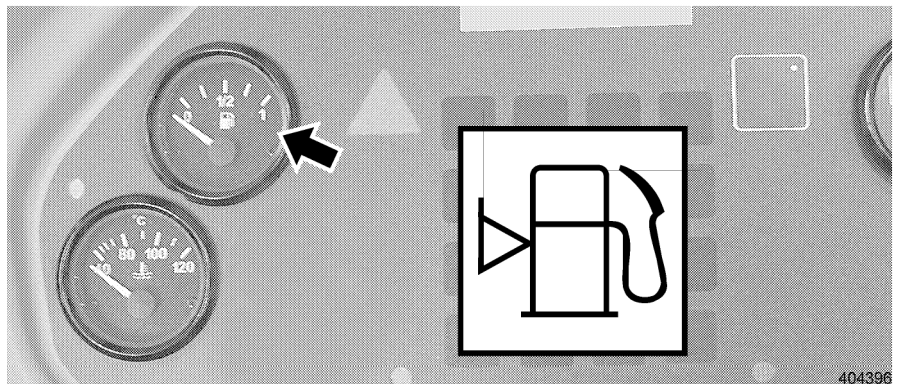


Rear view mirror

Adjust the rear view mirror

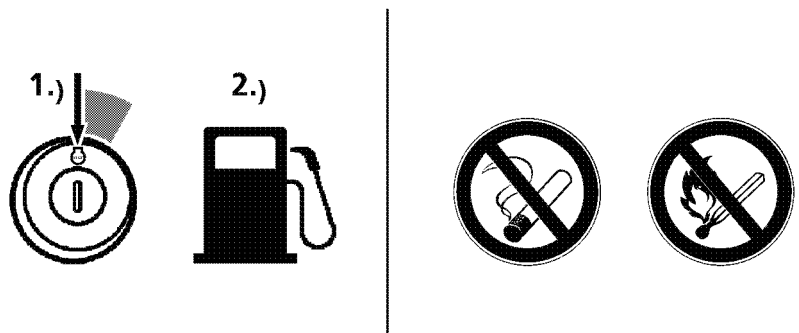
- Adjust the rear view mirror.

Add Diesel fuel



Fuel gauge

- Fuel gauge**
- Set the starter switch to contact position.
 - Check on the fuel gauge if there is sufficient Diesel fuel in the tank.



Refueling safety

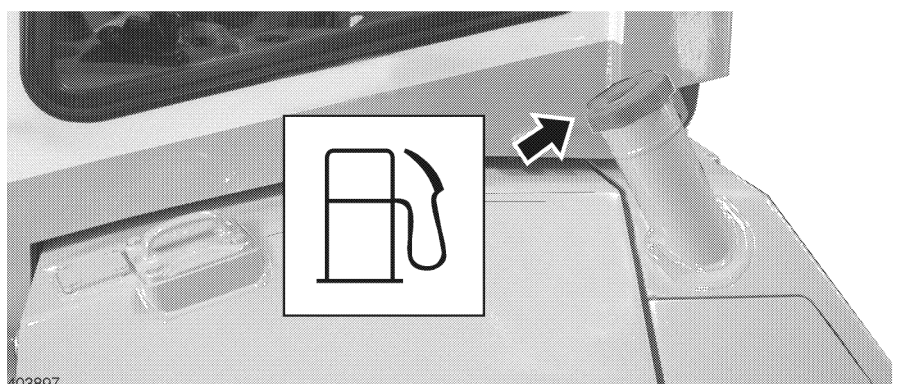
Danger

During refueling, there is a danger of fire and explosion.

! Do not smoke and avoid open flames when refueling.

! Add fuel only when the Diesel engine is turned off.

- Make sure to observe all safety guidelines for refueling. See also: Chapter "Safety guidelines".



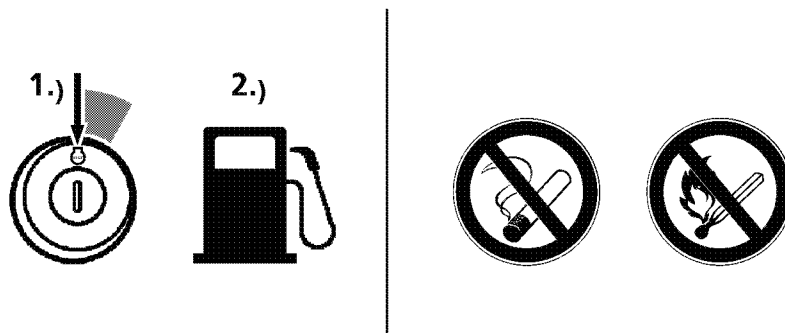
Tank cover

- Unscrew the tank cover.
- Add only clean Diesel fuel.
- Add Diesel fuel only via the integrated strainer.

To avoid condensation in the fuel tank, always refuel after work or after a shift change.

Add Diesel fuel with the refueling pump

(Optional equipment)



403183

Refueling safety

Danger



During refuelling, there is a danger of fire and explosion.
! Do not smoke and avoid open flames when refueling.
! Add fuel only when the Diesel engine is turned off.

- Make sure to observe all safety guidelines for refueling. See also: Chapter "Safety guidelines".

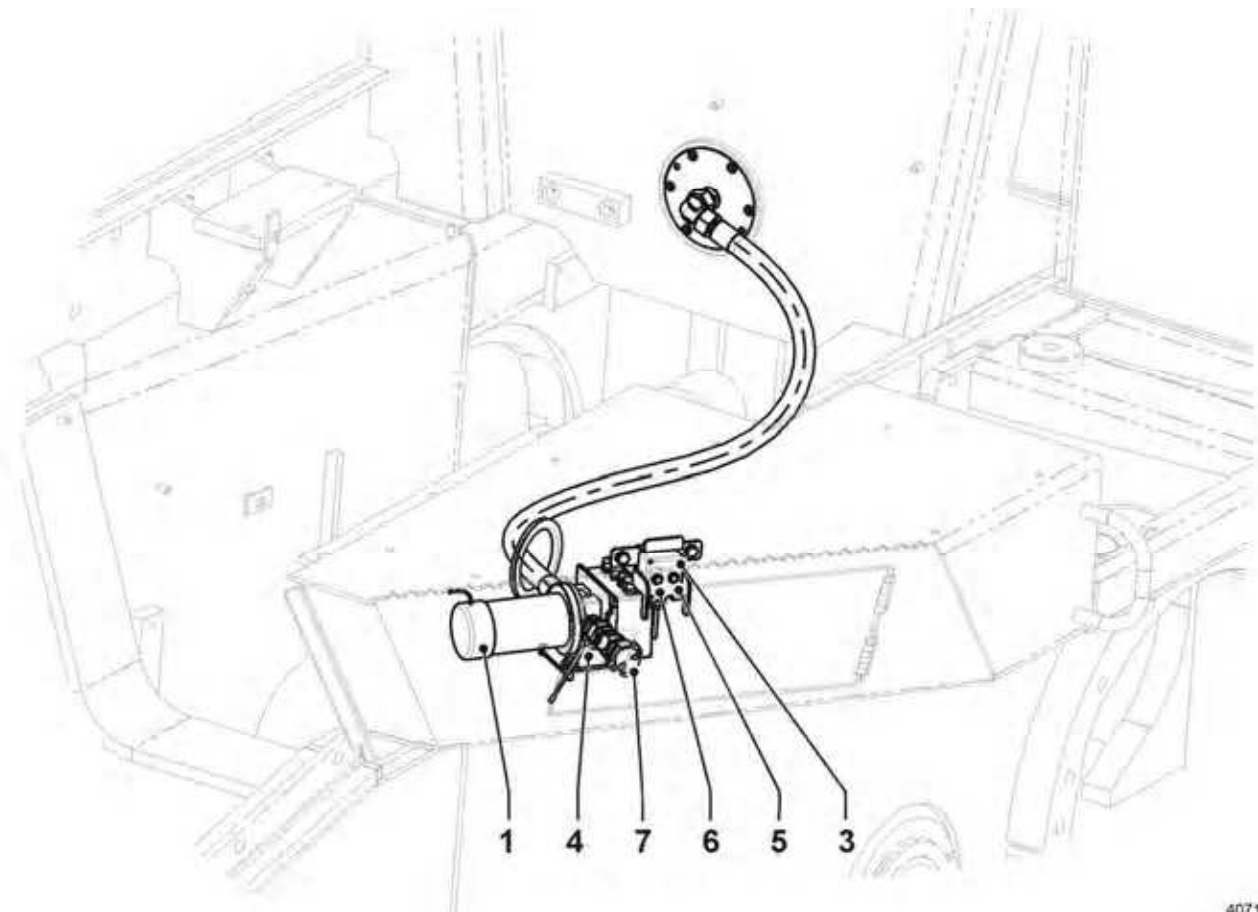


Access – refueling pump

Refuelling procedure

The refuelling pump is located on the left hand side in the step.

- Open the step door 1.



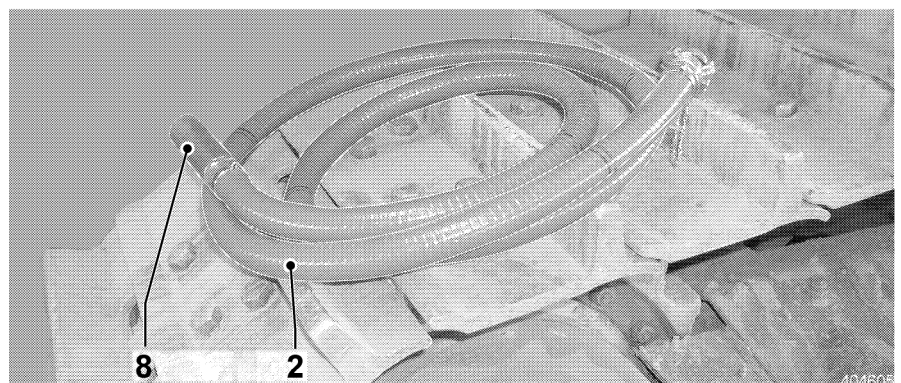
Installation – refueling pump

1 Refuelling pump
2 Suction hose
3 Control

4 Shut off valve
5 Switch - On (green)
6 Switch – Off (red)

7 Cover
8 Strainer

– Control 3 is removable.



Suction hose - strainer

2 Suction hose
8 Strainer

- Remove the blind couplings on the connection on the refueling pump and on the suction hose 2.
- Connect the suction hose 2 to the connection of the refuelling pump.

Caution

Danger of damage to the refueling pump!

! Never refuel without a strainer on the suction hose.

– The strainer protects the refueling pump from contaminants.

- Dip the suction hose 2 with the installed strainer 8 into the fuel barrel.
- Open the shut off valve 4 on connection of the refuelling pump.
 - The shut off valve prevents Diesel fuel discharge from the refueling pump.
- ! Before turning on the refueling pump, make sure to open the shut off valve!
- Remove the control with cable from the retainer.
- Turn the refueling pump on with switch 5 (green).

As soon as the maximum fill level is reached, the fill level sensor turns the refueling pump off automatically.

The refueling procedure can be interrupted at any time by turning off the switch 6 (red).

Caution

The pump may not run dry.

! Make sure that the fuel level does not drop below the suction level of the suction hose.

- Close the shut off valve 4.
- Make sure that there is no fuel left in the suction hose 2 before storing it.
- Roll up the suction hose 2 and store it in the storage compartment. Close off the connections with the covers.
- Close the step door again.

3.3.2 Machine operation in low ambient temperatures

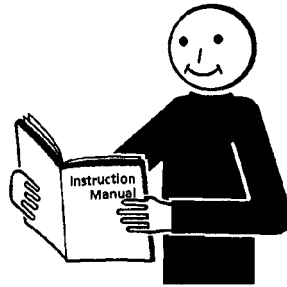
Your machine can be operated without additional special equipment to an ambient temperature of -22°C .

If the ambient temperatures remain constantly below -22°C , then special equipment should be installed to ensure proper operation.

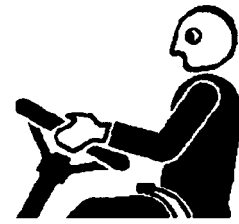
When using the machine below -22°C , contact your LIEBHERR service or the manufacturer directly.

3.3.3 Start the Diesel engine

1.)



2.)



403045

Operating instructions

- 1.) read and understand
- 2.) travel and work

Operate the machine only if you have read and understand the operating instructions!

Notes for travel drive of the machine:

- The machine is equipped with a hydrostatic travel drive.
- The Diesel engine cannot be started by pushing or towing the machine.

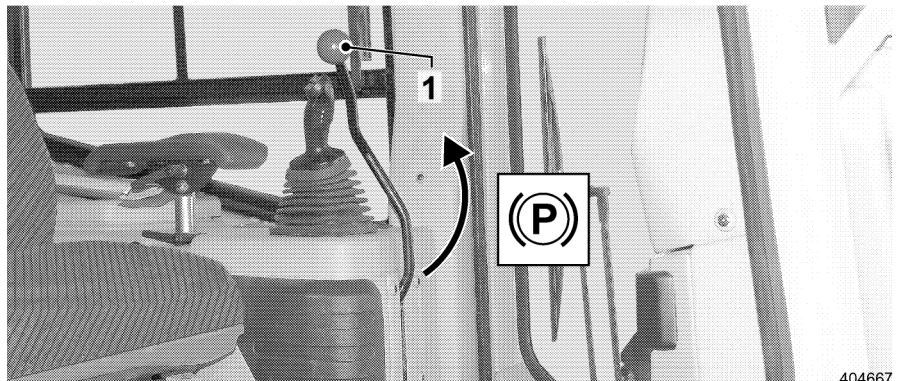
Preparations before starting

Before starting the machine, make the following preparations.
Make sure that the machine is in operating position.
See section "Operating position".

Caution



- The engine can only be started if the safety lever is raised.
- If the engine can be started in any other position of the safety lever, then this defect must be remedied.

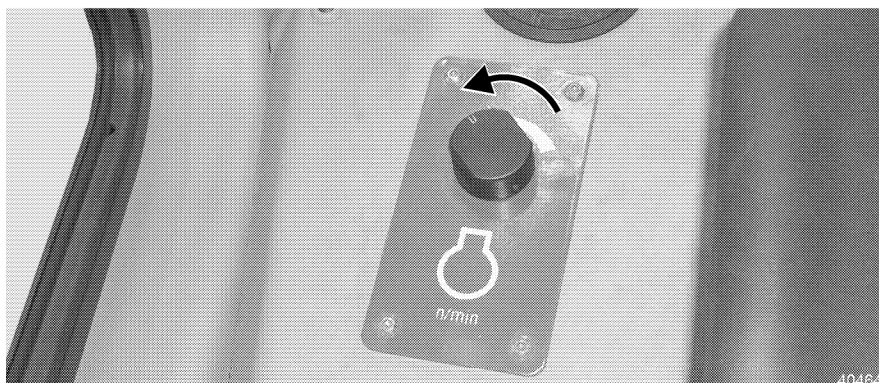


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Safety lever up

Check the joystick position

- Move the safety lever 1 up.
- The joystick must be in neutral position.



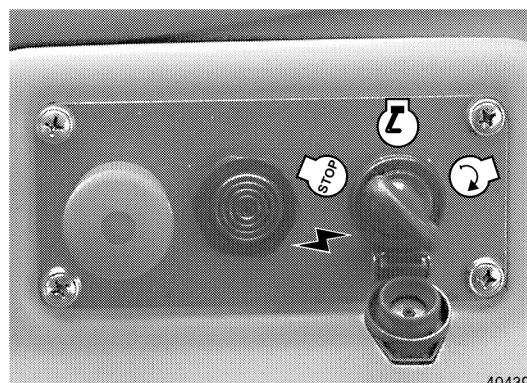
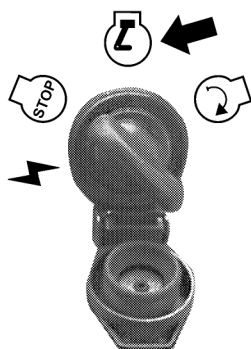
Throttle control – low idle

- Set the throttle control to low idle.
- Turn the throttle control to the stop to the left.
- ! After the starting procedure, leave the throttle control at low idle and wait for the Diesel engine to warm up before subjecting it to a full load. Do not place a full load on a cold Diesel engine.

Starting procedure

Check indicator lights

When the starter key is in contact position, the indicator lights, the on board electronic and the control electronic is checked.

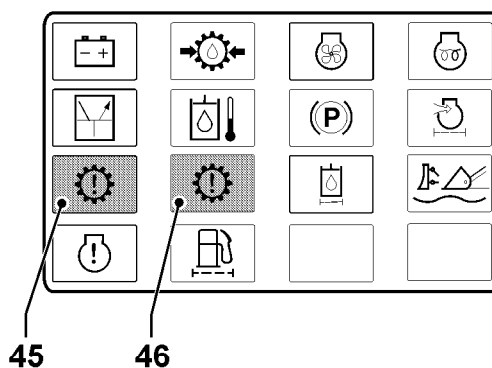


Starter switch – Contact position

- Set the ignition key to contact position.

Indicator lights

The following indicator lights light up only for a short time (duration 2.5 - 3 sec.).

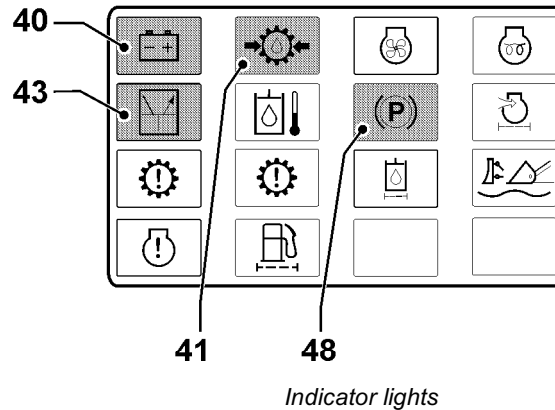


Indicator lights

404413

- 45 Indicator light - seal area, left
46 Indicator light - seal area, right

The following indicator lights must still light up:



404414

- 31 Warning light – Operator's cab
40 Indicator light – Battery charge
41 Indicator light – Pump replenishing pressure
43 Indicator light - Electronic
48 Indicator light – Travel brake

Start the engine

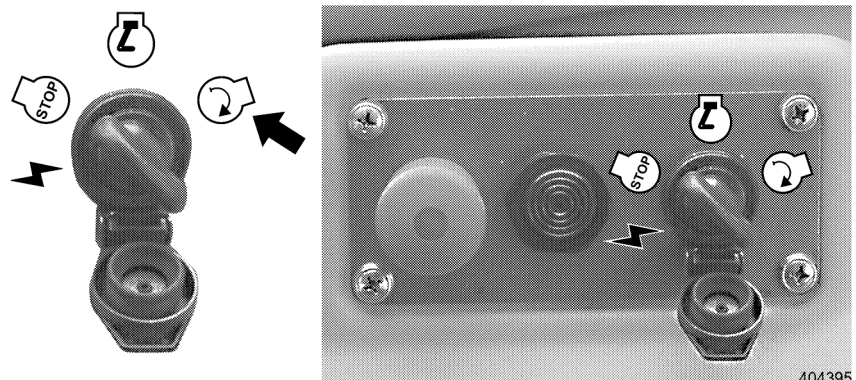
The preheat time depends on the ambient temperature and the electric starting conditions.

The Diesel engine is equipped with an automatic preheat system.

When the starter switch is moved to contact position, the preheating phase starts automatically, the indicator light – preheat system lights up.

The Diesel engine can be started as soon as a suitable starting temperature is reached. The indicator light – preheat system blinks.

! If the Diesel engine is warm or at high ambient temperatures, the Diesel engine can be started immediately. The indicator light – preheat system blinks.



Starter switch – Starting position

404395

- Set the starter switch to contact position.
 - In case of automatic preheat, the indicator light – preheat system lights up.
 - When the Diesel engine is ready to start, the indicator light – preheat system blinks.
- Turn the starter switch to starting position and hold it in this position until the engine starts.

- Do not turn the starter switch for longer than maximum 10 seconds without a break.

If the engine does not start:

- Turn the starter switch back to off position.

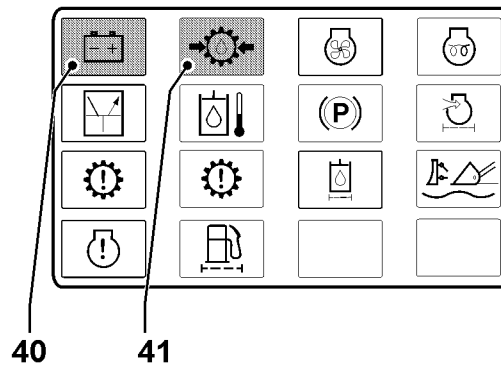
Problem remedy

The engine does not start?

- Repeat the starting procedure after waiting for 120 seconds.
- If the engine has not started after two starting attempts, check the troubleshooting chart (see section "Operating problems") and remedy the problem.

- As soon as the engine is running, release the starter switch. The starter switch returns by itself to operating position.
- Do not place a full load on the engine until after a short warm up period.

After the engine is running, the following indicator lights must turn off:



404415

Indicator lights turn off

31 Warning light – Operator’s cab
40 Indicator light – battery charge

41 Indicator light – pump replenishing pressure

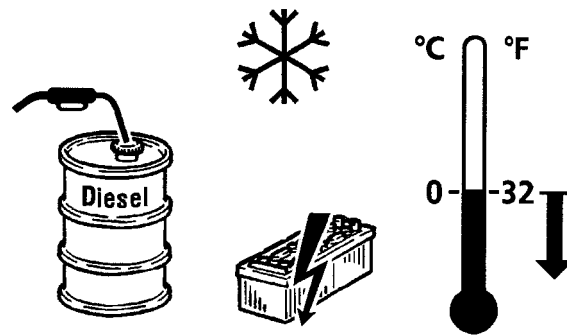
Problem remedy

The indicator lights do not turn off?

- Turn the engine off and find and remedy the cause as outlined in section "Operating problems".

Preparations for starting at freezing temperatures

The following preparations improve the starting behaviour at low ambient temperatures.



Winter operation

403046

Preparations:

- Check the battery charge, recharge the battery if necessary.
- Use Winter fuel. See section "Lubricants and service fluids" under "Winter operation".

Danger



Danger of explosion of Diesel engine!

When using ether based starting aids to start Diesel engines with preheat systems, there is a danger of explosion!

! Do not use ether based starting aids.

- Carry out the preparations for starting at freezing temperatures.

! After the starting procedure, move the throttle control lever immediately to low idle and wait for the Diesel engine to warm up before subjecting it to a full load. Do not place a full load on a cold Diesel engine.

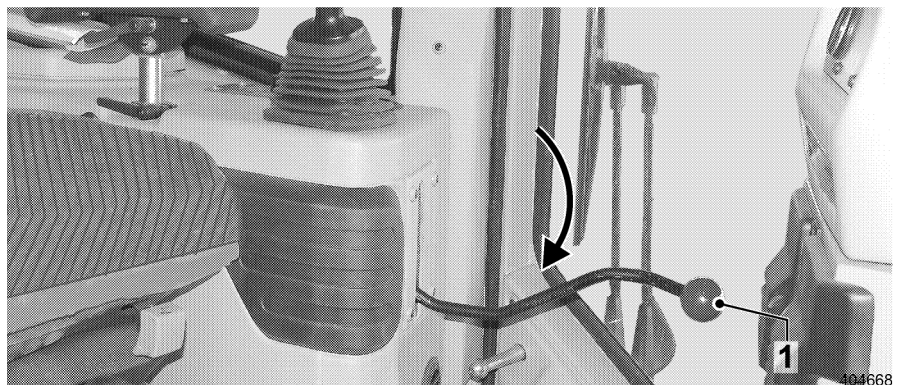
3.3.4 Travel operation

Preparations for travel operation

The preparations for travel operation must be carried out in the stated sequence.

First make sure that the machine is in operating position.

See section "Operating position".



Safety lever down

- Move the safety lever 1 down.

Self-check of electronic system

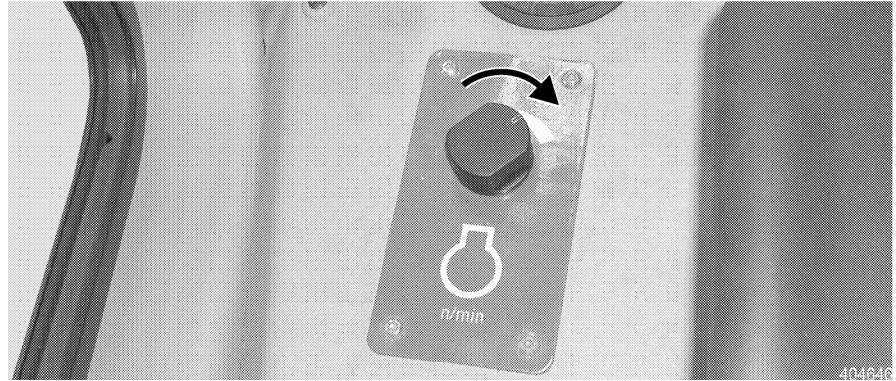
- After approx. 3 seconds, the indicator light – Electronic lights up momentarily.

- Do not deflect the travel joystick until after the indicator light – Electronic lights up. The electronic system runs through a self-check.

Operating temperature

Cold hydraulic oil causes the machine to react sluggishly.

- Bring the hydraulic oil to operating temperature by repeatedly actuating the working hydraulic cylinder to stop.



Throttle control – full load

- Set the throttle control to full load.
 - Turn the throttle control all the way to the right to the stop.
 - Always work with the machine at full engine RPM. Only in some cases should the machine be operated at reduced engine RPM. The machine is ready to travel.

Preselection of speed ranges

The machine is equipped with a rocker switch on the travel joystick to preselect the travel speed. By changing to positions "II" or "I", the maximum obtainable travel speed can be reduced. The maximum obtainable travel speed is shown in the LC - display.

- With the travel joystick in off position or in forward position, the maximum obtainable travel speed for forward travel is shown in the display.
- With the travel joystick in reverse position, the maximum obtainable travel speed for reverse travel is shown in the display.

The speed can also be selected during travel.

When shifting down from full travel speed, the machine is hydrostatically slowed down.



Low speed range

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Caution

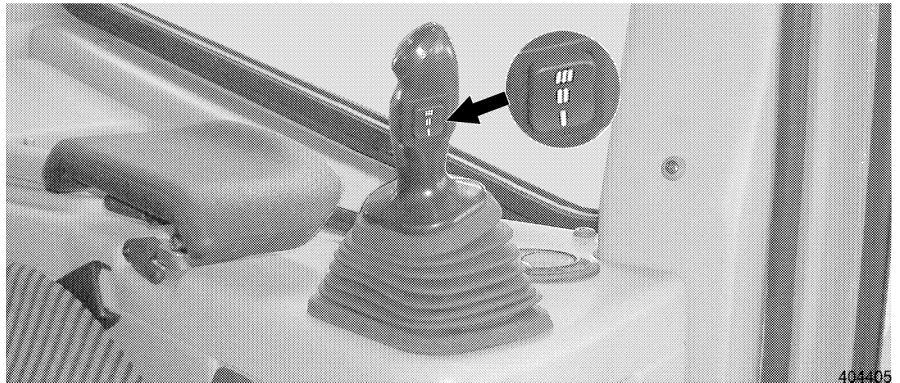
In constantly heavy push application and when working on slopes, switch to the low speed range "Position I".

! Do not drive on slopes faster than max. 4 km/hr.

! Drive downhill only at low speed, at max. 4 km/hr., or you could lose control over the machine.

– While doing so, the engine must run at highest RPM range, and the speed must be reduced by selecting the low speed range.

! Never switch into the low speed range when traveling down a slope, always do so before approaching the slope.



Rocker switch – Speed ranges

Basic setting – Speed ranges

Speed ranges

Full speed range

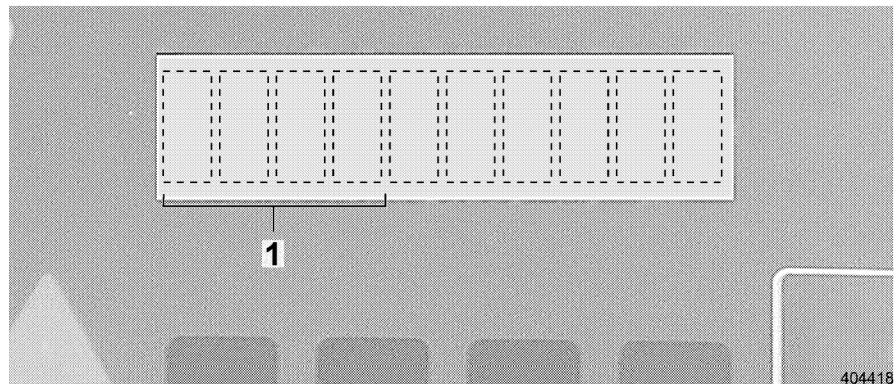
- Push the rocker switch on top - Position "III".
- Speed forward 0 - 11 km/hr.
- Speed reverse 0 - 11 km/hr.

Medium speed range

- Rocker switch in center position - Position "II".
- Speed forward 0 – 6.5 km/hr.
- Speed reverse 0 - 8 km/hr.

Low speed range

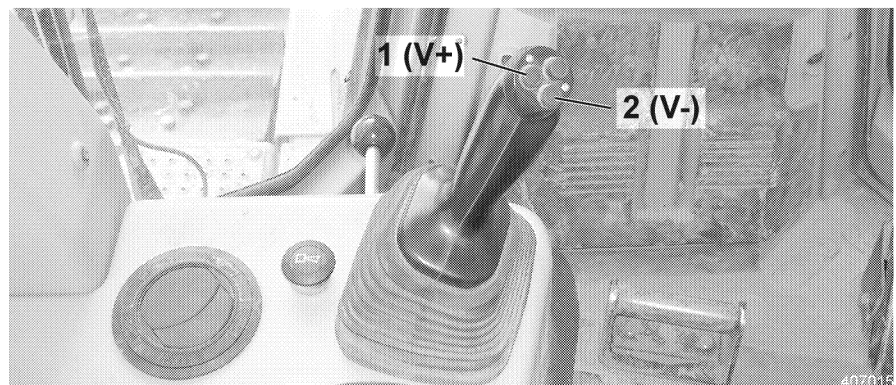
- Push rocker switch on the bottom - Position "I".
- Speed forward 0 - 4 km/hr.
- Speed reverse 0 – 4.5 km/hr.



LC display - km/hr.

The obtainable speed is shown in the LC - display 1 in km/hr.

Fine adjustment of travel speed



Button – Travel speed

- Press button 1 or 2 on the travel joystick and set the desired speed. The travel speed can be reduced or increased within the selected speed range (I, II, III) via button 1 and 2 on the travel joystick in 0.5 km/hr. intervals. The speed can be separately set for forward and also for reverse travel. This function allows the operator to optimally match the machine speed to the working conditions.

Adjustable speeds

Full speed range – rocker switch Position III

- forward 6.5 - 11 km/hr.
- reverse 6.5 - 11 km/hr.

Medium speed range – rocker switch Position II

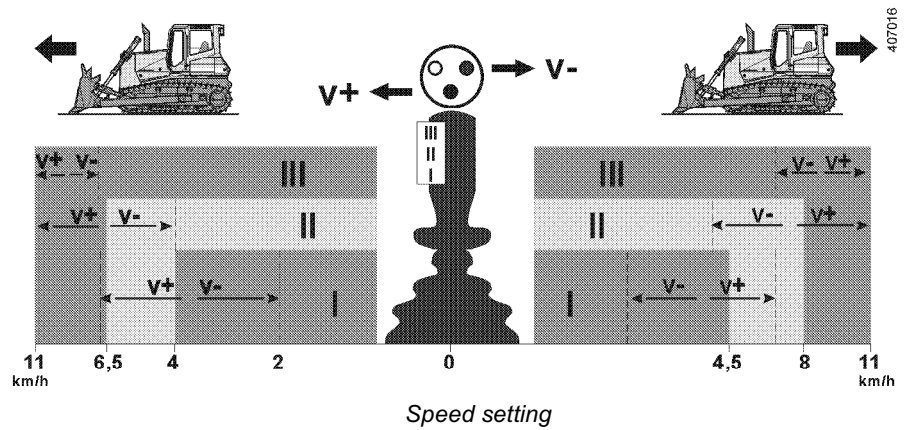
- forward 4 - 11 km/hr.
- reverse 4 - 11 km/hr.

Low speed range – rocker switch Position I

- forward 2 – 6.5 km/hr.
- reverse 2 – 6.5 km/hr.

The speed ranges for the travel speed cannot overlap due to the fine adjustment.

- For example, if the speed range III for travel speed forward has been set to 7 km/hr., then the speed cannot be set higher than 7 km/hr. in travel speed range II.

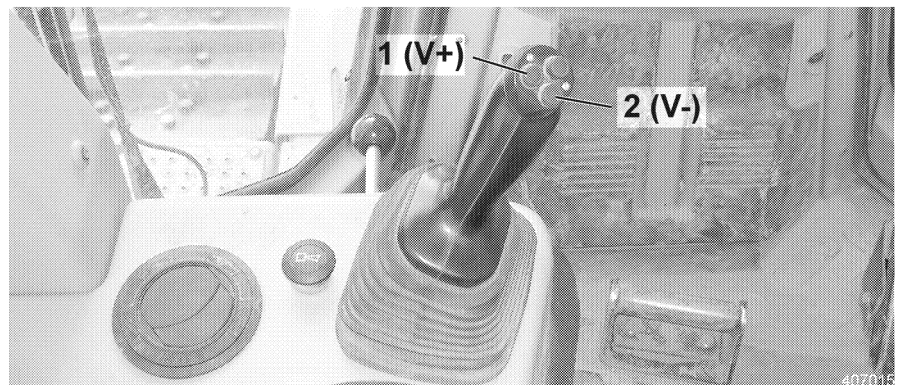


The fine adjustment has a memory function. The travel speed range selected via the buttons on the travel joystick is retained even after the machine has been turned off.

The travel speed can be set separately for forward travel as well as for reverse travel.

Set the travel speed

- Select the speed range.
 - Set the switch on the travel joystick to stage I, II or III.
- Deflect the travel joystick to the desired direction (forward or reverse).



Button – Travel speed

- Press button 1 or 2 on the travel joystick and set the desired speed.
 - The travel speed is shown in the LC – display and blinks as long as it is not saved. As soon as the speed does no longer blink, it has been automatically saved.

3.3.5 Travel

Straight travel



Forward travel

Forward travel

- Push the travel joystick slowly forward.
 - The machine drives forward.The further the travel joystick is pushed forward, the higher the travel speed.



Reverse travel

Reverse travel

- Pull the travel joystick slowly backward.
 - The machine drives back.The further the travel joystick is pulled back, the higher the travel speed.

Other steering maneuvers

In addition to forward and reverse travel, any desired steering movement can be carried out, at variable speeds.



Left hand turn

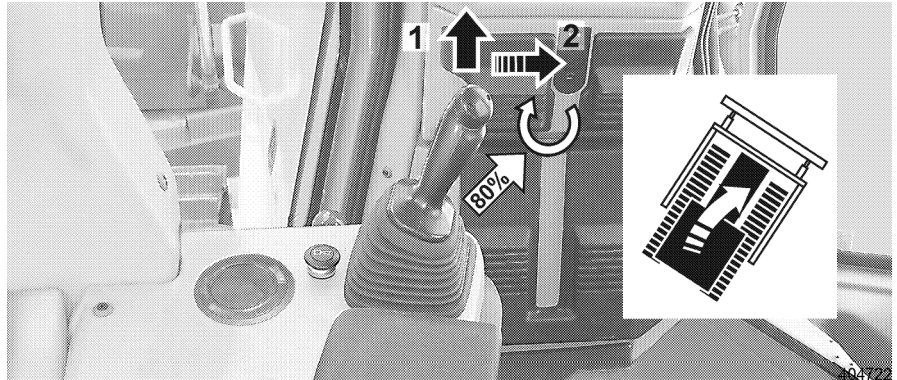
Left hand turn

- Deflect the travel joystick to the front and push it to the left.

- The machine moves forward at a slight left hand turn, both chains are moving forward.

The further the travel joystick is pushed to the left, the tighter the curve. If the joystick is deflected by 80%, the chain in the inside of the curve stops and the outer chain continues to turn at the preselected speed.

From 80 % deflection on, the chain in the inside of the curve turns in opposite direction to the chain on the outside of the curve. The further the travel joystick is deflected, the quicker the chain on the inside of the curve will turn.



Right hand turn

Right hand turn

- Deflect the travel joystick to the front and push it to the right.

- The machine moves forward at a slight right hand turn, both chains turn.

The further the travel joystick is pushed to the right, the tighter the curve.

If the joystick is deflected by 80%, the chain in the inside of the curve stops and the outer chain continues to turn at the preselected speed.

From 80 % deflection on, the chain in the inside of the curve turns in opposite direction to the chain on the outside of the curve. The further the travel joystick is deflected, the quicker the chain on the inside of the curve will turn.

3.3.6 Brakes

Travel joystick

Braking with the travel joystick

The hydrostatic travel drive of the machine also acts as a service brake. When moving the travel joystick back in the direction of neutral position, the travel speed is reduced in the same ratio.



Travel joystick – neutral position

- Move the travel joystick to neutral position.

When the travel joystick is in neutral position, the hydrostatic drive secures the machine to prevent it from rolling off.

In neutral position, the parking brake is applied automatically after max. 5 seconds. The working attachment can still be moved.

Speed reduction pedal (optional equipment)

Braking with the speed reduction pedal

By pressing down the speed reduction pedal, the travel speed, which was set with the travel joystick, can be reduced to a standstill.

Caution



If the speed reduction pedal is pressed down past a noticeable resistance, then the parking brake is applied.

! Danger of damage of the parking brake.

- Press the speed reduction pedal down completely only in an emergency situation.



Speed reduction pedal

- Press down the speed reduction pedal 1.

After releasing the speed reduction pedal, the machine continues at the preselected travel speed and travel direction.

- The foot detent 2 can be adjusted to match the corresponding requirements.

Caution

Danger of accident due to careless braking of the machine!

If the speed reduction pedal is pressed down completely, it causes the machine to stop abruptly.

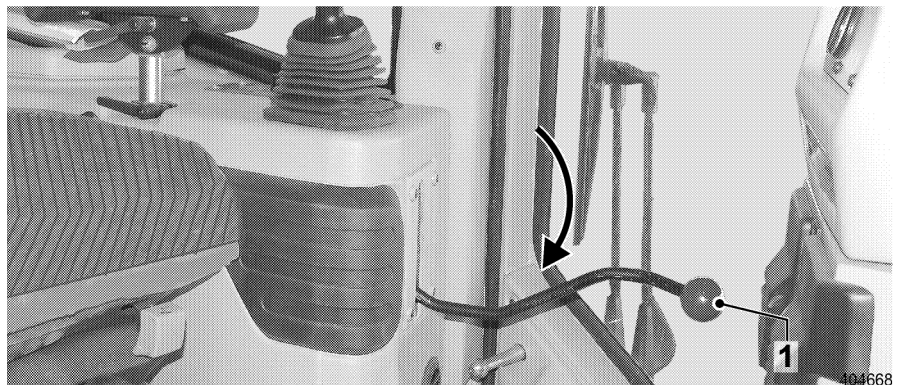
- Always wear the seat belt before operating the machine.

Parking brake

Activate the parking brake

The parking brake is activated by:

- moving the safety lever up.
- if the travel joystick is in neutral position for longer than 5 seconds.
- If the travel joystick is in neutral position and the chains continue to turn theoretically for approx. 2 cm.



Safety lever down

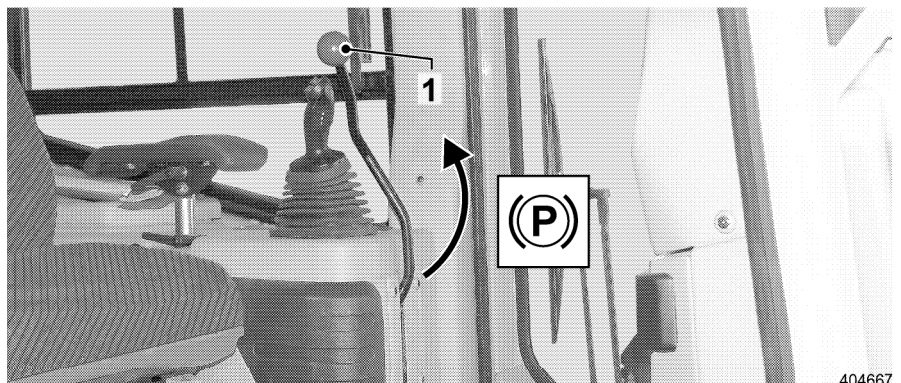
Release the parking brake

With the Diesel engine running:

- Move the safety lever 1 down.
- Deflect the travel joystick.

Turn the machine off

When the Diesel engine is turned off, the safety lever 1 must always be in the uppermost position.



Safety lever up

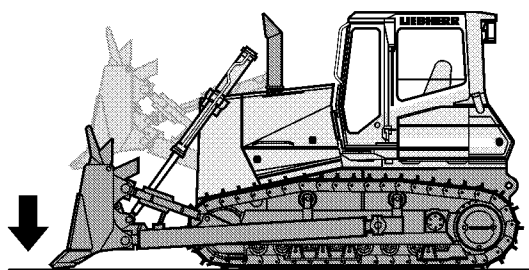
- Move the safety lever 1 up.

If the Diesel engine is turned off inadvertently, move the travel joystick to neutral position and bring the safety lever into the uppermost position.

3.3.7 Taking the machine out of service

Before turning the engine off and leaving the machine, proceed as follows.

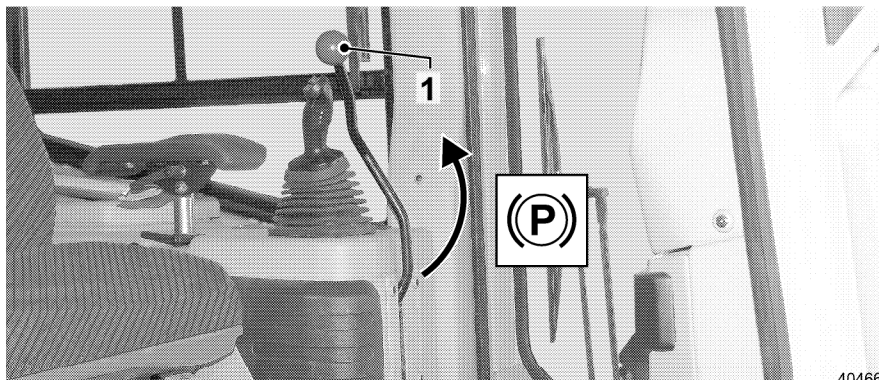
Working attachment



404010

Lower the working attachment

- Lower the working attachment.
For details, refer to section "Working with the attachment".



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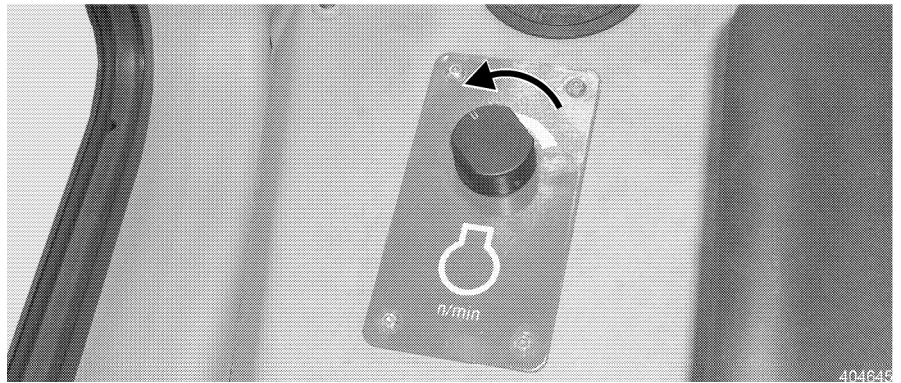
Safety lever up

- Move the safety lever up.
 - The indicator light – travel brake lights up.

Turn the Diesel engine off

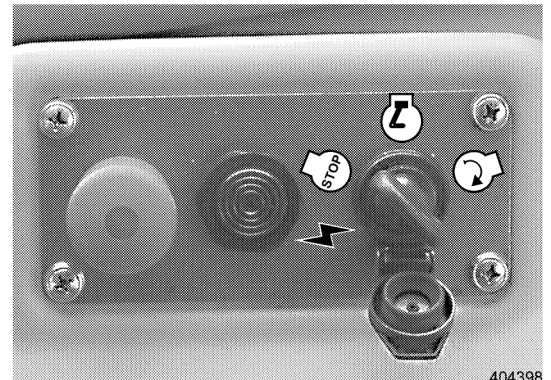
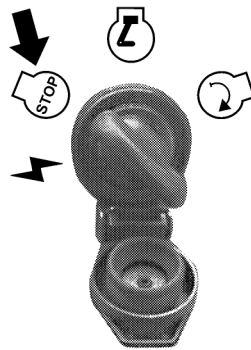
Do not turn the Diesel engine off suddenly if it is running at full load. This is especially important for turbocharged engines.

If the machine is suddenly turned off, the turbo charger runs for some time without oil supply.



Diesel engine – low idle RPM

- Reduce the engine RPM to low idle.
 - Turn the throttle control to the stop to the left.
- Continue to let the engine run for a short time - approx. 10 to 15 seconds at low idle.
- Turn off all activated users (such as headlights, windshield wipers, ...) before turning off the starter switch.

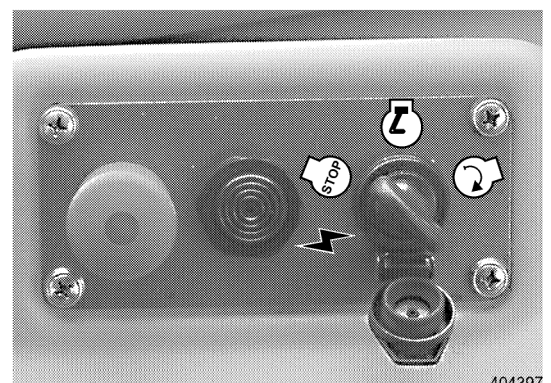
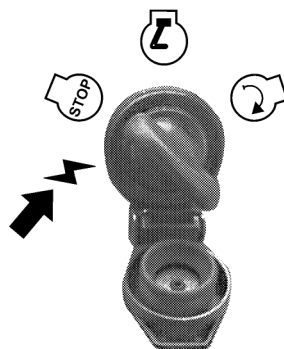


Starter switch – off position

- Turn the starter switch to off position and pull it off.
 - All indicator lights turns off.

Parking position

The starter switch cannot be pulled off in parking position.



Starter switch – parking position

- Turn the starter switch to parking position.
 - The following users are operational.

- Interior lights

Danger



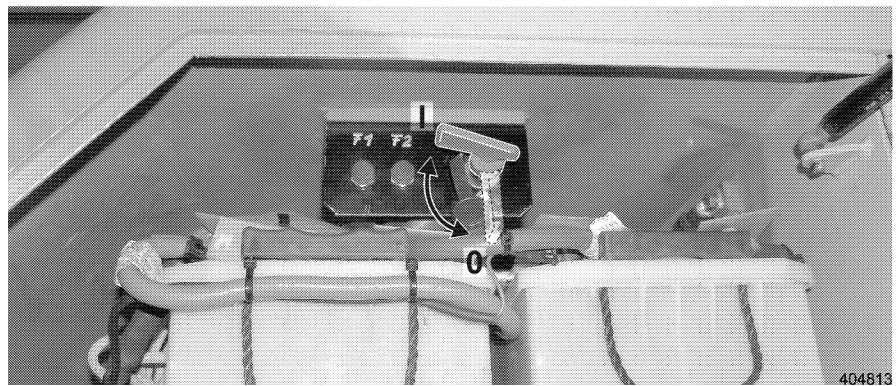
Do not allow another person to work on the machine, as this can endanger maintenance personnel and a serious accident can occur!
! Secure the machine to prevent unauthorized access by other persons!

When you leave the machine:

- Turn the starter switch to off position and pull it off.

Turn the battery master switch off

The battery master switch is on the right in the battery compartment. When you leave the machine and you leave it unsupervised, then the battery master switch must be turned off.



Battery master switch

Turn the battery master switch off

- Turn the battery master switch off.
- Set the switch to position " O ".

Emergency off button

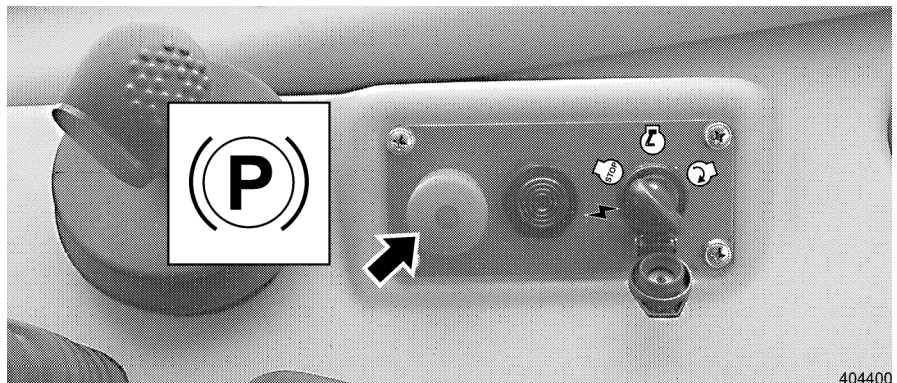
Caution



Danger of accident if the machine stops suddenly.
The machine stops suddenly.
! Always wear the seat belt before operating the machine.

Stop the travel drive

In dangerous or unclear situations, the travel drive can be stopped by pressing the emergency off button.



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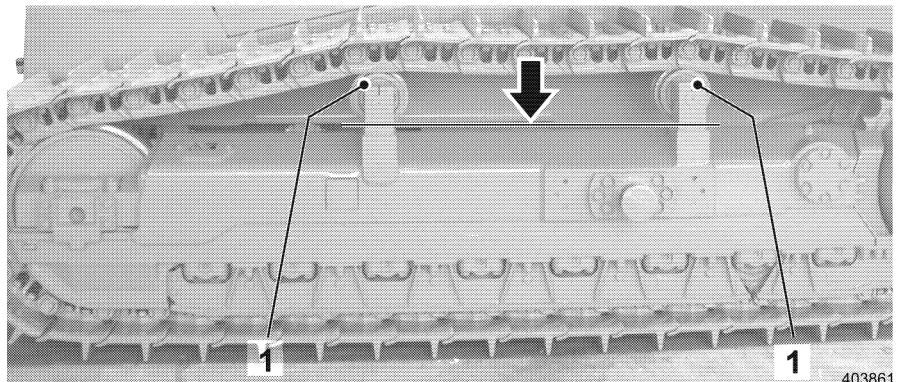
Emergency off button

- Press the emergency off button
 - The travel drive is stopped abruptly, the Diesel engine continues to run. The attachment can still be moved.

Continue to work

- Move the travel joystick to neutral position.
- Lift the emergency off button until it engages.
- Deflect the travel joystick into the desired direction. See also section "Travel".

3.3.8 Guidelines for working in water



403861

Lower edge - carrier roller

When driving through wet areas or when working in water, the maximum fording depth (lower edge of carrier roller 1) may not be exceeded.

- After working in water, lubricate all lube points.

Caution

! Danger of fan damage!

- If the maximum fording depth is being exceeded, the fan will be destroyed.

Never exceed the maximum fording depth (lower edge of carrier roller).

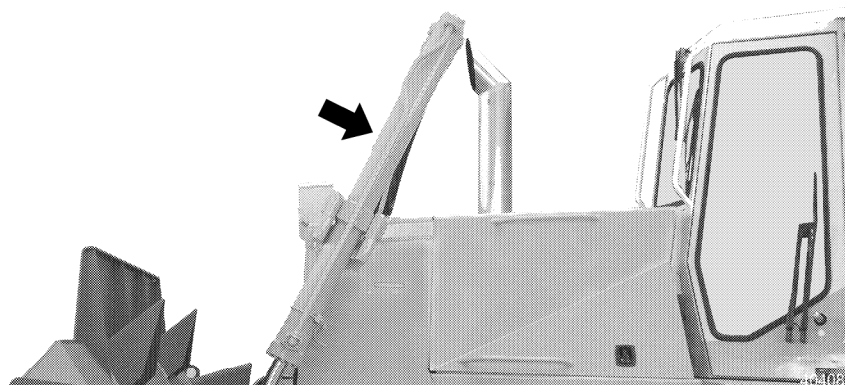
3.3.9 Working with the attachment

Danger



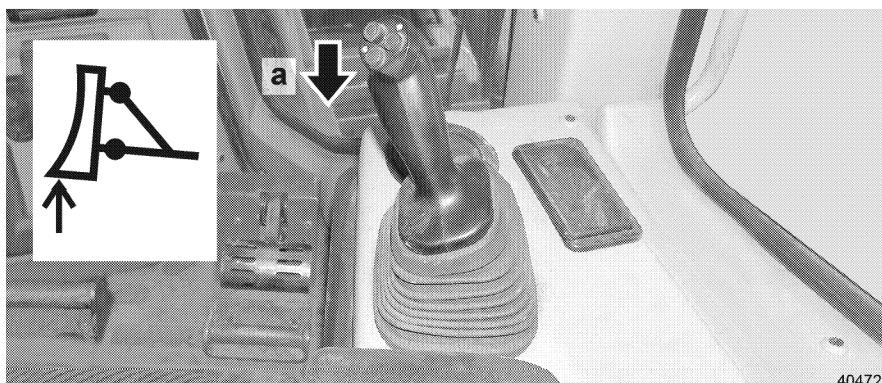
Danger of accidents due to raised attachment.
! Never work under the raised working attachment!
– Always support the working attachment properly from below or place it on the ground.

Actuate the lift cylinders



Lift cylinders

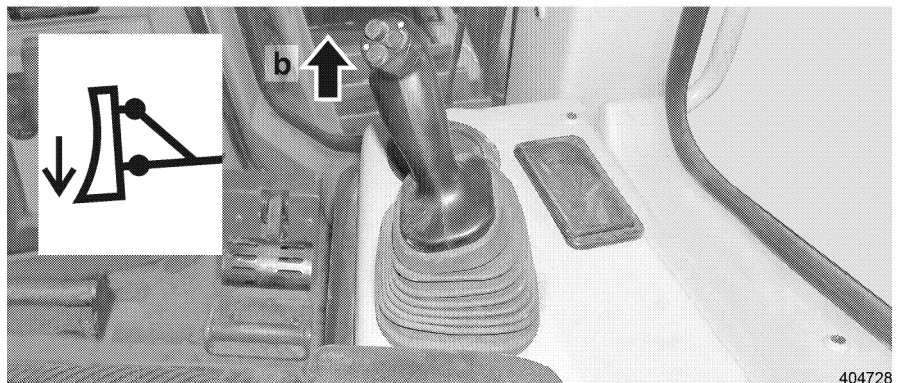
The dozer blade is raised or lowered with the lift cylinders.
Depending on the lever deflection, the dozer blade is brought to the desired working height at different speeds.
When the blade control lever is released, it returns by itself to neutral position. The attachment remains in the adjusted working height.



Lift the dozer blade

Lift the dozer blade

- Move the blade control lever in direction - a -.
- The dozer blade is raised.



Lower the dozer blade

Lower the dozer blade

- Move the blade control lever in direction - b -.
- The dozer blade is lowered.



Quick drop

Dozer blade - quick drop

- Move the blade control lever to the front past the pressure point all the way to the stop and release it.
- The dozer blade is dropped quickly.

Lower the dozer blade in an emergency

In case of failure of the Diesel engine or the hydraulic, the dozer blade can be lowered by deflecting the blade control lever in direction – b - . The safety lever must be in the lowest position.

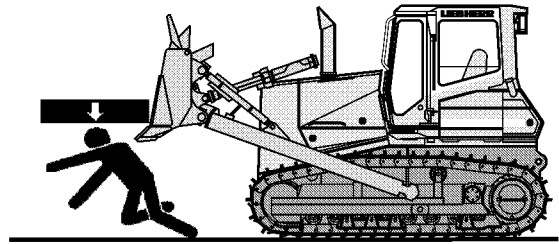
- Move the blade control lever in direction - b -.

Caution

In dangerous situations, immediately lower the working attachment, then move the safety lever up.

Actuate the float position

The float position makes it possible to place the working attachment with its own weight on the ground and allow it to move freely over unlevel ground.



404011

Danger situation

Danger



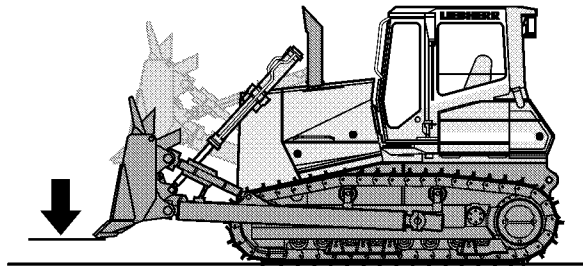
Danger of accident due to quick dropping attachment!

By activating the float position, the raised attachment is quickly lowered to the ground!

Persons below the raised attachment are crushed!

! It is prohibited for anyone to remain within the danger zone of the machine.

Do not activate the function for the float position when the attachment is raised completely!

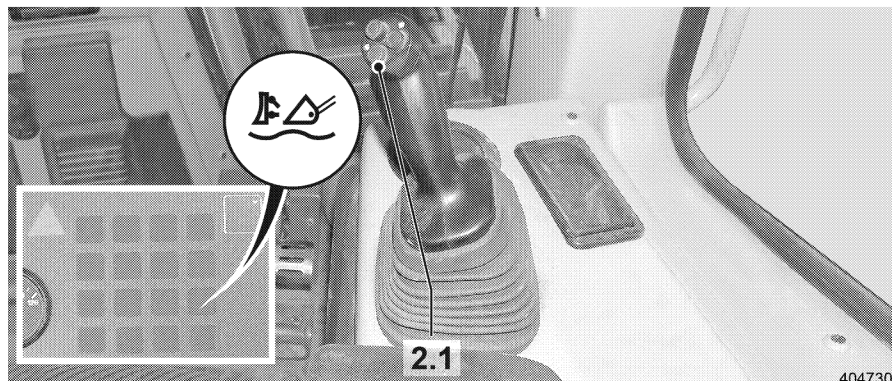


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Lower the working attachment

Activate the float position

- Lift the dozer blade approx. 30 cm above the ground.



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Button – float position

By pressing the button 2.1 on the blade control lever, the function is preselected.

- Press the switch 2.1 for float position.
- The indicator light – float position lights up.



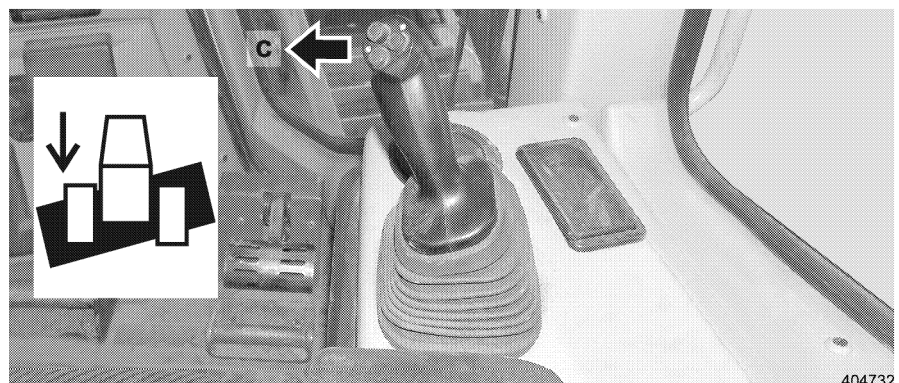
Float position

- Move the blade control lever forward past the point of resistance to the stop and release it.
 - The bucket control lever will be held in this position by magnetic force.
 - The function - float position is thereby activated.
 - The bucket falls freely to the ground and adapts to the ground conditions.
- The float position is turned off by pulling the bucket control lever back.
- Then turn the preselection of the float position off on the blade control lever.

Actuate the tilt cylinder

The dozer blade can be tilted to the left or right with the tilt cylinder. Depending on the lever deflection, the dozer blade is tilted to the desired side at different speeds.

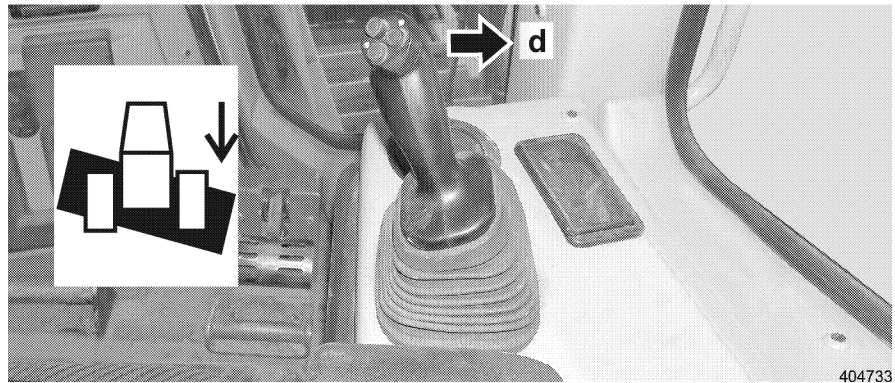
When the blade control lever is released, it returns by itself to neutral position. The preselected incline of the dozer blade remains.



Tilt the dozer blade to the left

Tilt the dozer blade to the left

- Push the blade control lever to the left in direction - c -.
 - The dozer blade is tilted to the left.



Tilt the dozer blade to the right

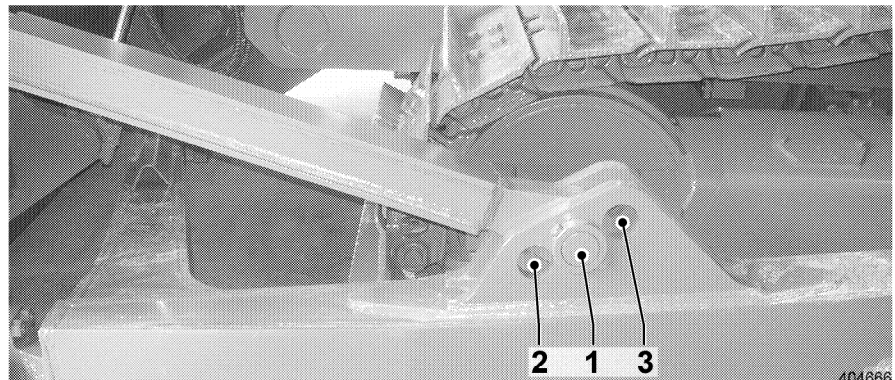
Tilt the dozer blade to the right

- Push the blade control lever to the right in direction - d -.
- The dozer blade is tilted to the right.

Cutting angle adjustment - mechanical

The cutting angle of the dozer blade can be matched to the current ground conditions by changing the strut as well as the tilt cylinder position in 3 stages.

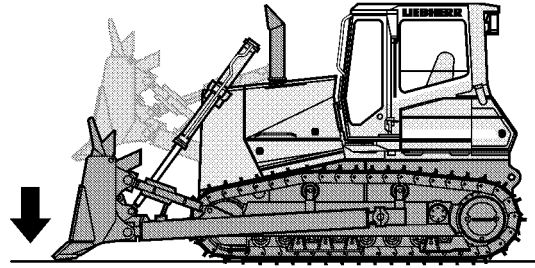
- ! The cutting angle position must be pegged in the same position on the strut side as well as on the tilt cylinder side.
- Due to this arrangement, the full tilt path is available in all cutting able positions.



Adjustable positions

Cutting angle positions

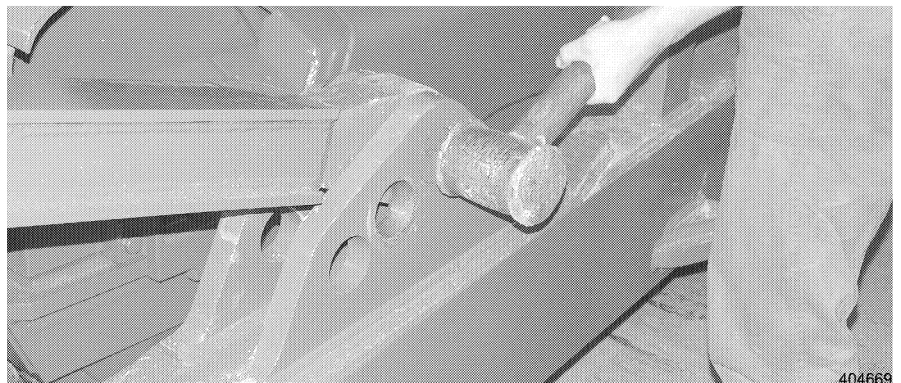
- 1 = Position center
 - For normal ground.
- 2 = Position front
 - For hard ground. For hard ground, set a steep cutting angle.
- 3 = Position rear
 - For soft ground. For soft ground, set a flat cutting angle.



404010

*Lower the blade***Adjust the cutting angle**

- Lower the dozer blade to the ground.
- Actuate the tilt cylinder momentarily to relieve the pin on the strut.
- Park the machine properly.



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Remove the pin

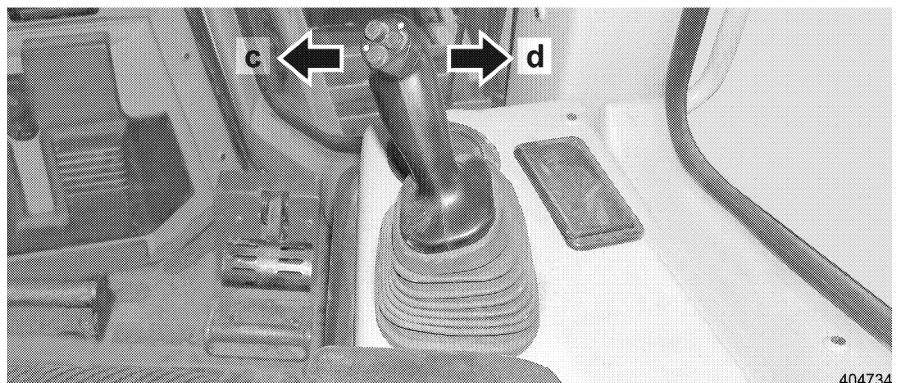
- On the strut, remove the retaining screw and the ring and knock out the pin.

Caution

Danger of injury of fingers!

Never align the bores with your fingers during the adjustment procedure.

- Use suitable tool.

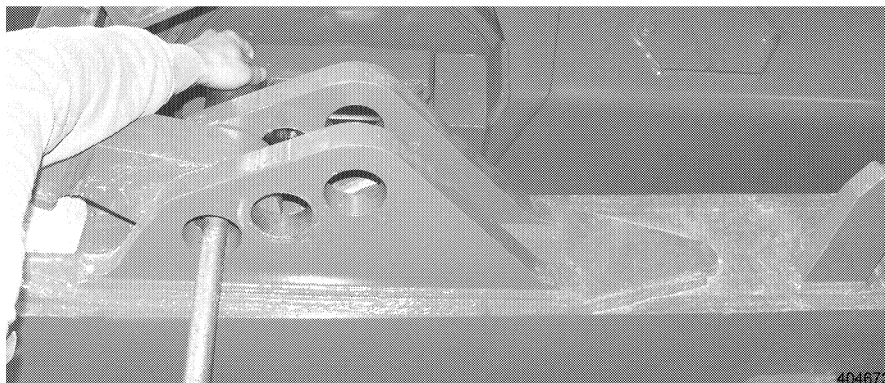


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Actuation – tilt cylinder

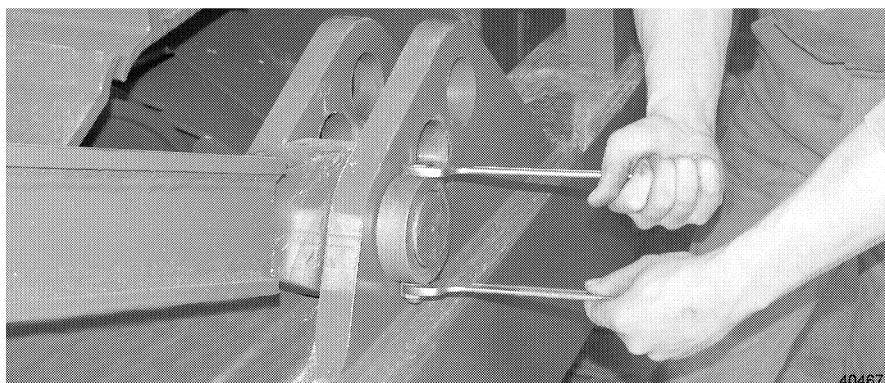
- Start the machine and move the tilt cylinder in the desired direction, until the pin can be installed.
- The strut is pushed forward by extending the tilt cylinder.

- The strut is pushed backward by retracting the tilt cylinder.



Align the strut

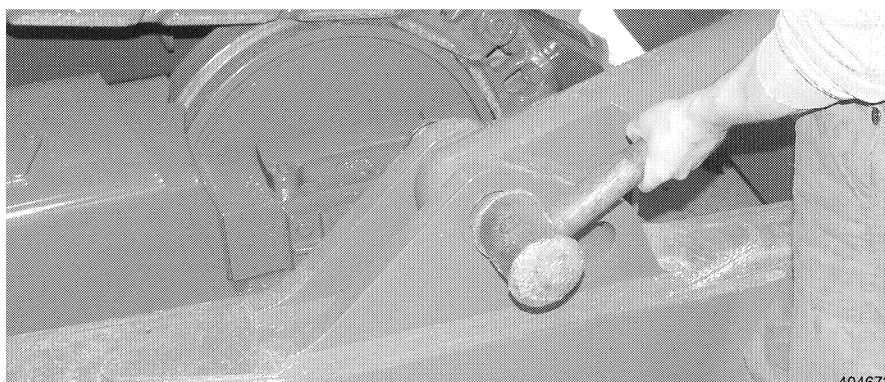
- With a suitable tool, align the strut until the pin can be installed. If necessary, retract or extend the tilt cylinder.



Install the pin

- Install the pin from the inside to the outside and affix with ring and retaining screw.

Carry out the same procedure on the tilt cylinder side.



Remove the pin

- On the tilt cylinder, remove the retaining screw and the ring and knock out the pin.

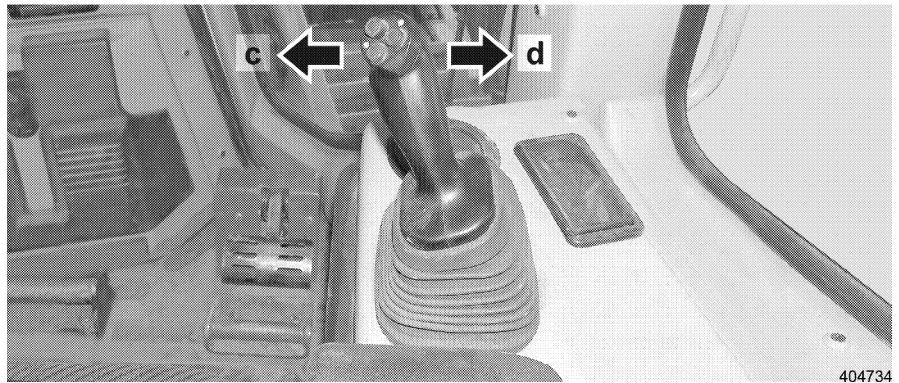
Caution



Danger of injury of fingers!

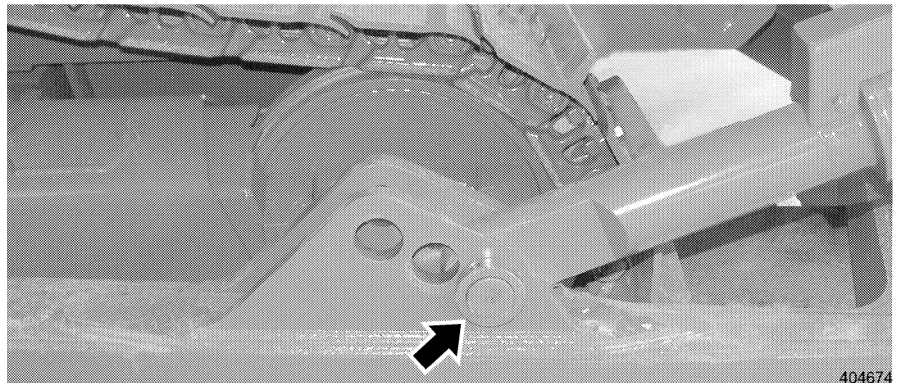
Never align the bores with your fingers during the adjustment procedure.

- Use suitable tool.



Actuation – tilt cylinder

- Start the machine and move the tilt cylinder into the desired direction until the pin can be installed.
- The strut is pushed forward by extending the tilt cylinder.
- The strut is pushed backward by retracting the tilt cylinder.
- ! The cutting angle position must be pegged in the same position on the strut side as well as on the tilt cylinder side.

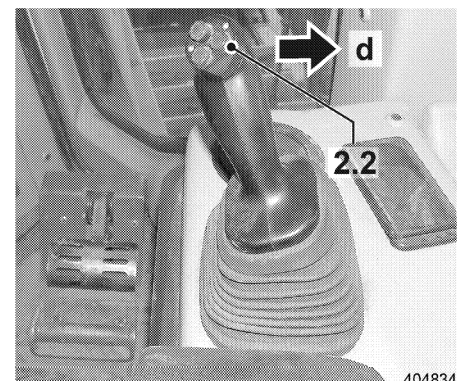
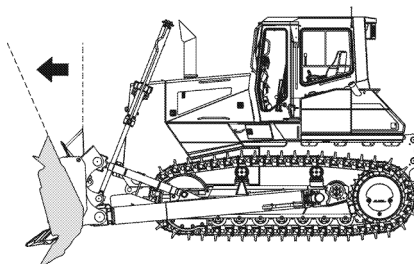


Install the pin

- Install the pin from the inside to the outside and affix with ring and retaining screw.

Cutting angle adjustment – hydraulic (Special equipment)

The cutting angle of the blade can be matched to the corresponding ground conditions by retracting or extending the cylinder on the push frame.

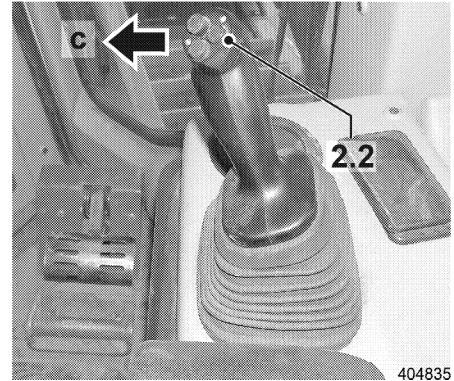
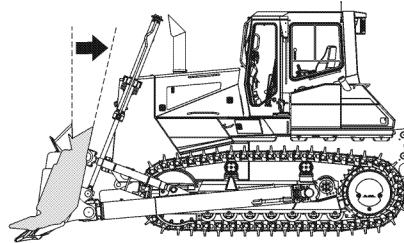


Steep cutting angle

Steep cutting angle

For hard ground, set a steep cutting angle.

- Press the button 2.2 on the blade control lever and hold it down.
- Push the blade control lever to the right in direction - d - until the desired blade pitch is reached.



Flat cutting angle

Flat cutting angle

For soft ground, set a flat cutting angle.

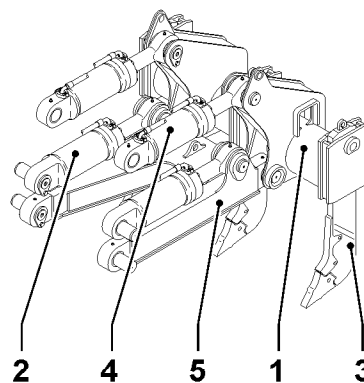
- Press the button 2.2 on the blade control lever and hold it down.
- Push the bucket control lever to the left in direction - c - until the desired blade pitch is reached.

The dozer blade is tilted by changing the blade pitch. With the tilt cylinder, align the dozer blade again parallel to the ground.

3.3.10 Working with optional attachments

In this section, we describe the operation or work with various optional attachments.

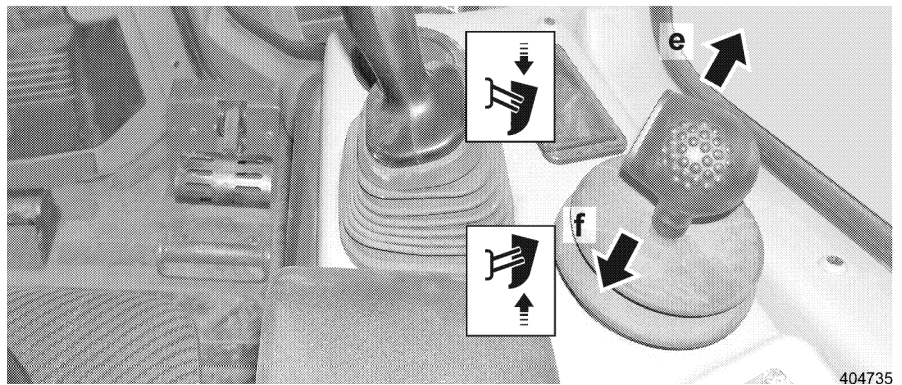
Control of ripper



403711

- | | |
|----------------------|--------------------------|
| 1 Pull bar | 4 Tooth control cylinder |
| 2 Hydraulic cylinder | 5 Frame |
| 3 Ripper tooth | |

The ripper is operated with the ripper control lever on the right hand side of the operator's seat.



Ripper control lever

Lower the ripper

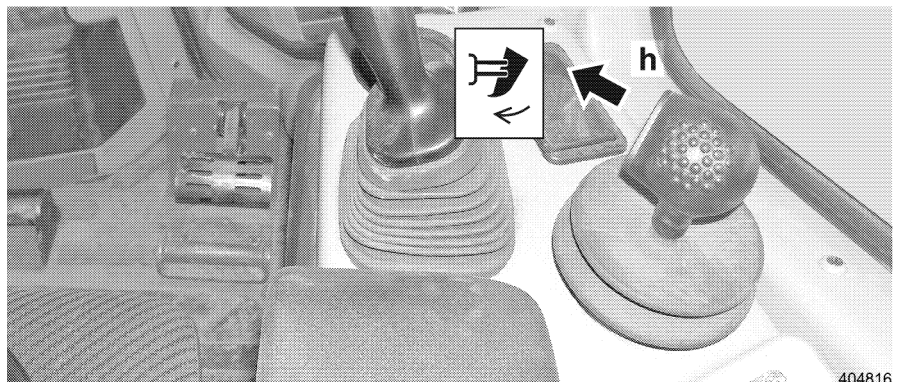
- Push the ripper control lever forward in direction - e -.
- The ripper is lowered.

Raise the ripper

- Pull the ripper control lever back in direction - f -.
- The ripper is raised.

Tooth angle adjustment

The tooth angle of the ripper tooth can be matched to the respective ground conditions by retracting or extending the tooth adjustment cylinder.



Steep tooth angle

Steep tooth angle

For soft ground, a steep tooth angle can be set.

- Push the ripper control lever forward to the left in direction - h -.
- The ripper tooth is moved inward.

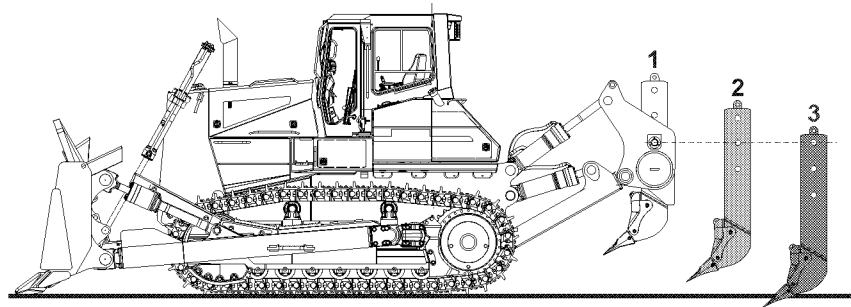


Flat tooth angle

Flat tooth angle

For hard ground, a flat tooth angle can be set.

- Push the ripper control lever back to the right in direction - g –.
- The ripper tooth is moved outward.



404537

Individual tooth length adjustment

Tooth length adjustment, mechanical

1 – tooth ripper

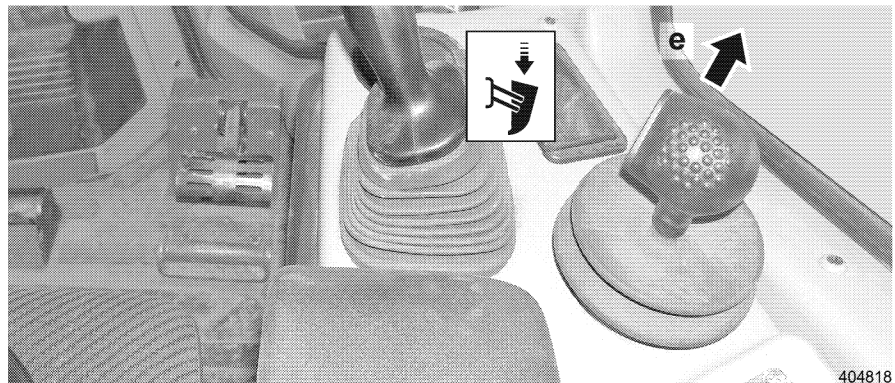
The length of the ripper tooth on the single tooth ripper can be adjusted in 3 positions to match it to the corresponding conditions.

Caution



Danger of accident!

! The tooth length adjustment may only be made on solid ground.

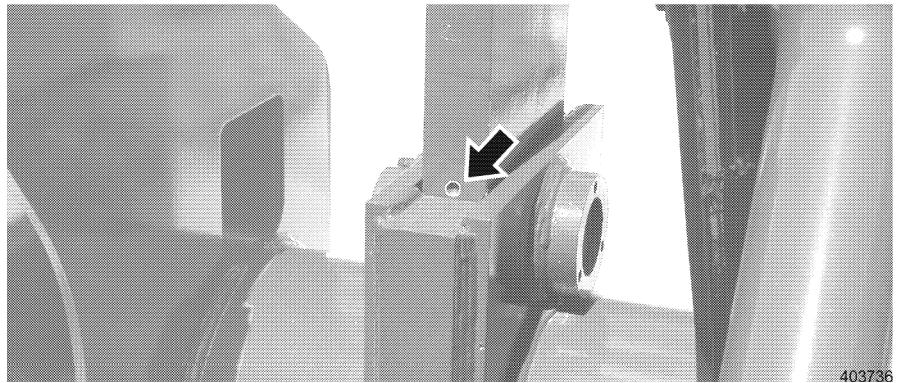


404818

Lower the ripper

Adjustment procedure:

- Push the ripper control lever forward in direction - e – and lower the ripper tooth without pressure on the ground.
- Use a suitable access ladder.
- Remove the retaining screw and the ring from the pin.
- Knock out the pin.



Marks on the ripper tooth

The ripper tooth can be locked in 3 positions. The positions are visible by an indent on the tooth.

- The ripper tooth can only be locked in one of these positions.

Caution



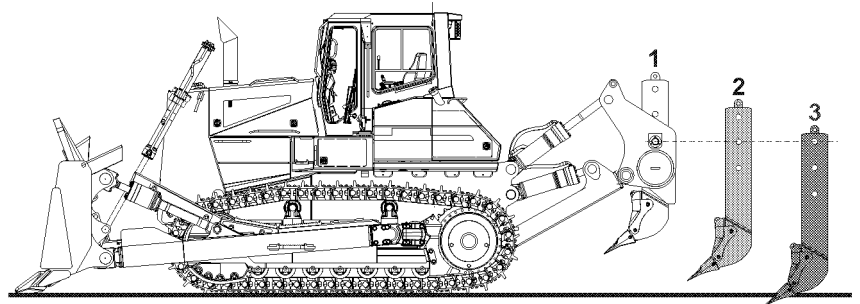
Danger of accident!

! If the ripper is raised too far, the tooth will fall from the guide.

Lift the ripper only to the point where the tooth cannot fall from the guide.

- Set the desired tooth length by lifting or lowering the ripper.
 - Push the ripper control lever in direction - e - or - f – until the desired tooth length is reached and a mark becomes visible for pinning.
 - If necessary, move the machine slightly forward or backward so that the tooth doesn't twist in the guide.

Knock in the pin on the ripper tooth and secure with ring and hex head screw.



404537

Individual tooth length adjustment

Tooth length adjustment - hydraulic

1 – tooth ripper

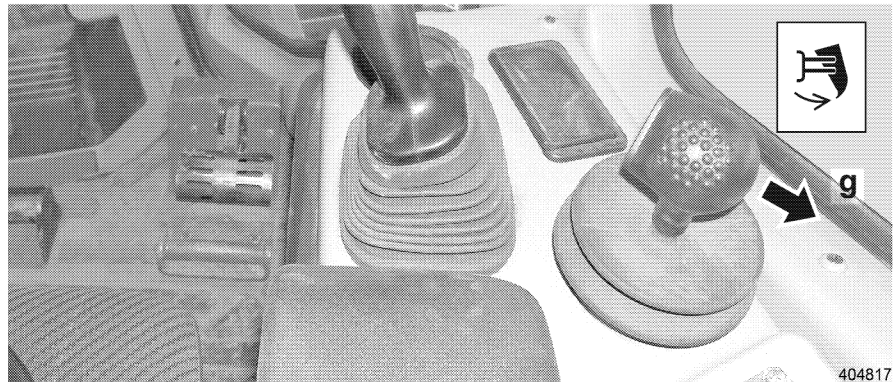
The length of the ripper tooth on the single tooth ripper can be adjusted in 3 positions to match it to the corresponding conditions.

Caution



Danger of accident!

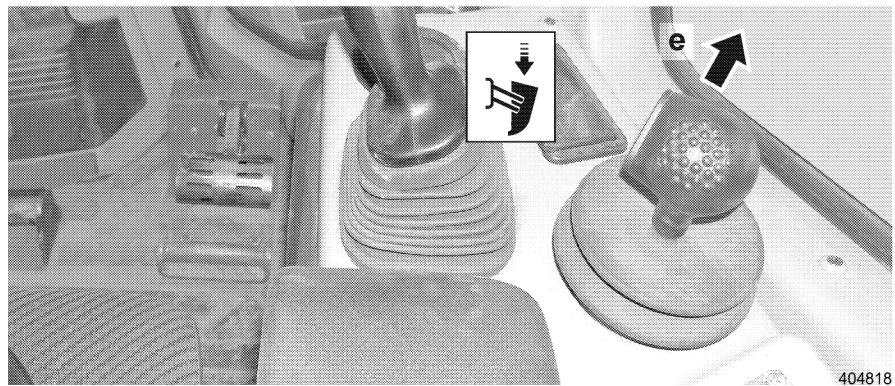
! The tooth length adjustment may only be made on solid ground.



Retract the cylinder

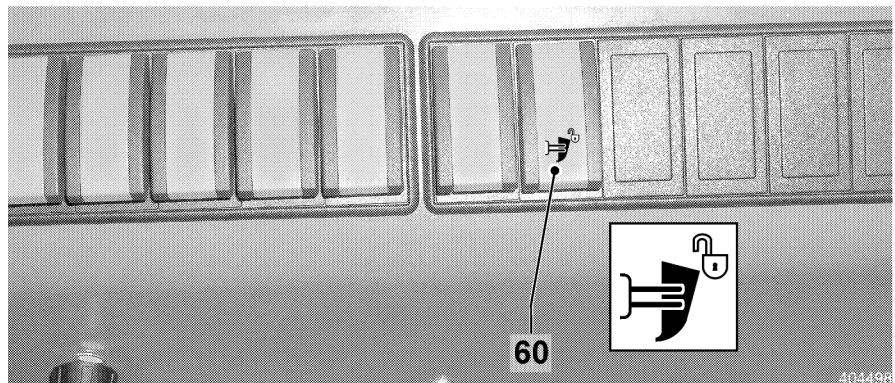
Adjustment procedure:

- Push the ripper control lever to the right in direction - g – until the tooth angle adjustment cylinders are completely retracted.



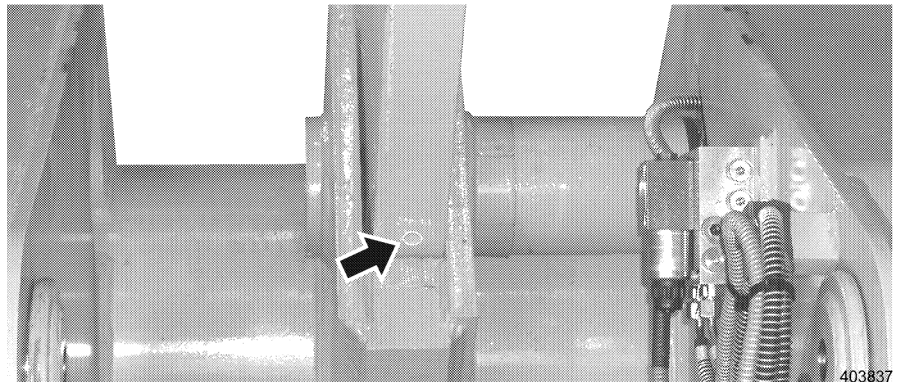
Lower the ripper

- Push the ripper control lever forward in direction - e – and lower the ripper tooth without pressure on the ground.



Button – pin puller

- Press the button - pin puller 60 and hold it down.
 - During the adjustment procedure, hold the button – pin puller down.
- Push the ripper control lever to the right in direction - g – until the locking pins on the tooth are completely retracted.
 - The locking pin retracts and releases the tooth for adjustment.



Marks on the ripper tooth

The ripper tooth can be locked in 3 positions. The positions are visible by an indent on the tooth.

The ripper tooth can only be locked in one of these positions.

- Adjust the desired tooth length, with the button – pin puller 60 held down, by lifting or lowering the ripper.
 - Push the ripper control lever in direction - e - or - f – until the desired tooth length is reached and a mark becomes visible for pinning.
 - If necessary, move the machine slightly forward or backward so that the tooth doesn't twist in the guide.

Caution

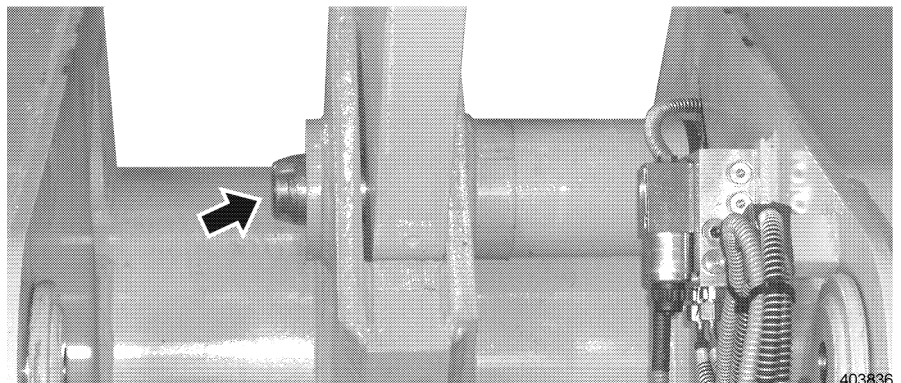


Danger of accident!

! If the ripper is raised too far, the tooth will fall from the guide.

Lift the ripper only to the point where the tooth cannot fall from the guide.

- Release the button – pin puller 60.



Locking pin extended

- Push the ripper control lever to the right in direction - g -.
 - The locking pin extends and the ripper tooth is pinned.

Caution



After the tooth length adjustment, check if the locking pin is completely extended.

- Operate the machine only with pinned ripper tooth!

Winch operation

Caution



There is a danger of injury when working with winches.
! When operating a winch, the operator's compartment must be protected with a protective grill.

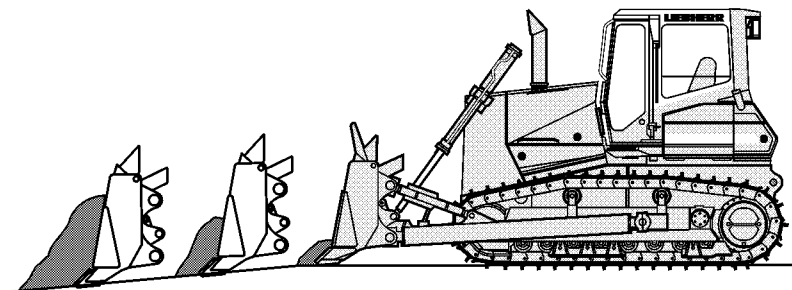
For installation of the protective grills, contact Liebherr.

3.4 General operating methods

Routine operating methods are described in this section.

3.4.1 Dozing

To doze and push material, various methods can be selected, depending on the ground conditions.



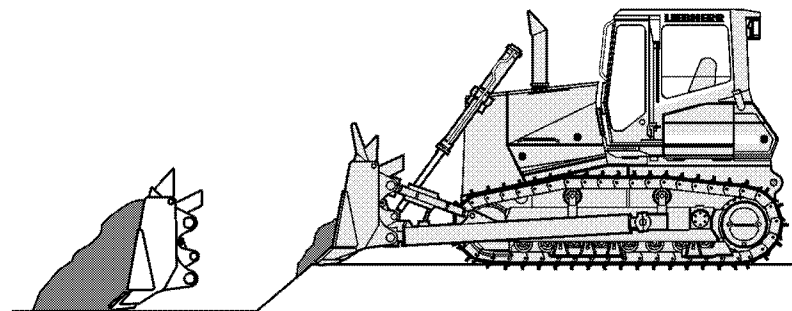
403865

Increasing blade volume

Increasing blade volume

To increase blade volume, material is added over the total dozing distance.

This method is normally used successfully when working with heavy, dense ground.



403866

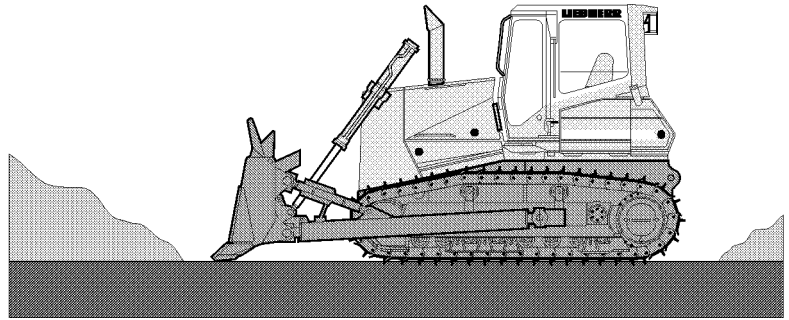
To doze with a full blade

To doze with a full blade

This method is used when working with loose ground, resulting in maximum output while retaining the dozing track.

- The dozer blade is filled at the start of the pushing distance.
- If you feel the chain is starting to slip, lift the blade slightly.

3.4.2 Fine grading



403867

Initial surface for fine grading

Initial surface

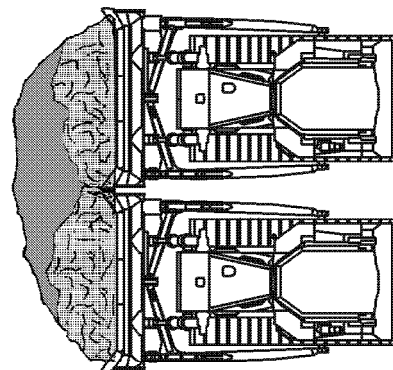
To establish a fine grade, start out with an even platform, which should be at least as long as the tracks of the machine, and at the same level as the desired surface.

Starting from this initial surface, the necessary material can be added for the desired fine grade.

To remove the machine tracks, use the blade float position to regrade.

- For fine grading, straight blade corners for the attachment are available.

3.4.3 Operating several machines



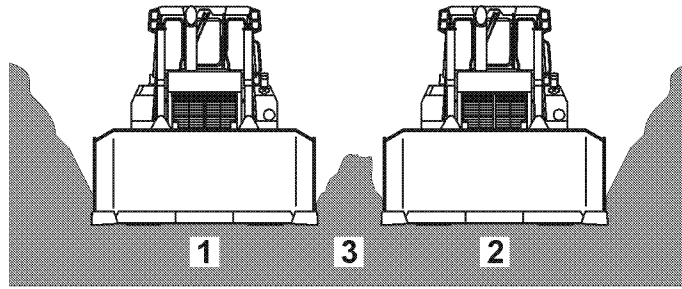
403868

Parallel operation of two machines

Parallel operation

If two crawler dozers are used simultaneously to doze larger quantities of loose material, we recommend to run them in parallel operation.

- Guide the machines side by side, with the dozer blades as close to each other as possible.
- This technique significantly increases the total output.



403869

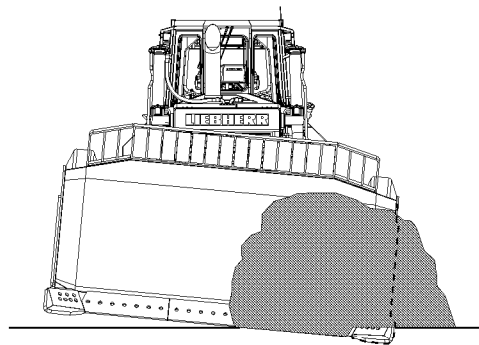
Dozing in a path

Dozing in a path

This method is predominantly used for transporting large volume of material over a long distance.

- To start a path, push the first blade volume about 10 - 20 m along the preset path. Move the dozer back, fill the blade again and push it to the end of the path, together with the material, which was already moved during the first run.
- By using this procedure, little material will fall from the blade to the side and blade volume will be significantly increased per operation.

3.4.4 Pulling or backfilling a trench

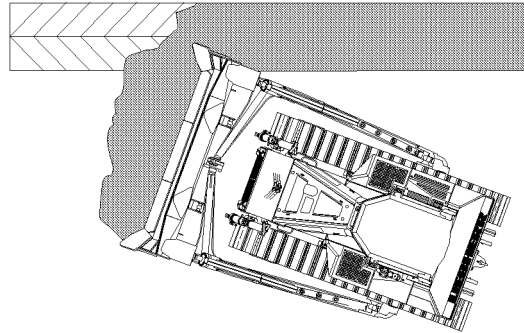


404542

Pulling a trench

Pulling a trench

- To establish a trench, fully tilt the dozer blade in the desired direction. See section: "Working with the attachment".
- Set the lowered blade corner into the ground along the center of the planned trench and cut the direction of the trench. Continue this procedure until the required depth and corresponding angle are reached.
- Set the blade horizontal and clean up the edges of the trench. Deep trenches are usually dug vertically to the trench line after the initial cut.



404558

*Backfilling a trench***Backfilling a trench**

Depending on the blade attachment, different methods can be used:

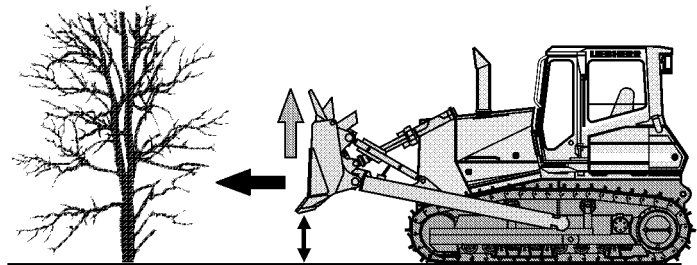
- With a straight blade attachment, fill the material at an angle to the trench.

For a more efficient way, use a tilt angle blade attachment.

- Set the blade at an angle to the trench and fill the trench by moving along in direction of the trench.

3.4.5 Land clearing operation**Removing hedges to medium sized trees**

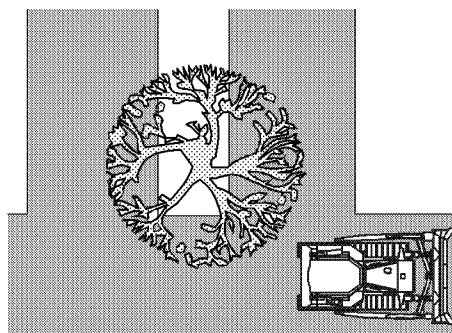
- Pull hedges from the ground by pushing them with the blade approx. 5 to 10 cm (2 to 5 inches) from the ground level and moving forward.
- Slightly lift the blade to allow the soil to fall from the roots.



403874

*Push tree over***High hedges and medium sized trees**

- Hold the blade at a height of approx. 30-40 cm (12 to 16 inches) and push over. Continue to raise the blade while moving forward.



403875

Cut the roots

Felling trees

- Clean the surrounding area.
- Cut the tree roots opposite and parallel to the desired drop direction with the blade.

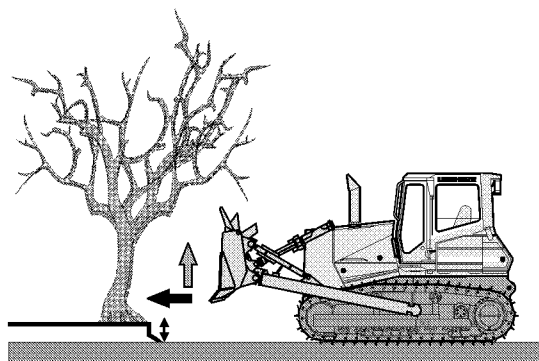
Caution



Danger of accidents due to falling trees.

! As soon as the tree starts to fall, move back immediately!

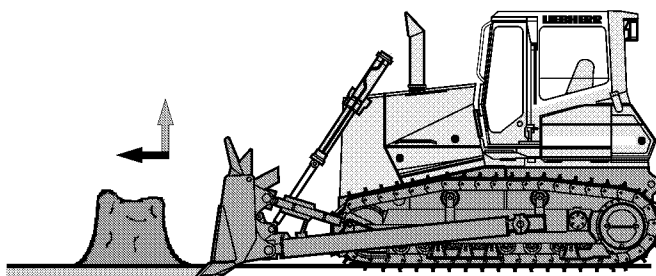
! Do not move on top of the root system of the falling tree.



403871

Felling tree

- Slowly move forward in the direction you want the tree to fall, with the blade raised.

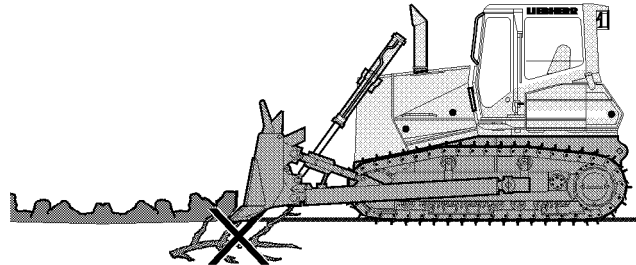


403876

Remove the tree stump

Remove tree stumps

- Move towards the tree stump with the blade below ground level and rip it from the ground by moving forward, while slowly raising the blade at the same time.
- ! When moving over terrain, be sure to check ground clearance, watching for tree stumps and rocks!



403877

*Covering removed material***Covering removed material**

- Bury removed material as far as possible below ground level.

If branches and roots are too close to the surface, any parts sticking out can be ripped to the surface again when grading.

Working area

The following applies:

Generally, the working area should be established as even as possible for efficiency and ease of machine operation.

3.4.6 Ripper application

For multi-tooth rippers it is more advantageous to install additional ripper teeth than to select a higher travel speed.

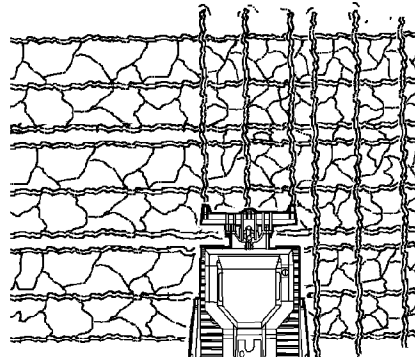
Generally use only one ripper tooth to rip difficult to rip or material which breaks into large pieces.

Easily rippable material, which breaks up into small pieces, can be handled with one multi-tooth ripper with two or three teeth.

During the ripping operation, always make sure that both travel gears are on the ground with their full length. If necessary, prepare the ground accordingly.

Generally, the ground should be ripped as deeply as possible. In case of unbroken ground, it is preferable to proceed in layers. In these cases, to reach the desired depth, it is often required to rip the same track several times.

The distance of the ripper tracks should be selected depending on the desired fragmentation.



403018

Crosswise ripping

In individual cases, crosswise ripping can be required.
On slopes, always rip the ground moving downhill.

Caution



Do not turn the machine or drive in reverse if the ripper teeth are still in the ground.

! Due to the high turning stress, the teeth could be damaged.

- Check the teeth often for wear and damage.

3.4.7 Transporting the machine

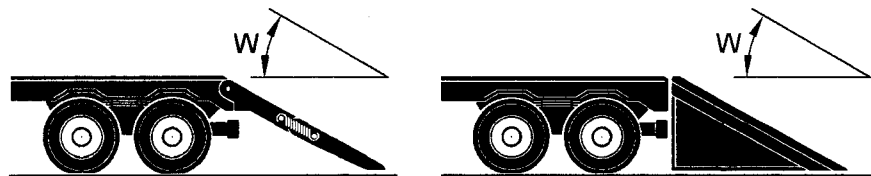
Transporting the machine by truck or rail

Before driving onto the loading surface

Before driving onto the loading surface, proceed as follows.

If necessary, remove part of the machine attachment for transport.

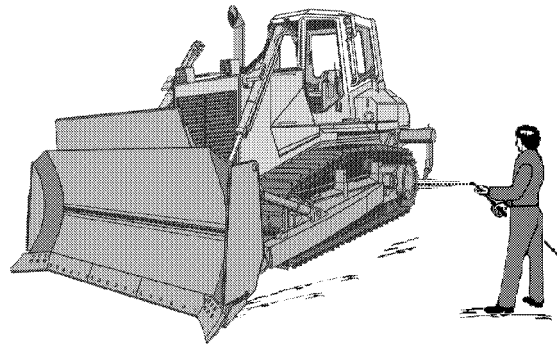
- Have suitable tension cables or chains available for rigging.



403048

Ramp incline

Have a suitable ramp available to drive onto the loading surface. The ramp incline angle - **W** - may be no more than maximum 30°.



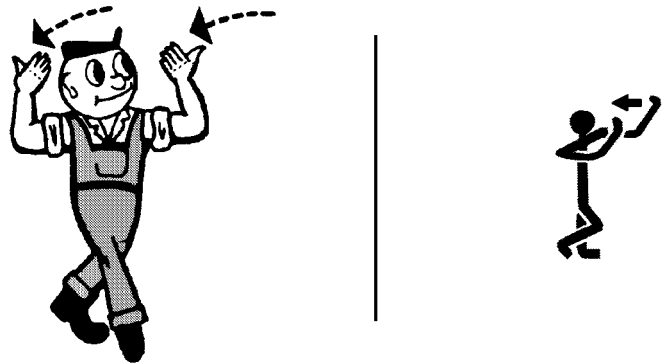
404138

Wet cleaning

Remove all ice or mud from the tracks before driving onto the ramp.

Driving onto the loading surface

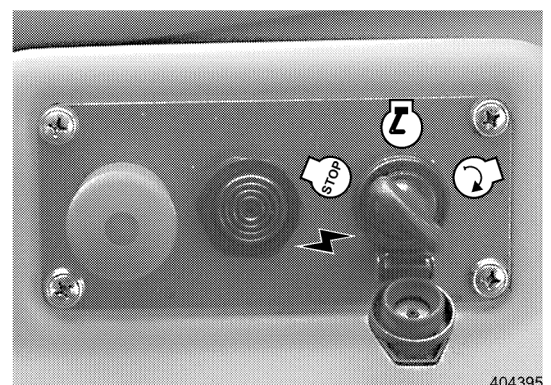
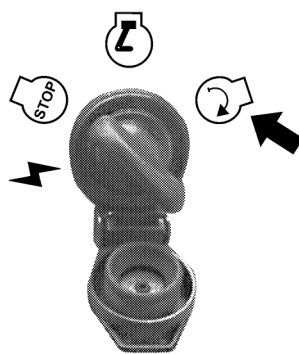
For detailed description, see "Control, operation". Have another person guide you when driving onto the loading surface!
Make sure that a guide is available to signal the machine driver.



403050

Guide

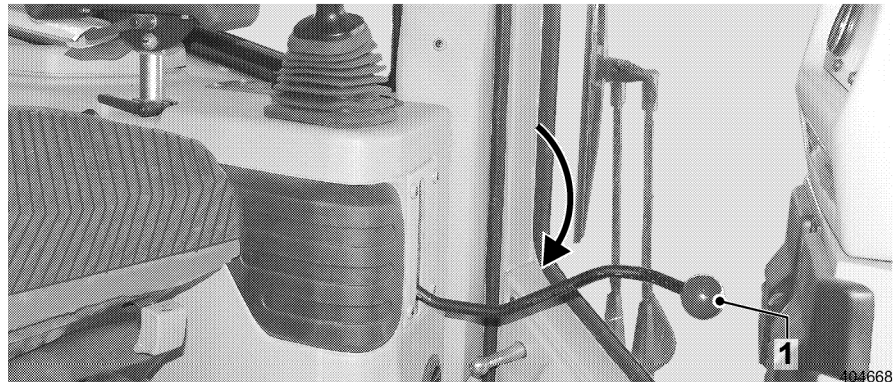
Any person, which functions as guide must be positioned to the side of the machine!



404395

Starting procedure

- Start the Diesel engine.
- See also sections "Starting the Diesel engine" and "Travel operation".



Safety lever down

- Move the safety lever 1 down.

Danger

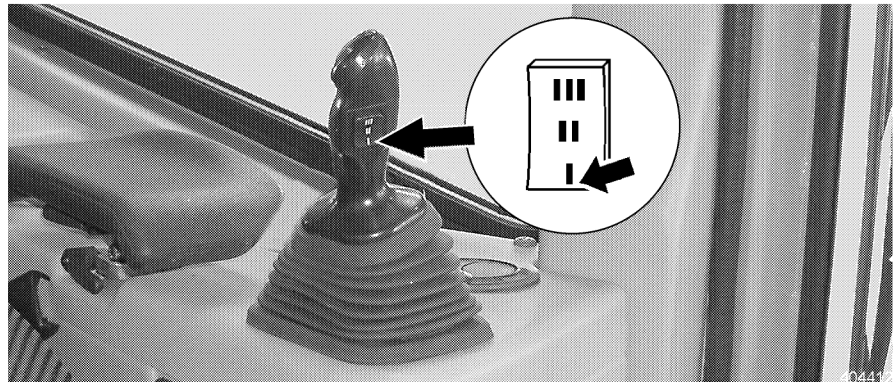


Danger of accidents due to careless driving!

Careless driving can endanger the loading personnel, the guide as well as the driver of the machine.

! Always drive carefully when loading the machine!

Drive up the ramp only in low speed range, position "I"!

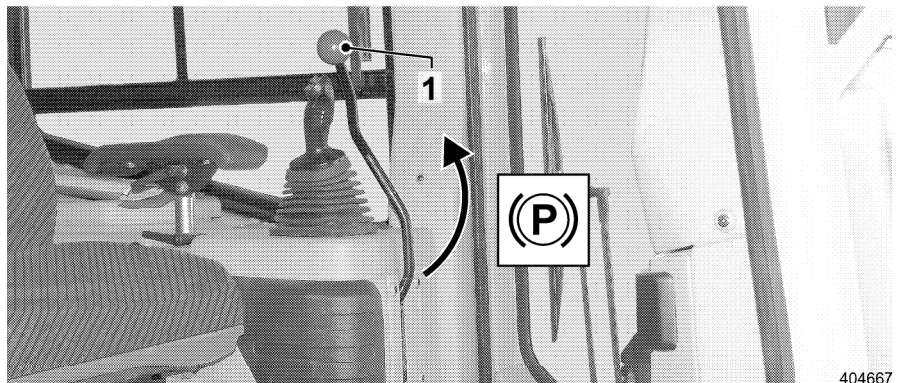


Low speed range

- To select low speed range: Set the rocker switch to position "I".
 - Start driving the machine carefully.
- For detailed descriptions, see section "Control, operation".

After driving onto the loading surface,

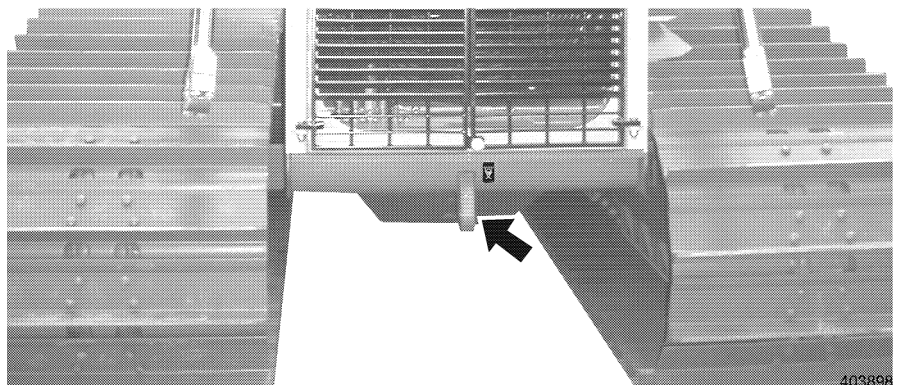
- stop the machine.
- Lower the attachment and set down the attachment level with the loading surface.



404667

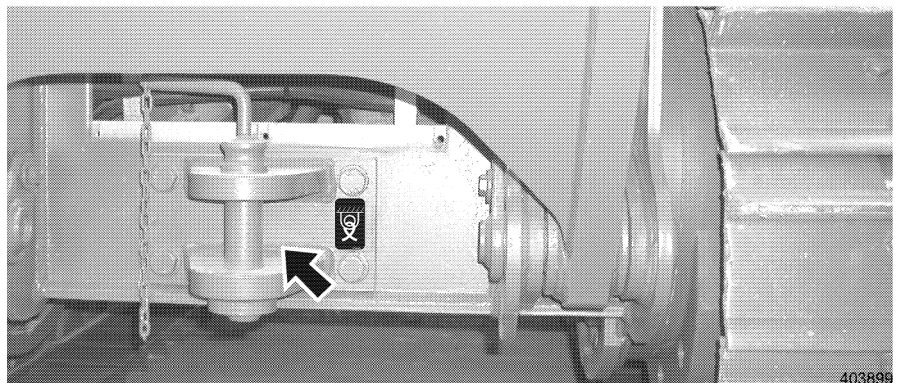
Safety lever up

- Move the safety lever 1 up.
- Turn the Diesel engine off.
- Close and lock all doors and covers on the machine.



403898

Rigging point - front



403899

Rigging point - rear

- Secure the machine to prevent it from sliding: use wedges as well as tension cables or chains.
- Attach the tension cables or chains on the marked rigging points on the machine.

If the machine is positioned against the transport direction for transport, then the wind can enter through the exhaust opening of the smoke stack.

The wind can turn the turbo-charger of the Diesel engine.

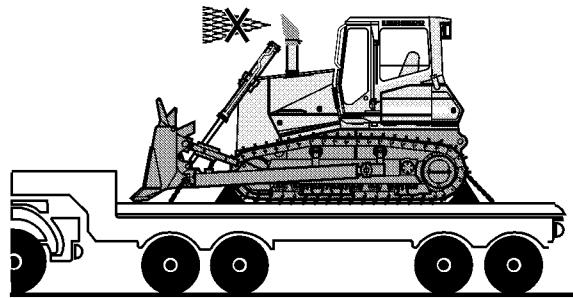
To prevent damage to the turbo-charger during transport, proceed as follows.

This is especially important for rail transport, because the travel direction is not known in advance!

Caution



Danger of damage to the turbo-charger due to external influences!
Air infiltration through the smoke stack can cause the turbo-charger of the Diesel engine to turn.
If the engine is not running, the turbo-charger is not lubricated.
Without lubrication, the turbo-charger will be damaged.
! Prevent air infiltration into the smoke stack!



403878

Cover the smoke stack

- To cover the smoke stack, always step on the machine only via the step and select a secure standing position.
- Cover the smoke stack opening with wind proof and slip-resistant material.

3.4.8 Loading the machine with a crane

All accident prevention guidelines must be observed when loading the machine!

See section "Safety guidelines to be observed when loading a machine with a crane".

Before loading the machine, make the following preparations.

Preparations:

- Bring all control levers to neutral position.
- Move the safety lever up.
- Turn the Diesel engine off.
- Close and lock all doors and hoods on the machine.

For detailed description, see section "Control, operation".

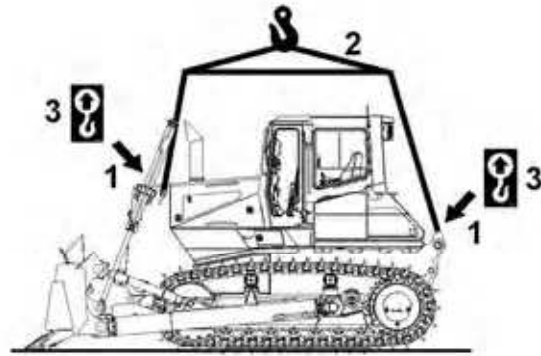
Check the following:

- Weight and dimensions of the machine: See section "Technical Data"
- The required load carrying capacity and the length of the lifting device.

Danger



Danger of accident due to suspended / falling load!
! Standing under the raised machine is not permitted!



404637

Rigging – lifting points

Machine without rear attachment

For loading with a crane, the following equipment is required:

- Crane eyehooks, rear: Available as additional equipment. Liebherr Id. No.: PR 754 - 9414564.
- Suspension device / bars 2

The machine is equipped with lifting hooks on the front side, as standard equipment.

- Attach / hang the suspension 2 on the intended rigging – lifting points 1 on the machine.
- The rigging – lifting points are marked with sign 3.
- Carefully lift the machine and load.

Machine with rear attachment

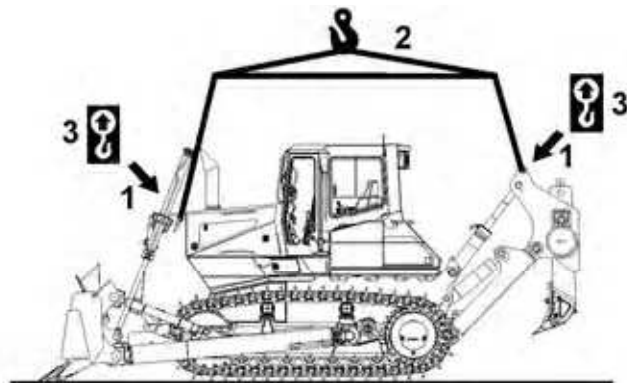
To load the machine with a crane, the following equipment is required:

- Suspension device / bar 2

The machine is equipped on the front with standard eyehooks.

If a rear attachment (ripper, ballast weight, ..) is installed on your machine, then standard eyehooks are installed on this attachment to lift the machine.

These eyehooks are marked with sign 3.



40463E

Rigging – lifting points

- Before loading the crane, lift the rear attachment (only ripper).
- Attach the suspension on the intended rigging and lifting points on the machine.
- Carefully lift the machine and load.

3.5 Installation guidelines to be observed for removal and installation of attachments

3. Control, instrumentation

3.5 Installation guidelines to be observed for removal and installation of attachments

To remove and install the attachments, a suitable lifting device is needed.

Clean all bearing points, pins, threads and similar and check for damage.

Before removing the attachment, proceed as follows:

Preparations:

- Lower the attachment.
- Bring all control levers into neutral position.
- Move the safety lever up.
- Turn the Diesel engine off.

Check the following:

- Weight and dimensions of the machine: see "Technical Data".
- The required load carrying capacity and length of the tackle.

Danger



Danger of accidents due to suspended / falling load!

! Never step or stand underneath a raised machine or load!

3.5.1 Attachment bearing shells



Attachment pivot points

In the pivot points of the attachment, wear resistant bearing shells are installed.

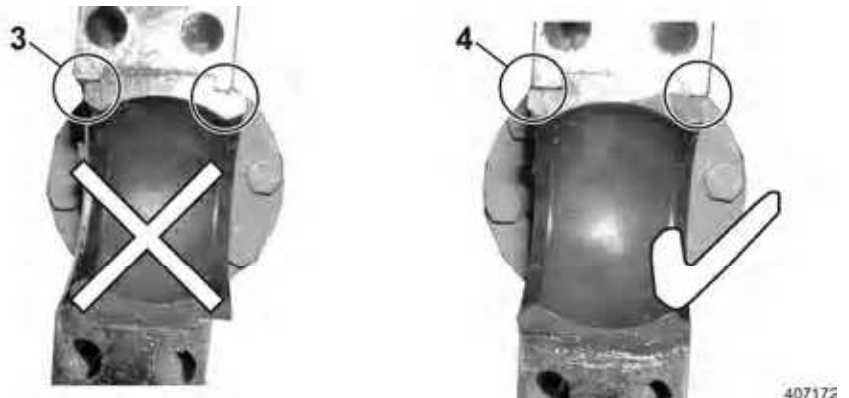
When installing the bearing shells, make sure they are installed true to side.



Bearing shell - bar

On the bearing shells is a narrow 1 as well as a wide 3 bar.

- Install the bearing shell in such a way that it is flush.

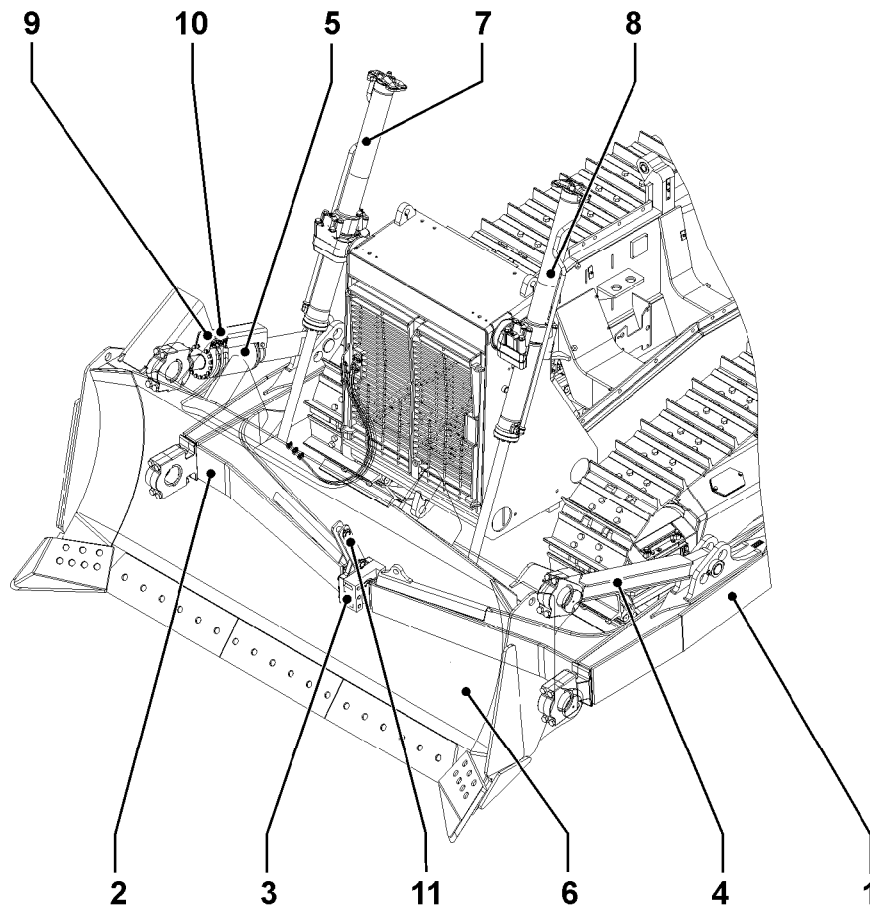


Bearing shell - attachment

- Install the bearing shell true to side.
- Bearing shell 3 incorrectly installed
- Bearing shell 4 correctly installed

3.5.2 Assembly and disassembly of outside push frame with straight blade

Design - overview



Push frame – straight blade

407113

- | | |
|--------------------|------------------|
| 1 Left push frame | 4 Jack |
| 2 Right push frame | 5 Tilt cylinder |
| 3 Center bearing | 6 Straight blade |

3. Control, instrumentation

3.5 Installation guidelines to be observed for removal and installation of attachments

7 Lift cylinder
8 Lift cylinder
9 Connection - tilt cylinder

10 Connection - tilt cylinder
11 Center support link

- On the push frame linkage, on the left and right hand side, support the straight blade 6 with wooden blocks, until the blade is standing freely.

Caution

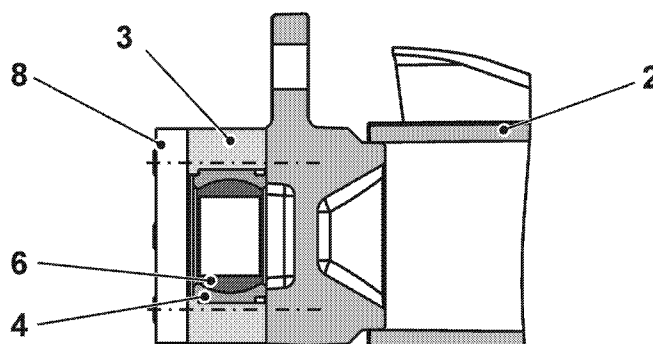


Danger of injury if the blade tips over!

– Secure the blade to prevent it from tipping over.

Make sure that the blade cannot tip over. Approach the blade only from the side.

- Place the half shells with inserted screws on the blade side onto the push frame linkage on the straight blade.
 - Hold the half shells in place with a short piece of wood.
- Install the right push frame 2 on the right straight blade 6 push frame connection.
- Install the center support link 11 on the push frame 2 and on the straight blade 6.
- Align the right push frame 2 right angled to the straight blade and support it from below until it is positioned parallel to the ground.



407122

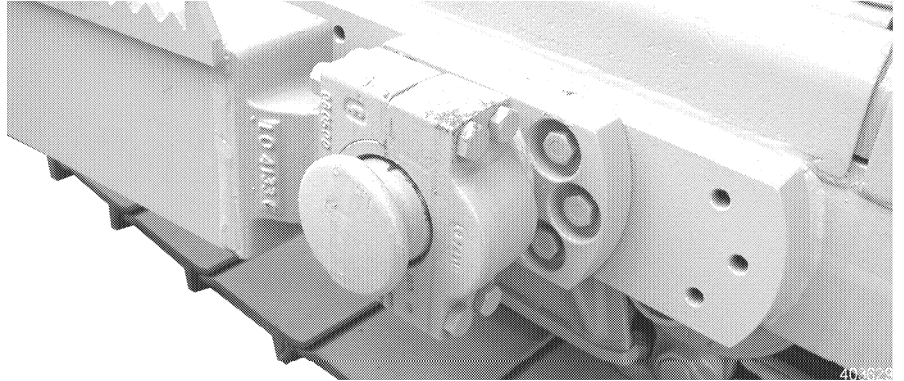
Center bearing

2 Right push frame
3 Intermediate plate
4 Bearing – half shell

6 Bearing ring
8 Threaded bracket

- Push the center bearing with the bearing shells on the left push frame (preassembly according to drawing).
 - Joint of half shells top and bottom (vertical).
- Guide the left push frame 1 into the right push frame 2 and install on the left straight blade 6 push frame connection.
- Align the left push frame 1 right angled to the straight blade and support it from below until it is positioned parallel to the ground.
- Install the screws and the threaded brackets on the center bearing 3 and tighten them slightly.
- Place the half shells with inserted screws for tilt cylinder and screw jack mount on the blade side on the straight blade.
 - Hold the half shells in place with a short piece of wood.

- Install the tilt cylinder 5 on the right hand side on the straight blade 6 and on the push frame 2.
- Install the jack 4 on the left hand side on the straight blade 6 and on the push frame 1.
- Install the trunion balls on both sides on the track roller frame.



Push frame – trunion ball

- Carefully drive the machine into the push frame until the push frame touches the trunion ball on both sides. Install the push frame with the half shells on the trunion ball.
- Turn the transport brackets on the lift cylinders down and tighten.
- Start the machine as described before. See "Starting the Diesel engine".
- Carefully extend the lift cylinder.
- Park the machine properly.
- Attach the lift cylinder on the straight blade with half shells.



Hydraulic pressure

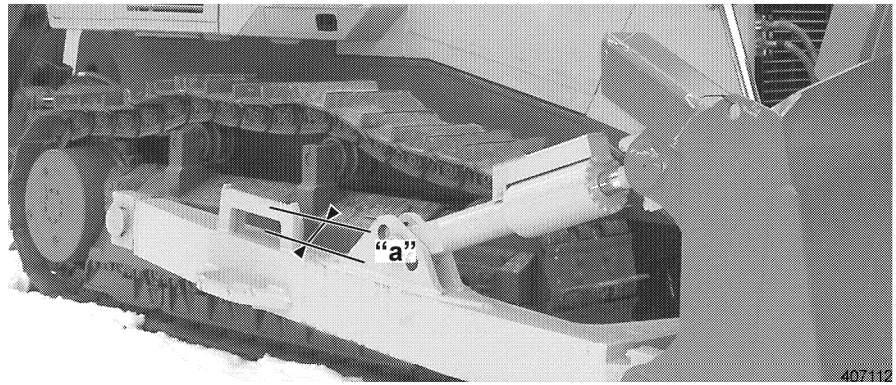
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Caution



! Do not remove any lines, hoses and connector pieces as long as the hydraulic system is under pressure.
With the Diesel engine turned off and the ignition turned on, actuate all functions again to reduce the pressure in the hydraulic lines.

- Place a suitable container under connections 9 / 10 on the machine and on the tilt cylinder.
- Remove the cover and install the tilt hoses.



Align the machine

- Start the machine and align to the blade through careful counter-rotation.
 - The distance "a" on the left and right hand side between the push frame and the track roller frame must be equal.
- Park the machine properly.
- Tighten the screws of the center bearing 3.
Disassembly is in reverse order.
 - For extended storage, protect the parts from corrosion.

3.6 Emergency operation

The electronic system of the machine is monitored by the electronic box. In case of an error, the electronic box of the machine switches to emergency operation. Depending on the error, the machine is switched to two different variations of emergency operation.

Indicator light – Electronic blinks:

- Error is shown in the LC-display. Travel speed is normal.

Indicator light - Electronic blinks:

- Error is shown in the LC-display. Travel speed is reduced.

In both cases, contact Liebherr Service immediately.

In case of a problem, the machine might have to be towed from the danger zone, if required, or it might have to be driven from the danger zone in reverse.

3.6.1 Towing the machine

The following towing instructions apply only for exceptional situations, to move a disabled machine to a location where it can be repaired or loaded.

Towing speed and towing distance:

- max. towing speed no more than 2 km/h (step by step speed),
- only short distance is permissible to tow a machine from the danger zone.

Over long distances, the machine must always be moved by means of transport!

Towing the machine is problematic, it is always the responsibility of the operator.

Damage or accidents, which occur when towing the machine are never covered by the manufacturer's warranty.

Towing safety

See also "Machine towing safety".

Danger



Danger of accidents due to improper towing!

Improper towing of a disabled machine can cause severe injuries or death!

! Before releasing the brakes for towing, make sure the machine is secured to prevent it from rolling off!

- Observe all safety guidelines and the following recommendations when towing the machine.
 - Keep the angle of the towing cable in relation to the machine to a minimum. The angle should never exceed 30° from the machine length axle.
 - Start or move the machine out slowly and evenly. Uneven movements of the machine can overload or snap the towing cable or the rod.
 - When towing the machine on a hill, the towing machine must be at least as large as the machine being towed. Power, weight and brake force of the towing machine must be adequate to keep both machines under control. If necessary, add a machine of the same size to the rear for braking purposes.

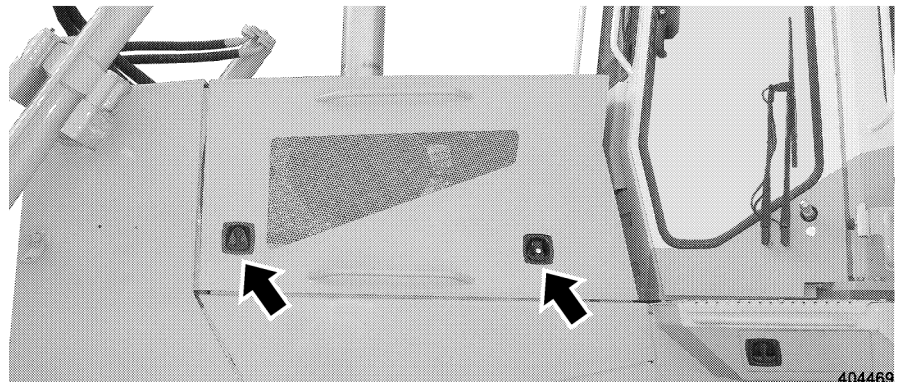
Towing

The machine is equipped with a parking brake, which is vented with hydraulic pressure, the hydrostat acts as a service brake. If the machine is disabled, the parking brake is applied and the machine cannot be moved.

Prepare the machine for towing

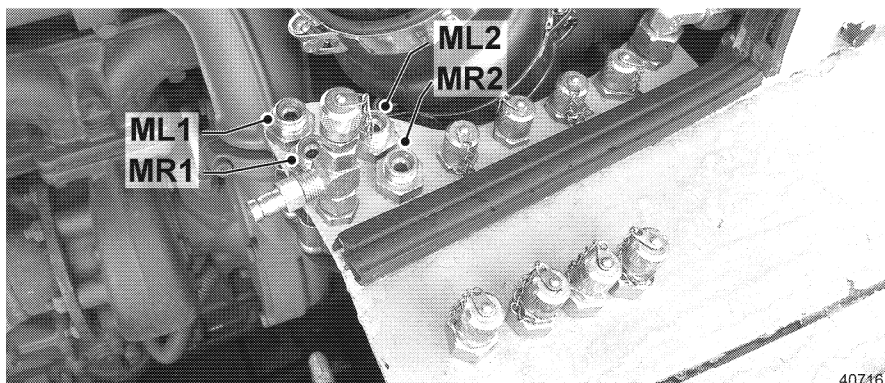
To be able to tow the machine, the hydrostatic drive must be short circuited and the parking brake must be released.

! The machine can only be towed if the electrical system is fully functioning.



Open the left engine compartment door

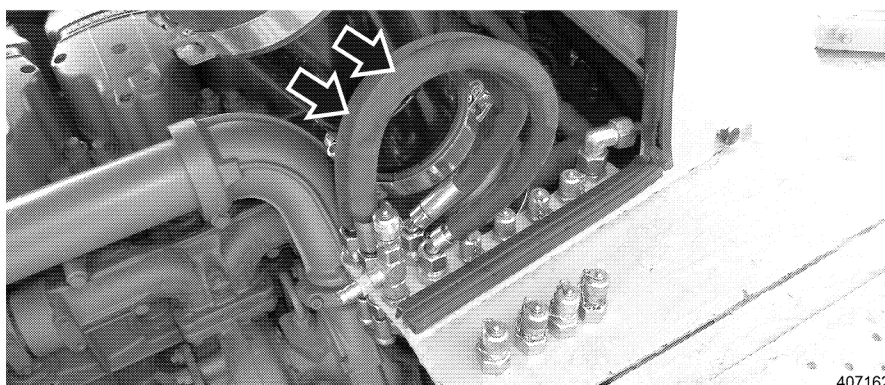
- Open the left engine compartment door.



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Remove the test fittings

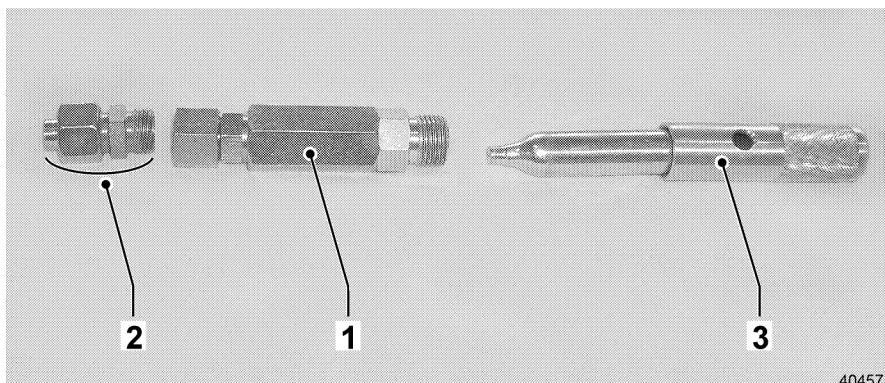
- On the console, remove the four test fittings.
- Remove the hydraulic lines from the tool box to short circuit.



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Short circuit the connections

- Short circuit the connections "ML1-ML2" and "MR1-MR2" with the hydraulic lines.



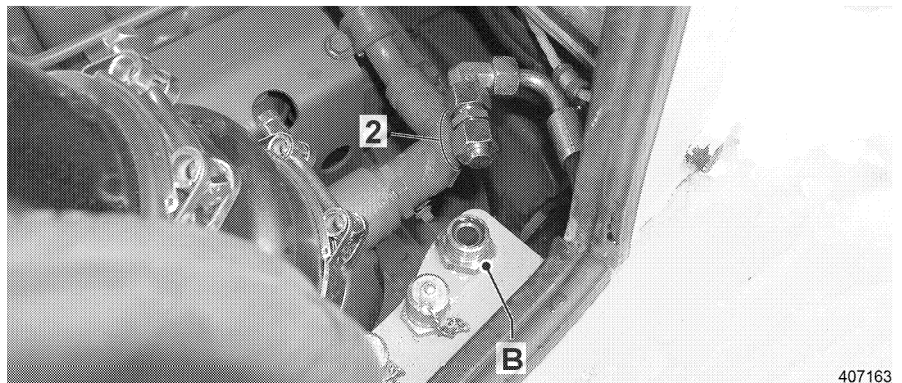
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Brake adapter

1 Brake adapter
2 Fitting

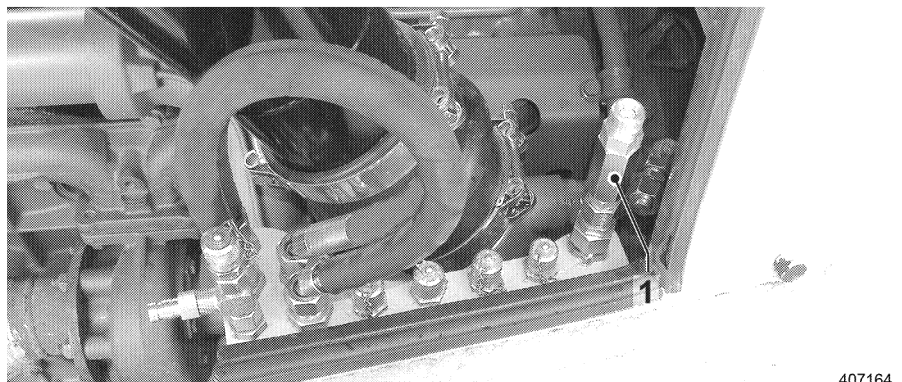
3 Cartridge holder

- Remove the brake adapter 1 from the tool box.
- Remove fitting 2 with union nut and cap from the brake adapter.



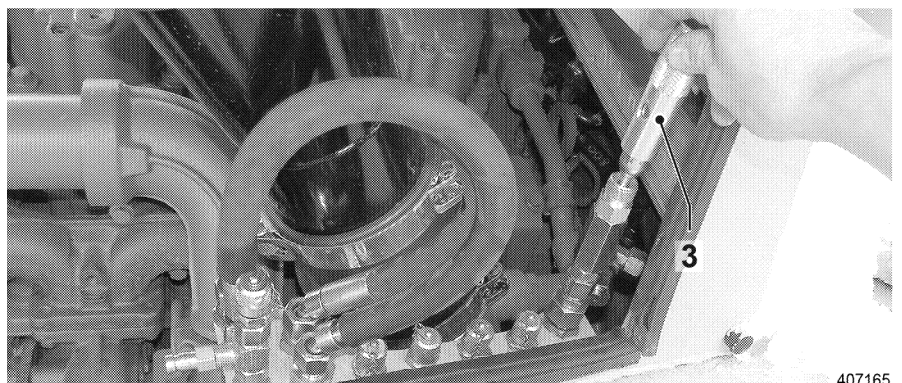
Remove the hose

- Remove the hose from connection "B" and close off with fitting 2 of the brake adapter.



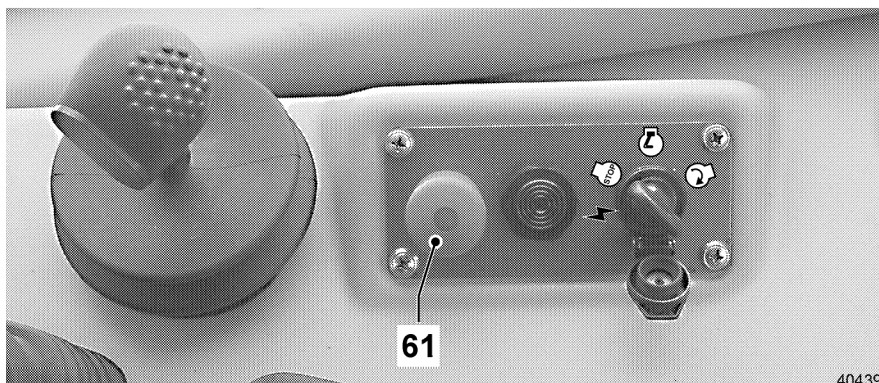
Connect the brake adapter

- Remove the brake adapter 1 from the cartridge holder 3 and connection on connection "B".



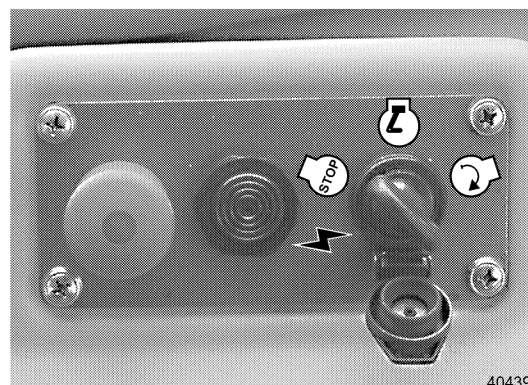
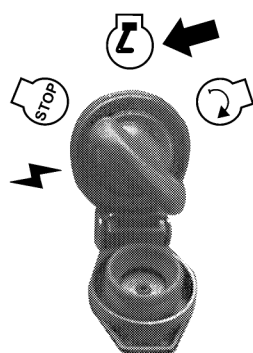
Install the cartridge holder

- Insert a new air pressure cartridge into the cartridge holder 3 and install the cartridge holder on the brake adapter.
- Access the operator's platform.
- Close the engine compartment door.



Emergency off button raised

- Check the position of the emergency off button 61.
 - For the towing procedure, the emergency off button 61 must be in operating position (emergency off button raised).

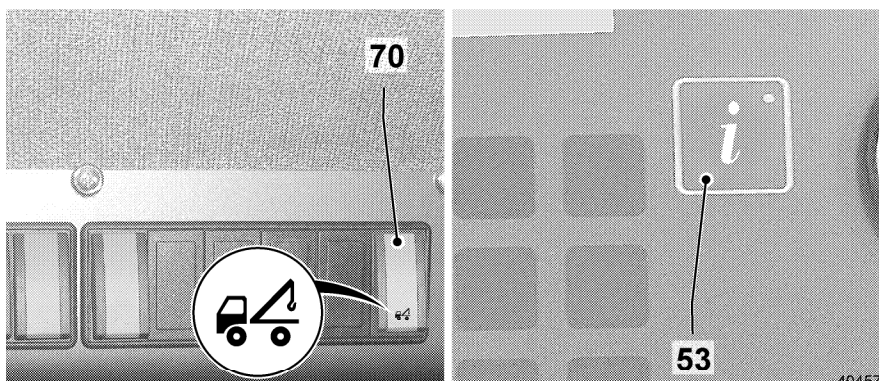


Starter switch – Contact position

- Set the starter switch to contact position.

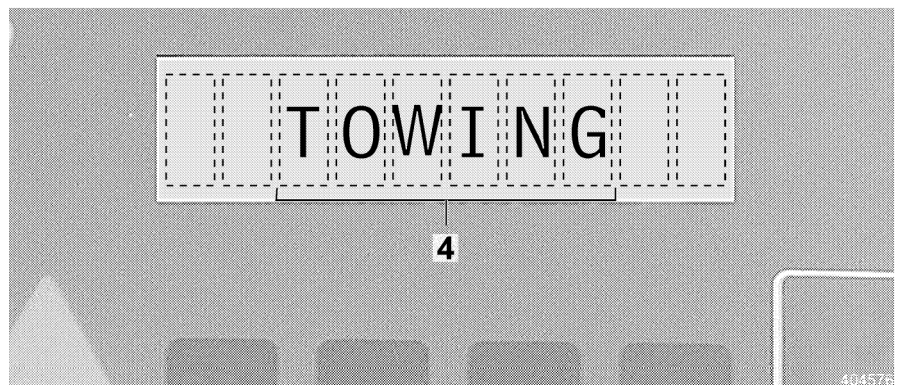
The following indicator lights light up:

 - Indicator light – Travel brake
 - Indicator light – Pump replenishing pressure
 - Charge indicator light
 - Indicator light – Electronic problem



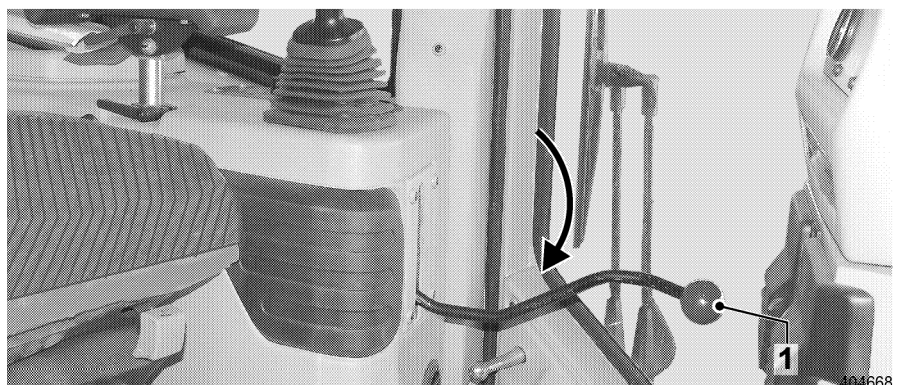
Press towing button / scroll key

- Press the towing mode button 70 and the scroll key 53 simultaneously within 10 seconds.



LC – display "TOWING"

- In the LC display, the word "TOWING" blinks.
- The towing mode is now active.




Safety lever down

- Move the safety lever down.
- Indicator light – Travel brake lights up.




Forward travel

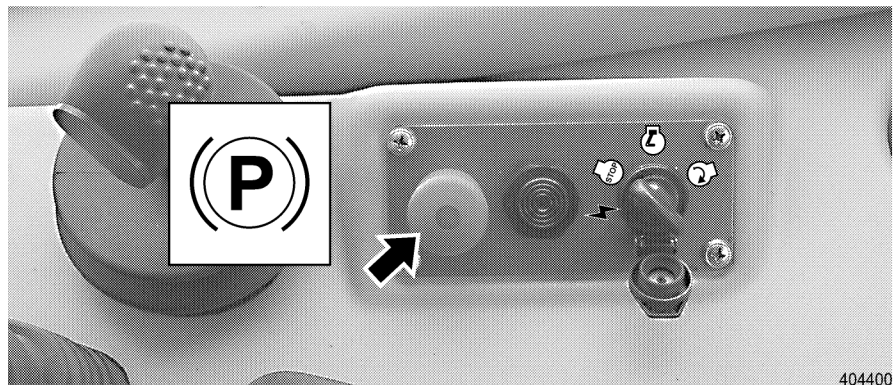
- Deflect the travel joystick to the front.
- By deflecting the travel joystick, the parking brake is released.
- Indicator light – Travel brake turns off.

Danger  The machine has no brakes.
– Carry out the towing procedure by observing all safety guidelines.

Stop the machine To be able to stop the machine, you can:

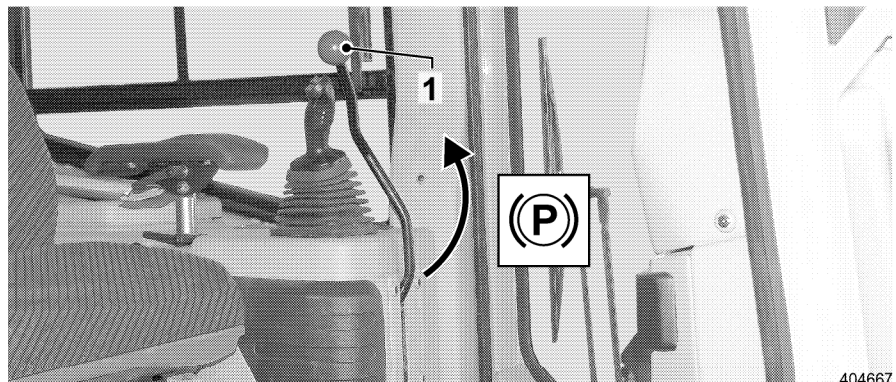
- move the travel joystick to neutral position.
- Press the emergency off button.
- turn the ignition off.

Caution  In dangerous or unclear situations, the machine can be stopped by pressing the emergency off button.



Press the emergency off button.

- Press the emergency off button.
 - The parking brake is applied.
- To continue towing, raise the emergency off button and repeat the towing procedure from pressing the scroll key and the towing mode button.
- If the indicator light – travel brake does not turn off, then the towing procedure must be repeated from the point where the air pressure cartridge was inserted.
- The pressure in the system is not sufficient to vent the brake.



Safety lever up

After the towing procedure

- Move the travel joystick to neutral position.
 - The parking brake is applied.
 - Indicator light – Travel brake must light up.

- Press the emergency off button.
- Move the safety lever up.
- Turn the ignition off



Hydraulic pressure

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Caution

- ! Before removing the brake adapter, relieve the hydraulic pressure in the system.
- Relieve the pressure in the hydraulic system by moving the travel joystick several times in forward and reverse direction.
 - Carefully remove the brake adapter.

Danger

Before putting the machine back into service, check if the parts installed for the towing procedure have been removed again and the machine has been returned to its original series condition.

3.6.2 Auxiliary starting procedure

In case of starting problems due to old batteries, the machine can also be started with an external battery.
Make sure that the following safety preparations have been made.

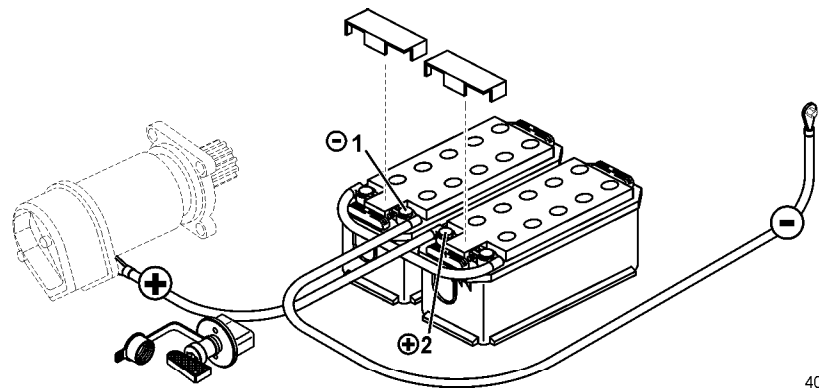
Attach the auxiliary battery

Danger

Danger of accidents due to incorrect or unsafe procedure when starting the machine with auxiliary batteries!

When connecting the auxiliary batteries, increased gas formation on aging batteries can cause an "EXPLOSION"!

- ! Avoid open flames and sparks in the area near the batteries.
- ! Make sure to wear protective glasses and gloves during the auxiliary starting procedure.
- ! Use a sufficiently sized auxiliary starting cable.



Auxiliary starting procedure

- 1 Ground point of discharged battery
- 2 Positive terminal of discharged battery

- Connect an auxiliary starting cable first to the positive terminal of the discharged battery 2 and then to the positive terminal of the external battery.
- Connect the second auxiliary starting cable first to the ground point for the discharged battery 1 and then to the negative terminal of the auxiliary battery.
- Start the Diesel engine. See section "Start the Diesel engine".

Disconnect the auxiliary battery

Before removing the auxiliary starting cable, bring the Diesel engine to low idle speed.

If necessary, turn on a large power user, such as the floodlights, to avoid over voltage.

- Remove the auxiliary starting cable first from the negative terminal of the auxiliary battery and then from the ground point of the discharged battery 1.
- Then remove the second auxiliary starting cable from the positive terminal of the auxiliary battery and then from the positive terminal of the discharged battery 2.

4. Operating problems

Warning and problem reports

- Diverse problems are shown optically via the corresponding indicator lights or indicators and gauges on the instrument panel.
See also "Control, operation", paragraph "Indicator unit".
- Warning functions are sometimes also acoustically supported.

Recognition and remedy of problems and errors

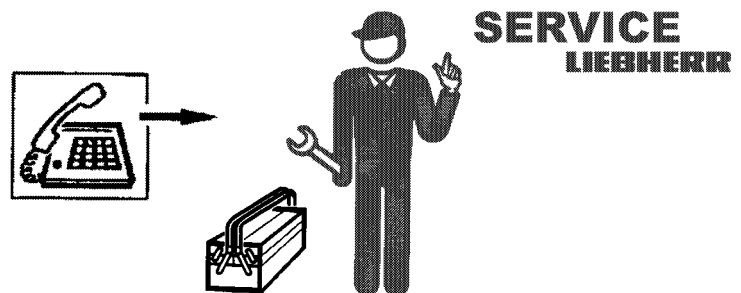
- Often problems are caused by improper machine operation or maintenance.

For that reason, always read the corresponding section in the Operating Manual if a problem occurs.

- Analyze the cause of the problem and fix it immediately!
- If you contact LIEBHERR Service, please describe the problem and all corresponding circumstances in detail.

Detailed information makes it possible to find and fix the cause of the problem quickly. Have the machine data and serial number of the machine available.

- Do not perform any work for which you are not trained.






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LIEBHERR Service

If you cannot find the cause of the problem with the "Error code charts", or if you cannot fix the problem, contact LIEBHERR Service.

4.1 Problems and remedy

Diesel engine

 Problem / error	 Cause	 Remedy
Starter does not crank	Main fuse burnt out	Replace the fuse
	Battery connections loose or corroded	Clean and tighten loose connections
	Battery voltage too low	Charge battery or replace it
	Starter current circuit interrupted or contacts corroded	Contact LIEBHERR SERVICE
	Starter defective	Contact LIEBHERR SERVICE
Starter cranks slowly	Battery voltage too low	Charge battery or replace it
	Battery connections loose or corroded	Clean and tighten loose connections
	Ambient temperature too low	Observe the measures for winter operation
Diesel engine does not start or stops right away	Fuel tank empty	Refuel, bleed fuel system
	Fuel filter plugged	Replace fuel filter
	Fuel line, precleaner or strainer in fuel tank plugged	Clean and bleed fuel system
	Fuel system or filter leaks	Seal and bleed
	Air in fuel system	Bleed the fuel system
	Fuel not cold hardy	Clean prefilter, replace fuel filter; use winter fuel
	Ambient temperature too low	Observe the measures for winter operation
	Heater flange defective (in cold temperatures)	Check heater flange and replace, if necessary
Diesel engine is hard to start	Leaks or insufficient pressure in fuel low pressure circuit	Check for leaks (visual inspection); have checked by LIEBHERR SERVICE
	Diesel engine compression too low	Contact LIEBHERR SERVICE

!	?	✓
	Heater flange defective (in cold temperatures)	Check heater flange, replace if necessary
	Problem in electronic	Read error memory of engine control unit, contact LIEBHERR SERVICE
Diesel engine turns off unintentionally	Current supply interrupted	Contact LIEBHERR SERVICE
	Leaks or insufficient pressure in fuel low pressure circuit	Check for leaks (visual inspection); have checked by LIEBHERR SERVICE
	Problem in electronic	Read error memory of engine control unit, contact LIEBHERR SERVICE
Insufficient Diesel engine output (insufficient power)	Defect on fuel system (plugged, leaks)	Check visually for leaks, change filter, contact LIEBHERR SERVICE
	Charge pressure too low	Loose clamps, defective seals and hoses, air filter contaminated, turbo charger has no power
	Charge air temperature too high (automatic power reduction by engine control unit)	Charge air cooler contaminated, bad fan performance, ambient temperature too high, consult LIEBHERR SERVICE
	Coolant temperature too high (automatic power reduction by engine control unit)	Check cooler for contamination, check fan and thermostat, check coolant level, contact LIEBHERR SERVICE
	Fuel temperature too high (automatic power reduction by engine control unit)	Contact LIEBHERR SERVICE
	Application area higher than 1800 meters above sea level	No remedy, Diesel engine output is automatically reduced
	Fuel injectors get stuck or do not spray	Contact LIEBHERR SERVICE
	Diesel engine compression too low	Contact LIEBHERR SERVICE
	Problem in electronic	Read error memory of engine control unit, contact LIEBHERR SERVICE
Diesel engine gets too hot (according to coolant temperature display)	Insufficient coolant	Refill
	Cooler dirty inside or calcified, cooler very dirty externally	Clean or decalcify

4. Operating problems

4.1 Problems and remedy

!	?	✓
	Thermostat defective	Check or replace, contact LIEBHERR SERVICE
	Sensor coolant temperature defective	Check or replace, contact LIEBHERR SERVICE
	Fan insufficient RPM (only hydrostatic fan drive)	Check or replace fan drive, contact LIEBHERR SERVICE
Indicator light charge flow lights up when the Diesel engine is running	Tension of V-belt insufficient	Check V-belt tension, replace tension pulley, if necessary
	V-belt ripped	Replace V-belt
	Cable connections loose or separated	Attach cable or replace it
	Alternator, rectifier or regulator defective	Contact LIEBHERR SERVICE
Diesel engine emits black smoke	Fuel injectors get stuck or do not spray	Contact LIEBHERR SERVICE
	Turbo charger defective (insufficient charge pressure)	Contact LIEBHERR SERVICE
Exhaust fumes are blue	Oil level in Diesel engine is too high. Lube oil gets into the combustion chamber and is burnt.	Correct oil level, contact LIEBHERR SERVICE
	Compressor side seal on turbo charger defective	Contact LIEBHERR SERVICE
	Crank case bleeder defective	Check, replace if necessary
Exhaust fumes are white	Start of injection is too late	Contact LIEBHERR SERVICE
	Heater flange defective (in cold temperatures)	Check heater flange, replace if necessary
Diesel engine hammers	Combustion problems	Contact LIEBHERR SERVICE
Diesel engine knocks	Valve play too large	Adjust valve play
	Fuel injectors damaged or carbonized	Contact LIEBHERR SERVICE
	Bearing damage	Contact LIEBHERR SERVICE
	Piston rings worn or broken, piston seized	Contact LIEBHERR SERVICE
Abnormal noises	Leak in intake and exhaust line causes whistling noise	Fix leak, replace seal if necessary

!	?	✓
	Scraping of turbine or compressor gear on housing; foreign particle in compressor or turbine; seized bearing of rotating parts	Contact LIEBHERR SERVICE
Lube oil pressure too low	Oil level in oil pan too low	Add oil to the required mark
	Lube oil fluid too thin (oil dilution via Diesel fuel)	Drain oil, add specified oil
	Oil pressure gauge or pressure sensor defective	Check oil pressure and replace damaged oil pressure sensor or gauge; contact LIEBHERR SERVICE
	End regulating valve is not working correctly or dirt in end regulating valve	Contact LIEBHERR SERVICE
	Bearing plays too large due to wear or bearing damage	Contact LIEBHERR SERVICE
Lube oil in cooling system	Oil cooler or oil cooler plate leaks	Contact LIEBHERR SERVICE
Coolant in lube oil	O-rings on cylinder liners leak	Contact LIEBHERR SERVICE
	Oil cooler or oil cooler plate leaks	Contact LIEBHERR SERVICE




Hydraulic system

!	?	✓
Problem / error	Cause	Remedy
Indicator light replenishing pressure does not turn off after starting the engine NOTE: Turn the engine off immediately	Excessive leakage	Call Service
Abnormal noises of hydraulic pumps NOTE: Turn the engine off immediately!	Shut off valve on hydraulic tank closed	Open shut off valve
	Hydraulic pumps draw air	Check oil level in hydraulic oil tank, check suction lines for leaks
No reaction on deflection of travel joystick	Safety lever in up position or emergency off switch pushed	Move safety lever down / pull emergency off switch
No reaction when actuating blade up function	Blade release turned on	Turn blade release off




Travel gear, track

4. Operating problems




4.1 Problems and remedy

 Problem / error	 Cause	 Remedy
Oil emerges on track rollers, carrier rollers or idler	Seal defective	Replace seal
Insufficient chain guide on idler	Idler guide on track roller frame has too much play	Adjust play on idler guide
Chain jumps off or over	Chain tension insufficient / sprocket worn	Adjust / retension chain tension
Correctly tensioned chain quickly loses tension during use	Chain tension cylinder defective	Check chain tension cylinder, replace if necessary or reseal (only by authorized expert personnel)
Track or carrier roller is stuck	Track extremely dirty	clean

Electrical system

 Problem / error	 Cause	 Remedy
Charge indicator light does not turn off	V-belt for alternator loose or ripped	Tension or change V-belt
	Alternator defective	Change alternator
Batteries are not or insufficiently charged	Batteries defective	Change batteries
	Battery connections dirty / corroded	Clean battery connections
	Cable loose or defective	Connect or replace cable
Non- or erroneous function of an indicator light or display instrument	Bulb burnt out, display instrument defective	Replace damaged part
Failure of some or all functions of instrument panel	Plug connector separated or damaged, ground line interrupted, short circuit - fuse defective	Attach plug connector correctly or change it, fix short circuit, replace fuse

Heater system

 Problem / error	 Cause	 Remedy
Heater does not supply warm air	Shut off valves of coolant line on engine closed	Open shut off valves
	Engine is not at operating temperature	Bring engine to operating temperature
Heater fan is not running	No power supply	Check fuse and wiring/ fix
	Blower motor defective	Change blower motor
Only slight air flow into operator's cab	Fresh air filter dirty	Clean air intake ports, replace fresh air filter

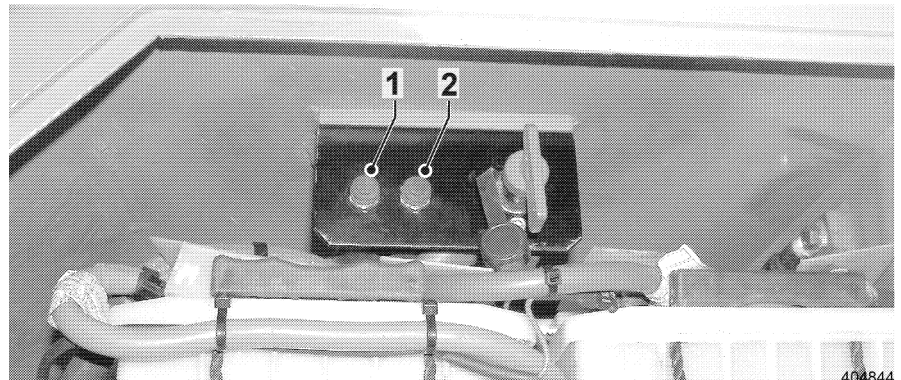
Working attachment

! Problem / error	? Cause	✓ Remedy
Cylinder gives way under load	Piston seal in cylinder defective	Overhaul cylinder
PR-chain scrapes on push frame	Blade adjustment imperfect	Adjust correctly
Excessive bearing play on attachment	Bearing points worn	Replace bearing parts

4.2 Problem remedy

4.2.1 Change the fuse

To prevent damage on the electrical system, always use fuses with the correct amperage. Before replacing a fuse, check the affected circuit.



Fuses in the battery compartment

Main fuse

The main fuse 1 (45A) is installed on the right hand side of the machine in the battery compartment.

Fuse – Intake air preheating

The fuse for the intake air preheating 2 (60A size) is installed on the right hand side of the machine in the battery compartment.

If the safety fuse is triggered, it is important to find the cause of the overload and remedy the problem before turning the safety fuse back on.

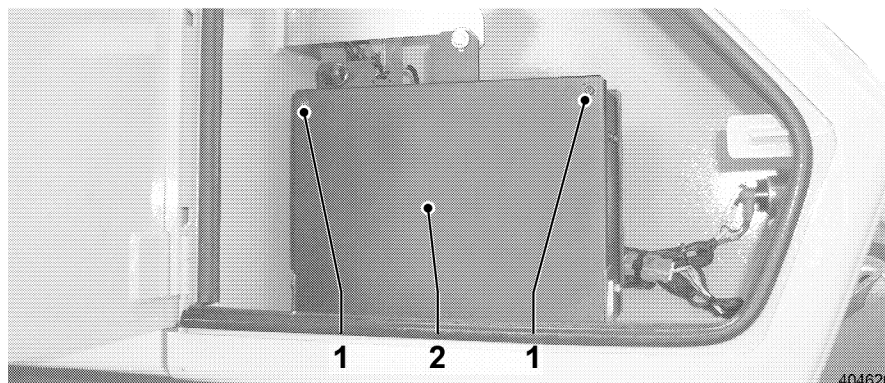
- The power supply of the machine is reestablished by pressing the push button on the safety fuse.

Fuses in central electric housing

The additional fuses are located in the central electric housing on the left rear in the compartment.

4. Operating problems

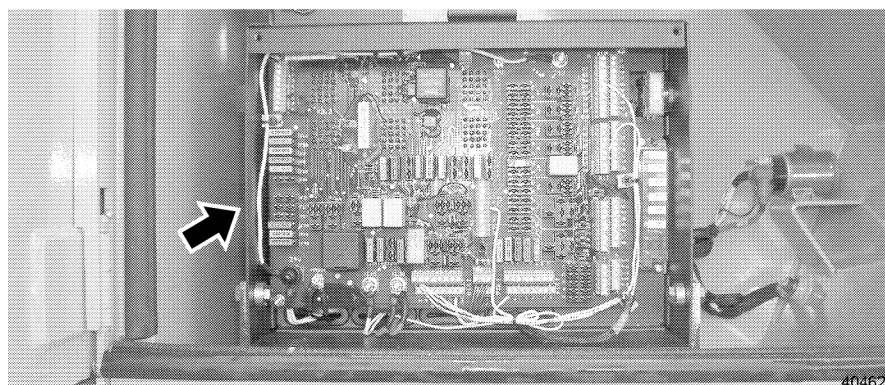
4.2 Problem remedy



Central electric housing

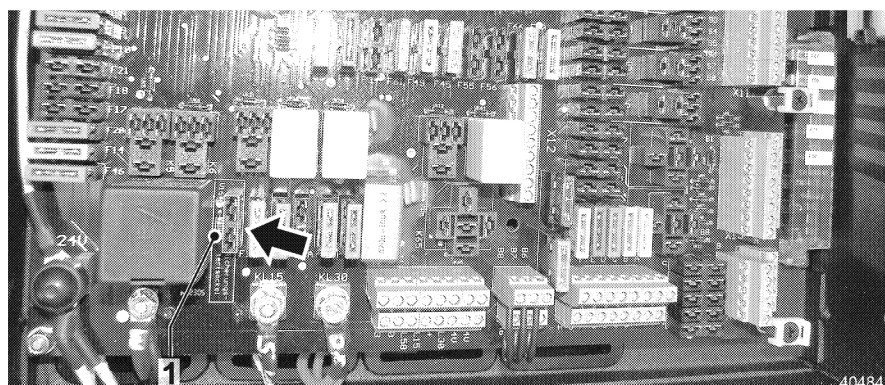
Access to the fuses is provided after removing the screws and the cover.

- Remove screws 1 and remove cover 2.



Central electric housing - fuses

- Depending on the electrical problem, check the following chart - for the description and fuse size.
- Pull the affected fuse and replace it with a new fuse (Amperage according to location).



Test base

Fuse tester

A possibly defective fuse can be checked on the fuse test base.

- Push the fuse on the test base.

If the fuse is not defective, the bulb 1 on the test base lights up. Otherwise, change the defective fuse.

Fuse listing in central electric housing

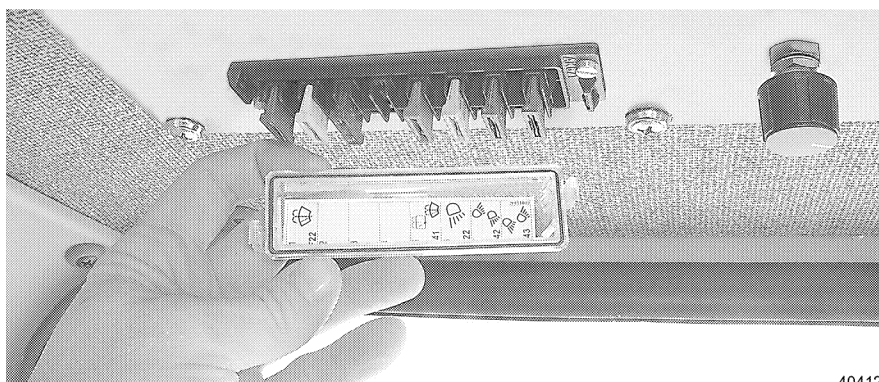
SI = Special installation

Fuse	Value	Unit	Description / function
F 3 - F 6			Not assigned
F 7	5	A	Power supply display console
F 8	7,5	A	Safety lever
F 9	10	A	Electrical socket
F 10	3	A	Display instruments, warning light
F 11	3	A	Horn button (installation circuit board)
F 12	7.5	A	Transformer 24/12V
F 13	5	A	Fan control - electronic
F 14	5	A	Solenoid valves quick drop
F 15.a	3	A	Solenoid valve blade release
F 15.b	5	A	Solenoid valve blade release ripper (SI)
F 16	5	A	Button – blade control lever
F 17 - F 18			Not assigned
F 19	20	A	Air conditioning system (SI)
F 20.a	10	A	Heater
F 20.b	10	A	Auxiliary heater (SI)
F 21	5	A	Operator's seat, air cushioned, seat heater (SI)
F 23	7.5	A	Headlight low beam front (SI)
F 24	7.5	A	Headlight high beam (SI)
F 25	7.5	A	Headlight – fuel tank (SI)
F 26	7.5	A	Floodlight step (SI)
F 27	20	A	Refueling pump (SI)
F 28.a	3	A	Back up warning device (SI)
F 28.b	3	A	Back up warning device, off switchable (SI)
F 29	3	A	Hydraulic oil level check (SI)
F 30	3	A	Shift release rear winch (SI)
F 31	16	A	Fuel water separator, heatable (SI)
F 32	3	A	Coolant level check (SI)
F 33	3	A	Cutting angle adjustment, hydraulic (SI)
F 34	3	A	Pin puller (SI)
F 35	30	A	Operator's cab
F 36	3	A	LCD Module A10
F 37	5	A	Auxiliary heater (SI)
F 38	15	A	Auxiliary heater (SI)
F 39			Not assigned
F 44	2	A	Warning light – Operator's cab
F 45	3	A	Cab interior lights
F 46	10	A	Terminal X18 (24V)
F 47	10	A	Terminal X18 (30)
F 48	10	A	Terminal X18 (15)
F 49	5	A	Transformer
F 50	5	A	Beacon (SI)
F 52			Not assigned
F 53	3	A	Control motors Heater / air conditioner

4. Operating problems

4.2 Problem remedy

F 55 - F 60			Not assigned
F 61	1	A	Safety lever
F 64	10	A	Transformer 12V (Installation loosely in wiring harness)
F 65	3	A	Power supply ECU
F 66	3	A	Power supply, ECU, E-Box
F 67	15	A	Power supply ECU
F 68	15	A	Power supply ECU
F 79	7,5	A	Refueling pump (SI)
F 80	7,5	A	Back-up Alarm optically (SI)
F 81	1	A	Radio, clock (Installation loosely in wiring harness)
F 84	3	A	Horn button (outside circuit board)
F 90	5	A	Float position
F 92	3	A	Diagnostics plug
F 107	10	A	Fuel water separator heatable (SI)
F 108	5	A	Float position
F 109	5	A	Blade float position
F 114	7.5	A	Operator's seat, air cushioned, seat heater (SI)



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Fuses in roof console

Fuse listing in roof console

The fuses in the roof console can be changed after removing the cover.

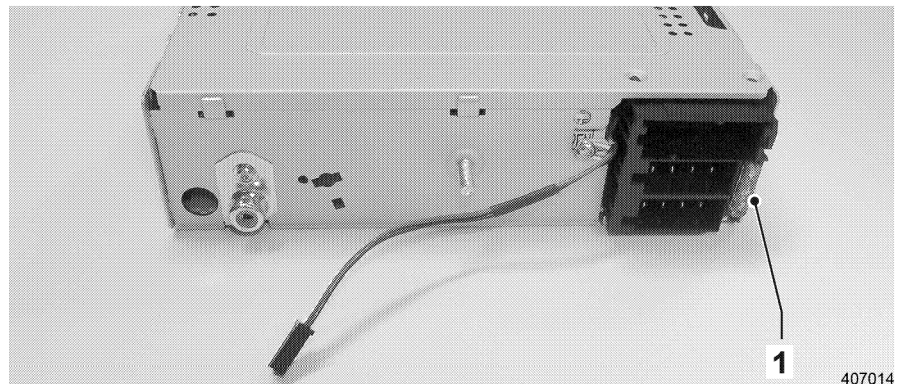
- Remove the cover and change the defective fuse.

Fuse listing in roof console

Fuse	Value	Unit	Description / function
F 22	15	A	Headlight cab front
F 40	7.5	A	Wiper doors
F 41	7.5	A	Wiper front and rear
F 42	7.5	A	Headlight left front, left rear
F 43	7.5	A	Headlight right front, right rear
F 51	8	A	Additional headlight rear (SI)
F 54	3	A	Heater / air conditioner control motors

Fuse Radio

The radio is secured with a separate fuse.

*Radio fuse*

- If the radio is not functioning, remove the radio and check fuse 1 or change it.

Fuse	Value	Unit	Description / function
F 71	5	A	Radio

5. Maintenance

5. Maintenance

5.1 Maintenance and inspection schedule

5.1 Maintenance and inspection schedule

Maintenance / inspection at operating hours							Work to be carried out	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000		
							<p>by maintenance personnel</p> <p>■ first and only interval ● Repeat interval</p> <p>OM - Operating instructions SM - Service Manual</p>	<p>by authorized expert personnel</p> <p>□ first and only interval ○ Repeat interval</p> <p>hrs. – operating hours</p>
Diesel engine								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check oil level and coolant level	OM
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check engine, cooling system and belly pan for contamination / clean if necessary	OM
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check fuel water separator on the prefilter / empty if necessary - or as soon as the indicator light lights up	OM
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drain condensation and sediments from fuel tank - at least 1x weekly	OM
			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Change engine oil ¹⁾ Specification: CI-4, CH-4 Change engine oil ¹⁾ Specification: E4, E5, E7 - shorten intervals as necessary - at least 1x a year	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Change the lube oil filter - at least 1x a year	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check the corrosion inhibitor / antifreeze fluid concentration in the coolant	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check V-belt condition	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check the mounting of the control units, check condition of sensory and cable connections	OM
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check oil, coolant and fuel system for leaks and condition	OM
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check intake and exhaust system – mounting and leaks	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check engine mount	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check engine RPM	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Change fuel pre and fine filter - note bleeding guidelines	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check / adjust valve play - with cold engine	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grease gear ring on flywheel	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Take oil sample before oil change and send it in for analysis	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Change /replace oil separator filter insert	OM
							Check vibration damper for distortion - 3000 hrs.	OM
							Check heater flange - before start of cold season	
							Replace air filter inserts - as necessary / once a year	OM
							Replace coolant with antifreeze - every 2 years	OM

Maintenance / inspection at operating hours							Work to be carried out	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000		
							<p>by maintenance personnel</p> <p>■ first and only interval ● Repeat interval</p> <p>OM - Operating instructions SM - Service Manual</p>	<p>by authorized expert personnel</p> <p>□ first and only interval ○ Repeat interval</p> <p>hrs. – operating hours</p>
Hydraulic system								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check oil level in hydraulic tank	OM
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clean magnetic rod (also after repairs) - up to 50 hrs. daily	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drain condensation and sediments from hydraulic tank - at least every 6 months - Weekly when using an "environmentally friendly hydraulic medium"	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check / clean oil cooler for contamination	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Replace pressure filter for replenishing	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Replace main return filter element or as soon as the indicator light lights up	OM
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check working and travel hydraulic system for function and leaks, check hose routing for chafing	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check / adjust all hydraulic pressure according to adjustment check list	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check mountings and fittings for tight seating	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Take oil sample (before oil change) and send it in for analysis	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Replace oil in hydraulic system (add oil via filter) - at least every 4 years - when using environmentally friendly hydraulic oils, request / observe special guidelines	OM
Splitterbox								
<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check oil level	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Replace gear oil - at least every 2 years	OM
Electrical system								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check function of system, incl. displays and instruments	OM
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check battery electrolyte level - at least 1x a year	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Clean / check / grease battery terminals	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check cable routing and connections	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check / adjust control system of travel drive according to adjustment check list	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check battery charge - before start of cold season	

5. Maintenance

5.1 Maintenance and inspection schedule

Maintenance / inspection at operating hours							Work to be carried out	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	<p>by maintenance personnel</p> <p>■ first and only interval ● Repeat interval</p> <p>OM - Operating instructions SM - Service Manual</p>	<p>by authorized expert personnel</p> <p>□ first and only interval ○ Repeat interval</p> <p>hrs. – operating hours</p>
Heater / ventilation / air conditioning								
			●	○	○	○	Turn on the air conditioning system regularly - at least 1x in 14 days	OM
□				○	○	○	Check system for function and leaks	OM
				○	○	○	Check condenser for contamination - as necessary	OM
				○	○	○	Clean recirculated / fresh air filter, replace if necessary, shorten maintenance interval for dust intensive application.	OM
				○	○	○	Check mounting screws and drive belt of air conditioner compressor	OM
				○	○	○	Check dryer unit (moisture, fill, condition) - replace as necessary - Evacuate the system and refill	OM
				○	○	○	Check / clean water drain valve for air conditioner	OM
				○	○	○	Check evaporator unit, clean if necessary	OM
				○	○	○	Check electrical lines for abrasions and plug connections for tight seating	OM
							Air conditioning system inspection by expert HVAC personnel 1x a year	
Travel gear								
□			●	○	○	○	Check oil level for seal area - at least 1x a year - or as soon as the indicator light lights up	OM
□				○	○	○	Check gear oil level – clean magnetic plug	OM
				□	○	○	Check fittings for tight seating	OM
				□	○	○	Change gear oil ¹⁾ - clean magnetic plug - at least every 4 years	OM
				□	○	○	Replace lube oil in seal area / flush seal area - at least every 4 years	OM
				○	○	○	Take oil sample before oil change and send it in for analysis	OM
Track								
		■	■	○	○	○	Check mounting screws and nuts of track components, especially track pad and sprocket segment screws for tight seating	OM
		■	■	□	○	○	Check oil level of support axle bearings	OM
			●	○	○	○	Lubricate the equalizer bar bearing - shorten intervals as necessary	OM
				○	○	○	Check carrier rollers, track rollers, idlers for leaks	OM
				○	○	○	Check / adjust idler guides, replace parts as necessary	OM
				□	○	○	Check front side axle bearing screws for tight seating (only PR 754)	OM
□							Adjust chain tension to suit application - as necessary / change of application	OM
							Clean track - as necessary	OM
							Check travel gear for wear - as necessary	

Maintenance / inspection at operating hours							Work to be carried out	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000		
							by maintenance personnel ■ first and only interval ● Repeat interval OM - Operating instructions SM - Service Manual	by authorized expert personnel <input type="checkbox"/> first and only interval <input type="radio"/> Repeat interval hrs. – operating hours
Working attachment								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check cutting edges, corners and ripper teeth for wear - make sure attachments are suited to application	OM
<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check blade center position and mounting tightness of bracket - and at every installation	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check all bearing points for play / wear	OM
		<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check screws, nuts and pin retainers for tight seating	OM
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check attachment for damage	OM
General								
<input type="checkbox"/>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lubricate all lube points according to the lubrication chart - shorten intervals as necessary	OM
<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Check complete machine for proper maintenance and condition.	OM
<input type="checkbox"/>							Explain machine documentation, especially operating instructions / safety guidelines to operating personnel	OM

1) For oil specification and viscosity, refer to chapter "Lubricants and service fluids".

5.2 Lubrication chart, quantities

5.2.1 Quantities chart

For information regarding the required quantities, refer to section "Quantities chart".

For information regarding the required quantities, refer to section "Quantities chart".

Data in chart column - Quantity:

- Listed here are the usual „Lubricants and service fluids“ available for Central European climate conditions.
- Before changing the oil or adding oil to the hydraulic system (hydraulic tank) check if it filled with mineral oil or bio oil.
- For detailed information about required lubricants and service fluids, refer to

data in chart column - Dosage:

- The values for the fill quantities noted in the chart are only guidelines.
- In any case, the dipstick or level marks are applicable.
- The level in the corresponding component must be checked after every oil change or refill.

Description	Medium	Quantity	Unit
Diesel engine (with filter change)	Engine oil SAE 10W - 40	43 11.8	l US gal.
Fuel	Diesel	650 172	l US gal.
Coolant system – Diesel engine (total contents)	Coolant	74 19.5	l US gal.
Hydraulic tank	Engine oil SAE 10W - 40	215 57	l US gal.
Hydraulic system (total contents)	Engine oil SAE 10W - 40	320 85	l US gal.
Splitterbox	Gear oil SAE 85W 140EP	5.5 5.8	l quarts
Travel gear	Gear oil SAE 85W 140EP	2 x 18.5 2 x 19.5	l quarts
Slip ring seal – travel gear	see Hydraulic system	2 x 9.8 2 x 10.4	l quarts
Windshield washer system	Commercially available window cleaning fluid	9.5 10	l quarts

Coolant mixing ratio

- Premix the coolant in a suitable container.

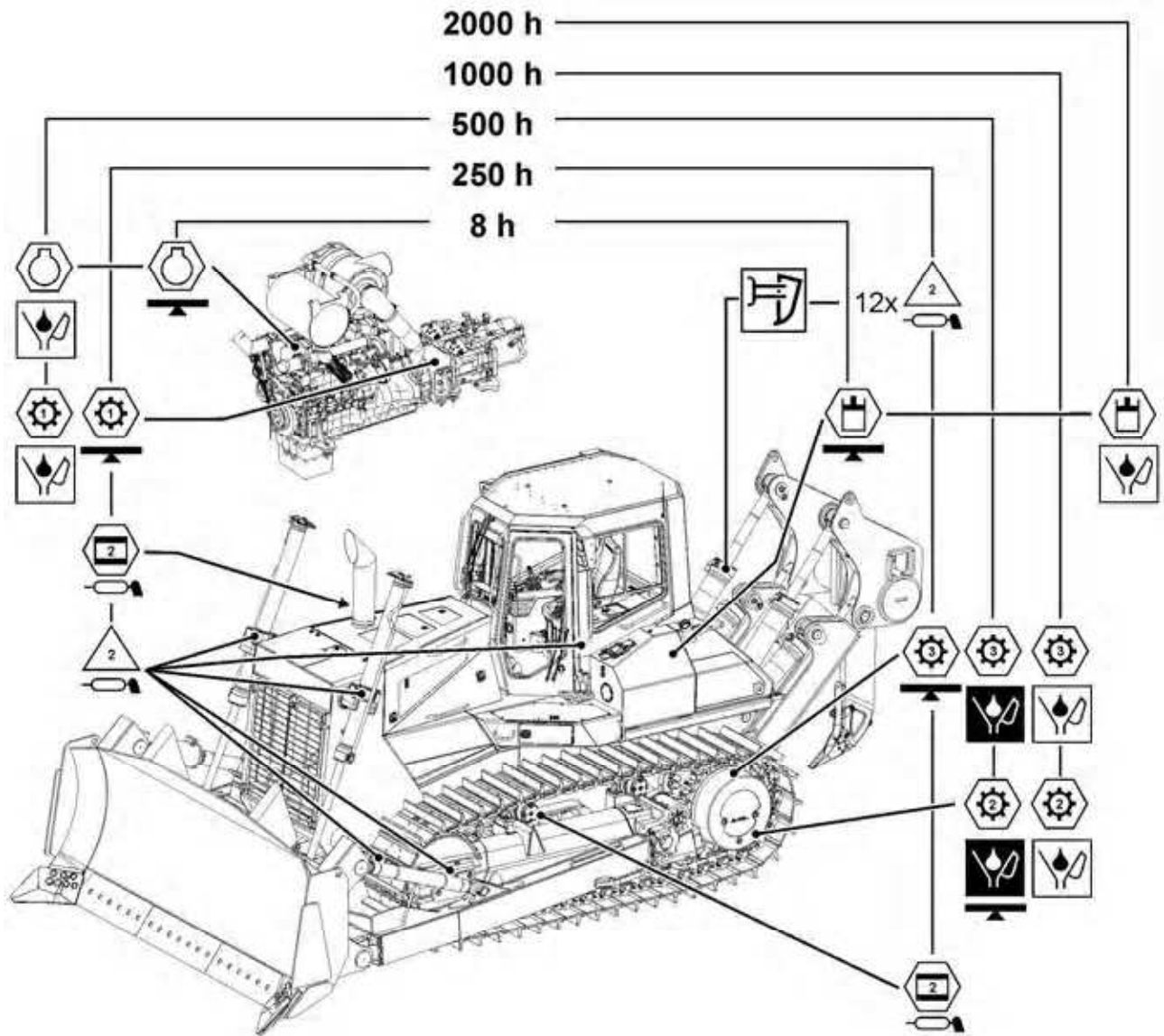
Machine type	Quantities	Freeze protection to	Part water	Part corrosion inhibitor / antifreeze fluid
PR 754	approx. 74 l	-37°C / -34°F	37 l	37 l
	approx. 74 l	-50°C / -58°F	29.5 l	44.5 l

5.2.2 Lubrication chart

The lubrication chart provides an overview of the locations of maintenance points on the machine and the time frame of the maintenance intervals.

For detailed information, refer to "Maintenance and Inspections schedule", as well as individual descriptions about completion of maintenance tasks, see section "Maintenance".

For detailed information about required lubricants and service fluids, refer to section "Lubricants and service fluids".



Lubrication chart - view

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5. Maintenance

5.2 Lubrication chart, quantities

	Diesel engine
	Hydraulic tank
	Splitterbox
	Travel gear
	Travel gear - slip ring seal
	Equalizer bar bearing
	Lube points
	Hinges
h	Intervals in operating hours
	Check oil level
	Oil change, one time
	Oil change
	Grease

5.3 Lubricants and service fluids

5.3.1 Handling lubricants and service fluids

Careful adherence to the handling instructions for lubricants and service fluids increases the reliability and life expectancy of your machine. It is especially important that the lubrication specifications are adhered to.

Cleanliness is of utmost importance when changing engine, gear and hydraulic oil. Always clean fittings, covers and the surrounding area before removing them.

For information regarding maintenance intervals, refer to "Maintenance and inspection schedule" and "Lubrication chart".

For information regarding procedure for lubrication, fluid level check and changing of service fluids, refer to "Maintenance", "Maintenance tasks...". When handling lubricants and service fluids, proceed as follows and observe environmental guidelines.

Environmental measures

- Always adhere to and observe environmental measures.
- Observe all regional and local regulations.
- Before draining service fluids, make sure you know the correct way to dispose of the fluids.

Disposition of used service fluids and materials

Affected are used service fluids and materials, such as:

- oils, lubricants, coolants, etc.,
- fuels,
- filters, oil filter elements, etc.,
- rubber, insulating panels, etc.,
- batteries.
- Please observe all environmental protection regulations and guidelines when disposing of used service fluids and material.
- Collect all used service fluids and materials in a suitable container, store and dispose of them only in an environmentally safe manner in officially designated locations.
- Observe all local and regional regulations.

5.3.2 Lubricants and service fluid specification

The quantities given in the lubricants and service fluid chart are only guidelines:

- In any case, the dipstick or level marks are applicable.

The level in the corresponding component must be checked after every change or addition of lubricants or service fluids.

Specifications Explanation:

API = American Petroleum Institute
 ACEA (CCMC) = Association des Constructeurs Européens de l'Automobile
 SAE = Society of Automotive Engineers



Diesel engine – lube oil

Lube oil – quality

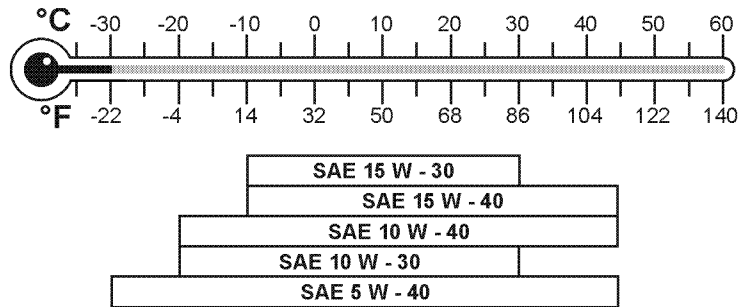
Presently only high alloyed lube oils are used for modern Diesel engines. They consist of base oils mixed with additives. The lube oil specification for LIEBHERR Diesel engines is based on the following specifications and guidelines.

Specification	
API - classification	CH-4, CI-4 (observe special oil change intervals)
ACEA - classification	E4, E5, E7 Specification E6 may not be used.

Recommended Diesel engine oil

Ambient temperature from -20°C / 4°F to +45°C / 113°F.

- SAE 10W - 40 / Specification E4
- Id. No.: 86 10 049 - 20 Liter container



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Temperature dependent selection of SAE classification

Lube oil viscosity

The selection of the lube oil viscosity is made according to the SAE classification (Society of Automotive Engineers). The determining factor for the correct selection of the SAE classification is the ambient temperature. The selection of the SAE classification provides no information about the quality of the lube oil. If the viscosity is too high, the machine may be hard to start, if the viscosity is too low, it may provide insufficient lubrication. The temperature ranges in the chart are guidelines, they may be exceeded in either direction for a short time period.

Lube oil – change intervals

Change intervals
 - First oil and filter change when using initial use oil: See "Maintenance and Inspection schedule".

- Oil change intervals depend on climate zone, sulfur content in fuel and oil quality, as noted in the chart below.

If the noted annual operating hours (hrs.) are not reached, change the Diesel engine oil and filters at least once a year.

Aggravating circumstances

Various factors or difficult applications can change the maintenance interval:

Aggravating circumstances or difficult applications are:

- Repeated cold starts
- Sulfur content in fuel above 0.5%
- Ambient temperature below -10°C

If aggravating circumstances or difficult applications are present, then the oil change intervals noted in the "Maintenance and inspection chart" must be carried out. (hrs. = Operating hours)

Ambient temperature	Sulfur content in fuel	E4, E5, E7	CI-4, CH-4
Climate – normal to -10°C	to 0.5 % above 0.5 %	500 hrs. 250 hrs.	250 hrs. 125 hrs.
below -10 °C	to 0.5 % above 0.5 %	250 hrs. 125 hrs.	--



Diesel fuels

Specification	
DIN	EN 590
ASTM	D 975-89a 1D and 2D

Specification

Diesel fuels must meet the minimum requirements of the above noted fuel specifications.

For additional fuel specifications contact the Diesel engine design department at LIEBHERR Machines Bulle S.A.

Sulfur content in Diesel fuel

In DIN EN 590, a sulfur content of max. 50 mg/kg = max. 0.005 % per volume is permissible.

"Low sulfur" Diesel fuels with a sulfur content below / less than 0.05 % are only suitable, if lubricity is ensured by adding additives. The Diesel fuel lubricity per HFRR (60) Test must be max. 460 µm [lubricity corrected "wear scar diameter" (1.4) at 60°C].

For Diesel fuels with a sulfur content above / more than 0.5 % per volume, the oil change intervals must be cut in half.

Diesel fuels with a sulfur content above / more than 1 % are not permissible.

Depending on the Diesel engine lube oil quality, an approval may be issued!

The fuel standard ASTM D 975 does not foresee that fuels must undergo a lubricity test. A written confirmation from the fuel supplier must be requested. The additives should be added by the supplier - in his capacity as the responsible party for the fuel quality. It is not recommended that customers add secondary lubricity additives.

A Cetane number of at least 45 is required for fuels according to ASTM D975. A Cetane number above 50 is preferred, especially in temperatures of less than 0°C or 32°F.

Contamination in Diesel fuel

The fuel filtration and the fuel filter change intervals are set for the injection system in use and the fuel specification according to **DIN EN 590** .

If the fuel does not meet this specification in regards to the

- total contamination of max. 24 mg/kg [mg total contamination / kg fuel]
- or average contamination
- of more than / equal to 10 mg/kg,

then the change interval for the fuel prefilter and the fine filter must be cut in half (reduced by half), contrary to the guidelines given for "normal" fuel.

Diesel fuels at low temperatures (winter operation)

In low ambient temperatures, Diesel fuel excretes paraffin crystals, which increase the flow resistance in the fuel filter to a point, where a sufficient fuel supply of the Diesel engine is no longer ensured.

In temperature climates, a cold flow behavior is ensured up to:

- 0°C from April 15 – Sept. 30
 - 10°C from Oct. 1 – Nov. 15 / March 1 – April 14
 - 20°C from Nov. 16 – Feb. 29
- according to DIN EN 590.

For insufficient cold flow behavior of the Diesel fuel or even lower ambient temperatures than -20°C, we recommend the use of a fuel filter heater.

Caution



! Danger of damage to the Diesel engine.
Benzine and petroleum additives to the Diesel fuel are not permitted!
Use winter Diesel fuel.



Coolant for Diesel engines

Specification	
For corrosion inhibitor / antifreeze fluids, refer to chart	

Recommended corrosion inhibitor / antifreeze fluids

- Ambient temperature to -37°C
- Liebherr Anti-Freeze APN Mix
 - Id.No. 8611045 - 20 l container

General recommendations

The cooling system only functions reliably if it is under primary pressure. For that reason it is imperative that it is kept clean and free of leaks, that the radiator cap and working valves are functioning correctly and that the required coolant level is maintained.

Corrosion inhibitors / antifreeze fluids approved by Liebherr ensure sufficient freeze and anticorrosion and cavitation protection, do not affect the seals and hoses and do not foam.

Coolant The cooling system must contain at least 50 % corrosion inhibitor / antifreeze fluids year round. This corresponds to an antifreeze protection to approx. -37°C . In case any coolant is lost, check the ratio, do not fall below 50 % of the total volume.

Coolant, which contains unsuitable or insufficient corrosion inhibitor / antifreeze fluids or is incorrectly prepared can cause failure of components and parts within the coolant circuit due to cavitation and corrosion damage. In addition, heat insulating deposits on heat transferring components can occur, which lead to overheating and finally to engine failure.

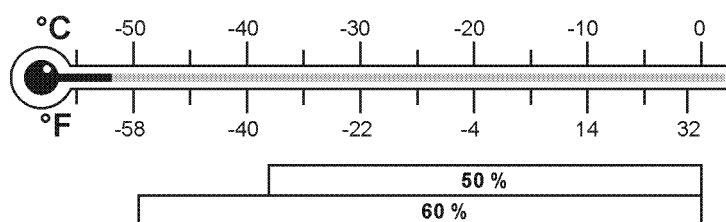
For continuous problemfree operation of Liebherr Diesel engines, the coolant must consist of 50% water and 50% corrosion inhibitor / antifreeze fluid. In exceptional cases the use of corrosion inhibitors is possible. Emulsifiable anticorrosion oils are generally not permitted.

Caution

Danger of damage to the Diesel engine!

! A higher percentage of corrosion inhibitor / antifreeze fluid would actually reduce the cooling efficiency, which could damage the Diesel engine.

- Do not use more than 60 % corrosion inhibitor / antifreeze fluid.

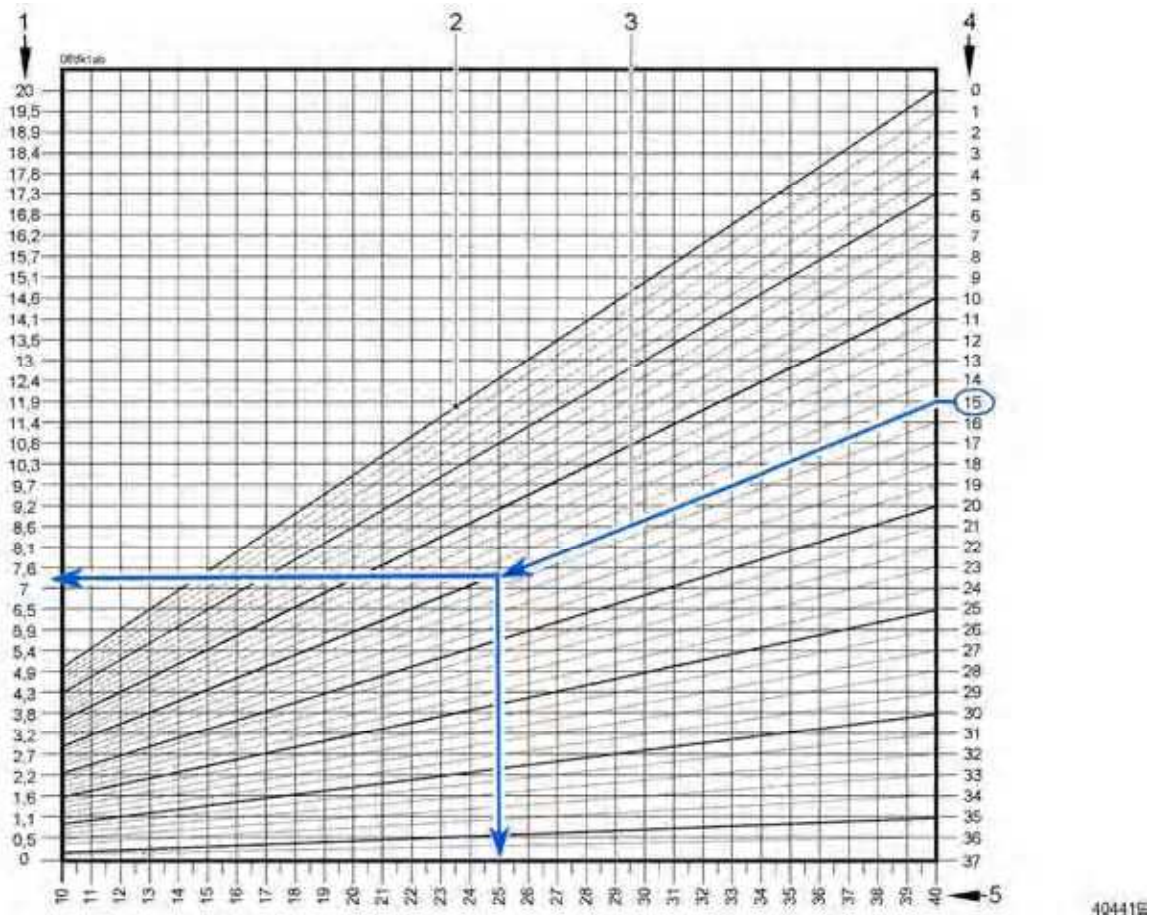


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Percentage % of corrosion inhibitor / antifreeze fluids

Inspection and replacement of coolant

- Lost coolant must always be replaced with a mixture of coolant and a min. of 50% corrosion inhibitor / antifreeze fluid.
- Never allow the corrosion inhibitor / antifreeze fluid concentration to drop below 50% per volume.
- Do not use more than 60% corrosion inhibitor / antifreeze fluid, since a higher percentage would actually reduce the cooling efficiency and the antifreeze protection.
- Check the concentration every 500 hrs. (during maintenance work).
- Replace the complete coolant fluid no later than after 2 years.



Selection for antifreeze concentration

Procedure on example of -15 °C:

If a temperature of -15 °C is measured, move along the line 3 (starting from the measured temperature) to the lower left until the vertical line fill quantity – cooling system 5 and from this point horizontally to the outer left.

This provides the refill quantity of clean corrosion inhibitor /antifreeze fluid 1 which must be replaced to again obtain freeze protection again -37° C.

- To reestablish the correct mixing ratio, drain at least the previously determined amount from the cooling system.
- Add the determined amount of clean corrosion inhibitor / antifreeze fluid.

To reach the required coolant level, refill the remainder with the previously drained coolant.

Water (fresh water)

Suitable is colorless, clear, drinkable tap water, free of mechanical contaminants with the following restricting analysis values.

Sea water, brackish water, brine and industrial wastewater are not suitable.

Fresh water quality when using anti-corrosion fluid / antifreeze

- Sum of alkaline earths (water hardness) 0.6 to 3.6 mmol/dm³ (3 to 20° d)
- Ph value at 20 °C 6.5 to 8.5
- Chloride ion content max. 80 mg/dm³
- Sulfate ion content max. 100 mg/dm³

Fresh water quality when using coolant with DCA 4

Sum of alkaline earths (water hardness) 0.6 to 2.7 mmol/dm³ (3 to 15° d)

Ph value at 20 °C 6.5 to 8.0

Chloride ion content max. 80 mg/dm³

Sulfate ion content max. 80 mg/dm³

Contact the local public authorities for drinking water analysis.

Corrosion inhibitors

1. Use of DCA 4 (Diesel coolant additives 4) without corrosion inhibitors / antifreeze fluid

In **exceptional cases** and in constant ambient temperatures above freezing, for example in tropical regions, where **no approved corrosion inhibitor / antifreeze fluid is available, water and DCA4 may be used as coolant.**

The DCA 4 concentration must be checked or corrected during maintenance work (every 500 hrs.). The DCA4 concentration must be between 0.3 and 0.8 units per liter. To check, we recommend test kit CC 2602 M by Fleetguard.

2. Use of Caltex / Chevron Texaco / Havoline / Total without anti-freeze fluid

The mixing ratio must be checked or corrected during maintenance work (every 500 hrs.).

When using products by Caltex / Chevron Texaco / Havoline / Total, the mixing ratio must consist of 7.5% corrosion inhibitor and 92.5% water. To check, we recommend the refractometer 2710 manufactured by Gefo.

Disposal of corrosion inhibitors / antifreeze fluids

Undiluted corrosion inhibitors / antifreeze fluids should be treated as hazardous waste. When disposing used coolant (mixed with water), observe the regulations of the local public authorities.

Approved corrosion inhibitors / antifreeze fluids for Diesel engine cooling systems

Product description	Manufacturer
Agip Antifreeze Plus	Agip Petroli S-P.A. / ROM
Agip Langzeit-Frostschutz	Autol-Werke GmbH, Würzburg
Antigel DB 486	Sotragal SA, St-Priest/France
Aral Kühler-Frostschutz	Aral AG, Bochum
AVIA Frostschutz APN (G48-00)	Deutsche AVIA-Mineral-Oel-Ges.mbH München
BP anti frost X 2270	Deutsche BP AG, Hamburg
BP Nappel C 2270/1	BP Chemicals Ltd., London/England
Caltex Engine Coolant DB	Caltex (UK) Ltd., London/England
Caltex Extended Life Coolant	Caltex
Castrol Anti-Freeze O	Deutsche Castrol Vertriebsges.mbH, Hamburg
Century F.L. Antifreeze	Century Oils, Hanley, Stoke-on-Trent/England
Chevron DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
DEUTZ Kühlschutzmittel 0101 1490	DEUTZ Service Intl. GmbH (DSI), Cologne
Esso Kühlerfrostschutz	Esso AG, Hamburg
Fricofin	Fuchs Mineralölwerke GmbH, Mannheim
Frostschutz Motorex (G 48-00)	Bucher + Cie, Langenthal/Switzerland
Frostschutz 500	Mobil Oil AG, Hamburg
Glacelf Auto Supra	Total

5. Maintenance

5.3 Lubricants and service fluids

Glycoshell AF 405	Shell
Glycoshell N	Shell
Glysantin (G48-00)	BASF AG, Ludwigshafen
Havoline XLC	ARTECO
Havoline DEX-COOL Extended Life Anti-Freeze/Coolant	Chevron Texaco
Igol Antigel Type DB	Igol France, Paris/France
Labo FP 100	Labo Industrie, Nanterre/France
Motul Anti-Freeze	Motul SA, Aubervilliers Cedex/France
OMV-Frostschutzmittel	OMV AG, Schwechat/Austria
Organifreeze	Total
OZO Frostschutz S	Total Deutschland GmbH, Düsseldorf
Total Antigel S-MB 486	Total Deutschland GmbH, Düsseldorf
Total Frostfrei	Total Deutschland GmbH, Düsseldorf
Veedol Antifreeze O	Deutsche Veedol GmbH, Hamburg
Wintershall Kühlerschutz	Wintershall Mineralöl GmbH, Düsseldorf

Approved corrosion inhibitors / antifreeze fluids / 50:50 Premix for Diesel engine cooling systems

Product description	Manufacturer
Liebherr Anti-Freeze APN Mix Id.No. 8611045 - 20 l container	LIEBHERR
Caltex Extended Life Coolant Pre-Mixed 50/50 (ready-to-use-version)	Caltex
Chevron DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
Havoline XLC, 50/50	ARTECO
Havoline DEX-COOL Extended Life Prediluted 50/50 Antifreeze coolant	Chevron Texaco
Organicool 50/50	Total

Approved water soluble corrosion inhibitors (concentrate) for Diesel engine cooling systems

The coolant must be changed once a year.

When changing from corrosion inhibitor / antifreeze to a corrosion inhibitor or vice versa, the complete coolant must be drained!

Product description	Manufacturer
DCA 4 Diesel Coolant Additives	Fleetguard
Caltex CL Corrosion Inhibitor Concentrate	Caltex
Chevron Texaco Heavy Duty Extended Life Corrosion Inhibitor Nitrite Free	Chevron Texaco
Havoline Extended Life Corrosion Inhibitor (XLI)	ARTECO
Total WT Supra	Total



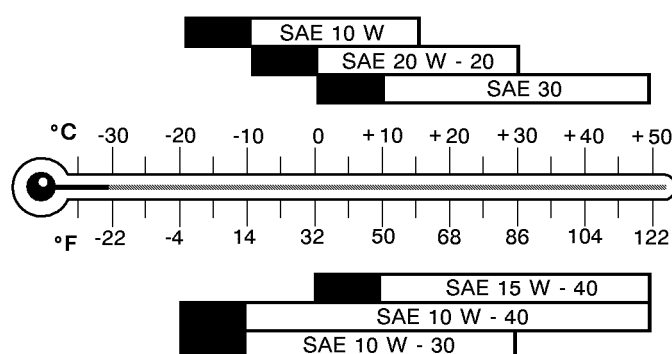
Hydraulic oil

Specification	
API - classification	CF-4, CG-4, CH-4
ACEA - classification	E2, E3, E4, E5

In addition to the quality, the oil must also meet a certain viscosity. The selection is made per SAE classification.

The determining factor for the correct selection of the SAE classification is the ambient temperature.

The temperature ranges noted in the following chart are guidelines. When operating the machine within the temperature ranges marked in black, the following warm up procedure must be observed.



403060

Temperature dependent selection of SAE classification

Warm up procedure

- For temperatures to 10°C below the indicated limit: (black range)
 - After starting, run the Diesel engine at ½ speed. Carefully actuate the working hydraulic. Actuate the hydraulic cylinder and fully extend it for a short period. After approx. 5 minutes, carefully actuate the travel hydraulic too. Total warm up period is approx. 10 minutes.
- At even lower temperatures:
 - Before starting the Diesel engine, preheat the hydraulic oil tank, then carry out warm up procedure as outline in paragraph 1.



Splitterbox gear oil

Specification	
API	GL-5
MIL	L-2105 B,C or D

Approved corrosion inhibitors / antifreeze fluids

Viscosity per SAE

- SAE 85 W 140 EP
- SAE 80 W 90 EP
- SAE 90 EP
- SAE 90 LS



Travel gear oil

5. Maintenance

5.3 Lubricants and service fluids

Specification	
API	GL-5
MIL	L-2105 B,C or D

Approved gear oil Viscosity per SAE
– SAE 85 W 140 EP



Slip ring seal – travel gear oil

Hydraulic oil, viscosity per SAE
See Hydraulic system
– Use same oil quality and viscosity as in hydraulic system.



Axle bearing oil (not in PR 754)

Hydraulic oil, viscosity per SAE
See Hydraulic system
– Use same oil quality and viscosity as in hydraulic system.



Equalizer bar bearing

Approved grease See following listing
Grease, viscosity per SAE



Lube points on working attachments, chain tensioner, door hinges and equalizer bar bearing

Grease, viscosity per SAE
High pressure grease KP2k, consistency 2 of NLGI classification per DIN 51818 and DIN 51825 or EP 2 per NF-T-60 132
The grease must be lithium based with a VKA value of at least 2300 N according to DIN 51350 or ASTM D 2596.

Use:

- Grease for all lubrication points (according to lubrication schedule)
- Grease for pin installation
- Grease for automatic grease central lubrication system

Approved grease The LIEBHERR special grease 9610 is a stable, age resistant and corrosion protective Lithium grease of excellent lubricity over a wide temperature range.
The molecular composition provides great stability as well as good delivery in long pipe lines.

Id. No.	Description	Quantity
86 13 02908	LH Special grease 9610	400 g (cartridge)
86 13 01308	LH Special grease 9610	10 kg (container)
86 13 04508	LH Special grease 9610	25 kg (container)

Grease for automatic grease central lubrication system

Grease with high pressure additives (EP-grease) is recommended.

Use only grease with the same saponification type.

Caution

Grease with solid lubricants, such as graphite is not suitable.
! This type of grease may not be used.

Corrosion protective grease

To protect exposed piston rods, they may be thickly covered with acidfree corrosion protective grease.

Approved corrosion protective grease

LIEBHERR Anticorrosion grease CTK Id.No.861331301

**Hinges and joints**

Lubricate hinges and joints without grease fittings with engine oil.

**Windshield washer system**

Commercially available window cleaning fluid

Rubber seal on doors and covers


Silicon spray or Talcum powder

5.3.3 Changing from mineral oil to environmentally friendly hydraulic fluids

For the operation of the LIEBHERR crawler with "environmentally friendly hydraulic fluids" we recommend **Panolin HLP Synth 46**.

Liebherr approved Bio hydraulic oils for crawlers:

- Hydraulic oil Panolin HLP-Synth 46
- Hydraulic oil Avia N 46 L Synthofluid
- Hydraulic oil Avia PE-B 50 Synthofluid
- Hydraulic oil Avia Synthofluid PE-B 30

Caution  Danger of damage for the hydraulic system of the machine!
When mixing "environmentally friendly hydraulic fluids" with "mineral oils" an aggressive reaction occurs, which in turn will damage the hydraulic system.
! Avoid mixing "environmentally friendly hydraulic fluids" with "mineral oils"!

Change over guidelines

- When changing the machine retroactively to "environmentally friendly hydraulic fluids", consult LIEBHERR Service!
Make sure to request the "**bulletin**" the "**Change over guidelines**" from LIEBHERR and follow them!

Bio - hydraulic oil analysis

Since the testing scope for bio hydraulic oils deviates from normal hydraulic oils, it is important to pay attention that for these oil **only test containers with yellow cover** may be used.
Oil analysis sets can be ordered from Liebherr Parts sales departments.

5.3.4 Scheduled oil diagnostics - Analysis

Oil is subjected to various influences. Temperatures, pressures, non-oily fluids, most dust, friction particles, water and air contaminate the oil and break down its properties, which in turn can increase the risk of damage over time for the hydraulic system, Diesel engine and gear.
Unplanned repairs and downtime can be prevented by regularly taking oil samples, which show the condition of your machine.
For this procedure, always take oil samples and perform oil analysis in certain intervals.

Advantages

- You will learn everything about the condition of your machine.
- Impending damage is discovered in time.
- Unplanned repairs and downtime are prevented.
- The oil can be changed at the correct point in time (only Hydraulic system).
- You relieve the environment because less used oil is disposed of (only Hydraulic system).

Oil change interval

Oil change intervals can only be extended for the hydraulic oil, if oil samples are taken!

Oil sample intervals

According to the data in the Maintenance and Inspection schedule.

Taking oil samples

Danger

! Danger of injury due to turning engine parts!

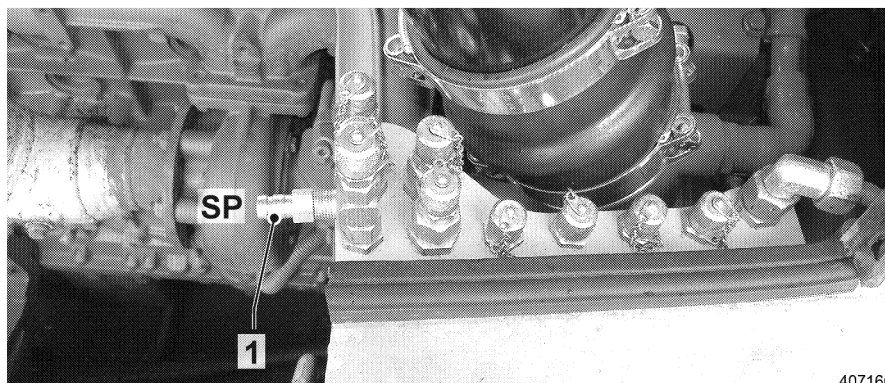
Contrary to the data in these operating instructions, the left engine compartment door may be opened while the Diesel engine is running to take an oil sample.

- Avoid wearing ties, scarves, open jackets or loose clothing.
- Pay attention to hot exhaust lines and engine parts.

Take the oil sample:

- via the oil sample valves (hydraulic and Diesel engine)
- Shortly after shutting down the machine – at that time dirt and wear particles are still floating and any water in the system has not yet settled.
- At operating temperature - warm oil can be removed quicker.
- Always in the same manner and at the same location.
- Never from the filter.
- Not shortly after an oil change or after large amounts of oil have been added.
- Only in a clean and dry container.
- With the manual suction pump, dip the hose approx. in the center of the oil volume

Locations to take sample

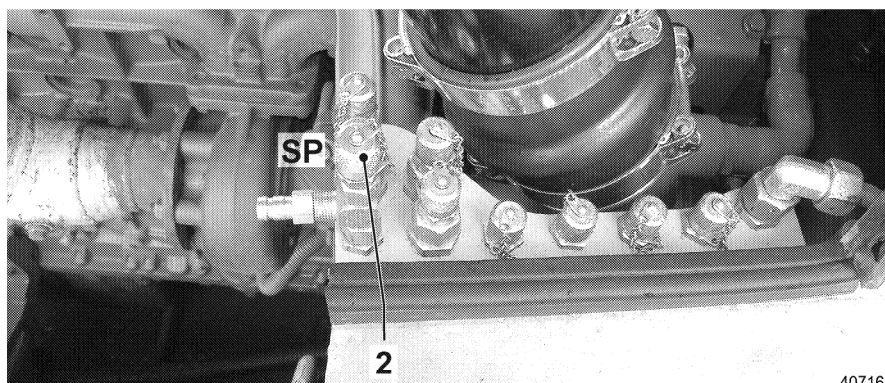


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Hydraulic – oil sample valve

Hydraulic system

a) On the SP-connection via the oil sample valve 1(recommended method) or



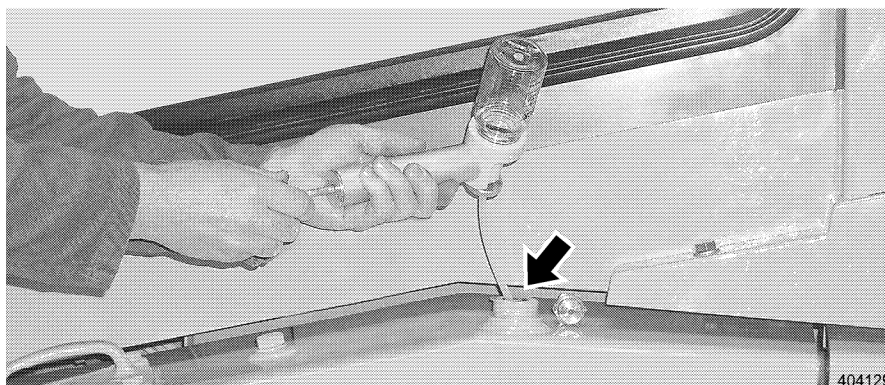
407167

SP - connection

b) on the SP- connection 2 with mini test hose or

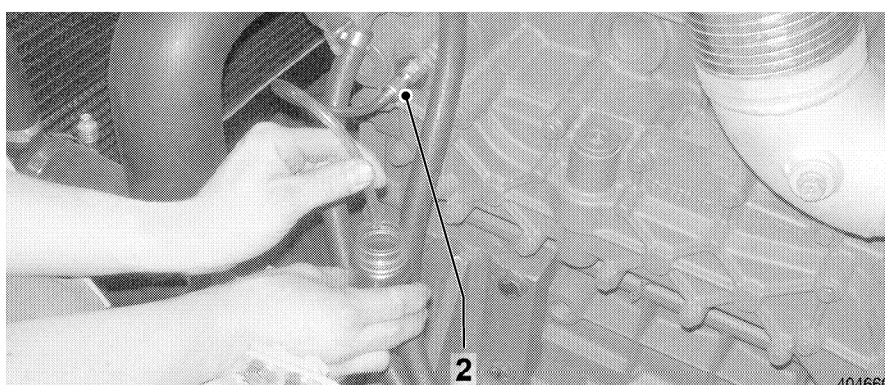
5. Maintenance

5.3 Lubricants and service fluids



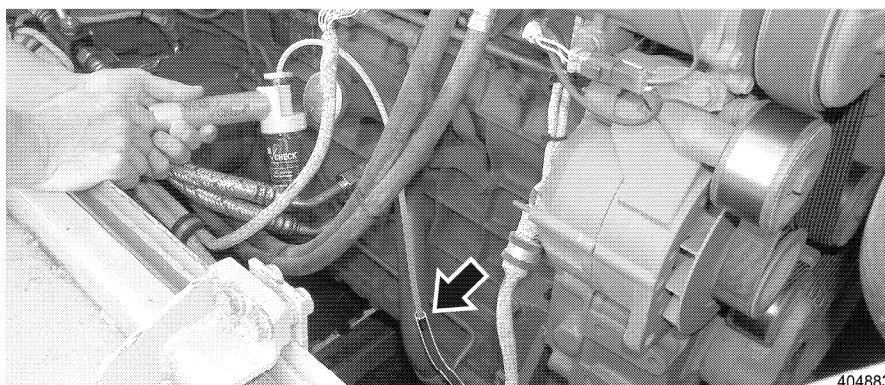
Breather screw

b) Remove the breather screw on the hydraulic tank and take oil sample with suitable manual suction pump.



Diesel engine – oil sample valve

Diesel engine a) On the oil sample valve 2 with hose or



Diesel engine – oil dipstick tube

a) with manual suction pump via dipstick tube or
b) take oil sample during oil change from discharging oil flow.



Splitterbox - dipstick tube

- Splitterbox**
- a) with manual suction pump via dipstick tube or
 - b) take oil sample during oil change from discharging oil flow.



Oil filler port

- Travel gear** With manual suction pump via oil filler port

Oil analysis

An oil analysis should include at least the following data:

Method	Determination of
Atom emissions spectroscopy (AES)	Wear metals, additives, contaminants iron, chromium, tin, aluminum, nickel, copper, lead, molybdenum, silver, silicium, callum, calcium, magnesium, borax, zinc, phosphorus, barium
FT Infrared spectroscopy (FT-IR),	Oil condition and contaminants Oil oxidation, glycol, water, nitrates, fuel, carbon
Viscosity	Viscosity test – viscosity at 40°C and 100°C, viscosity index Notation about lubricity and mixture
Analex PQ-Index	Magnetic metallic particles Notation about quantity of total magnetic metallic particles in the oil, which are larger than 5 microns

Liebherr recommends having the oil analysis completed at "Wear Check". A set, which includes sample bottles, hose, sample documentation and mailing pouches is available from LIEBHERR under the following Id. No.:

Id. No.: 70 18,369 (12 units)

Id. No.: 70 18 368 (6 units)

A manual hand pump to take the samples is required and can be ordered separately. (Id. No.: 81 45 666).

Taking a coolant sample

Take the coolant:

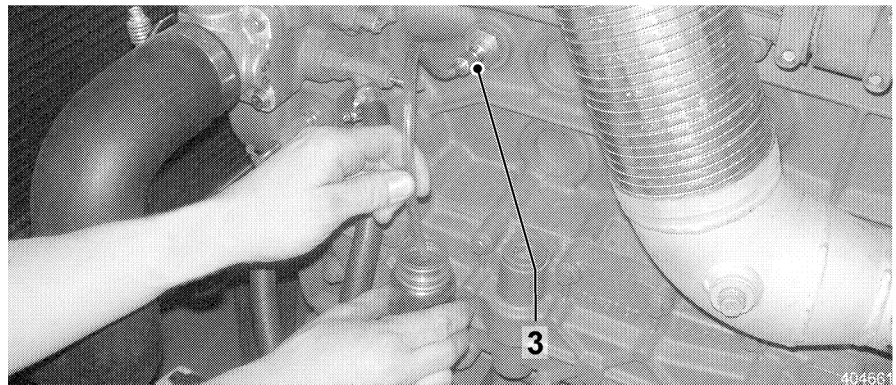
- with cold Diesel engine

Caution



Danger of scalding due to splashing coolant!

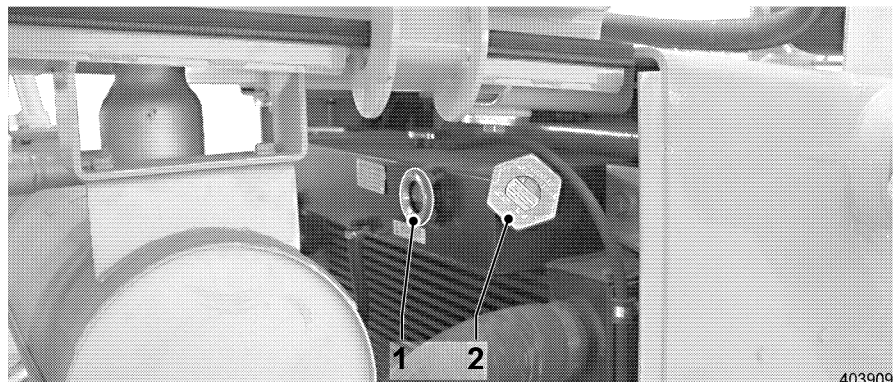
- ! At or near operating temperature, the engine cooling system is hot and under pressure.
- ! Open the cap on the filler neck of the expansion tank only when the engine is cooled off.
- ! Open the cover of the expansion tank only when it is cool enough to touch. Carefully turn the cover to relieve the pressure.
- ! Never add coolant when the engine is hot.
- ! Avoid skin contact with coolant!
- ! Observe the manufacturer's instructions.
- In case of an accidental splash, flush eyes or skin immediately with plenty of water.



Coolant sample valve

Cooling system

- a) On the coolant sample valve 3 with hose or



Sight gauge - coolant

- b) via coolant filler neck 2.

5.4 Preparations for maintenance

Before carrying out diverse maintenance tasks on the machine, bring the machine into maintenance position, if not otherwise noted.

Diverse maintenance tasks are, for example:

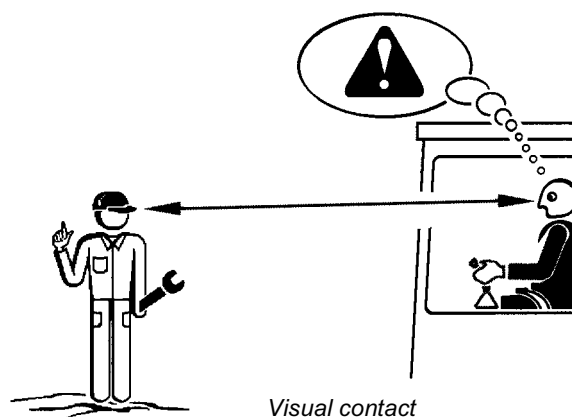
- Lubrication of attachment,
- oil level check or oil change on engine, splitterbox, travel gear, hydraulic tank, etc.,
- filter change as well as maintenance tasks on the hydraulic system.

Safety preparations for maintenance

Always observe all accident prevention guidelines when carrying out maintenance tasks!

See "Measures for safe maintenance".

Make sure that the operator in the operator's cab is always in visual contact with the maintenance personnel.



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Danger



Danger of accidents for maintenance personnel!

Never let other persons work on the machine, this would severely endanger the maintenance personnel!

! Never step unnoticed into the danger zone of the machine.

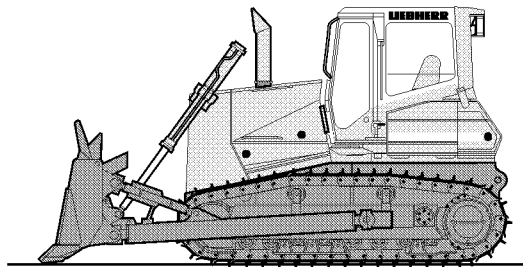
- Alert the operator before stepping into the danger zone of the machine!

5.4.1 Maintenance position

The basic maintenance position is described below. It allows access to the individual maintenance points.

Maintenance position

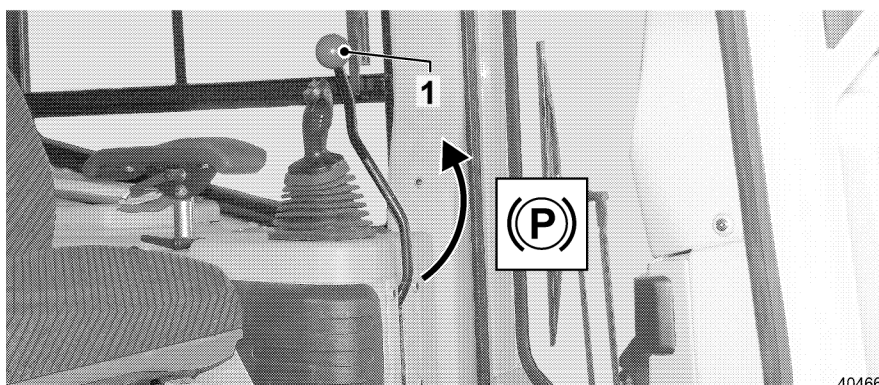
To bring the machine into maintenance position, proceed as follows. For detailed description of various procedures, see "Control, operation".



404008

Maintenance position

- Park the machine on level ground.
- Lower the working attachment.



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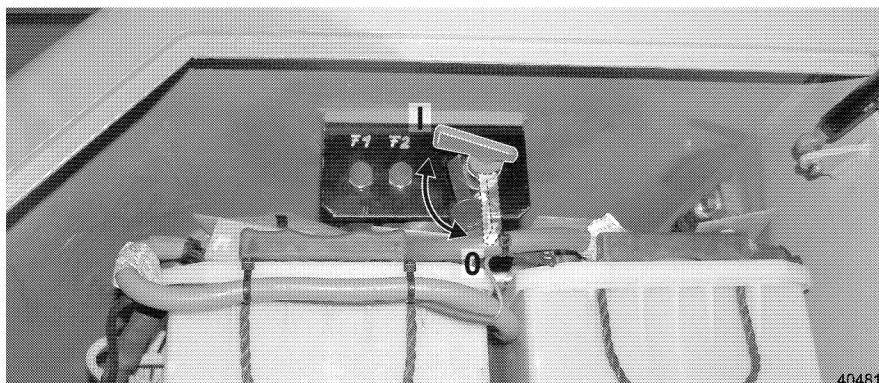
Safety lever up

- Move the safety lever up.
- Turn the Diesel engine off.
- Pull the starter key.

Turn the battery master switch off

The battery master switch is located on the right rear in the battery compartment.

When leaving the machine or for maintenance and repair work, the battery master switch must be turned off.



404813

Battery master switch

- Set the battery master switch to position " O ".

Open the engine compartment doors

Open the service doors and hoods

When the doors are open, access is provided to the following components:

- Diesel engine
- Cooling system
- Air filter
- Splitterbox



Open only if the engine is not running!

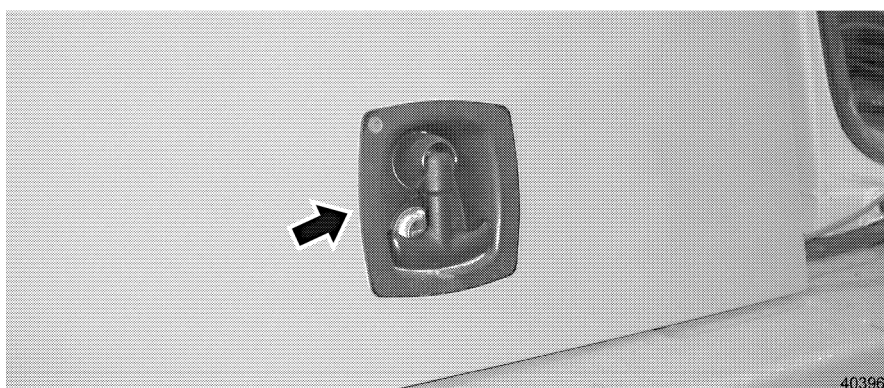
Danger



Danger of injury due to turning engine parts!

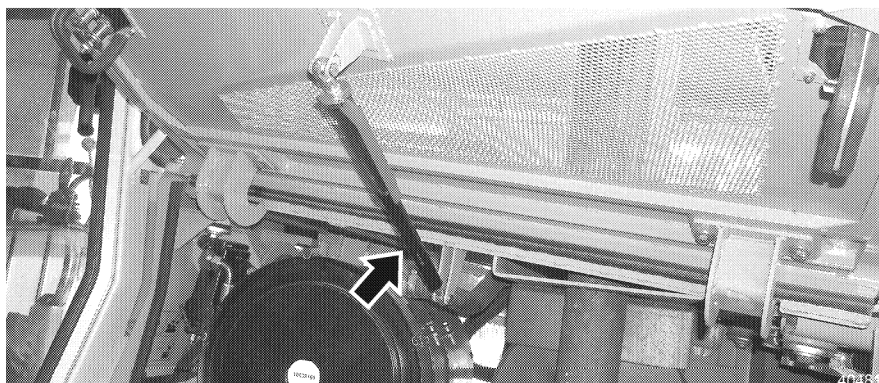
Turning and moving engine parts, such as fan blades or V-belt can cause injuries!

! Open the engine compartment doors only when the engine is at a standstill.



Open the engine compartment door

- Open the lock with the key.
- Open the door completely with the handle.
 - Fold the door handle out, turn it by 90° and open the door.
- The engine compartment door is held in this position by a gas cylinder and a latch.



Gas cylinder

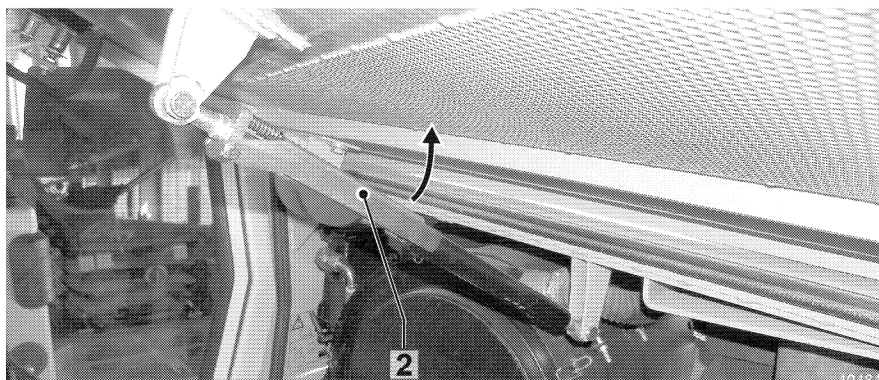
Caution



Danger of injury if the engine compartment door closes!

! Check to make sure that the completely open door is held in open position by the gas cylinder and the latch.

- If the function is not ensured, then the problem must be remedied immediately.



Latch

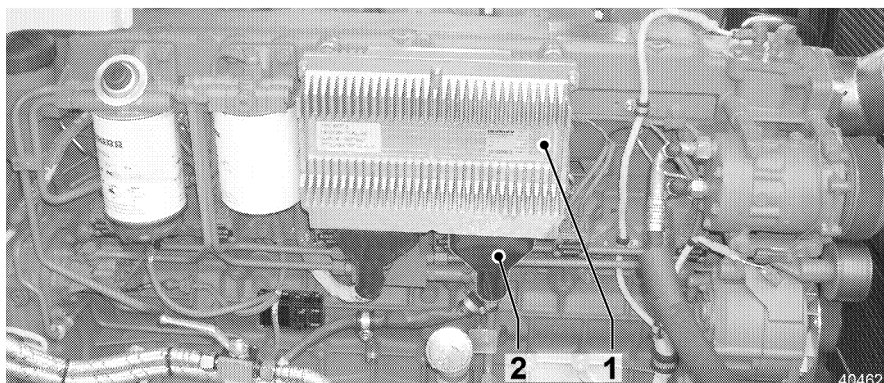
- To close the engine compartment door, push the latch 2 upward.

5.4.2 Electrical system

When working on the electrical system of the machine and before any welding on the machine, always disconnect the battery.

- Turn the battery master switch off.
- Disconnect the negative terminal (-) first and reconnect it last.

Disconnect the battery and remove the electronic boxes before any arc welding on the machine.



Diesel engine – Unplug the electronic box

Diesel engine – Unplug the electronic box

The Diesel engine – Electronic box is installed in the engine compartment on the right hand side on the Diesel engine.

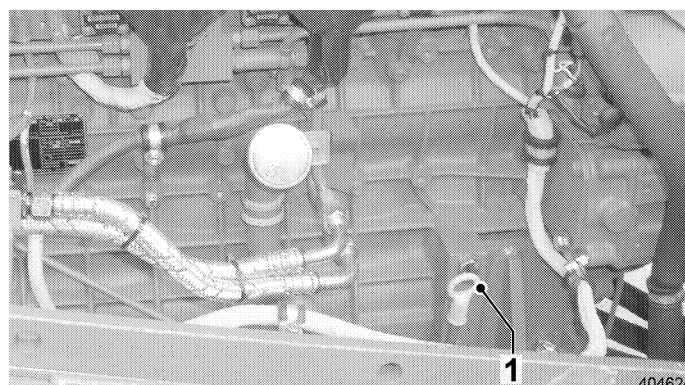
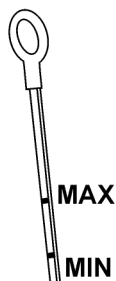
- Unplug the plug 2 on the Diesel engine – Electronic box 1.

5.5 Diesel engine

5.5.1 Check the engine oil level

Make sure that:

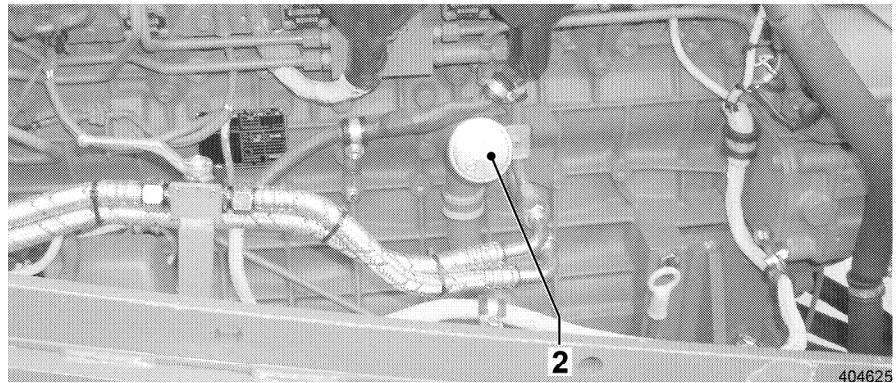
- the machine is in maintenance position,
- the right engine compartment door is open.



Dipstick

After turning the engine off, wait for a short time to allow the oil to collect in the oil pan.

- Pull out the dipstick 1, wipe it with a clean cloth and reinsert it all the way.
- Pull the dipstick out again and check the oil level.
The oil level must be between the MIN and MAX mark.



Add oil

If the oil level is too low:

- Remove the oil filler cap 2 and add oil. For oil specification, see chapter "Lubricants and service fluids".
- Add oil via the filler neck.
- Check the oil level again, do not fill the Diesel engine above the "MAX" mark.
- Clean the cap, reinstall it on the filler neck and tighten.

5.5.2 Engine compartment

Make sure that:

- the machine is in maintenance position, see "Maintenance position",
- the engine compartment doors are open.

Check the Diesel engine location and oil pans for contamination

- Check the complete engine compartment for damage and contamination.

If very soiled, clean the engine - cooler and oil pan area.

Clean the Diesel engine

When cleaning the engine with water or steam, make sure that the sending units, such as oil pressure switch are not subjected to a direct blast.

Caution



Danger of damage to the Diesel engine!

Infiltrating moisture can cause corrosion and failure of the measuring function.

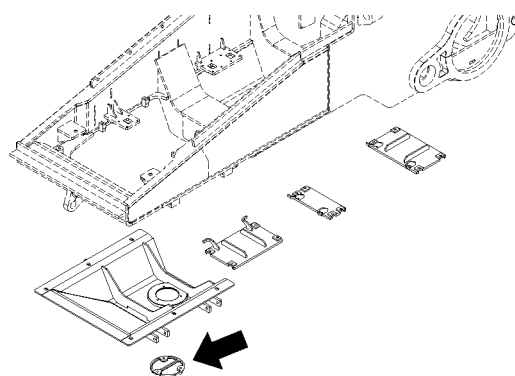
! Do not subject electrical sending units, such as oil pressure switch to a direct water or steam blast.

- Carefully clean the engine with steam.

5.5.3 Change the engine oil

Make sure that:

- the engine oil is warm,
- the machine is in maintenance position,
- the right engine compartment door is open.
- a suitable container and the drain hose with valve connection is available,
- the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.



Belly pan cover

404134

- Unscrew the belly pan cover.
- In case of heavy deposits in the belly pan area, the belly pans must be removed and cleaned.

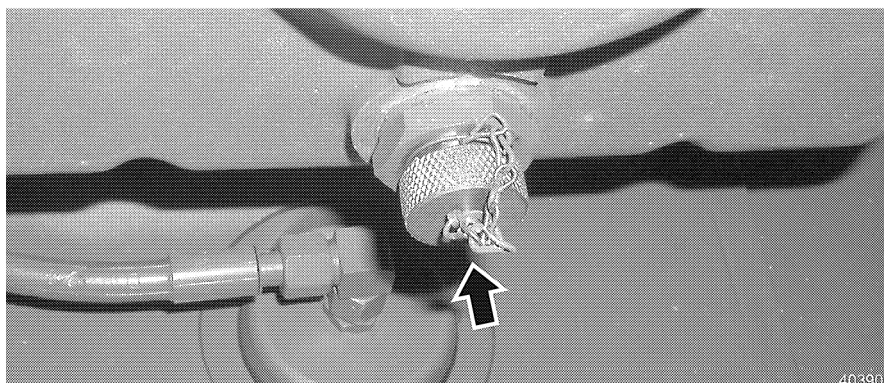
Danger

! Danger of injury when removing the belly pans. Due to the space restrictions and the great weight of the belly pans, removal is very difficult. A suitable lifting device is required to remove the belly pans.

- Unscrew the cap on the oil drain valve on the oil pan.

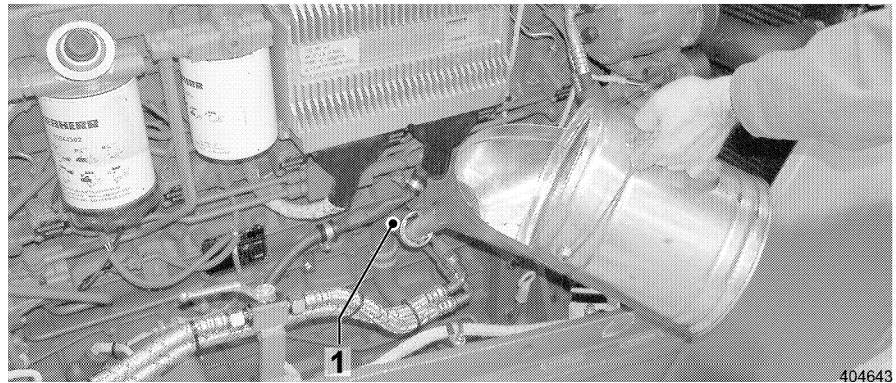
Caution

! When draining hot engine oil, there is a danger of scalding! Avoid skin contact with engine oil. Always wear protective gloves when changing oil.



Oil drain valve

- Install the oil drain hose to the oil drain valve and drain the oil into the container.
- Remove the oil drain hose and reinstall the cap on the oil drain valve.
- Reinstall the belly pan cover.



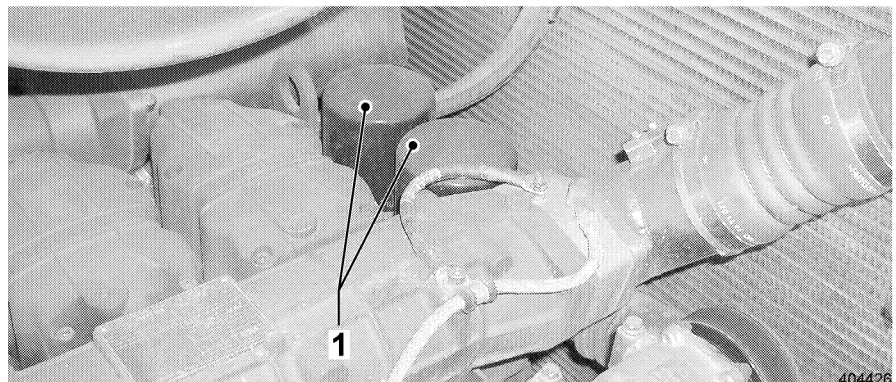
Add oil

- Add clean oil via the filler neck 1 to the MAX mark on the dipstick.
- Clean the oil filler cap, place it on the oil filler neck 1 and tighten.
- Start the Diesel engine.
 - The indicator light – Diesel engine problem must turn off shortly after start.
 - Error code ER-8002 may only be shown for a short time in the display.
- Turn the Diesel engine off and check the oil level on the dipstick after approx. 1-2 minutes. Correct the oil level, if necessary.

5.5.4 Change the lube oil filter

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,
- two LIEBHERR oil filter cartridges as well as a filter wrench are available.



Filter cartridges

- Place a suitable container under the Diesel engine.
 - When changing the oil filter cartridges, protect the V-belt from emerging oil!
 - After changing the oil filter, remove all traces of oil from the Diesel engine, also from behind the vibration damper, so that they are not diagnosed later as leaks from the radial shaft seal ring.
- Loosen the oil filter cartridges 1 with a filter wrench and unscrew the filter.
- Clean the sealing surface on the filter bracket.
 - The old filter seal and any remains must be removed completely.

- Lubricate the rubber seal rings on the new filter cartridges thinly with engine oil.
- Screw on the new oil filter cartridges, until the seal ring is seated on the filter bracket.

When the seal ring is seated on the filter bracket:

- Tighten the oil filter cartridge by 1/2 - 3/4 turn by hand (do not use a tool to tighten).
- Start the Diesel engine.
 - The indicator light – Diesel engine problem must turn off shortly after start.
- Turn the engine off, check the oil filter for leaks and check the oil level. If necessary, correct the oil level.

5.5.5 Check / change the V-belt

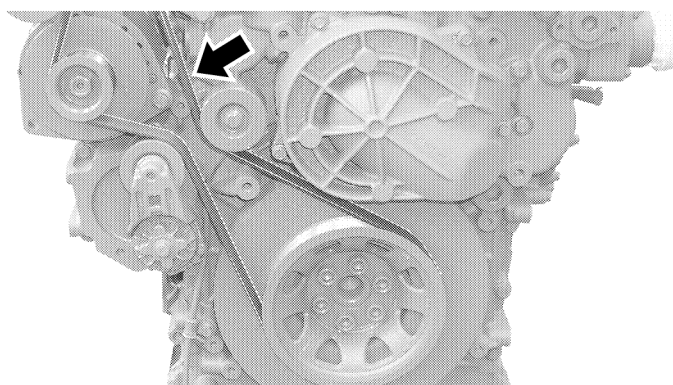
The V-belt is self-tensioning and is maintenance free. The V-belt and the tension pulleys must only be checked for damage and wear.

Access for checking is possible from the right side of the engine.

Always replace broken or damaged belts with new belts.

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open.

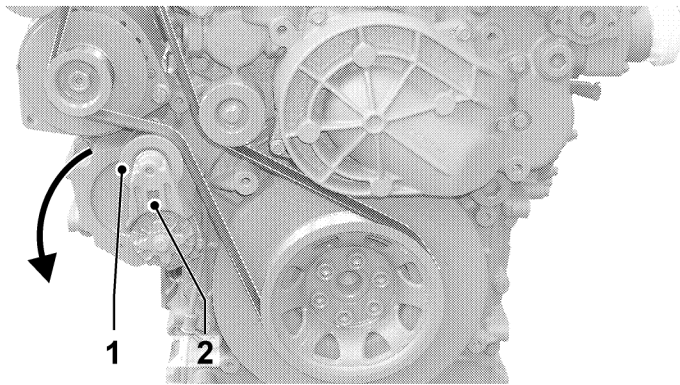


V-belt

404626

Check the belt assembly

- V-belt damage includes:
 - Broken ribs
 - Cross cracks in several ribs
 - Rubber rolls in the belt base
 - Deposits of dirt or rocks
 - Ribs loosened from the belt base
 - Cross cracks on the back
- Check V-belt for damage.
- Check the V-belt and tension pulley for proper condition and play (for example profile wear of belt pulleys, damage of tension pulley)
 - If any parts are damaged, replace damaged parts immediately.



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Change V-belt

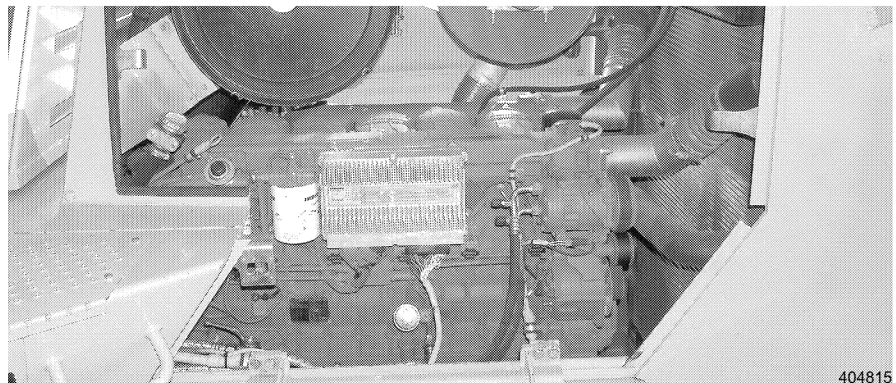
Change V-belt

- Insert a ratchet according to DIN 3122 D 12,5 (1/2") into the square bore 2 on the tension device 1.
- Swing the tension device 1 back against the spring force, in counterclockwise direction, to the stop and remove the V-belt.
- Check the belt pulley and the tension pulley for proper condition and play (for example profile wear of belt pulleys, damage of tension pulley, knocked off bearing).
 - If any parts are damaged, replace damaged parts immediately.
- Place the new V-belt with swung back tension device 1 on all belt pulleys and the tension pulley.
- Bring the tension device 1 again into tension position.

5.5.6 Check the Diesel engine assembly for leaks and condition

Make sure that:

- the machine is in maintenance position,
- the engine compartment doors are open.



404815

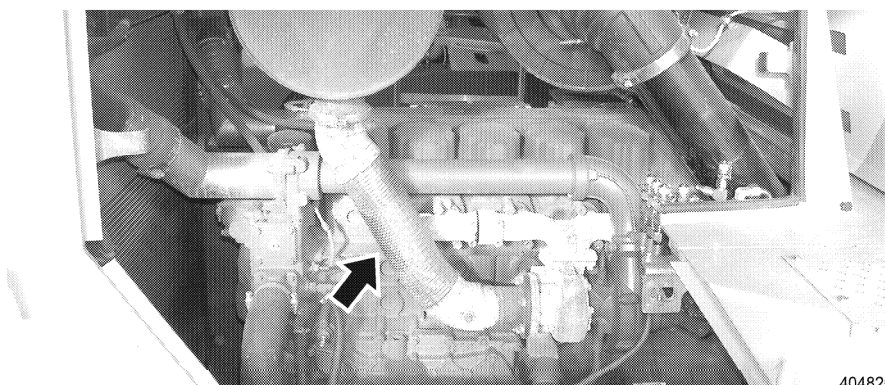
Diesel engine assembly

- Check the complete engine assembly for condition and leaks.
 - Be especially watchful for the leaky fuel lines.
- Replace damaged seals immediately.

5.5.7 Check the mounting of suction and exhaust lines

Make sure that:

- the machine is in maintenance position,
- the engine compartment doors are open.



404820

Suction – exhaust lines

- Check the suction lines between turbocharger, charge air cooler and engine for leaks and mounting.
- Check exhaust lines between engine and turbocharger, muffler and exhaust pipe end for leaks and mounting.

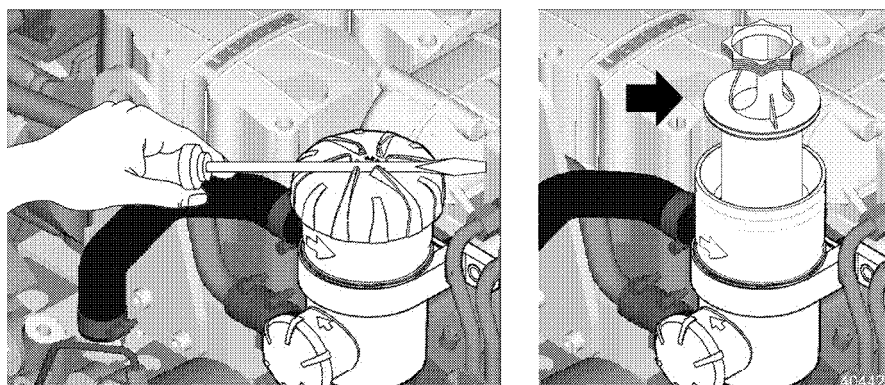
5.5.8 Oil separator

Change the oil separator filter insert

The oil separator is installed on the flywheel side on the right side of the Diesel engine.

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,
- an Original LIEBHERR Oil separator filter insert is available.

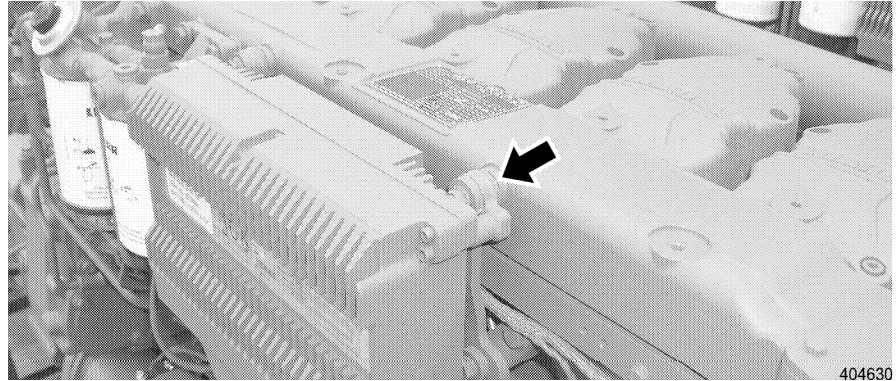


Oil separator

- Clean the oil separator and surrounding area carefully.
- Open and remove the oil separator cap, use a screw driver, if necessary.
- Pull the oil separator filter insert out and dispose of it properly.

- Insert a new oil separator filter insert and push it in all the way.
- Install the oil separator cap and tighten all the way by hand.

5.5.9 Diesel engine - Electrical system



Control unit bearing

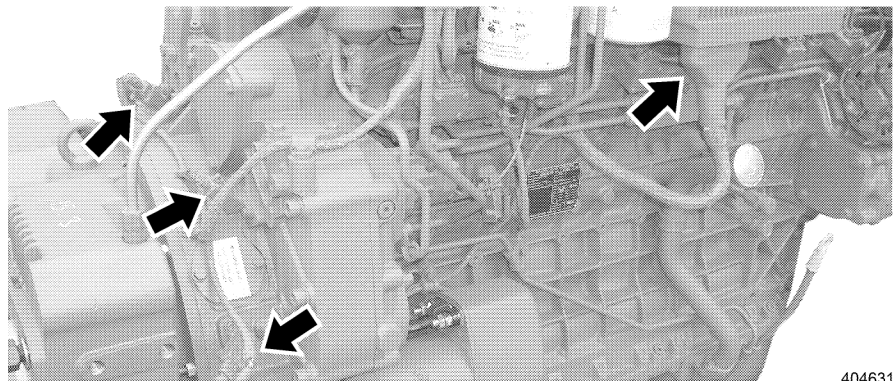
Check the condition of the control unit bearing

- Check the control unit bearing for damage and tight seating.

Troubleshooting

If the bearing is damaged:

- do not start the Diesel engine,
- replace every bearing.



Sensory and cable connections

Check the condition of the sensory and cable connection

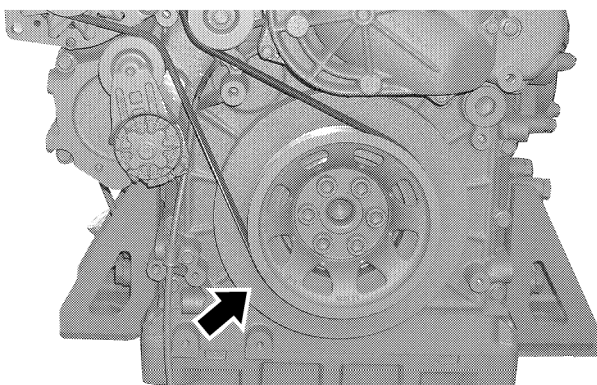
- Check all sensor and cable connections for tight seating and condition.
- Check all cables and wiring harnesses for proper condition as well as rub-free routing and proper mounting.

Troubleshooting

If any damage is found on cable connections, wiring harness or sensors:

- do not start the Diesel engine,
- replace the defective parts.

5.5.10 Vibration damper



404484

Vibration damper

- Check the vibration damper for distortion.

Problem remedy

If a distortion of the vibration damper is found:

- Do not start the engine
- Replace the vibration damper

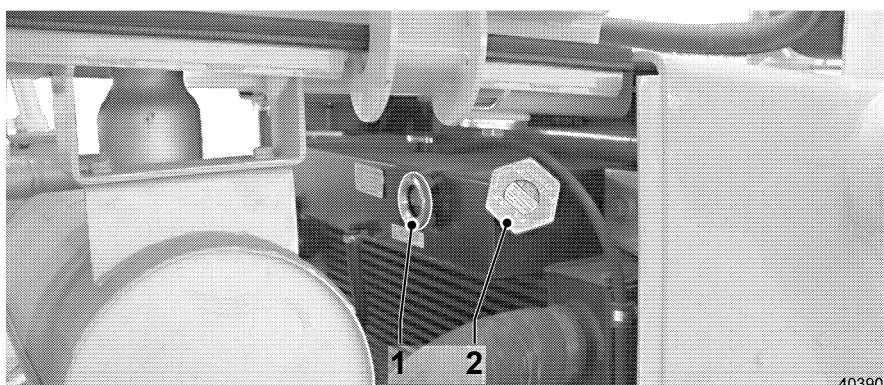
5.6 Cooling system

5.6.1 Check the coolant level

The coolant expansion tank with filler neck is installed on the top of the cooling unit. Access to the filler neck is provided via the right engine compartment door.

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open.



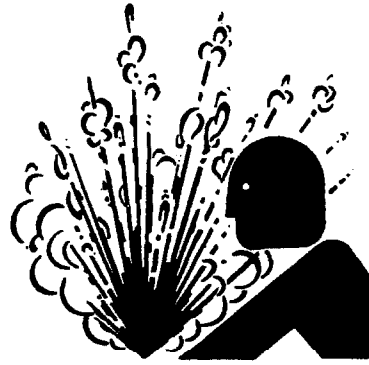
403909

Sight gauge - coolant

- The coolant must be visible in the sight gauge when the Diesel engine is turned off.
- If the coolant is not visible in the sight gauge, add coolant.


Antifreeze concentration

The coolant to be added must be in the corresponding antifreeze concentration. For details, see "Check corrosion inhibitor / antifreeze concentration in the cooling system".




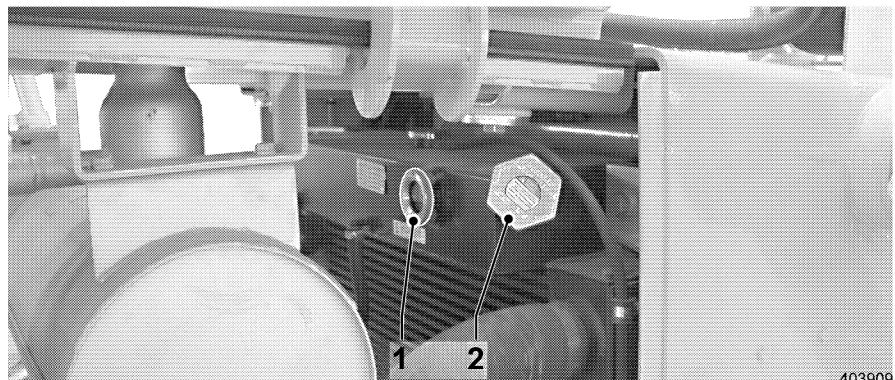
Danger of scalding

403276

- Caution**  Danger of scalding due to splashing coolant!
- ! At or near operating temperature, the engine cooling system is hot and under pressure.
 - ! Open the cap on the filler neck of the expansion tank only after the engine has cooled off.
 - ! Open the cap on the expansion tank only if it has cooled down enough so you can touch it. Then turn the cap carefully to relieve the pressure first.
 - ! Never add coolant when the engine is hot.

- Add coolant**
- Open the right engine compartment door.
 - Turn the cap on the filler neck a little in counterclockwise direction until the pressure is relieved, then open.

- Caution**  Avoid skin contact with coolant.
- ! Observe the manufacturer's instructions.
 - When mixing coolant, always wear rubber gloves and protective glasses.
 - In case of splashes in eyes or on skin, use lots of water to flush off any coolant residue.



Add coolant

403909

- Add coolant to the center of the sight gauge 1.
- Install and tighten the cap 2 on the filler neck.

5.6.2 Clean the cooling system

To ensure proper cooling of the media to be cooled, the coolers have to be cleaned, if necessary. In very dusty applications, the coolers must be checked daily and cleaned, if necessary.

Dirty cooler units lead to overheating. As a result, a visual warning is automatically issued.

Dust and other dirt can be removed with pressurized water, steam or pressurized air from the cooling fins. The use of pressurized air is recommended.

Make sure that:

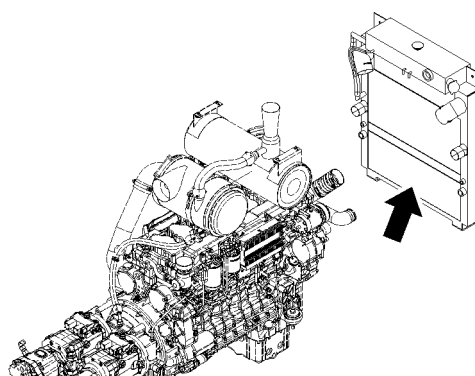
- the machine is in maintenance position,
- the engine compartment doors are open.

Caution



Careless treatment can damage the cooler fins.

! Do not use hard objects or excessive water pressure for cleaning.



Cooler

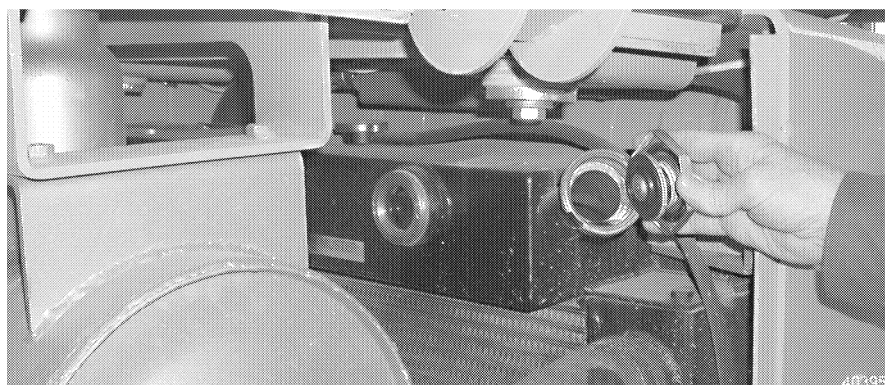
404911

- Clean cooler units with pressurized air, steam or water.
- Close the engine compartment doors again.

5.6.3 Check the cooling system

Make sure that:

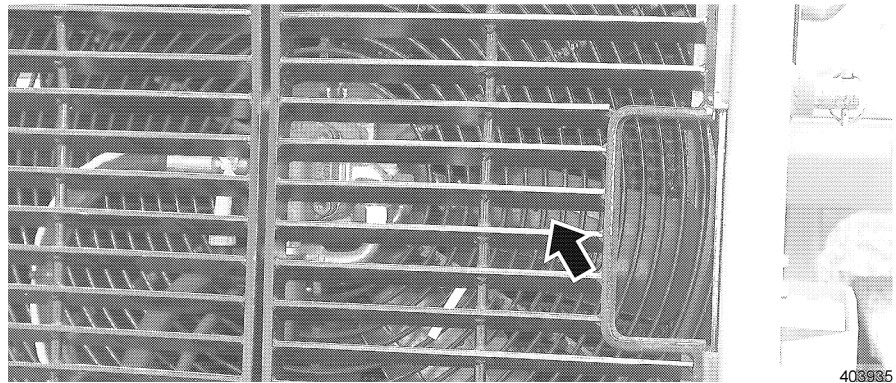
- the machine is in maintenance position,
- the right engine compartment door is open.



Cover

Check the radiator cover

- Check the radiator cover for leaks.



Fan

- Check the fan**
- Check the fan for damage.

5.6.4 Check the antifreeze concentration in the coolant

The cooling system must contain at least 50% but not more than 60% antifreeze solution year-round. This corresponds to a freeze protection to approx. -37°C.

Make sure that:

- the machine is in maintenance position,
- the engine compartment door is open,
- the testing tool "Optical concentration tester" or a strip test kit is available.

Procedure to check the antifreeze

Caution



Danger of scalding due to splashing coolant!

! Open the cap on the filler neck only after the engine has cooled off – the coolant temperature display on the segment field of the display unit should be in the lower third of the segment field.

- Carefully open the cap on the filler neck.
- Remove a coolant sample and check the antifreeze concentration with the testing tool or the strip test kit.
- If the antifreeze concentration is not reached:
Correct the mixing ration of the antifreeze in the coolant.

Procedure to correct the antifreeze concentration

- If the antifreeze concentration is too low:
Drain coolant and add clean antifreeze according to the following diagram.

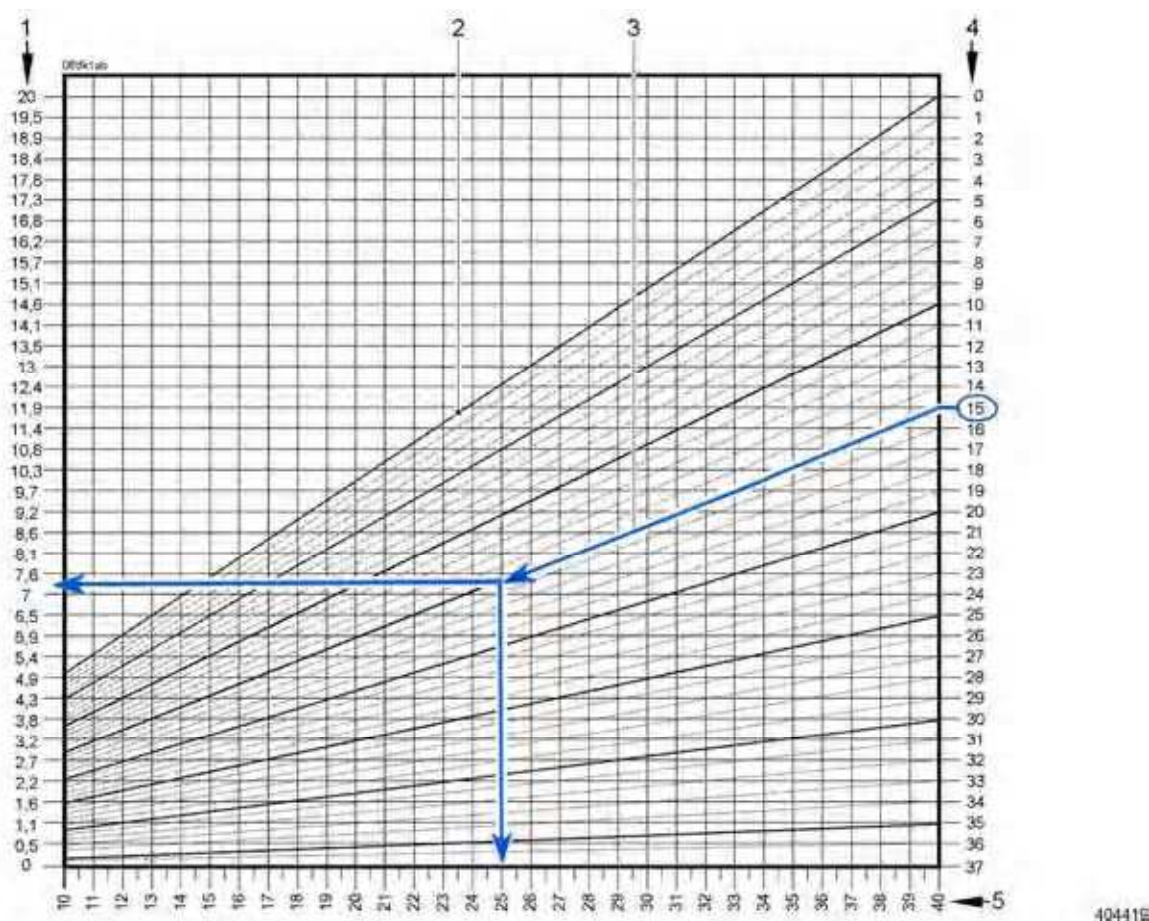
Caution



Danger of damage to the Diesel engine!

If the ratio of corrosion inhibitor / antifreeze fluid is too high, the cooling action is reduced. This in turn can cause damage to the Diesel engine!

! Never use more than 60% corrosion inhibitor / antifreeze fluid.



Selection for antifreeze concentration

1 Quantity of clean corrosion inhibitor / antifreeze in liters
2 Guidelines

3 Example -15°C
4 Measured freeze point of coolant in °C

5 Quantity – cooling system in liters

Procedure on example -15 °C:

If a freeze protection of -15 °C is measured, run along the guide line **3** (starting from the measured temperature) to the lower left until the vertical line quantity – cooling system **5** and from this point horizontally to the outer left.

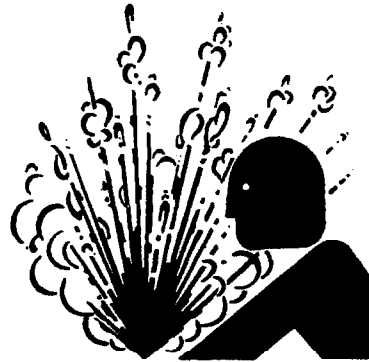
This results in the amount of clean corrosion inhibitor / antifreeze **1** which must be replaced to again obtain a freeze protection to -37° C.

- To reestablish the correct mixing ratio, at least the same amount (as determined before) must be drained from the cooling system.
- Add the determined amount of clean corrosion inhibitor / antifreeze fluid.
- To reach the required coolant level, add the remainder of the previously drained coolant.

5.6.5 Change the coolant

Make sure that:

- the machine is in maintenance position,
- the engine compartment door is open,
- the heater valves are open,
- a suitable container is available,
- the required amount of coolant is available (see chapter "Lubricants and service fluids").



403276

Danger of scalding

Caution



Danger of scalding due to splashing coolant!

- ! At or near operating temperature, the engine cooling system is hot and under pressure.
- ! Open the cap on the filler neck of the expansion tank only after the engine has cooled off.
- ! Open the cap on the expansion tank only if it has cooled down enough so you can touch it. Turn the cover carefully to relieve the pressure.
- ! Never add coolant if the engine is hot.

Drain the coolant

- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open.

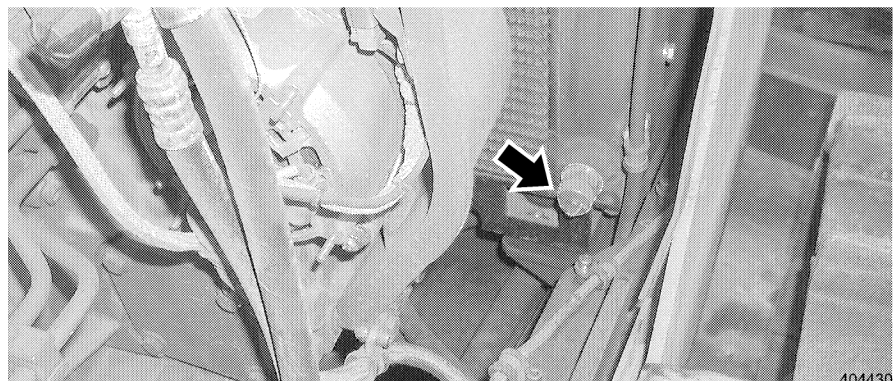
Caution



! Avoid skin contact with coolant.

! Observe the manufacturer's instructions.

- When mixing coolant, wear rubber gloves and protective glasses.
- In case of splashes in eyes or on skin, use lots of water to flush off any coolant residue.

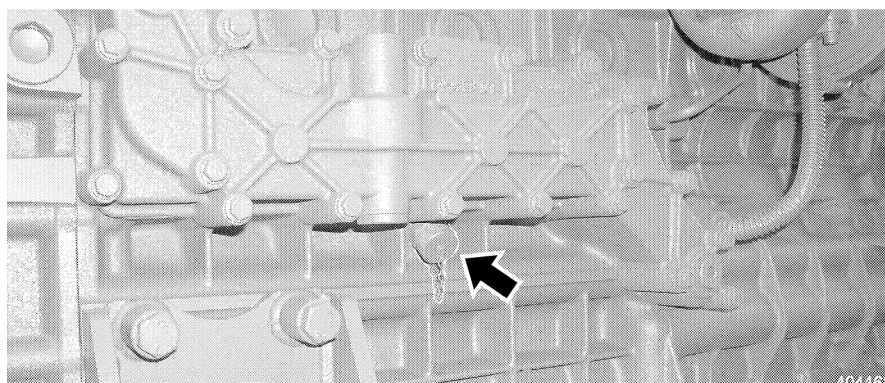


404430

Drain valve

Radiator

- Open the right engine compartment door.
- Set a container under the drain valve.
- Remove the cap on the drain valve.
- Install a drain hose (included in the tool box) on the drain valve and let the coolant drain into a prepared container.
- Remove the drain hose and install the cap on the drain valve.

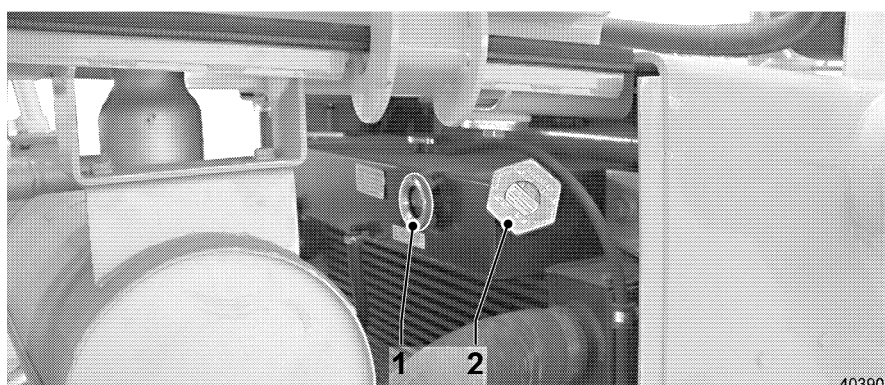


Oil cooler plate – drain valve

Oil cooler plate

To completely empty the coolant, the oil cooler plate must also be drained.

- Open the left engine compartment door.
- Place a container under the drain valve.
- Remove the cap on the drain valve.
- Install the drain hose (included in the tool box) and drain the coolant into the prepared container.
- Remove the drain hose and install the cap on the drain valve.



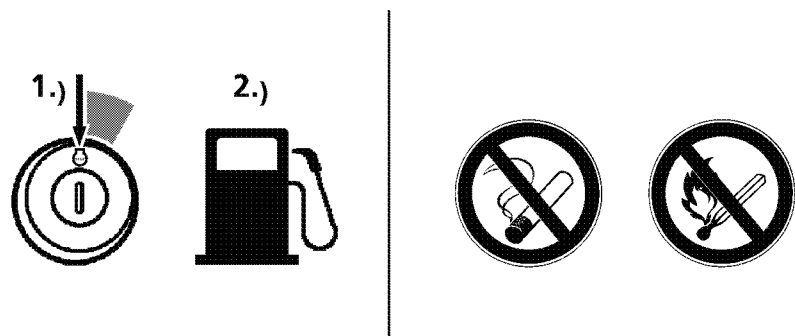
Add coolant

Add coolant

- Add premixed coolant via the filler neck according to "Lubrication and service fluid chart" to the center of the sight gauge 1.
- Install the radiator cap 2 on the filler neck and close.

- Close the engine compartment doors.
- Set the heater knob to "warm". Start the Diesel engine and let it run to warm up.
- Recheck the coolant level and correct, as necessary.

5.7 Fuel system



403183

Danger of fire

Caution



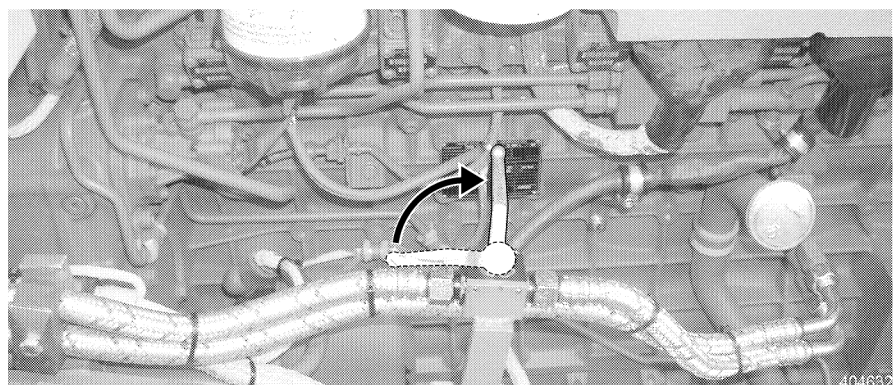
! Danger of fire!

- When working on the fuel system, never smoke or allow an open flame in refueling areas.

5.7.1 Drain the fuel filter condensation

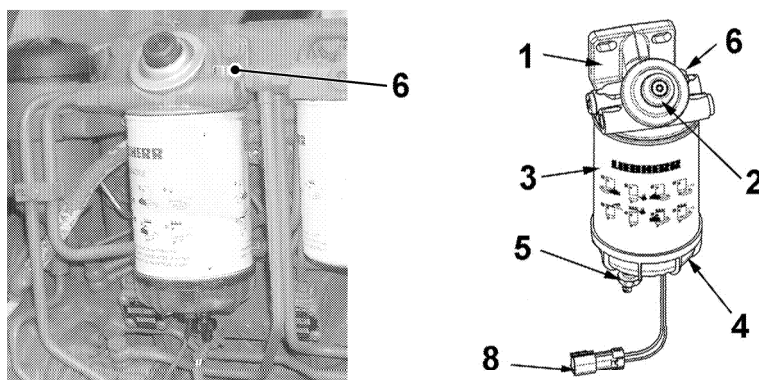
Make sure that:

- the machine is in maintenance position,
- a container with sufficient capacity is available.



Close the shut off valve – fuel system

- Close the shut off valve – fuel system.



404633

Drain the condensation in the fuel filter

- | | |
|---------------------------------|-----------------------------|
| 1 Filter head | 5 Drain plug |
| 2 Manual refueling pump | 6 Breather screw |
| 3 Fuel primary filter cartridge | 8 Plug – water level sensor |
| 4 Water separator container | |

- Open the breather screw 6.
- Open the drain plug 5 and drain the condensation into a suitable container until clean fuel emerges.

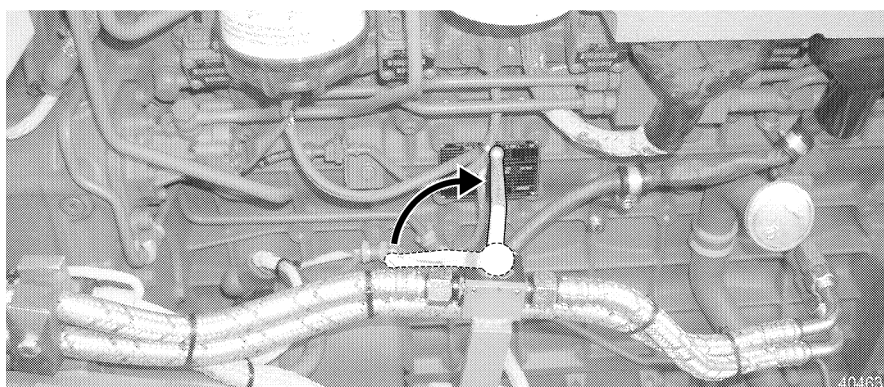
As soon as clean fuel emerges:

- Tighten the drain plug 5 and close the breather screw 6 again.
- Open the shut off valve – fuel system.

5.7.2 Drain the water and sediments in the fuel tank

Make sure that:

- the machine is in maintenance position,
- a container with sufficient capacity is available.



Close the shut off valve – fuel system

The shut off valve 1 is accessible via the right engine compartment door.

- Close the shut off valve – fuel system 1.

Access to the drain valve is on the rear of the machine, after removing the cover plate.

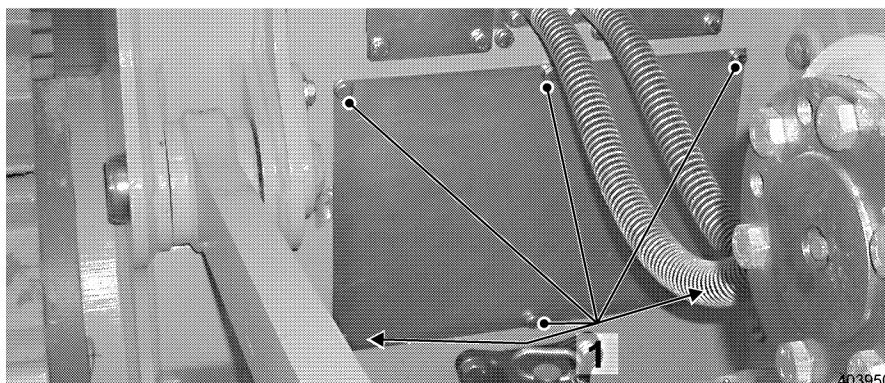
Danger



Danger of accident due to raised attachment.

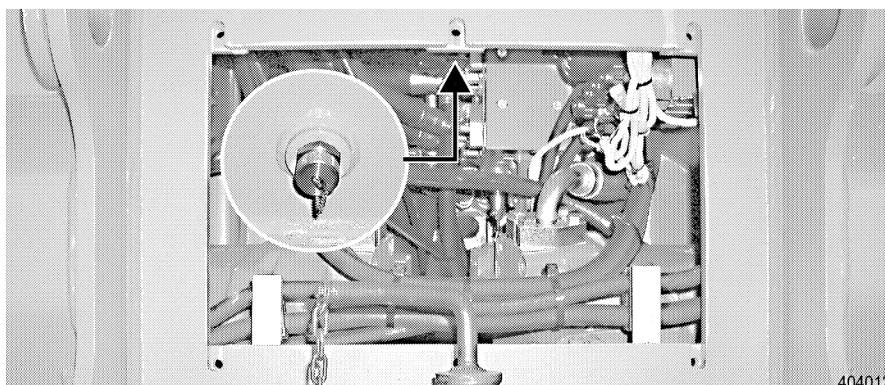
! Never work under a raised attachment.

- Support the attachment first from below or place it on the ground.



Cover plate

- Remove the hex head screws 1 and remove the cover plate.



Drain valve – fuel tank

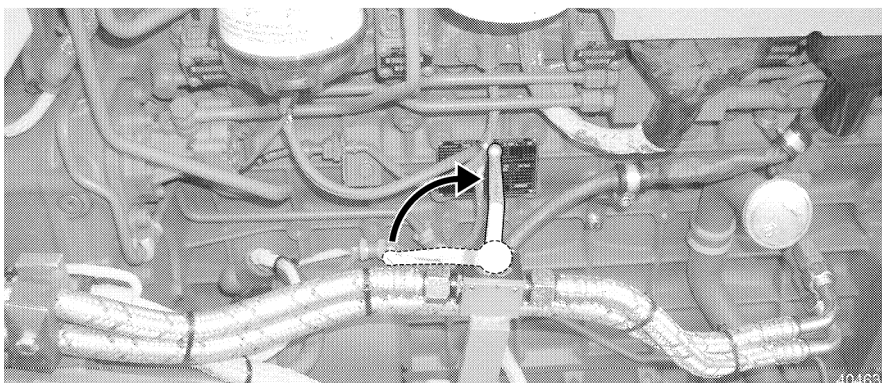
- Remove the cap on the drain valve on the underside of the fuel tank.
- Install the drain hose on the drain valve.
- Drain condensation and sediments into a suitable container until clean fuel emerges.
- Remove the drain hose and install and tighten the cap on the drain valve.
- Install the cover plate with hex head screws.
- Open the shut off valve – fuel system.

5.7.3 Empty the fuel tank

If the filter gets dirty frequently, then the fuel tank must be emptied and cleaned.

Make sure that:

- the machine is in maintenance position,
- a container with sufficient capacity is available.



Close the shut off valve – fuel system

- Close the shut off valve – fuel system 1.
- Remove the tank cover.

Access to the drain valve is on the rear of the machine, after removing the cover plate.

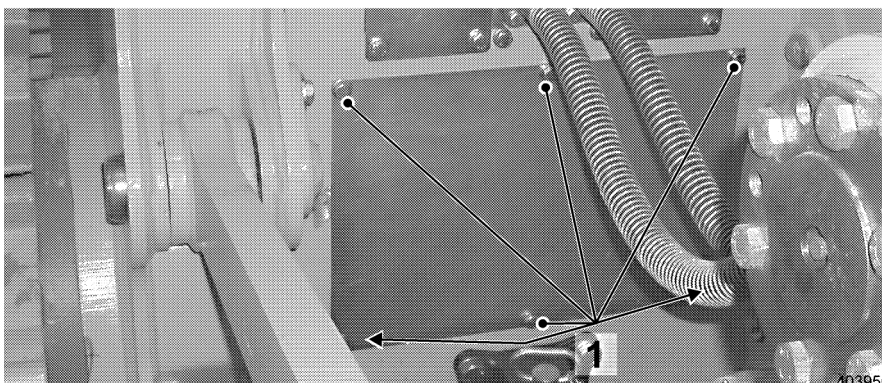
Danger



Danger of accidents due to raised attachment.

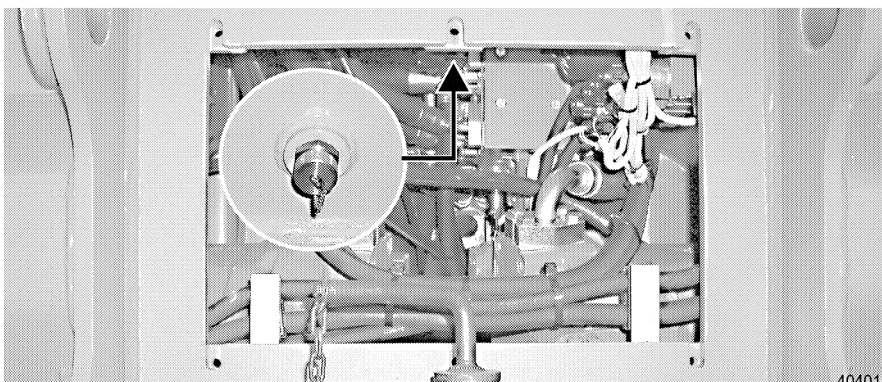
! Never work under the raised attachment.

– Support the attachment first from below or place it on the ground.



Cover plate

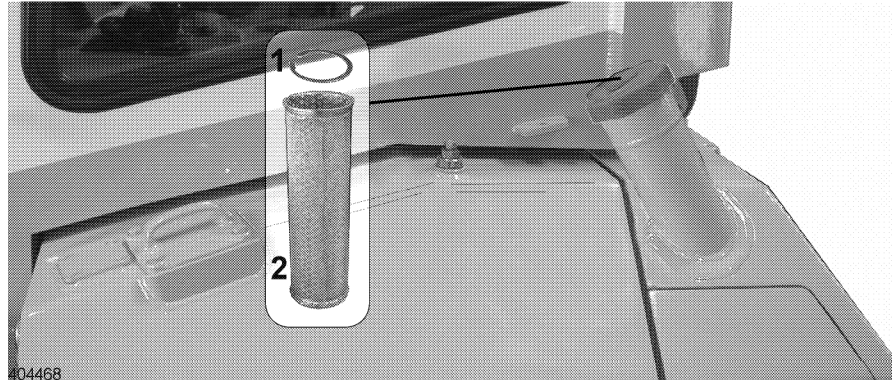
- Remove the hex head screws 1 and remove the cover plate.



Drain valve – fuel tank

- Remove the cap on the drain valve on the underside of the Diesel fuel tank.
- Place a container of sufficient capacity under the drain valve.

- Install a drain hose on the drain valve.
- Drain fuel into the container.
- Remove the drain hose and install and tighten the cap on the drain valve.
- Install the cover plate with hex head screws.



Fuel tank - Filler neck

- On the fuel filler neck, remove the retaining ring 1.
- Remove the strainer 2, check the strainer and replace it, if necessary.
- Check the fuel tank.

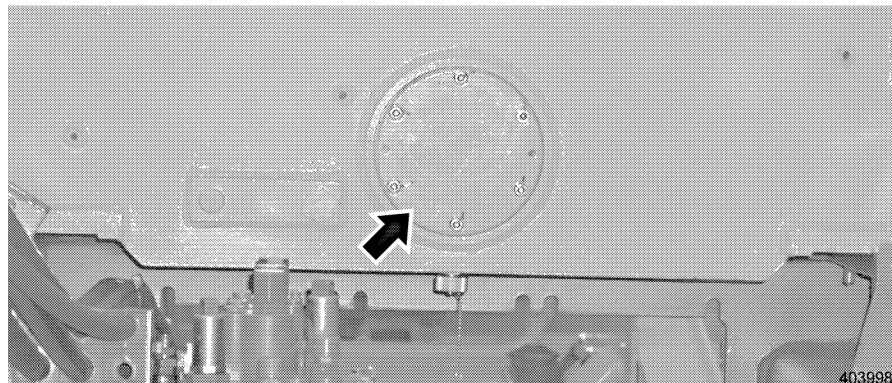
Troubleshooting

If the fuel tank is dirty, then it must be cleaned.

If cleaning is not required, then reinstall the strainer and retaining ring.

Clean the fuel tank

- Empty the fuel tank completely.



Cleaning cover

- Raise the operator's platform as described before.
 - The clearing cover can be accessed if the operator's cab is tilted.
- Remove the cleaning cover.
 - Check the O - ring on the cleaning cover and replace, as necessary.
- Clean the fuel tank.
- Install the cleaning cover with O - ring.
- Refill the fuel tank.
- Open the shut off valve – fuel system.

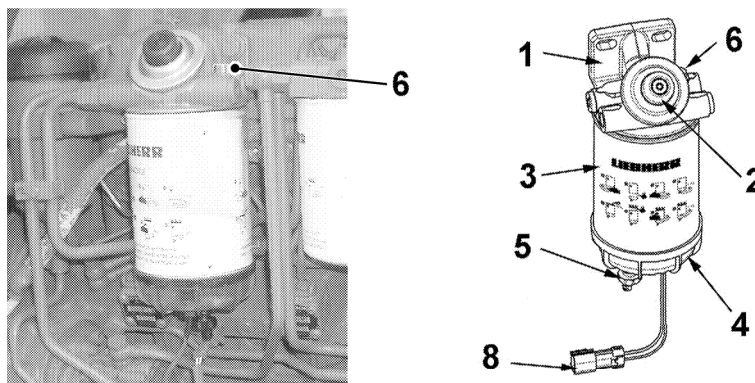
5.7.4 Change the fuel filter cartridges

The fuel primary filter with water separator, water level sensor and integrated manual refueling pump is on the right hand side of the Diesel engine.

Depending on the Diesel engine assembly, the fuel primary filter is equipped with a fuel preheating system.

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,
- an original LIEBHERR filter cartridge is available.



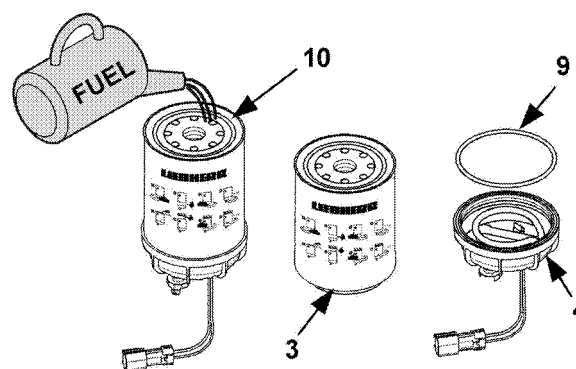
404633

Fuel primary filter cartridge

- | | |
|---------------------------------|-----------------------------|
| 1 Filter head | 5 Drain plug |
| 2 Manual refueling pump | 6 Breather screw |
| 3 Primary fuel filter cartridge | 8 Plug – water level sensor |
| 4 Water separator element | |

Change primary fuel filter

- Close the shut off valve – fuel system.
- Set a container under the primary fuel filter.
- Clean the primary fuel filter and the surrounding area carefully.
- Disconnect the electrical connections from the water level sensor.
- Drain the fuel: Open the breather screw 6 and the drain plug 5.
- Loosen the filter cartridge 3 with a wrench or similar tool and remove.



404634

Filter cartridge – Water separator container

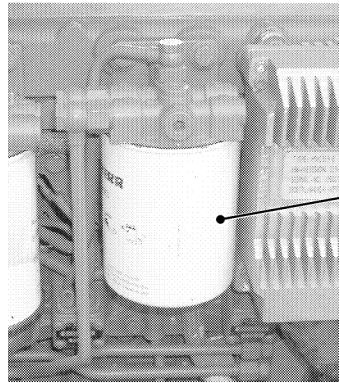
- Remove the water separator container 4 from the filter cartridge 3 .

- Dispose of the old filter cartridge.
- Wet clean the water separator container and dry it with pressurized air.
- Lubricate the O-ring 9 of the water separator container lightly with oil.
- Screw the water separator container onto the new filter cartridge until the O-ring is seated on the filter cartridge.
- Then continue to tighten the water separator container by hand by ½ turn.
- Close the drain plug 5.
- Clean the filter head and make sure that the threaded adapter is seated tightly in the filter head.
- Lubricate the seal ring 10 of the new filter cartridge with clean fuel.
- Fill the new filter cartridge with clean fuel and screw on until the seal ring is seated on the filter head.
- Then continue to tighten the filter cartridge by hand by ½ turn.
- Reestablish the electrical connections, close the breather screw 6 and open the shut off valve – fuel system.
- Bleed the fuel system, see section "Bleed the fuel system".

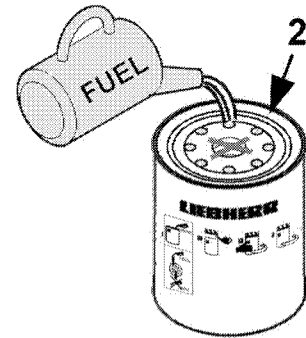
Change the fuel fine filter

The fuel fine filter is on the right hand side of the Diesel engine.

- Close the shut off valve – fuel system.
- Set a container under the fuel fine filter.
- Clean the fuel fine filter and the surrounding area carefully.



Fuel fine filter



404635

- Loosen and remove the filter cartridge 1 with a wrench or similar tool.
- Dispose of the old filter cartridge.
- Clean the filter base and make sure that the threaded adapter is seated tightly in the filter base.
- Lubricate the seal ring 2 on the new filter cartridge with clean fuel.

Caution

Prevent contamination of the fuel system.

! Fill the new filter cartridge only via the outer small openings.

! Prevent infiltration of contaminants into the filter cartridge via the large opening.

- Fill the filter cartridge with clean fuel.
- Screw on the filter cartridge until the seal ring is seated on the filter head.
- Continue to tighten the filter cartridge by hand by $\frac{1}{2}$ turn.
- Open the shut off valve – fuel system and bleed the fuel system, see section "Bleed the fuel system".

5.7.5 Bleed the fuel filter / fuel system

Caution

! Danger of fire and explosion!

Do not smoke.

Avoid an open flame.

Work only when the Diesel engine is turned off.

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,
- a container for the fuel is available,
- new injection lines are available, if necessary.

Bleeding the fuel filter is necessary after:

- Changing the fuel filters.

Bleeding the fuel system (low pressure system, high pressure system) is necessary after:

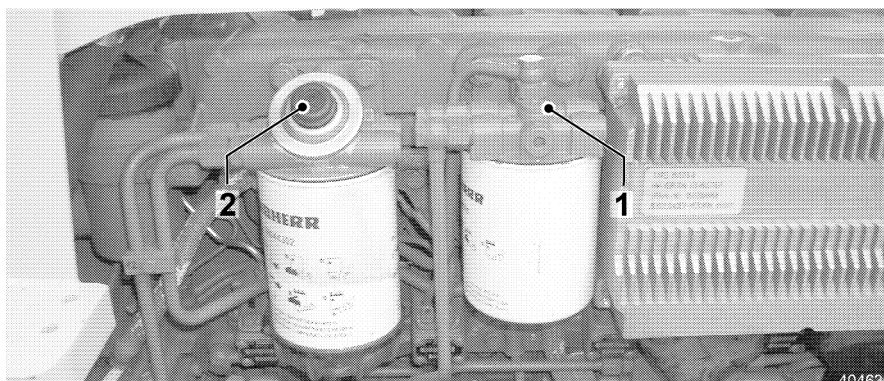
- Emptying the fuel tank.
- Cleaning the fuel tank.
- Repairs on the fuel system.

Caution

! Danger of damage to the Diesel engine!

To bleed the fuel filter, do not open any fuel / injection lines or fittings!

- Open only the breather screw on the filter head of the fine filter.



Bleed the fuel filters

Bleed the fuel filters

- Open the shut off valve - fuel system.
- Loosen the breather screw 1 on the filter head of the fine filter and back it out 2 - 3 threads.
- Actuate the hand pump 2.

If fuel free of air bubbles emerges on the breather screw:

- Tighten the breather screw 1 again.
- Continue to actuate the hand pump until you can feel a stronger resistance.
- Start the Diesel engine as described in section "Control, operation". If the Diesel engine does not start, repeat the bleeding procedure.



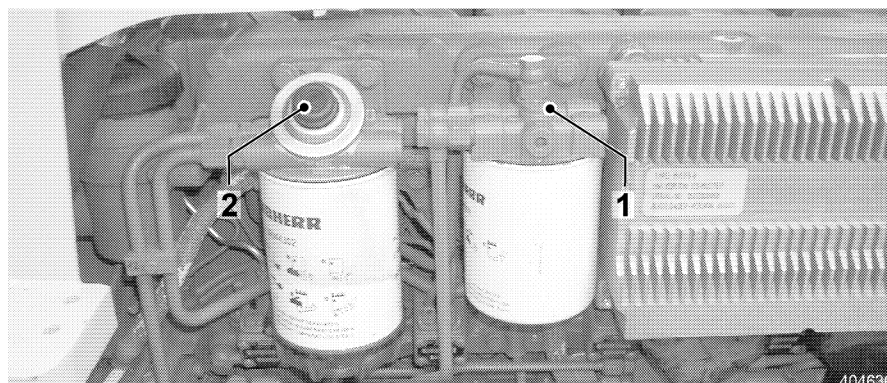
Breather screw on the filter head of the fuel prefilter

Bleed the fuel low pressure system

- Loosen the breather screw 3 on the filter head of the fuel pre-filter and back it out 2 - 3 threads.
- Actuate the hand pump 2.

If fuel free of air bubbles emerges on the breather screw:

- Tighten the breather screw 3 again.
- Continue to actuate the hand pump until you can feel a stronger resistance.



Breather screw on the filter head of the fuel fine filter

- Loosen the breather screw 1 on the filter head of the fuel fine filter and back it out 2 - 3 threads.
 - Actuate the hand pump 2.
- If fuel free of air bubbles emerges on the breather screw:
- Tighten the breather screw 1 again.

- Continue to actuate the hand pump until you can feel a stronger resistance.

Bleed the fuel high pressure system

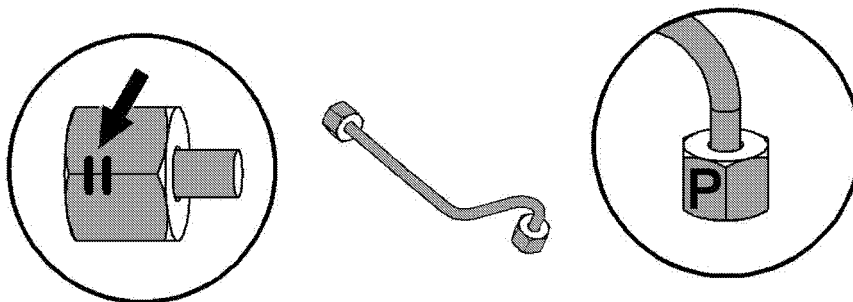
Make sure that:

- the fuel low pressure system has been bled.

Caution

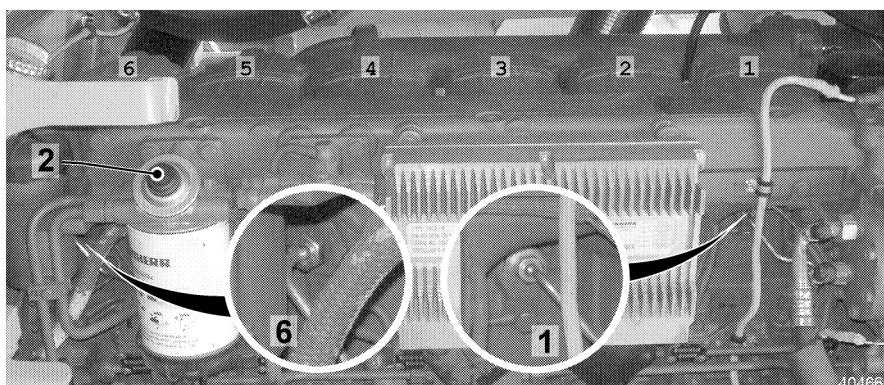


The injection lines must be marked every time they are opened, since they must be replaced after having been opened three times (marks).



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Marks on the injection line

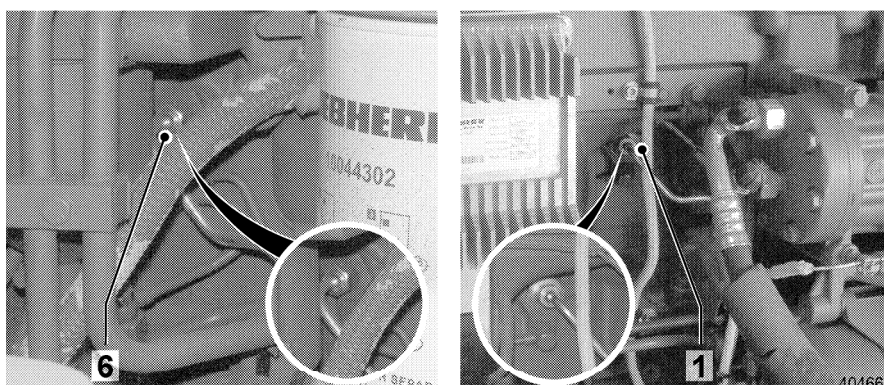


404663

Injection lines of cylinder 1 and 6

- Loosen injection lines of cylinder 1 and 6 on the pressure pipe fitting (nozzle side) 1 and 6. (Make sure that it doesn't turn along!)
- Actuate the hand pump 2.

If fuel free of air bubbles emerges on the breather screw:



404665

Injection lines of cylinder 1 and 6

- Retighten the injection lines on the nozzle side 1 and 6 with 27-33 Nm.

Tightening torque injection lines:

- nozzle side = 27-33 Nm
- pump side = 25-40 Nm

- Continue to actuate the hand pump until you can feel a stronger resistance.
- Start the Diesel engine as described in section "Control, operation". If the Diesel engine does not start, repeat the bleeding procedure.

5.8 Air filter system

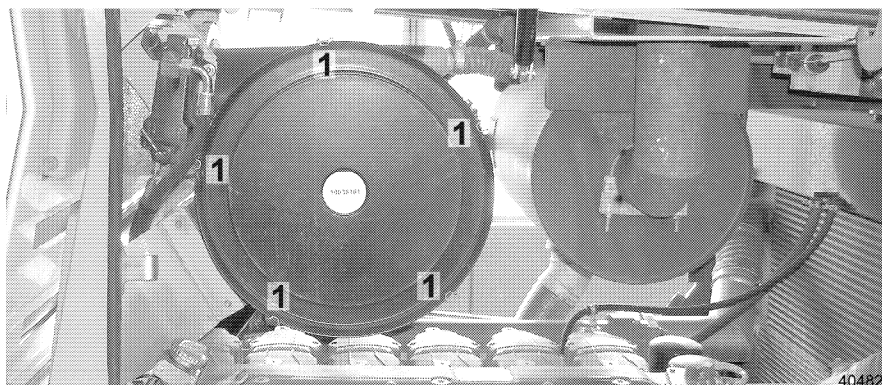
5.8.1 Clean / change the air filter

Clean or change the main element when the indicator light - air filter contamination in the instrument panel lights up or according to the given internal on the maintenance and inspection schedule.

If the indicator light – air filter contamination continues to light up after maintenance of the main element, then the safety element must also be changed.

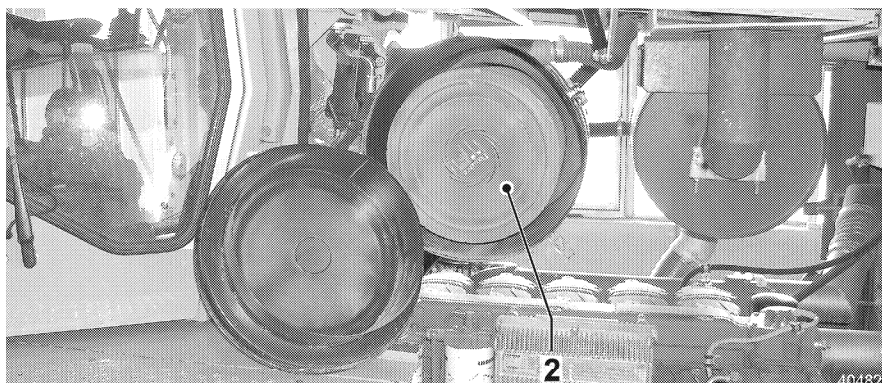
Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,



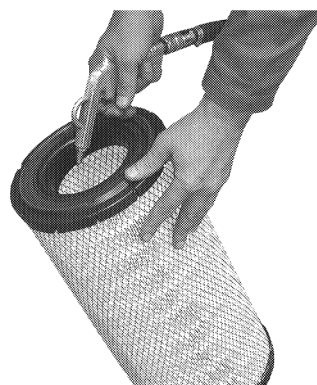
Mounting clamps

- Open the mounting clamps 1 on the service cover and remove the cover.



Main filter element

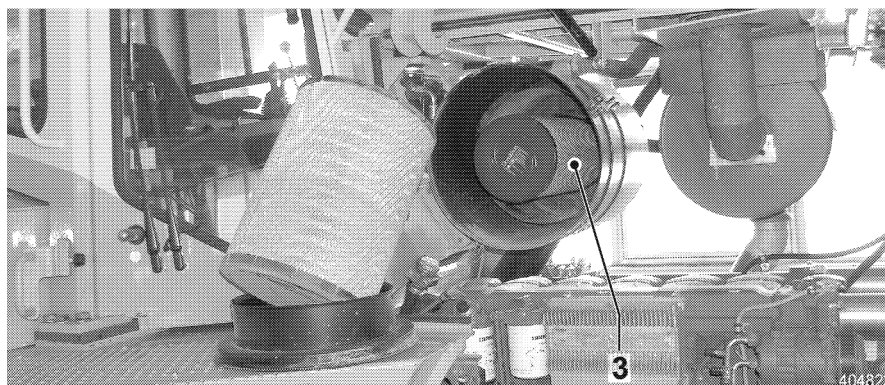
- Main filter element**
- Remove the main filter element 2, clean or change it.



403283

Blow out the main filter element

- Clean the main filter element**
- Blow out the main filter element from the inside to the outside with dry air. Avoid beating the filter, since such a cleaning method can cause damage.



Safety element

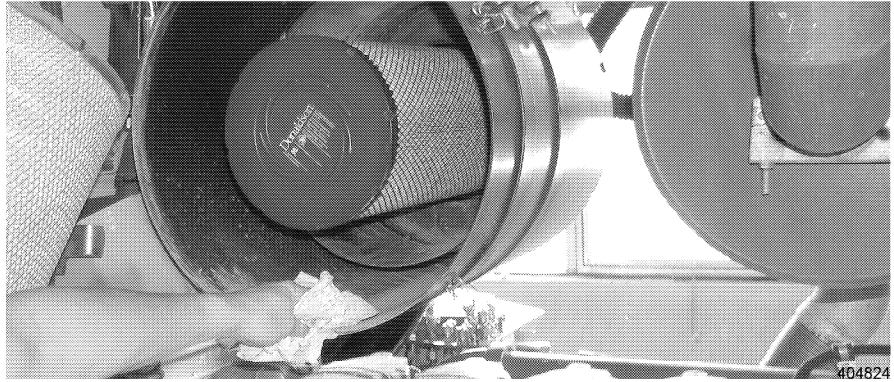
- Safety element**
- The safety element 3 should be replaced at every third cleaning or whenever the main filter element 2 is being replaced.
 - The safety element may not be cleaned!

Caution



Danger of damage to the Diesel engine.
! NEVER operate the machine without air filter.

- Make sure that any dirt in the filter housing is removed, before inserting a new or cleaned filter element.

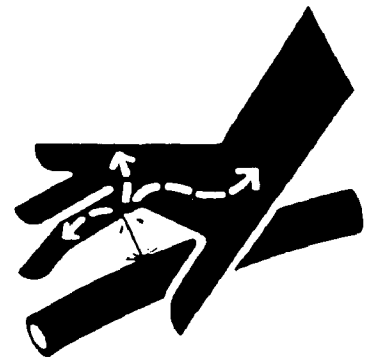


Clean the filter housing

Clean the filter housing

- Wipe out the filter housing with a clean cloth.
 - Do not use pressurized air!
 - Observe utmost cleanliness to avoid any dust from entering the clean air line.
- Reinstall the filter elements 3 and 2, make sure they are seated correctly.
- Clean the service cover and place it on the filter housing. The mounting clamps 1 can be closed easily only when the cover is placed evenly with its full circumference on the filter housing.
- Close mounting clamps 1.

5.9 Hydraulic system



Hydraulic pressure

403281

Caution



! Do not remove any hydraulic lines, hoses, connectors as long as the hydraulic system is under pressure. Turn the engine off and actuate all functions again to release pressure in all hydraulic lines.

5.9.1 Oil level in hydraulic tank

Make sure that:

- the hydraulic oil is cold,
- the machine is in maintenance position.

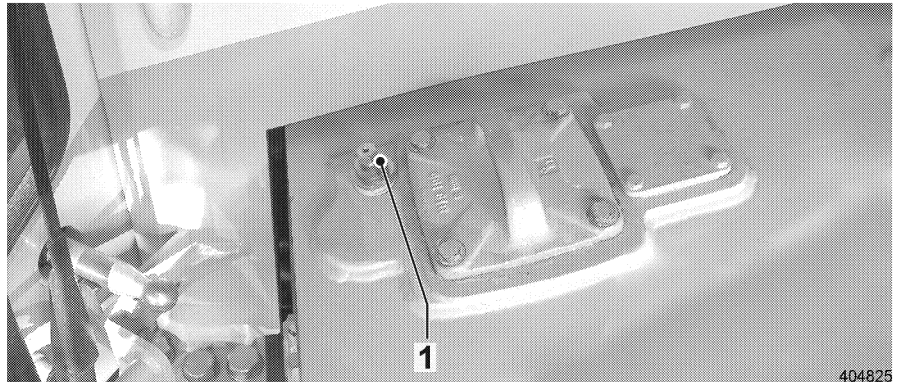


403916

Sight gauges

Check oil level

- Check the oil level on the sight gauges.
 - With retracted hydraulic cylinders, the oil level may exceed the center of the upper sight gauge.
 - With extended hydraulic cylinders, the oil level may not drop below the center of the lower sight gauge.
- If the oil level is below the nominal height: Add hydraulic oil.

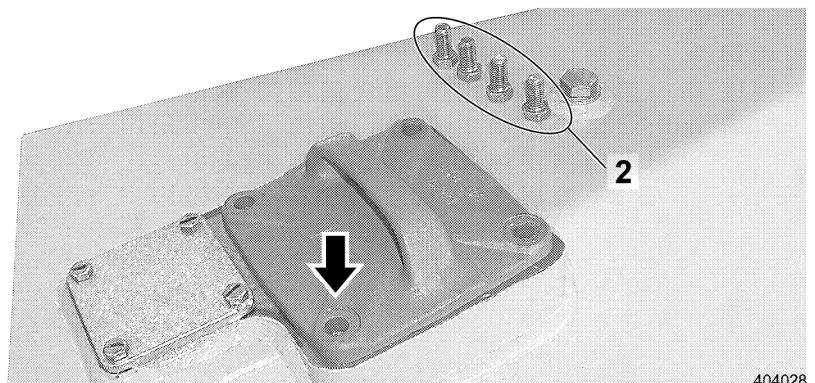


404825

Hydraulic tank – breather screw

Add hydraulic oil

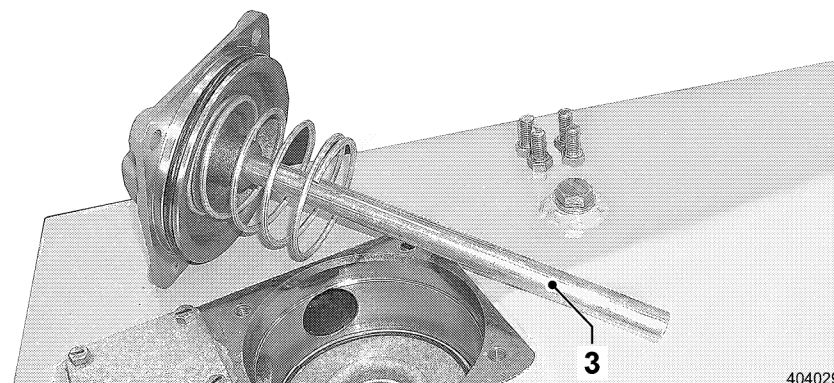
- Relieve tank pretension: Back the breather screw 1 on the hydraulic tank out by two turns.
- Add hydraulic oil only via the return filter.



404028

Filter cover

- Loosen the screws 2 on the filter cover and remove.
- Remove the filter cover with the magnetic rod.



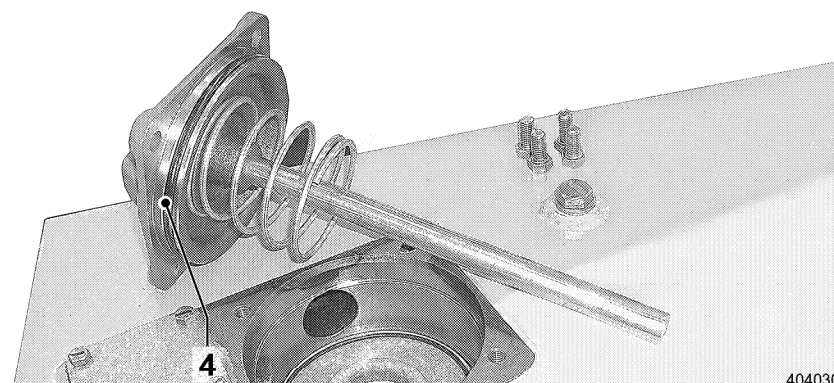
Magnetic rod

- Check the magnetic rod 3 and clean it, if necessary.

Problem remedy

Significant contamination or larger metallic particles on the magnetic rod or in the return filter can point to a problem in the hydraulic system.

- In this case, find the cause and remedy the problem in the hydraulic system.
-
- Add hydraulic oil via the return filter until the MAX mark.



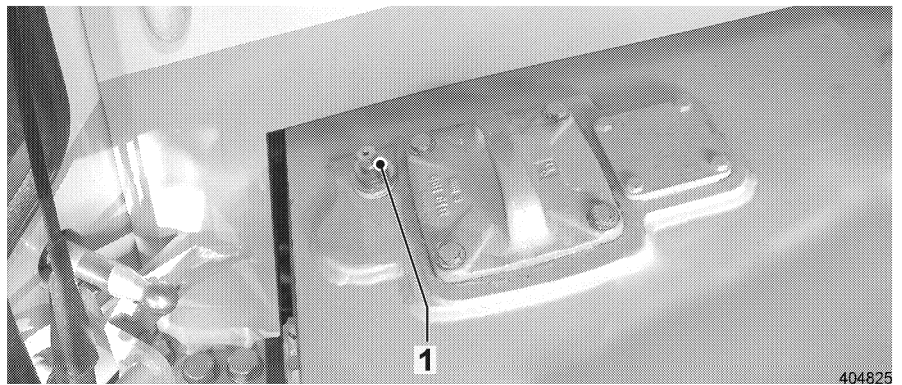
O - ring

- Check the O - ring 4 on the filter cover and replace it, if necessary.
- Insert the filter cover with the magnetic rod and attach with screws.
- Close the breather screw on the hydraulic tank.

5.9.2 Clean the magnetic rod on the hydraulic tank

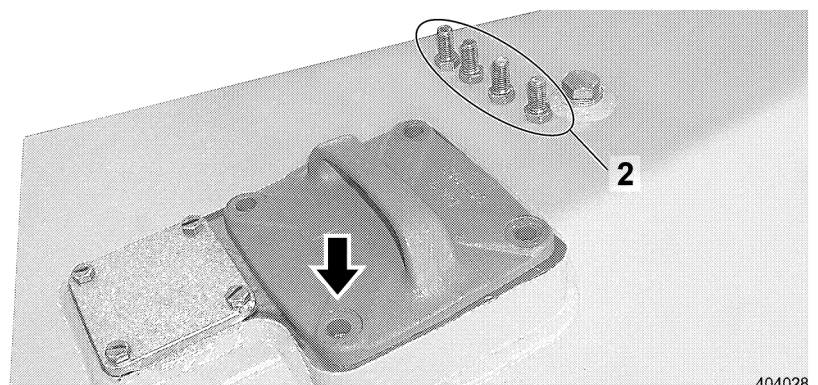
Make sure that:

- the machine is in maintenance position.



Breather screw

- Relieve tank pretension: Back out the breather screw 1 on the hydraulic tank by two turns.



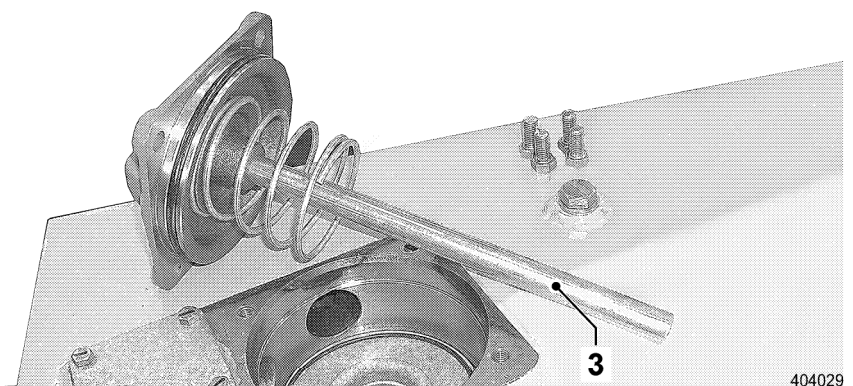
Filter cover

- Loosen screws 2 on the filter cover and slowly remove the filter cover with the magnetic rod.

Problem remedy

Heavy dirt deposits or larger metallic particles on the magnetic rod can point to damage in the hydraulic system.

- In this case, find the cause and remedy the problem in the hydraulic system.



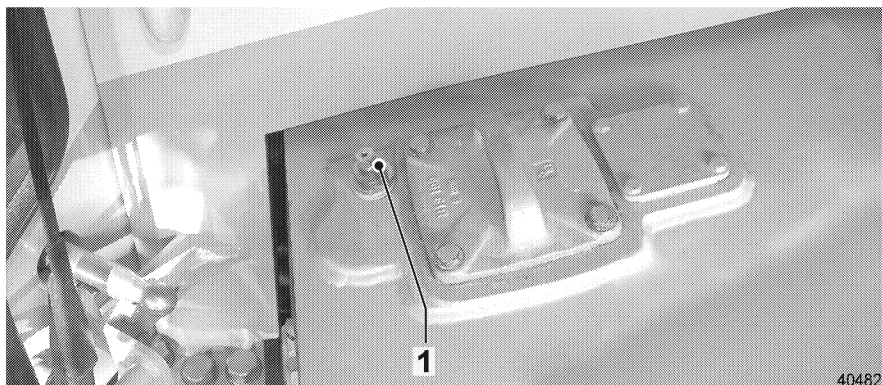
Magnetic rod

- Carefully clean the magnetic rod 3.
- Set the O - ring und filter cover with magnetic rod on the housing.
- Tighten the screws on the filter cover.

- Close the breather screw 1 on the hydraulic tank.

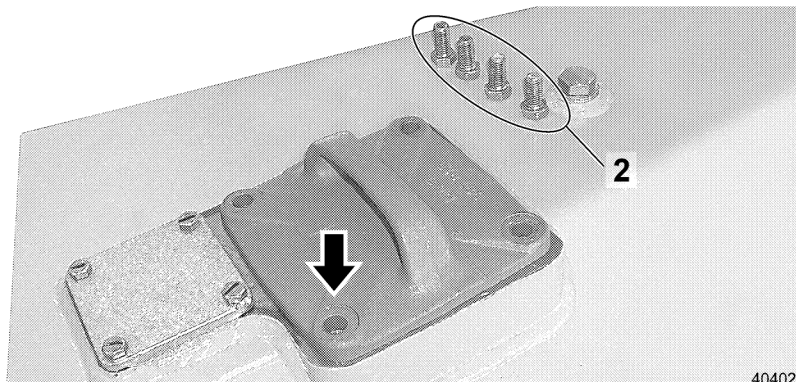
5.9.3 Change the return filter element

The return filter must be changed, contrary to the data in the maintenance and inspection schedule, if the "indicator light return filter" filter lights up, with the hydraulic oil at operating temperature. Use only an Original LIEBHERR return filter element. Make sure that the machine is first in maintenance position. The return filter element cannot be cleaned.



Breather screw

- Relieve tank pretension: Back the breather screw 1 on the hydraulic tank out by two turns.



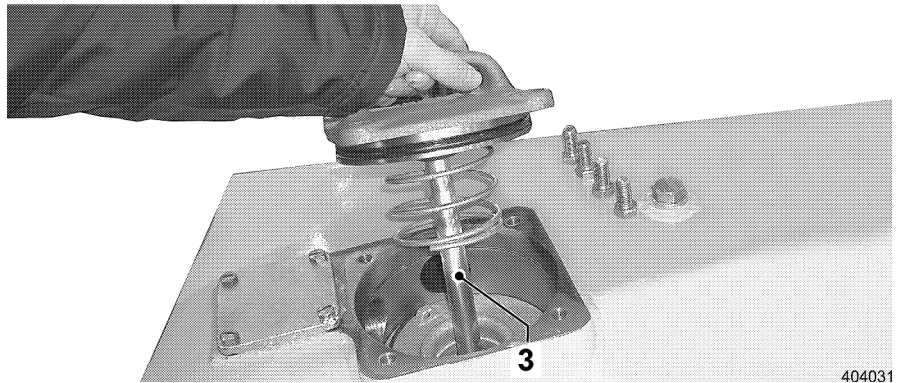
Filter cover

- Loosen screws 2 on the filter cover and slowly remove the filter cover with the magnetic rod.

Problem remedy

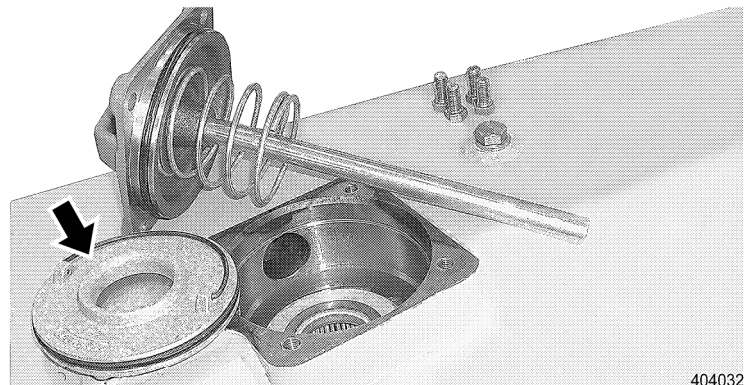
Heavy dirt deposits or larger metallic particles on the magnetic rod can point to damage in the hydraulic system.

- In this case, find the cause and remedy the problem in the hydraulic system.



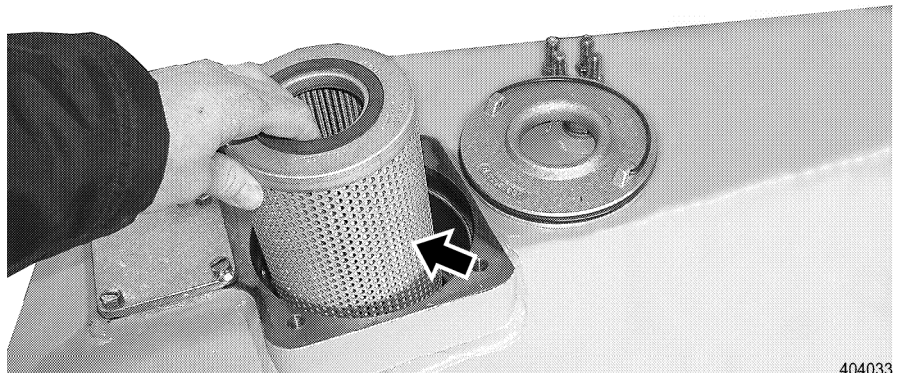
Magnetic rod

- Remove the filter cover with spring and magnetic rod 3.



Pressure plate

- Remove the pressure plate.



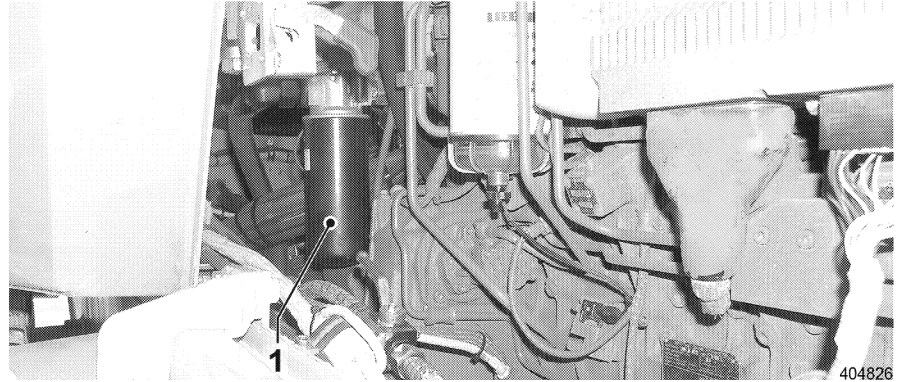
Return filter

- Remove the filter insert and dispose of it properly.
- Carefully insert a new filter insert.
- Carefully clean the magnetic rod.
- Check the O - ring on the filter cover and replace it, if necessary.
- Place the filter cover with magnetic rod on the housing.
- Tighten the screws on the filter cover.
- Tighten the breather screw.

5.9.4 Change the filter – replenishing circuit

Make sure that:

- the machine is in maintenance position,
- the right engine compartment door is open,
- a LIEBHERR oil filter cartridge is available.



Filter – replenishing circuit

- Remove the filter cartridge 1 with a filter wrench.
- Clean the sealing surface on the filter bracket.
- Lubricate the rubber seal ring on the new filter cartridge thinly with engine oil.
- Install a new filter cartridge on the filter bracket and tighten by hand.

5.9.5 Check the hydraulic system for function and leaks



Hydraulic pressure

Caution



- ! Never check for leaks on the machine with your bare hands.
- Fluid escaping from a small hole can have enough force to penetrate the skin and cause severe injury.
- Always wear protective gloves.

Make sure that:

- the machine is in maintenance position,
- the cab is raised, see "Maintenance", "Cab tilting device".
- See also "Safe maintenance of hydraulic hoses and lines".

- Check the complete hydraulic system for leaks.
- Replace defective hydraulic seals and hoses.
- Tighten loose hydraulic connections.

5.9.6 Clean the oil cooler

To ensure proper cooling of the media to be cooled, the oil cooler must be cleaned, as necessary. In dust intensive application, check the radiator daily and clean, if necessary.

Dirty cooling units cause overheating.

Dust and other contaminants can be removed with water pressure, steam or air pressure from the cooling fins. We recommend using pressurized air.

Make sure that:

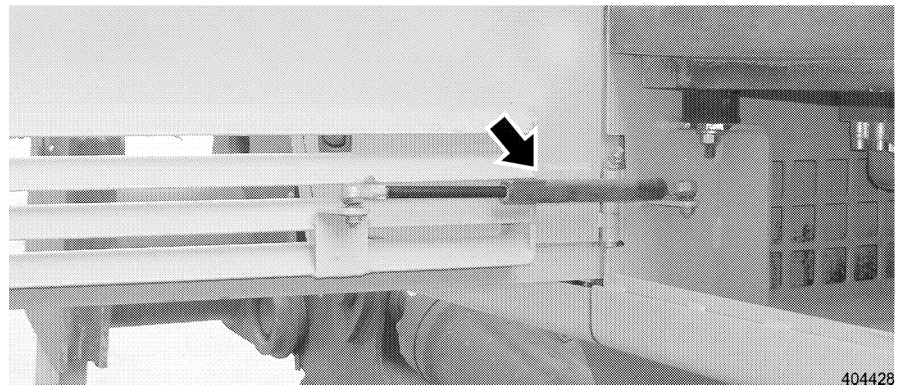
- the machine is in maintenance position,
- the oil cooler reservoir door is open.

Caution



Improper handling can damage the cooling fins.

! Do not use hard objects or excessive water pressure for cleaning.



Gas cylinder

- Open the oil cooler reservoir door.

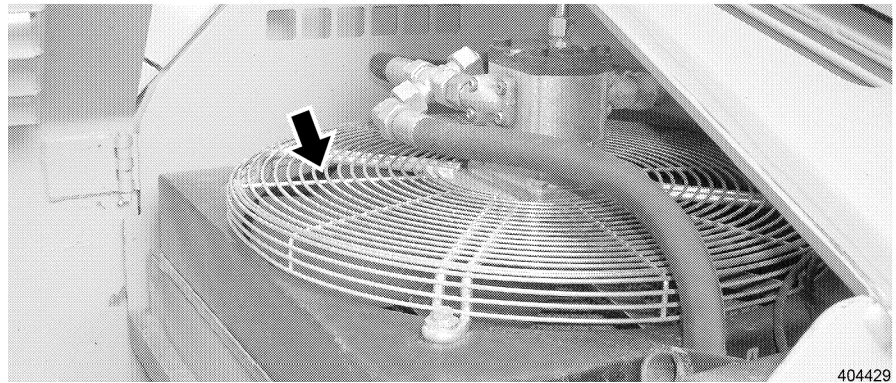
Caution



Danger of injury if the door falls down and closes!

! Check if the completely open door is held in this position by the gas cylinder.

- If the function is not ensured, then the problem must be remedied immediately.



404429

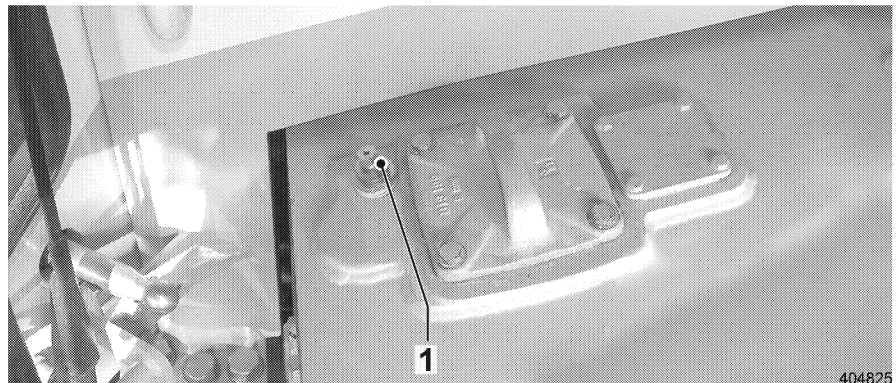
Oil cooler

- Clean the oil cooler unit with pressurized air, steam or water.
- Close the door again.

5.9.7 Change the hydraulic oil

Make sure that:

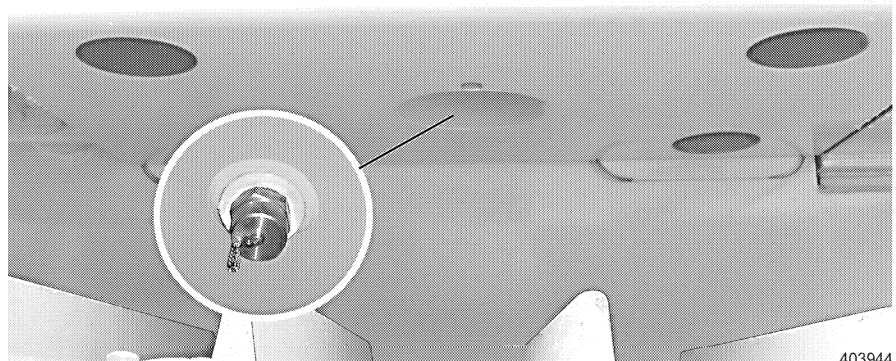
- the machine is at operating temperature,
- the machine is in maintenance position,
- a suitable container is available.
- the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.



404825

Hydraulic tank – breather screw

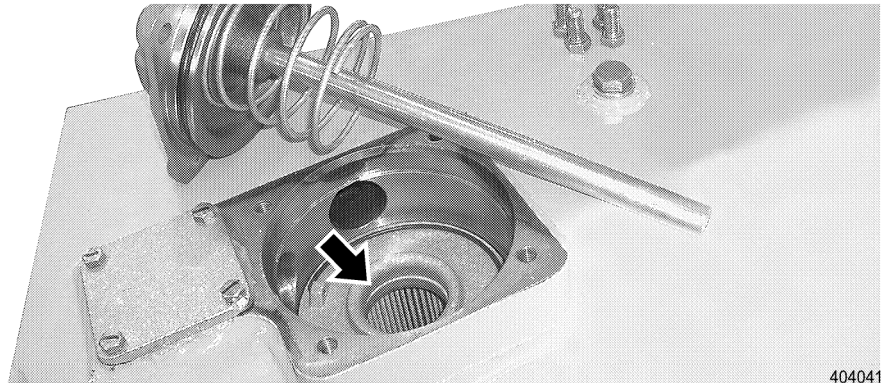
- Relieve tank pretension: Back out the breather screw 1 by two turns.



403944

Hydraulic tank - oil drain valve

- Unscrew the cap on the drain valve on the underside of the hydraulic tank.
- Install the drain hose on the drain valve.
- Drain the hydraulic oil into a suitable container.
- Remove the drain hose and reinstall the cap on the drain valve, tighten.



Add hydraulic oil

Add hydraulic oil only via the return filter.

- Loosen the screws on the filter cover and slowly lift the filter cover with the magnetic rod.



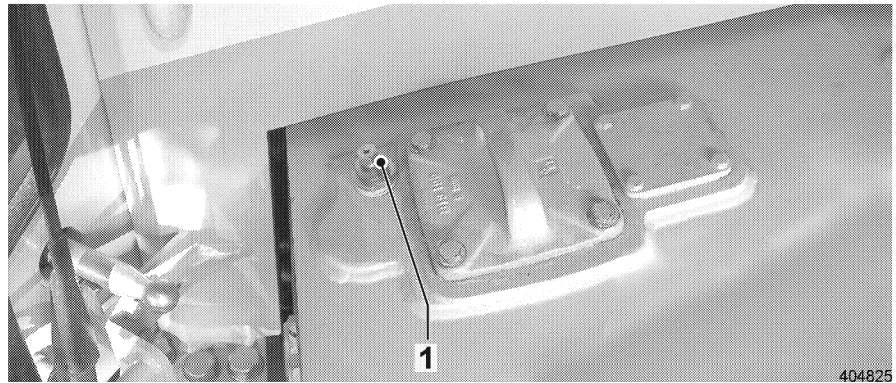
Oil level mark

- Add hydraulic oil to the oil level mark 2.
- Place the cover with the pressure spring on the housing and tighten.
- Tighten the breather screw.

5.9.8 Drain condensation and sediments in the hydraulic tank

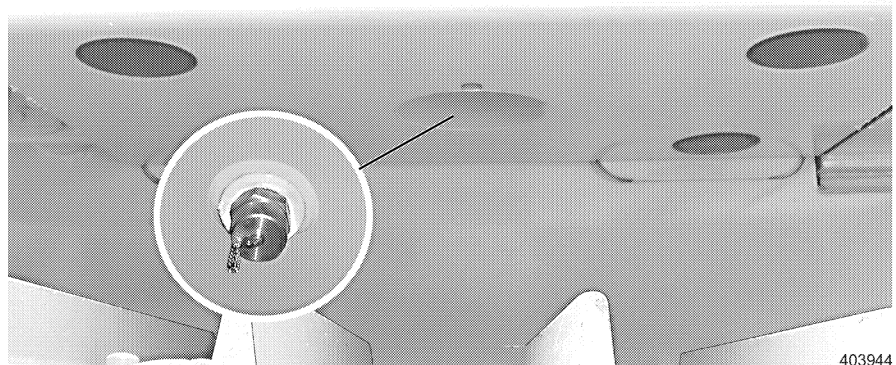
Make sure that:

- the machine is in maintenance position,
- a suitable container with the required capacity is available.



Breather screw

- Relieve tank pretension: Back the breather screw 1 on the hydraulic tank out by two turns.



Drain valve - Hydraulic tank

- Unscrew the cap on the drain valve on the underside of the hydraulic tank.
- Install the drain hose on the drain valve.
- Drain condensation and sediments into a suitable container until clean hydraulic oil emerges.
- Remove the drain hose and reinstall the cap on the drain valve and tighten.
- Check the oil level in the hydraulic tank and add oil, if necessary.

5.10 Splitterbox

5.10.1 Check oil level

The dipstick 3 and the oil filler neck 1 are in the engine compartment on the right side of the engine.

Make sure that:

- the machine is in maintenance position,
- the engine compartment door is open.



Oil filler neck - dipstick

- Pull out the dipstick 3, wipe it off and reinsert it.
- Pull the dipstick 3 out again and check the oil level. The oil level must be between the MIN and MAX mark.

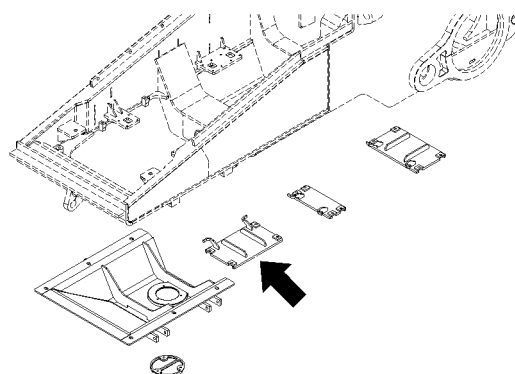
If the oil level is too low:

- Remove the oil filler cap 2 from the oil filler neck 1 and add oil. For oil specification, refer to chapter "Lubricants and service fluids".
- Clean the oil filler cap of the oil filler neck and place it on the oil filler neck for the splitterbox and tighten.

5.10.2 Change the gear oil

Make sure that:

- the machine is in maintenance position,
- the engine compartment door is open,
- a suitable container and the drain hose with valve connection is available,
- the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.



Belly pan cover

404135

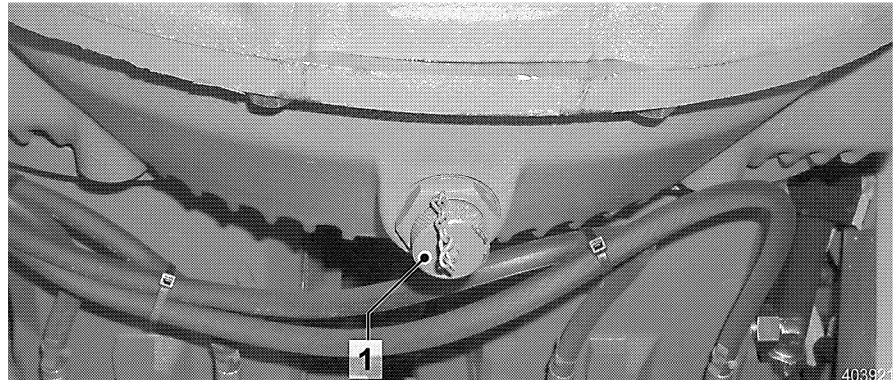
- Unscrew the belly pan cover.
- In case of heavy deposits in the belly pan area, the belly pans must be removed and cleaned.

Danger



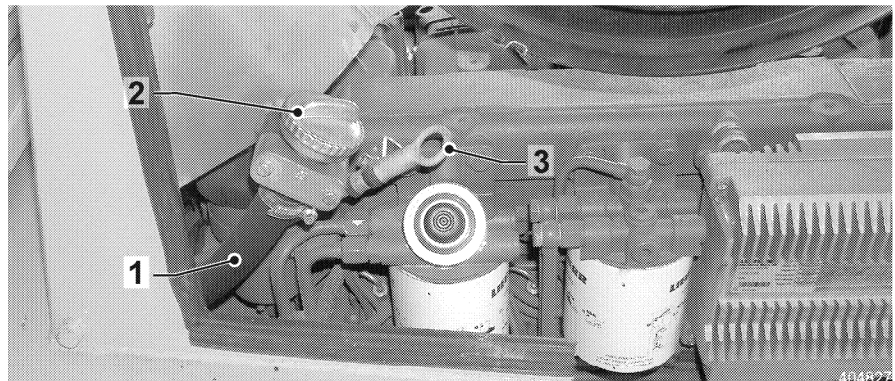
! Danger of injury when removing the belly pans. Due to the restricted space and the great weight of the belly pans, removal is very difficult. A suitable lifting device is required to remove the belly pans.

- Remove the oil filler cap 2 on the oil filler neck.
- Unscrew the cap on the oil drain valve on the oil pan.



Oil drain valve

- Install the oil drain hose to the oil drain valve 1 and drain the oil into the container.
- Remove the oil drain hose and reinstall the cap on the oil drain valve.
- Reinstall the belly pan cover.



Oil filler neck - dipstick

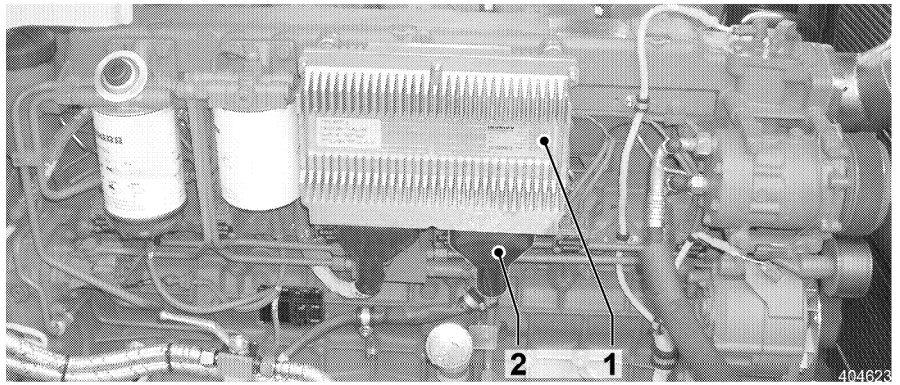
- Add clean oil via the filler neck to the MAX mark on the dipstick.
- Clean the oil filler cap, place it on the filler neck and tighten.

5.11 Electrical system

Always disconnect the battery when working on the electrical system and for all welding work.

- Turn the battery master switch off.
- Disconnect the cable on the negative terminal (-) first and reconnect it last.

For arc welding work, disconnect the electronic box – Diesel engine in addition to the battery.



Disconnect the Diesel engine – Electronic box

Disconnect the Diesel engine – Electronic box

The Diesel engine – Electronic box is located in the engine compartment on the right hand side on the Diesel engine.

- Unplug the plug 2 on the Diesel engine – Electronic box 1.

5.11.1 Check the indicator lights and illumination

For the location of the lights and the indicator lights on the indicator unit, see chapter "Operation".

- Start the Diesel engine and check the lights and indicator lights to ensure they work.

5.11.2 Batteries



Battery compartment

- Open the battery compartment door.

Check the fluid level and the terminals

The batteries are located in the battery compartment and are accessible after opening the battery compartment door.

For proper function of the machine, it is important that the batteries are always in proper condition.


Make sure that:

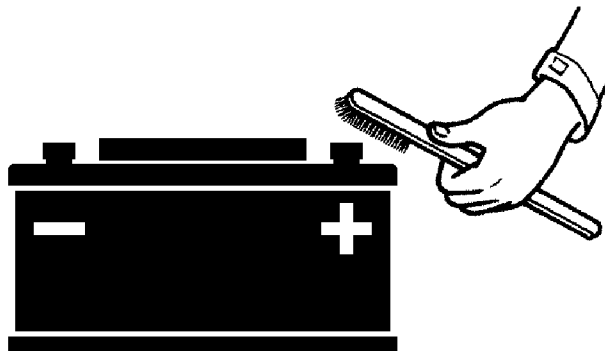
- the machine is in maintenance position,
- the battery compartment door is open,



403285


Explosive gases

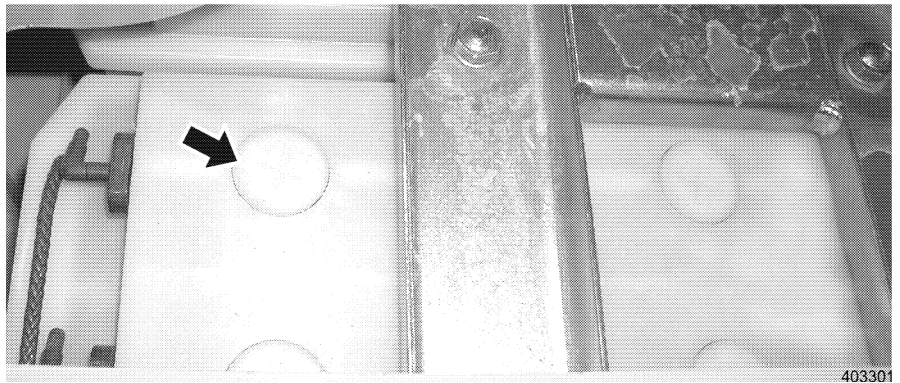
- Caution**  Batteries emit explosive gases. Battery acid has strong caustic properties.
- ! Do not smoke and avoid open flames when handling batteries, as well as when servicing or charging batteries.
-
- When working on batteries, always wear gloves and safety glasses.



403286

Special terminal brush

- Caution**  Danger of spark formation – gas explosion!
! Use the special terminal brush.
-
- Clean the battery surface with a clean cloth.
 - Tighten the battery mounts.
 - Clean the terminals and clamps.
 - To prevent a loose connection, check the clamps on the terminals to ensure they are seated properly and tighten them, if necessary.
 - Coat the battery terminals and cable clamps with acid resistant grease (such as Vaseline).
- In extremely high temperatures, the acid level in the individual cells can drop, due to different gases.



403301

Battery cells - plugs

- Open the plugs on the individual battery cells and check the electrolyte level.

Problem remedy

If the electrolyte level is too low:

- Add distilled water to approx. 10 mm above the plates.

5.11.3 Change the bulbs

Make sure that:

- the machine is in maintenance position.



404116

Halogen lights

Change the halogen bulbs in the halogen lights

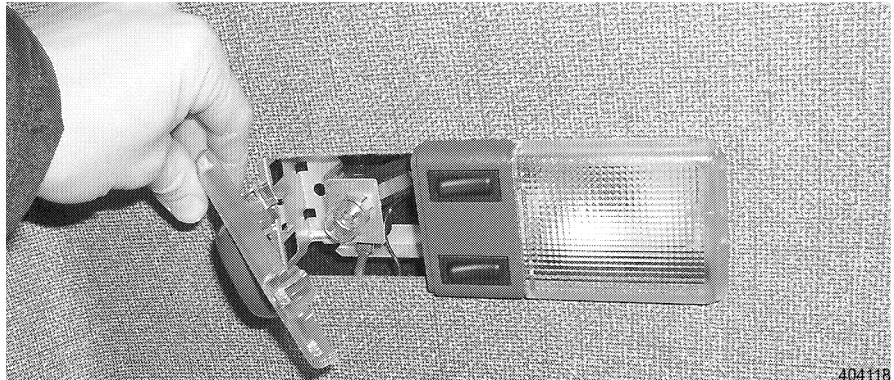
- Remove the screws on the frame of the lights.
- Remove the frame with the glass cover.



404117

Lamp base

- Release the spring bar and pull out the lamp base.
- Remove the bulb from the base and replace with a new bulb.
 - Do not touch the halogen bulb with bare fingers.



Interior lighting / reading light

Change the bulb

- Remove the diffuser.
- Remove the bulb from the base and replace with new bulb.
 - Do not touch the new bulb with bare fingers.
- Insert the new bulb.
- Insert the diffuser and push up.

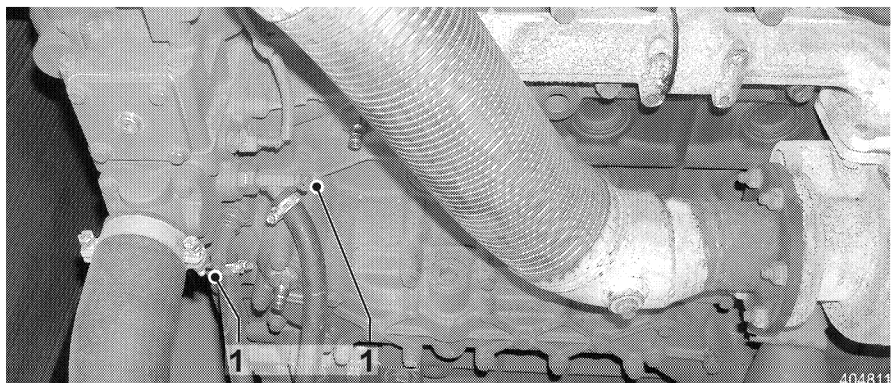
5.12 Heating and fresh air system, air conditioning system

The following checks must be made regularly, but at least once a year before the start of the cold season.

5.12.1 Check the heater for function and leaks

Check for leaks

- Check all water circuit connections for leaks.
- Check all clamps and retighten, if necessary.
 - Replace damaged hoses.

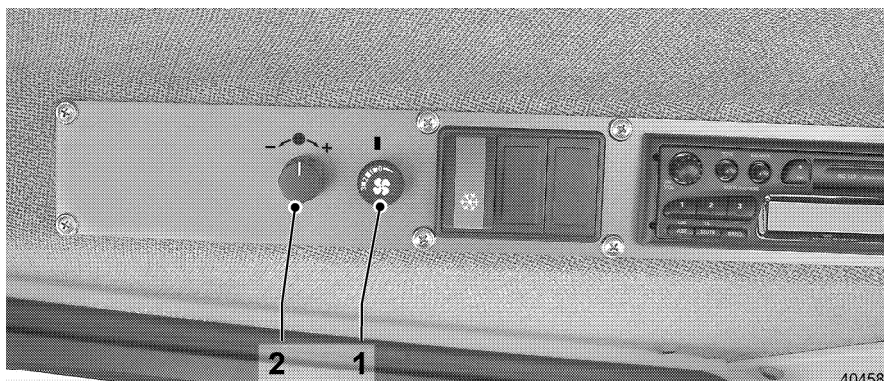


Shut off valves

During the summer months, when the heater is not required, or during maintenance and repairs, close the shut off valves on the engine block.

- Close the shut off valves.

By closing the shut off valves, the warm water supply to the heat exchanger is interrupted.



Heater operation

Check function

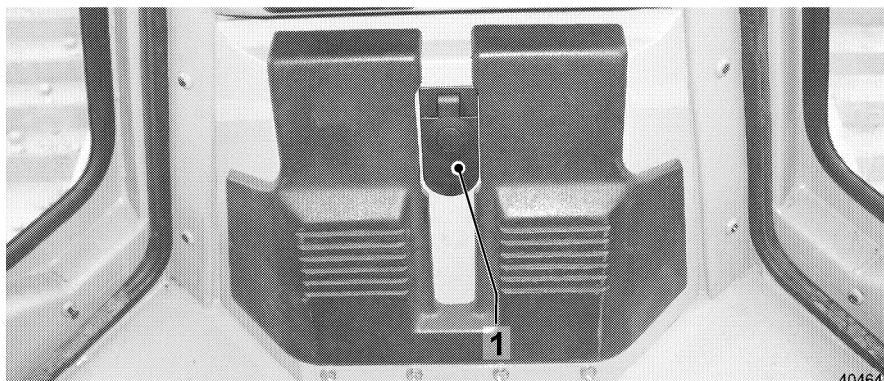
- Turn the heater on and check the function.
- Operate the heater to ensure that the coolant fluid contains sufficient antifreeze fluid. See section "Check the antifreeze concentration in coolant".

5.12.2 Heater - fresh air filter

Make sure that the machine is in maintenance position.

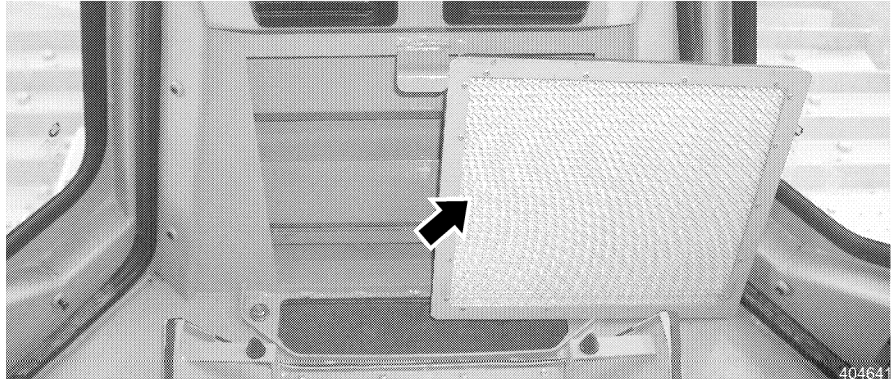
Clean / change the fresh air filter

Access to the cab fresh air filter is on the front in the operator's cab, below the documentation compartment.



Quick-release lock

- Open the quick - release lock 1.



Location of cab fresh air filter

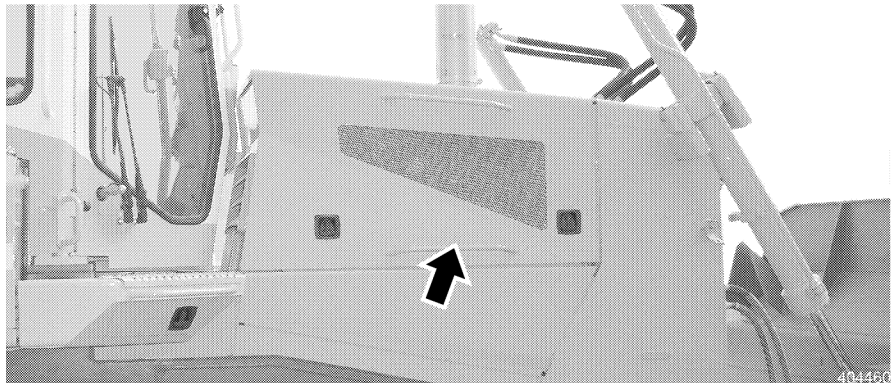
- Fold the cover back.
- Pull out the filter and remove.
- Clean the filter (blow it out) or change it, if necessary.
- Insert the cleaned or new filter.
- Fold the cover up and lock with the quick-release lock.

5.12.3 Air conditioning system

Proper function of the complete air conditioning system is only ensured if the maintenance tasks are carried out fully, properly and by especially trained personnel.

Only trained air conditioning mechanics may access and repair the coolant circuit.

The air conditioning system must be serviced once a year, before the begin of the warm season, by an authorized service center, otherwise the warranty is voided.



Open the engine compartment door

Compressor mounting

- Open the engine compartment door on the right hand side.



Open only if the engine is not running!

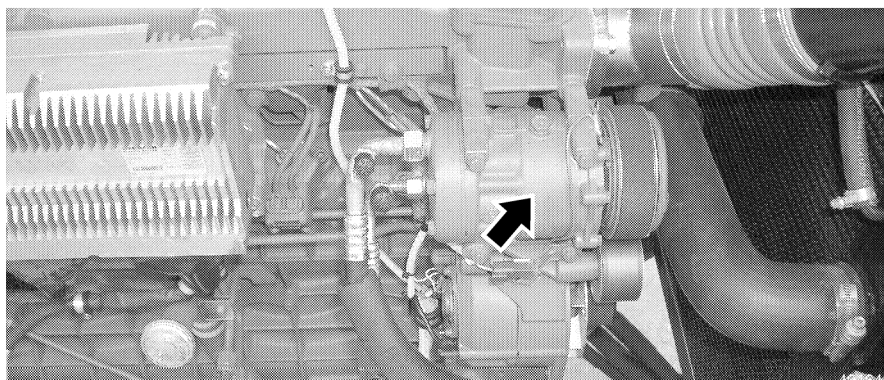
Danger



Danger of injury due to turning engine parts!

Turning and moving engine parts, such as fan blades or V-belt can cause injuries!

! Open the engine compartment doors only when the Diesel engine is at a standstill.

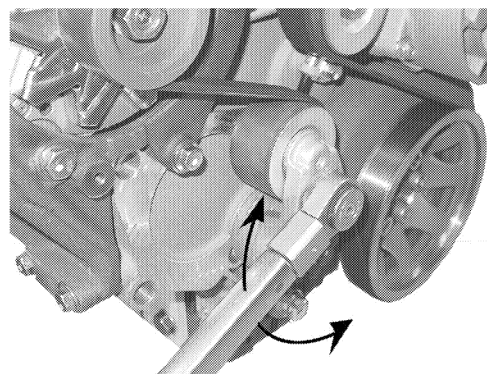
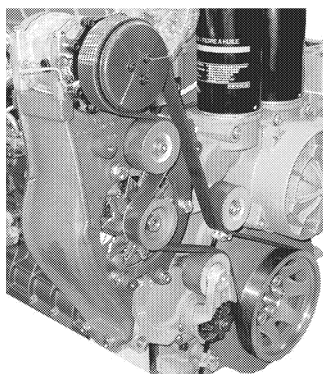


Compressor

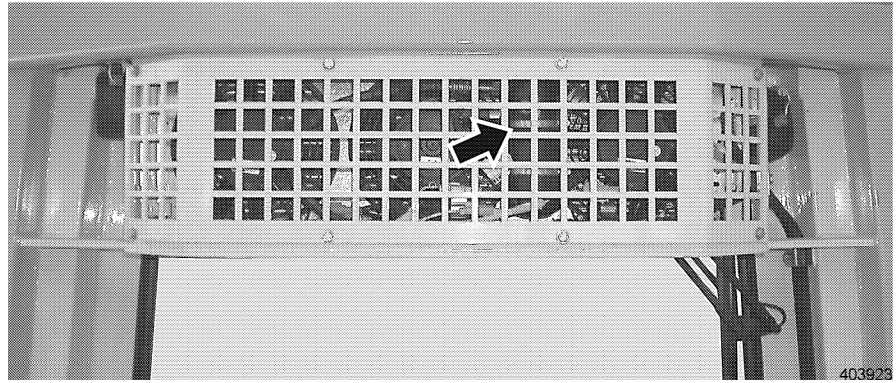
- Check the compressor carrier and supports for cracks and breaks, check the screws to ensure that they are all present and seated tightly.
- Check the compressor for leaks.
- Check the hose lines for leaks and chafing.

Check / change the V-belt

See "Diesel engine", "Check / change V-belt".



Air conditioning system – V-belt



Dryer

Refrigerant charge and moisture content

The dryer is installed on the rear on the operator's cab roof in the evaporator unit and can be seen through the protective grill.

Caution



! Danger of falling!
To check, use a suitable ladder!



Indicator pearls

- Check the color of the indicator pearls.

In the sight gauge are two indicator pearls.

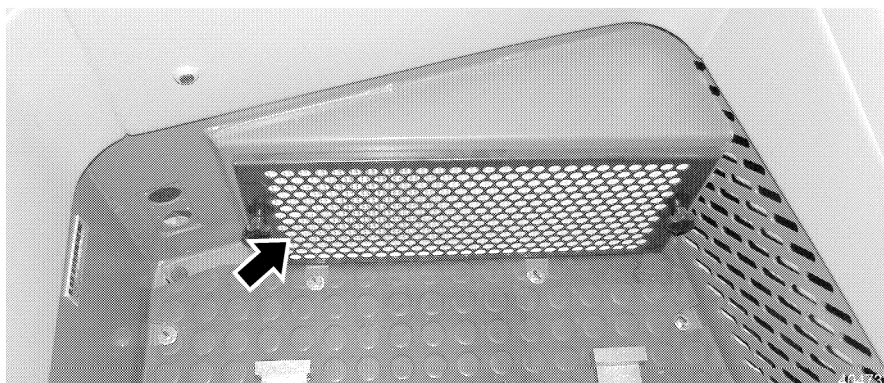
A white floater ball and a orange moisture indicator.

When the Diesel engine is running, the refrigerant must flow through the sight gauge of the fluid reservoir (dryer) without air bubbles and lift the white floater ball.

After the engine is turned off, the fluid level must fall back into the reservoir. This ensures that the system is not overfilled.

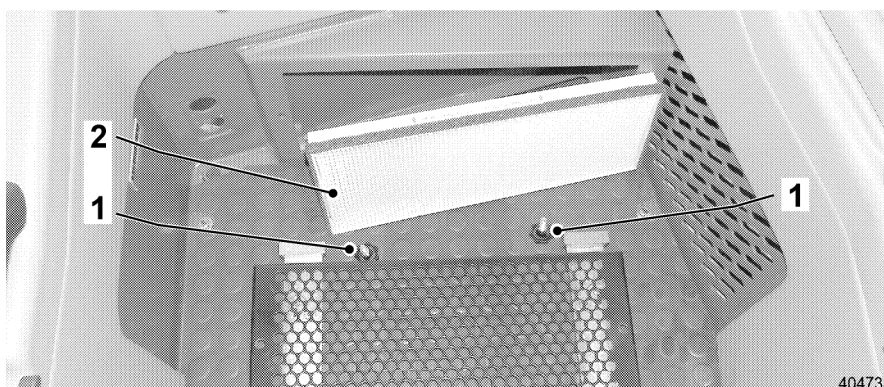
If the orange ball (moisture indicator) in the sight gauge changes its color to colorless, then the dryer must be replaced.

The moisture content in the system must be checked regularly, otherwise the air conditioning system can be destroyed due to acid formation.



Air filter

Air filter The air filter for the ventilation is located behind the operator's seat, on the floor of the operator's platform. The air in the cab is filtered through the air filter.



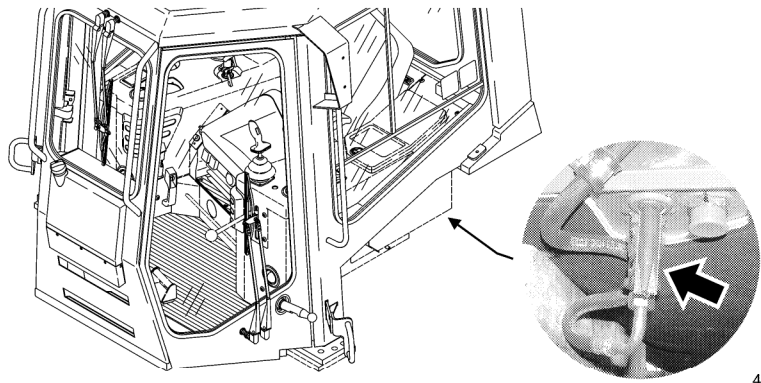
Change the air filter

Replace the air filter

- Move the operator's seat all the way forward.
- Remove the knurled screws 1 on the filter housing.
- Remove the protective grill and remove the air filter 2.
- Reinstall a new air filter and attach the protective grill with the knurled screws.

5.12.4 Check / clean the air conditioner's condensation drain valve

Condensation can form during the operation of the air conditioning system. This condensation can be drained via the drain valve on the underside of the operator's platform.



Air conditioning system – condensation drain valve

- Check the condensation drain valve and clean it, if necessary.

5.13 Travel gear

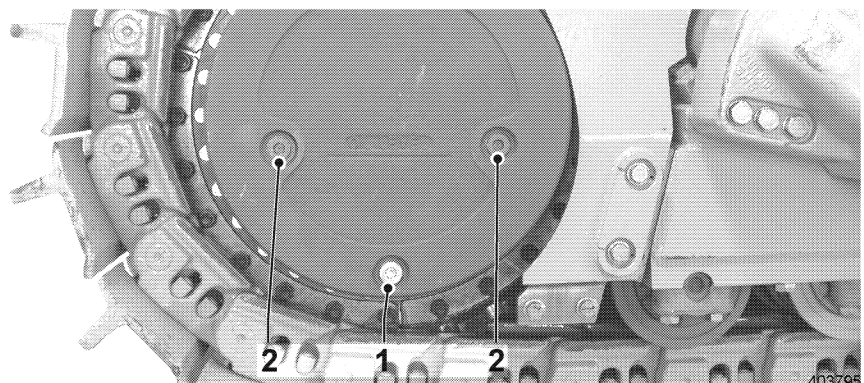
5.13.1 Check the condition of the travel gear

- Check the travel gear for leaks.
- Check the travel gear housing.
 - Remove anything which have wound around the gear to prevent damage to the seals.

5.13.2 Check the oil level

Make sure that:

- the machine is in maintenance position,
- the machine is parked in such a way that the oil drain plug 1 is at the lowest point on the gear,
- a torque wrench is available.



Travel gear

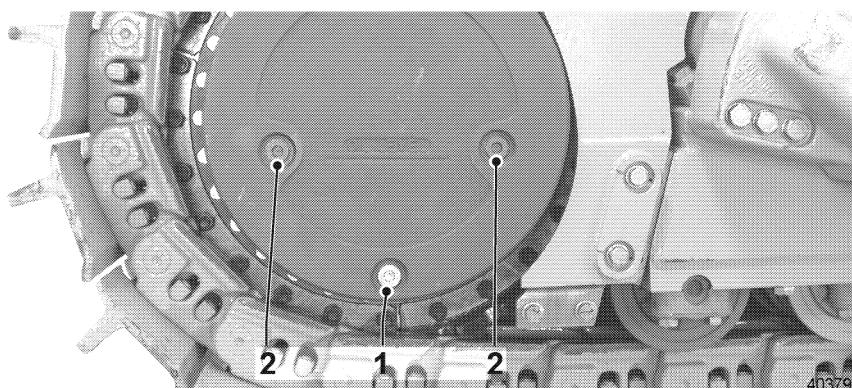
- Clean the area around the oil filler plug 2.
- Remove the oil filler plug 2 with a socket wrench. The oil level must be at the level of the oil filler port. If the oil level is too low:
 - Add oil via the oil filler port 2.
 - For oil specification, see "Lubricants and Service fluids ".

- Turn in the oil filler plug and torque to 120 Nm.

5.13.3 Change the gear oil

Make sure that:

- the machine is in maintenance position,
- the machine is parked in such a way that the oil drain plug is on the lowest gear point,
- a torque wrench is available,
- a suitable container is available.
- the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.



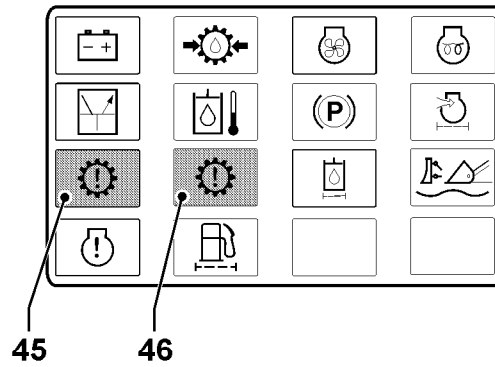
Travel gear

- Clean the area around the oil filler and oil drain plug.
- Place a container under the oil drain plug.
- Back out the oil filler plug 2.
- Back out the oil drain plug 1.
- Let the oil flow into the container.
- Check the oil for mechanical contamination.
- Clean the oil drain plug 1 and reinstall it.
 - Note the tightening torque of 120 Nm!
- Add oil to the gear via the oil filler plug 2 until the lower edge of the filler port.
- Clean the oil filler plug 2 and reinstall it.
 - Note the tightening torque of 120 Nm.

5.13.4 Travel gear - slip ring area

Slip ring area - oil level

If the oil level is too low, the indicator lights "Travel gear – slip ring area" 45 or 46 light up in the instrument panel.



404413

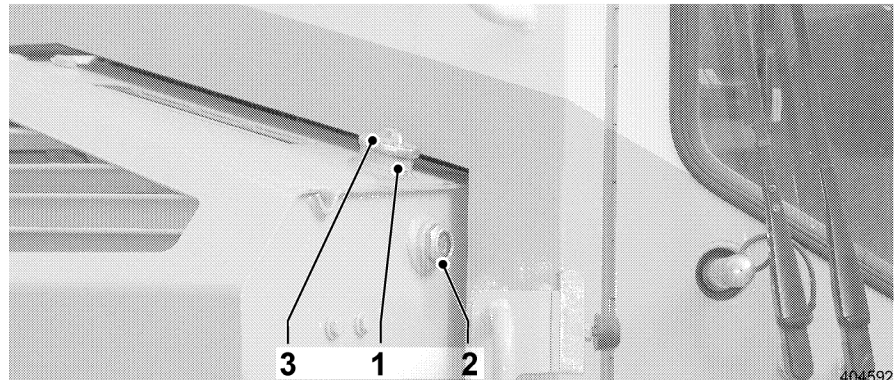
Indicator lights - travel gear – slip ring area

Proceed as follows if one of the indicator lights lights up:

- Turn the machine off.
- Check the affected travel gear externally for leaks.
- Contact Liebherr Service.
- For continued operation in the meantime, bring the oil level to normal level.

Slip ring area – check oil level

- Park the machine on level ground.



404592

Slip ring area - oil reservoir

The oil reservoir 1 is located on the right hand side in the oil cooler compartment.

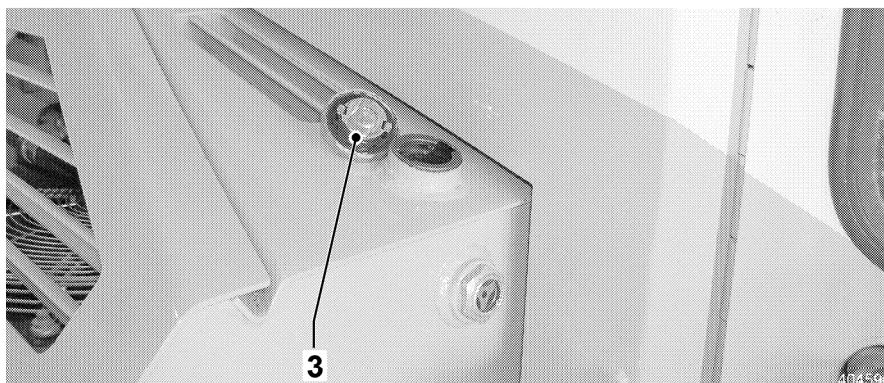
- Check the oil level on the sight gauge 2. The oil must be visible in the center of the sight gauge.
 - If necessary, add oil according to the lubricants and service fluid specification.

Change the oil in the slip ring area

Make sure that:

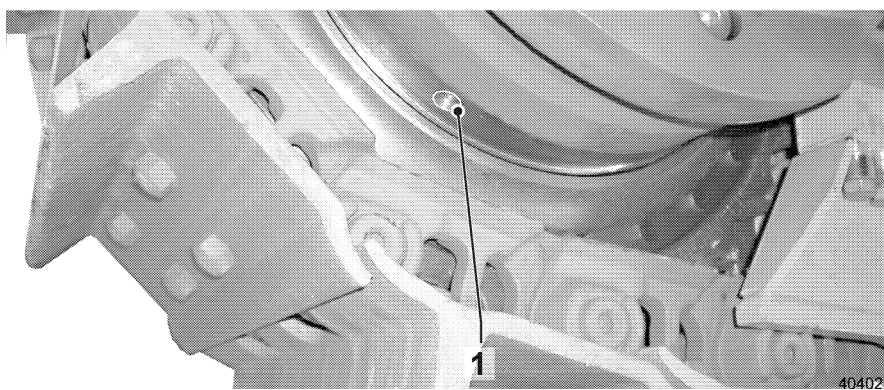
- the machine is in maintenance position,
- two suitable containers are available,
- the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.

The oil reservoir is located on the right hand side in the oil cooler compartment.



Slip ring area - oil reservoir

- Remove cover 3 on the oil reservoir.
- Place the containers under the drain plugs on the travel gears.



Drain plug – slip ring area

- Remove drain plug 1 on the bottom of the travel gear.
 - Let the oil drain into the container and dispose of it properly.
- Repeat the draining procedure on the second travel gear.

Flush the slip ring area

Before refilling, always flush the slip ring area adequately. Any possible debris will be removed from the slip ring area by the flushing procedure.



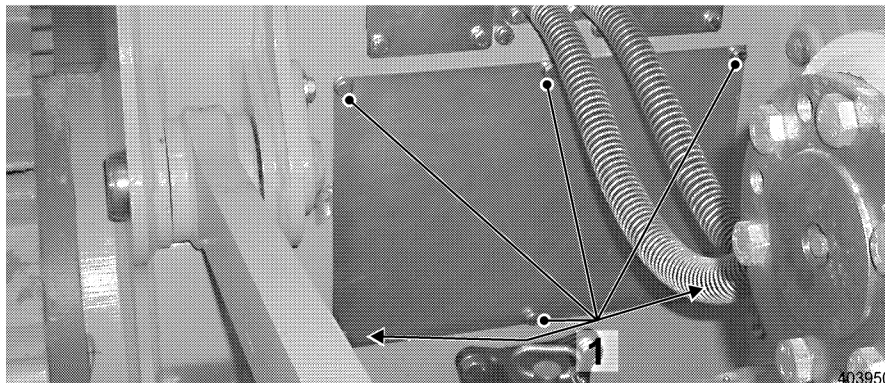
Drain plug – slip ring area

- Check if both containers are positioned under the drain plugs – slip ring area and if the drain plugs are open.
- Access to the flushing and fill connection is on the rear of the machine is provided after removing the cover plate.

Danger

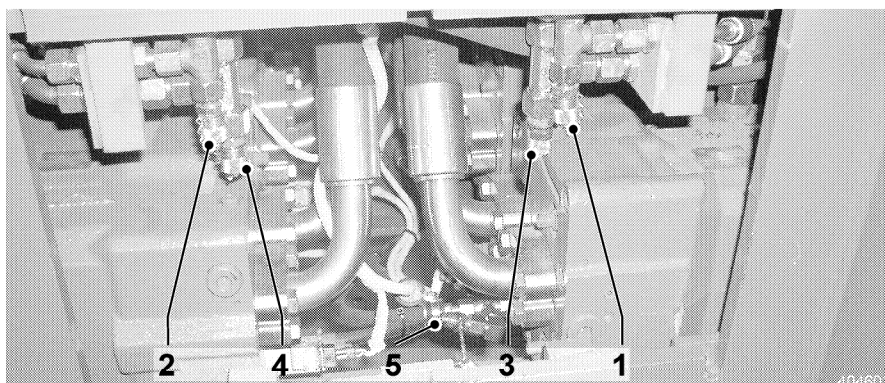


Danger of accidents due to raised attachment.
 ! Never work under the raised working attachment.
 – First support the attachment properly or place it on the ground.



Cover plate

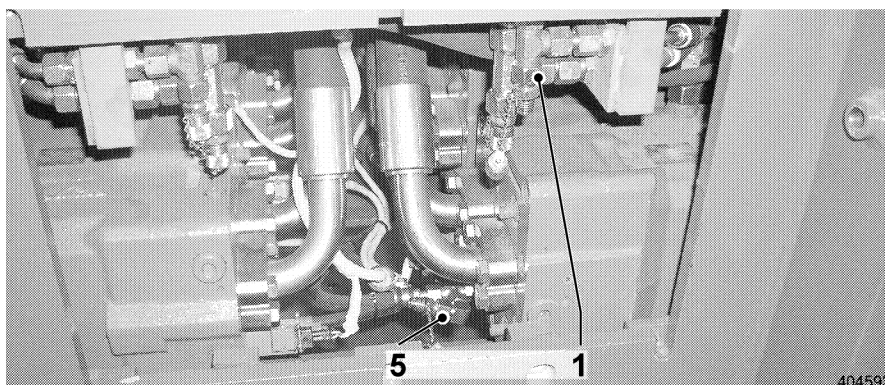
- Remove the hex head screws 1 and remove the cover plate.



Flushing / fill connections

- 1 Flushing connection, right
- 2 Flushing connection, left
- 3 Fill connection, right

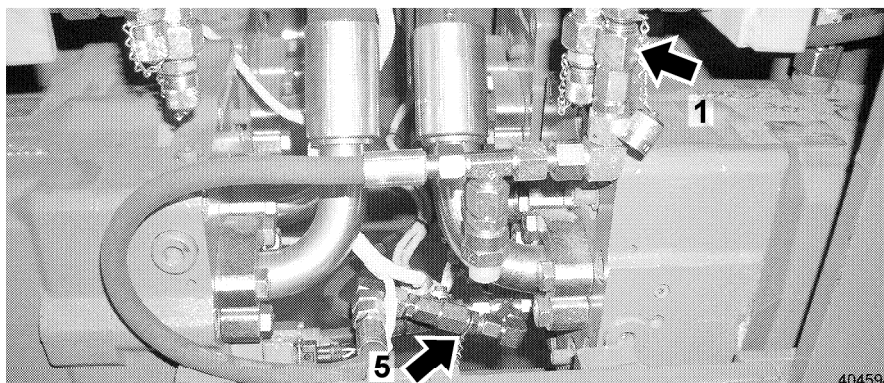
- 4 Fill connection, left
- 5 Replenishing pressure connection – travel motor



Remove caps

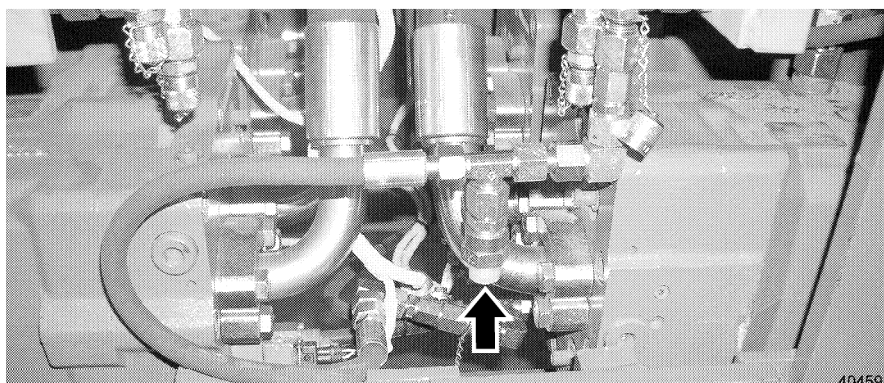
Slip ring area, right

- Remove the caps on connections 1 and 5.



Connect the flushing line

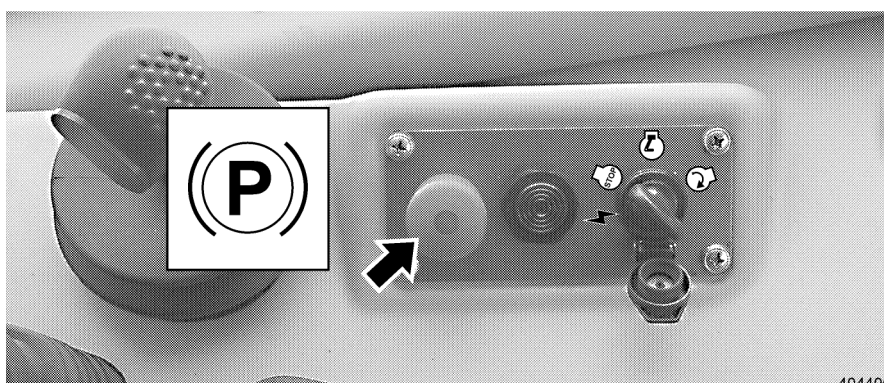
- Connect the flushing line (part of the tool box).



Pressure relief valve – flushing line

The flushing line is equipped with a pressure relief valve. If the discharge of the slip ring area is plugged up, the pressure relief valve actuates from an excess pressure of 1 bar.

- In this case, clean the drain bore and continue the flushing procedure.



Emergency off button

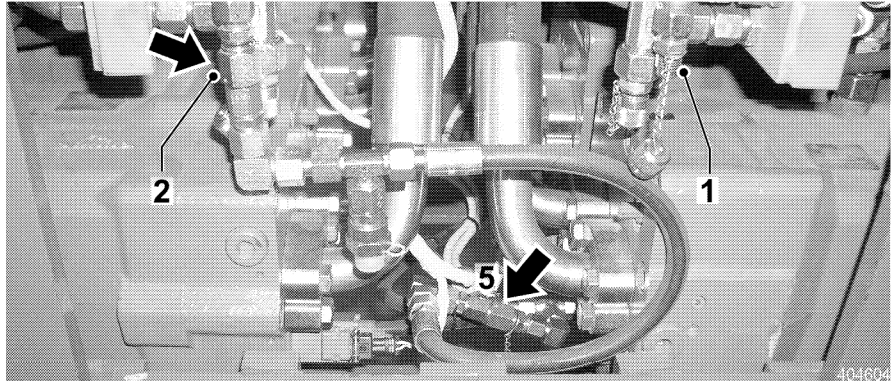
- Press the emergency off button in the instrument panel.

Caution

Danger of accident!

! During the oil change, the emergency off button must be pressed and the safety lever must remain in uppermost position!

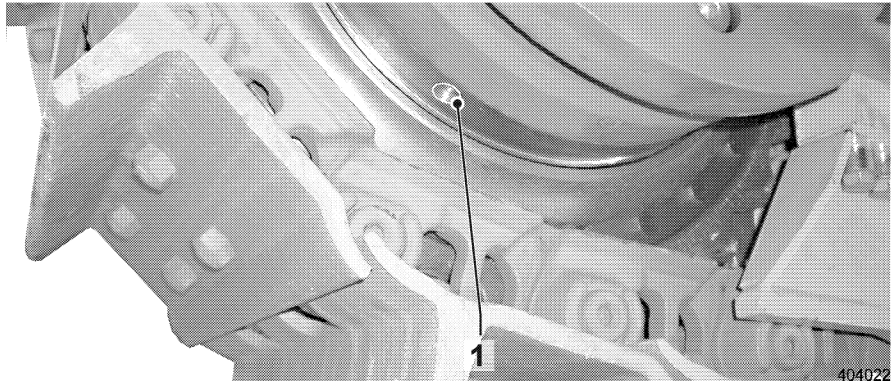
- Start the Diesel engine in low idle. See chapter "Control, operation".
- Let the Diesel engine run until only clean oil emerges from the drain plugs.
- Turn the Diesel engine off.



Connect the flushing line

Slip ring area, left

- Remove the flushing line from connection 1, right, and connect on connection 2, left.
- Carry out the flushing procedure on the slip ring area, left, as described for slip ring area, right.



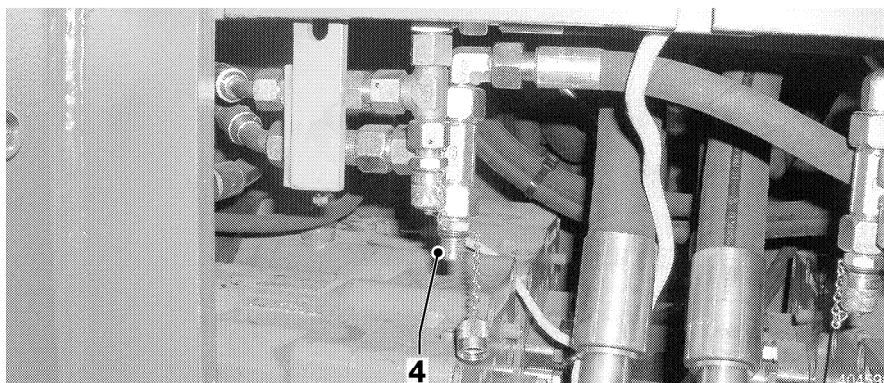
Drain plugs – slip ring area

- After the flushing procedure, install the drain plugs 1, left and right.
- Tightening torque, drain plug 40 Nm.

Add oil to the slip ring area

Drain the oil first as described previously and flush the slip ring area.

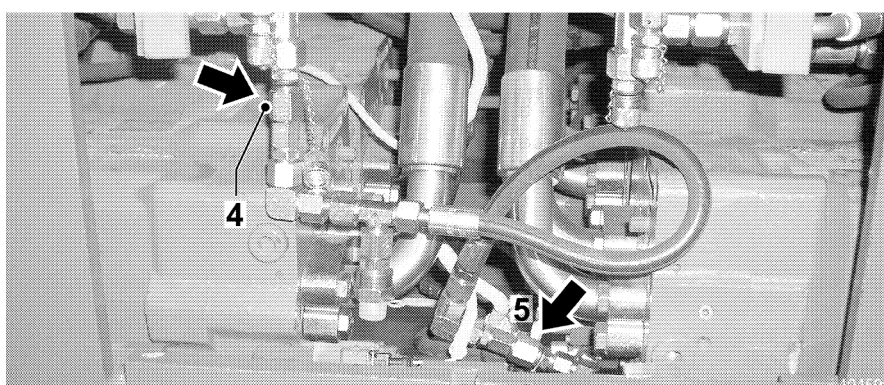
- Reinstall the drain plugs on the left and right hand side and tighten (40 Nm).



Remove the cap

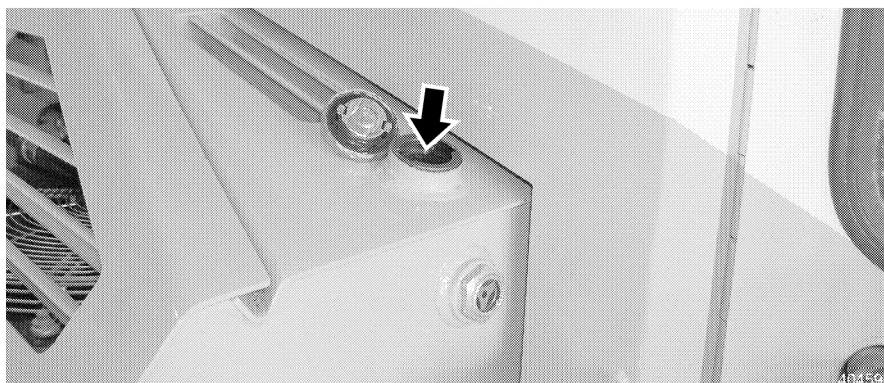
Slip ring area, left

- Remove the cap on fill connection 4.



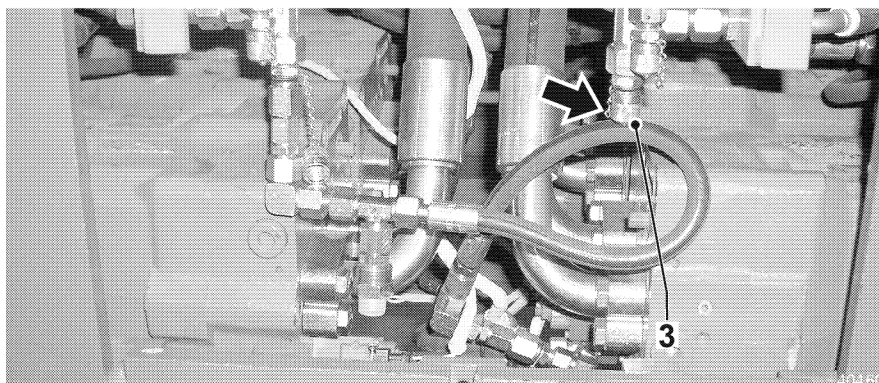
Flushing line, fill connection, left

- Connect the flushing line on fill connection 4, left.
- Start the Diesel engine in low idle. See chapter "Control, operation".
 - The slip ring area is filled with oil via the flushing line.



Slip ring area - oil reservoir

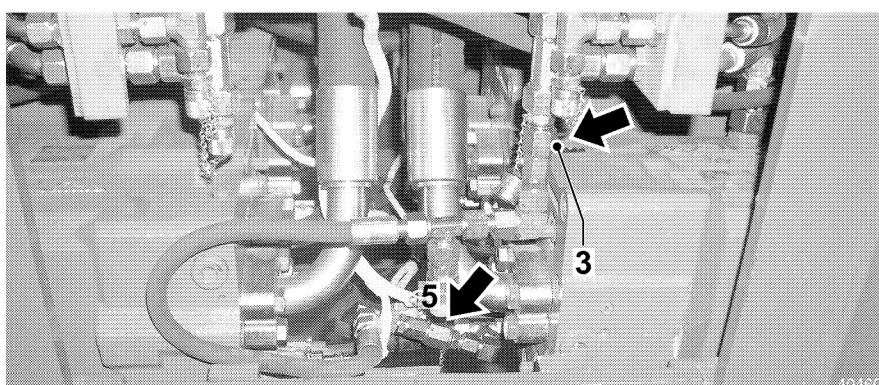
- Via the filler port 1, monitor the interior of the reservoir and turn the Diesel engine off as soon as the oil level increases visibly.
- Then wait for a short time until the oil level drops noticeably.



Remove the cap

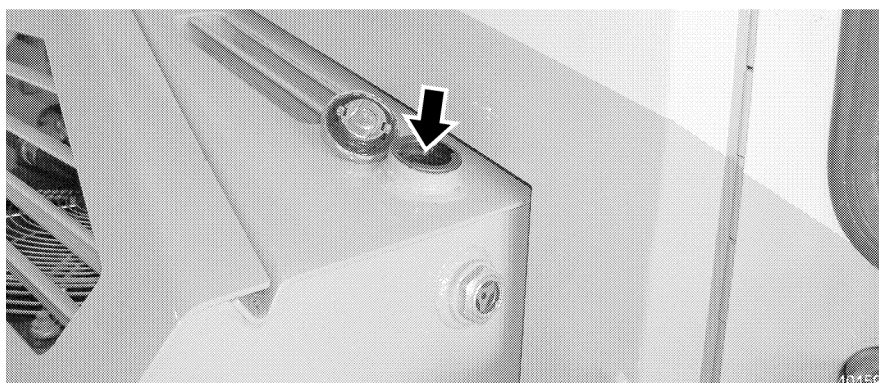
Slip ring area, right

- Remove the cap on fill connection 3, right.



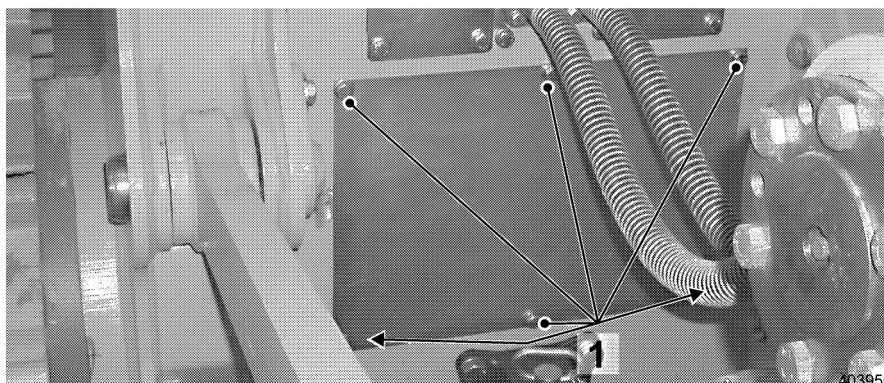
Flushing line, fill connection, right

- Remove the flushing line on fill connection 4 and connect on fill connection 3.



Slip ring area - oil reservoir

- Start the Diesel engine again at low idle RPM and let it run until the reservoir is filled to the lower edge of the filler port = overfill.
- Turn the Diesel engine off.
- Remove the flushing line and close the connections off with caps.



Cover plate

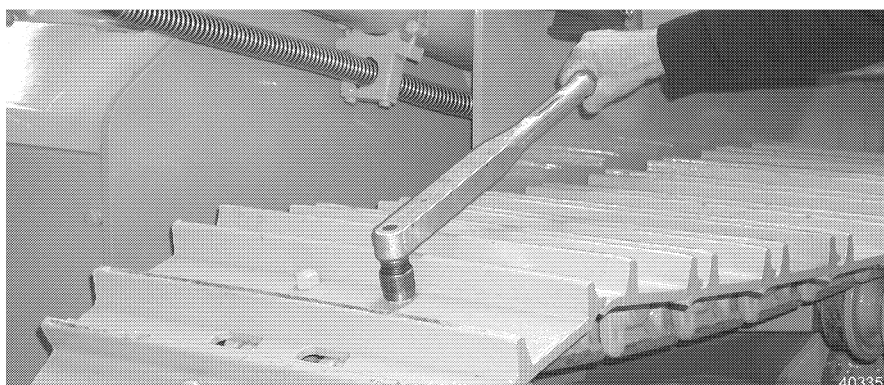
- Install the cover plate with hex head screws 1.
- Check the oil level in the hydraulic tank and add oil, if necessary.
- Operate the machine for a short time and recheck the oil level (add the oil, if necessary).

5.14 Track components

5.14.1 Check screws and nuts on track components for tight seating

Make sure that:

- the machine is in maintenance position,
- a torque wrench is available.
- Visually inspect the mountings bolts on the track pads and sprocket segments to ensure they are tight.



Tightening torque

- Check the tightening torques.
- Tightening torque for track pad or sprocket segment bolts (recheck):
- 5/8" UNF: 360 Nm
 - 3/4" UNF: 630 Nm
 - 7/8" UNF: 1130 Nm
- Loose screws and surrounding screws must be loosened and retightened.

The tightening torque in this case is:

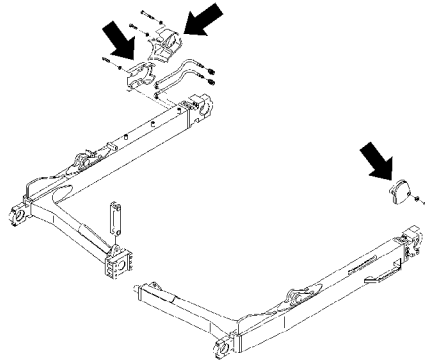
- 5/8" UNF: 180 Nm + 120°
- 3/4" UNF: 270 Nm + 120°

- 7/8" UNF: 400 Nm + 120°

5.14.2 Check the screws on the front axle bearing to ensure they are tight.

Make sure that:

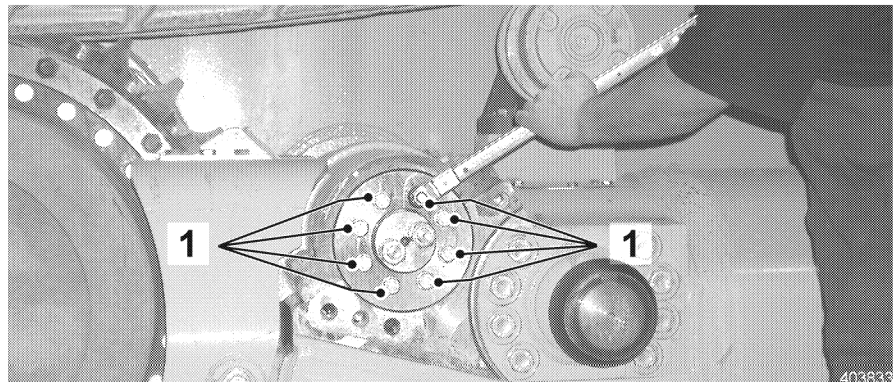
- the machine is in maintenance position,
- a torque wrench is available.



403832

Covers track - roller frame

- Remove the covers on the left and right hand side of the track roller frame.



Check the tightening torque

- Check the screws 1 with a torque wrench to ensure they are tight.
 - For tightening torque, see torque chart.
- Reinstall covers to the track roller frame.

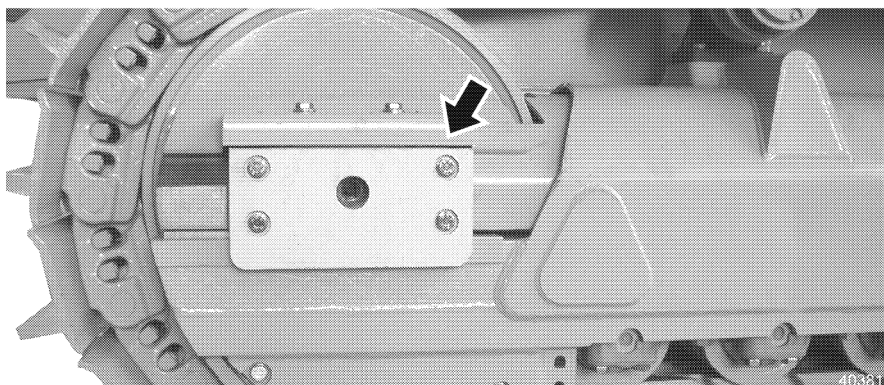
5.14.3 Check the seal on the carrier rollers, track rollers and idlers

- Check visually.

5.14.4 Idler guide

Make sure that:

- the machine is in maintenance position.

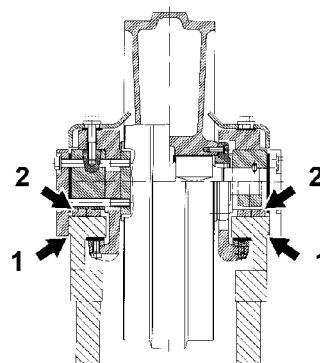


Idler guide

Check / adjust the idler guide

The normal play between the track roller frame and the side guide is 1 - 2 mm, the height clearance of the rubber springs is approx. 3 mm. The play increases due to wear of the wear strips, guide rails and guide plates.

When the maximum permissible value is reached, the play must be readjusted or the worn guide parts must be replaced.



Side play - vertical play

403817

New / repair dimension

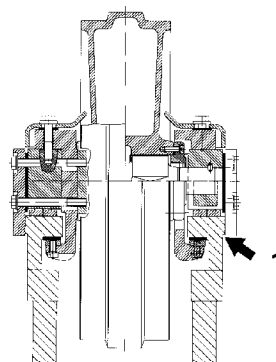
- Side play 1 = min. 1 - 2 mm
- Vertical play 2 = min. 3 mm

Maximum permissible play

- Side play 1 = 5 mm
- Vertical play 2 = 6 mm

Check / adjust the side play

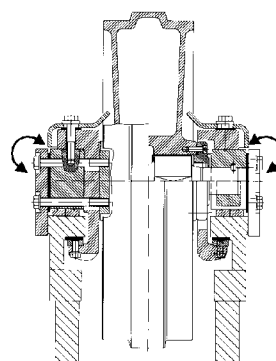
- Move the inner guide plate until it touches the track roller frame.
- This can be done by "counterrotation", see "Control", "Operation".



403819

Check the side play

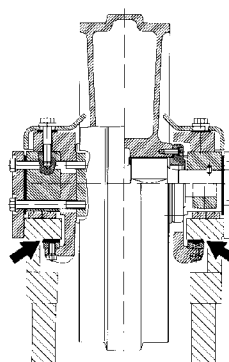
- Measure the existing play between the track roller frame and the outer guide plate.



403820

Correct the side play

- If the maximum permissible play is being exceeded, remove inside and / or outer shims.
 - There may never be a difference of more than 1 shim between the number of inside shims and the number of outside shims.
 - If there are no more shims available, replace the guide plates.

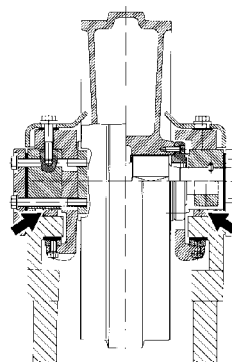


403818

Lift the idler

Check / adjust the vertical play

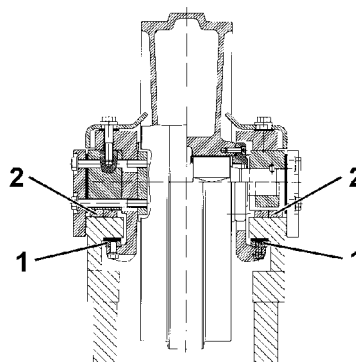
- Drive onto a wooden block to lift the idler until the claws touch the guide rails.



403821

Check the vertical play

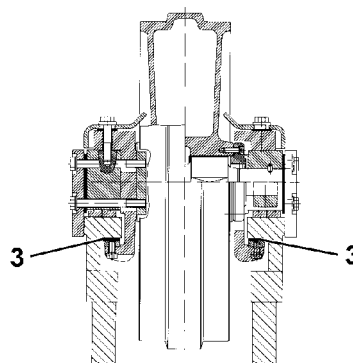
- Measure the play between the wear strips and the bearing bock.



403822

Correct the vertical play

- If the permissible play is being exceeded, replace the worn wear strips 1 and 2 as a pair.



403823

Guide rails

- When replacing the wear strips, check the welded on guide rails 3 and replace them also, if they are worn.

5.14.5 Chain tension

Danger

The chain tensioner may only be replaced or repaired by authorized expert personnel.

! The chain tension spring is pretensioned, even if the chain tension is relieved!

Due to wear of the travel gear, it is necessary to check the chain tension regularly and to retension the chain, if necessary.

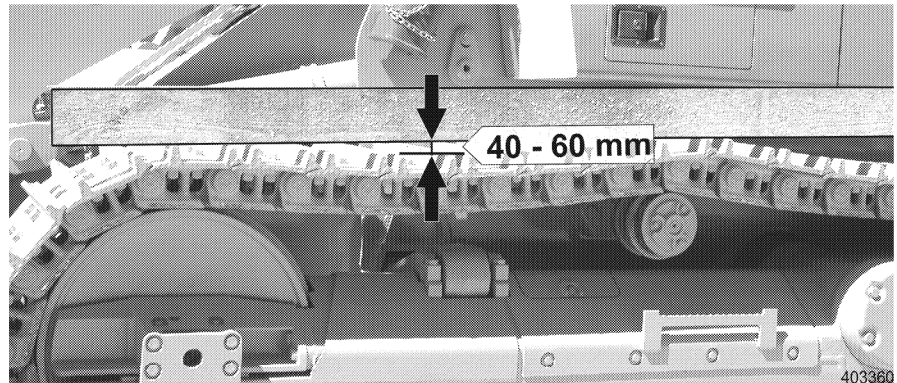
Since the material deposits on rocky terrain are less than on muddy ground, the adjustment of the chain must be made to reflect the job application.

Do not remove any material, which has built up during working hours before checking the chain tension.

! The conditions must be identical as the working conditions!

Make sure that:

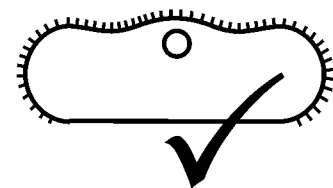
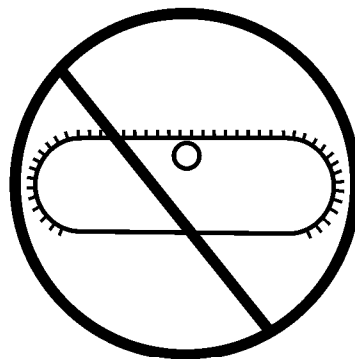
- the machine is in maintenance position,
- a measuring stick is available.



Check the chain tension

Check the chain tension

- Relieve the chains by moving the machine back and forth.
- Place the measuring stick in the area between the idler and the carrier roller.
- Measure the distance between the measuring stick - lower edge and chain bar.
- The chain is tensioned correctly for the job application if the slack between the carrier roller and the idler or sprocket is between 40 - 60 mm.



Chain tension

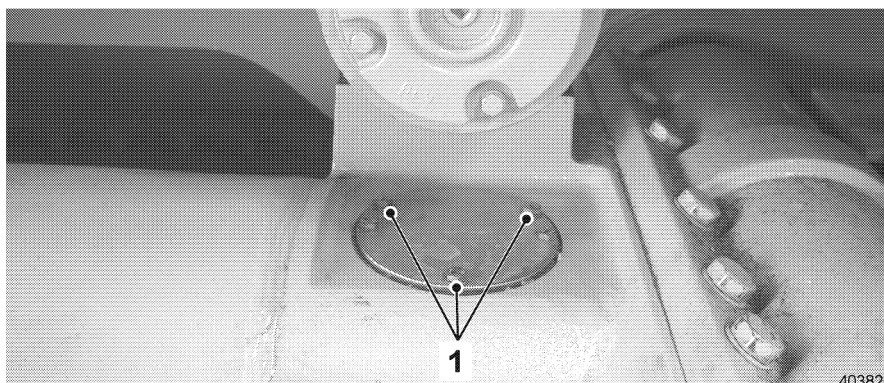
404344

- ! An incorrectly tensioned chain results in high chain wear.
- The chain tension must always be set to the given dimension for the job application.
- Correct the chain tension, as necessary.

Tension the chain

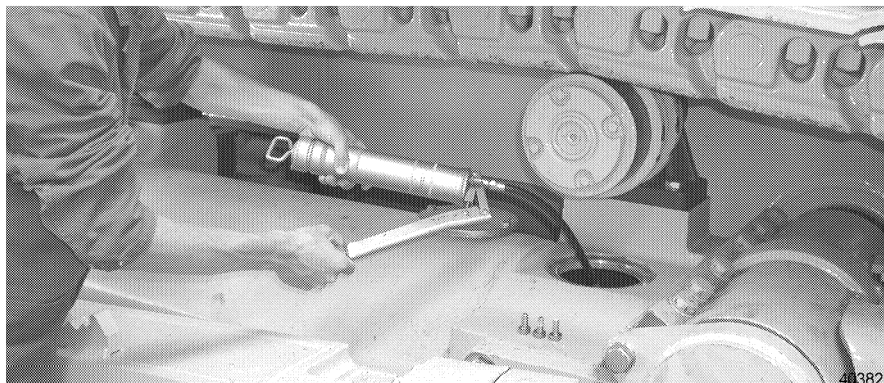
Make sure that:

- the machine is in maintenance position,
- a manual grease gun with adapter for the fitting of the chain tension cylinder is available.



Cover – track roller frame

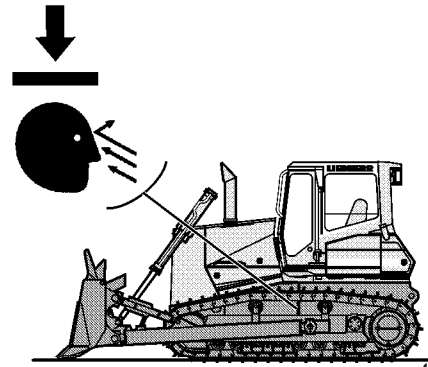
- Clean the surfaces around the cover on the track roller frame.
- Remove the hex head screw 1 on the cover and remove it.
- If the cover is stuck or rusted, then it can be pushed off by removing the two plugs and installing in longer screws.



Manual grease gun with adapter

- Connect the manual grease gun with adapter to the grease fitting on the tension cylinder.
- Pump in grease until the proper dimension (40 - 60 mm) is obtained.
- Attach the cover with hex head screws.

Relieve the chain tension



404013

Danger of injury

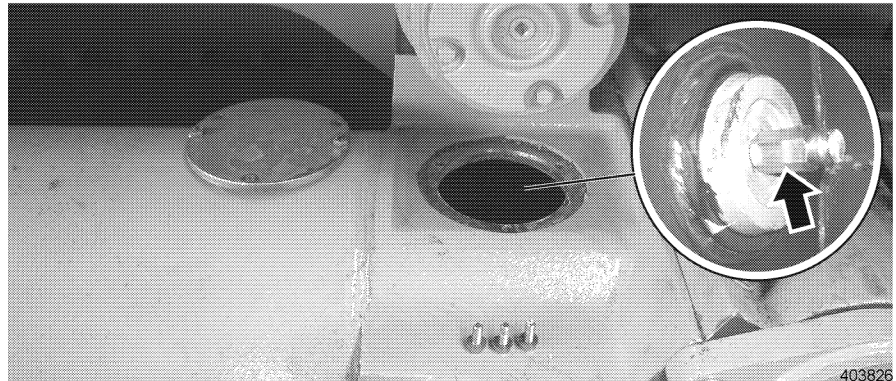
Danger



Danger of injury!

! The chain will sag and grease can squirt out.

- When adjusting the chain tension, keep your head clear of the track roller frame.



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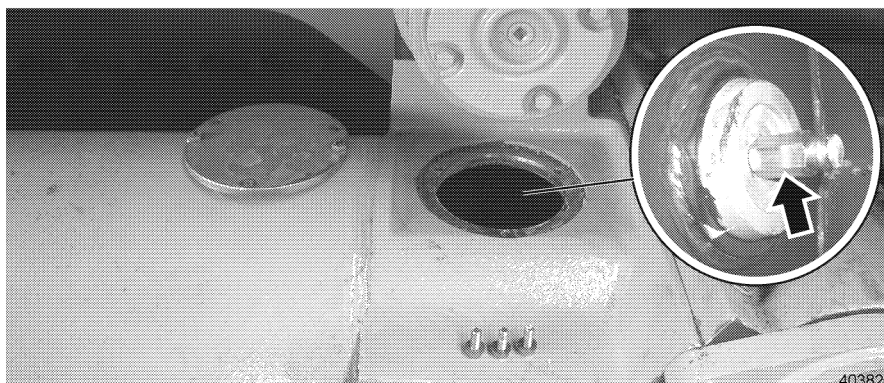
Grease fitting

- Carefully back out the grease fitting by a few turns until the grease emerges from the ring groove of the fitting.
- Tighten the grease fitting as soon as the desired chain tension is reached.
- After the adjustment procedure, move the machine back and forth and recheck the chain tension.

5.14.6 Changing the chain

Make sure that:

- a torque wrench is available,
- the necessary tools to change the chain are available.



Grease fitting

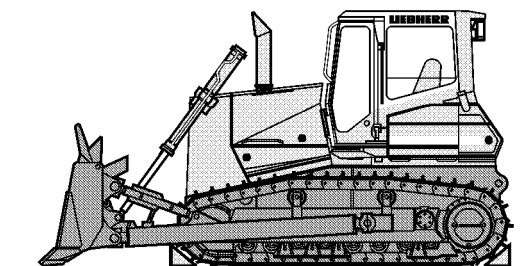
Removal of sealed chain

- Release chain tension, see "Chain tension".
 - Back out the grease fitting by a few turns.
- Slowly move the machine with the idler against a wooden block to push the idler completely closed.
- Park the machine on level ground in such a way that the master link pin is at the sprocket wheel about 1/3 between the horizontal and vertical center.
 - The master link pin can be recognized by a chamfered edge or countersunk bore.

Caution

- ! Knocking the master pin in or out with a sledge hammer can be very dangerous due to material chipping off the pin which could cause serious injuries.
 - Always wear safety glasses and protective clothing.
- If possible, use a hydraulic press to install and remove the pin.

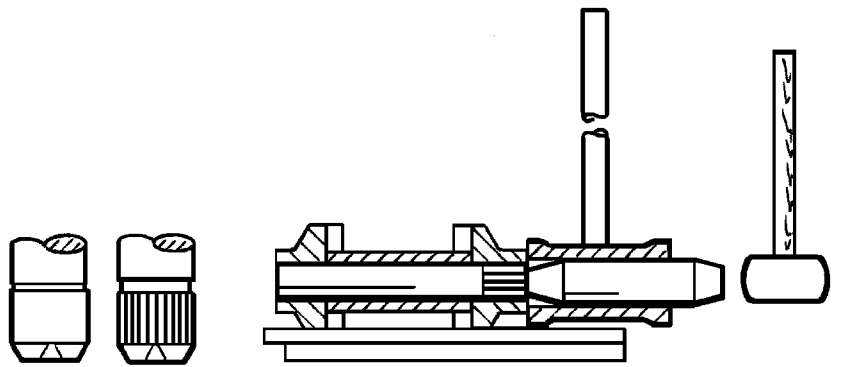
Knurled master pins must be pressed in from the outside to the inside and pressed out from the inside to the outside. Knurled edge on the outside!



404014

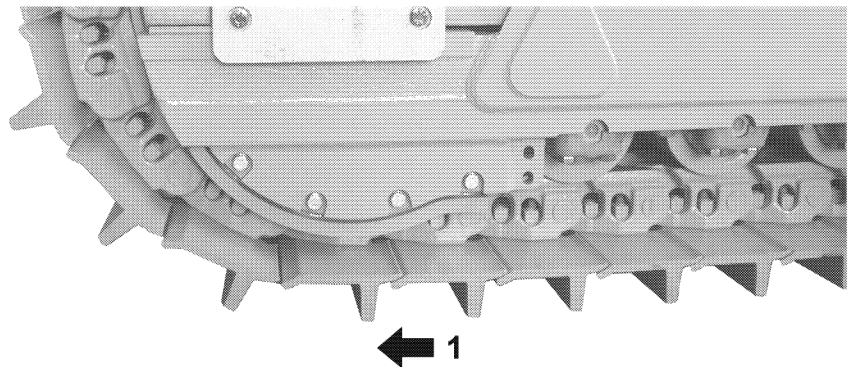
Place a wooden block

- Secure the chain in front of the idler and behind the sprocket with a wooden block to prevent it from rolling off.



Press out the chain link pin

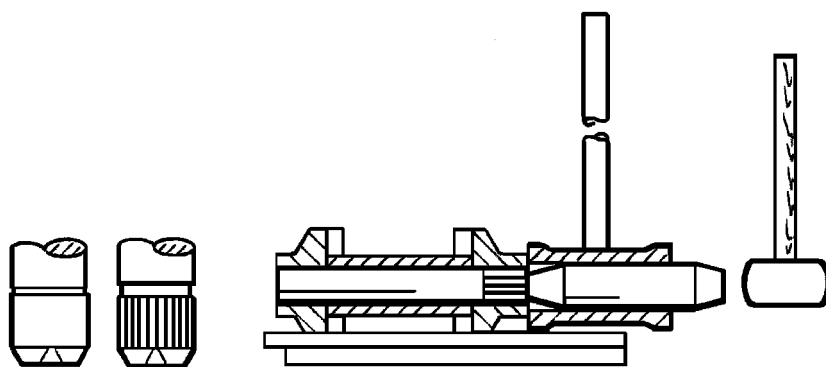
- Press out the master pin with a pin press or knock it out with a suitable tool.
- When knocking out the master pins, support the chain link on the other side.
- Raise the attachment.
- Carefully drive the machine forward until the complete chain rests on the ground.
- Drive the machine backward on the old chain.



Travel direction forward

Install a sealed chain

- Place the new chain in proper direction on the ground and connect it to the old track chain with the master link pin.
- Make sure the new chain and track pads are installed in the correct direction 1 = travel direction forward.
- Align the chain to the track frame and move the machine carefully onto the new chain until you get to the end of the new chain.
- Release the new chain from the old chain and attach the end of the new chain with a wire to the sprocket wheel.
- Carefully drive the machine forward until the chain is on the sprocket on top.
- Release the wire from the chain and sprocket wheel and continue to drive forward to bring the chain over the carrier roller and idler. Stop the machine when the idler wheel approaches the last 2 track pads.

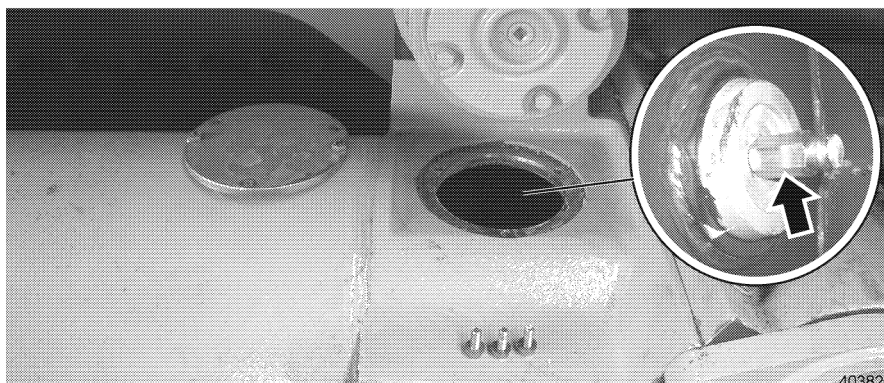


403339

Press in the master pin

- Raise the last track pads, reinsert the spacer rings and press in or knock in the master pin from the outside to the inside.
- Tension the chain. See "Adjust chain tension".
- Park the machine on firm and level ground.

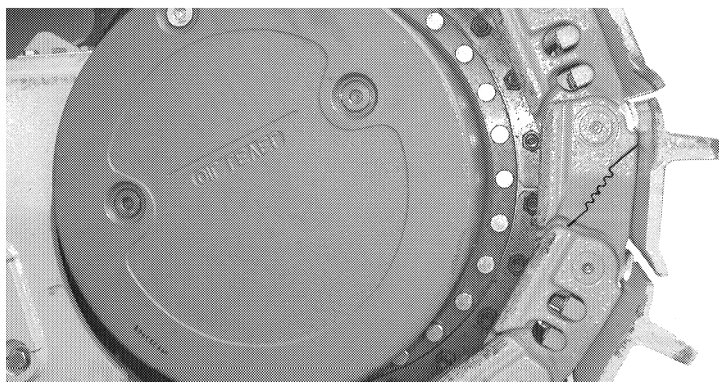
Remove a chain with split master link



403826

Grease fitting

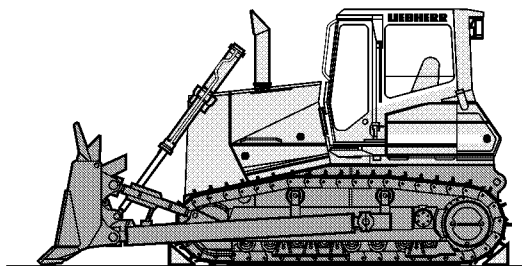
- Release the chain tension. See "Adjust chain tension".
 - Back out the grease fitting by a few threads.
- Move the machine with the idler against a wooden block, until the idler is pushed back all the way.



403828

Master link

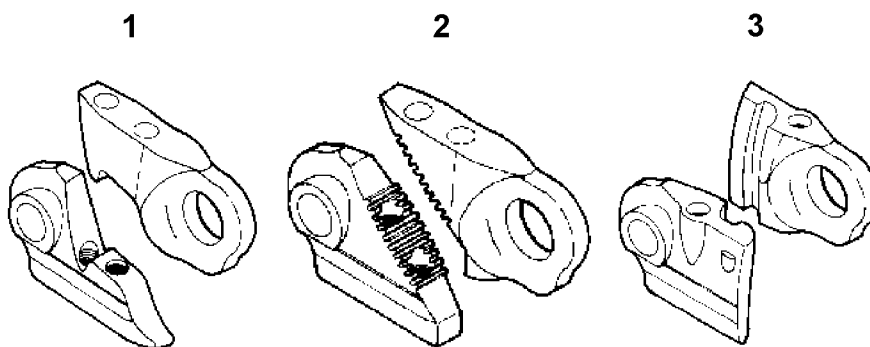
- Move and park the machine until the master link and the center of the sprocket are at the same level.



404014

Place the wooden blocks

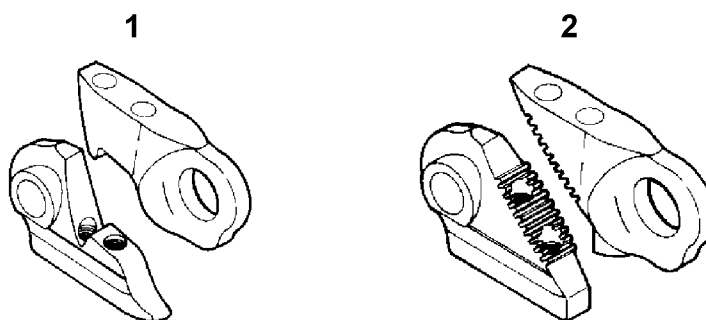
- Secure the chain in front of the idler and behind the sprocket with a wooden block to prevent it from rolling off.
- Spray the teeth and mating area of the master link with penetrating oil to help the oil penetrate by hitting the master link lightly with a hammer.



403345

Master link manufacturers

Various chains with split master links are used in Liebherr machines.

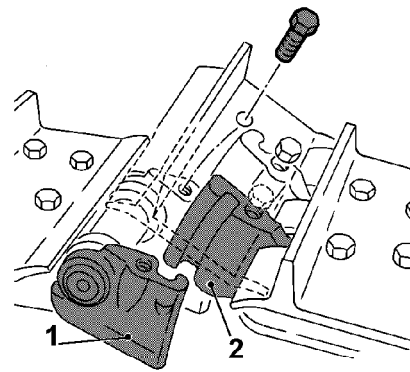


403346

Version 1 + 2

Version 1 + 2

- Unscrew the track pad bolts, remove the track pad and release and split the master link by hitting the master link lightly with a hammer.
 - If necessary, apply more penetrating oil.



403347

Version 3

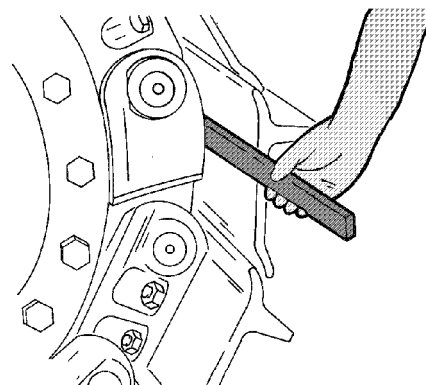
Version 3

Marks:

The pin section 1 is pressed to the pin, marked with the manufacturer's name and the track pad screws are spaced farther apart.

The bushing section 2 is pressed to the bushing, appears shorter from the outside and the track pad screws are spaced closer together.

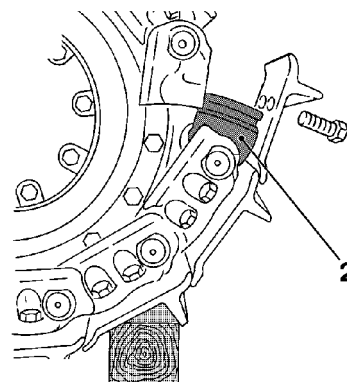
- Remove only the track pad screws from the pin section.



403348

Drive out the bushing section

- Use a steel wedge between the track pad and the pin section to drive out the bushing section.
- Support the drive action of the wedge by hitting the track pads lightly with a hammer.



403349

Bushing section

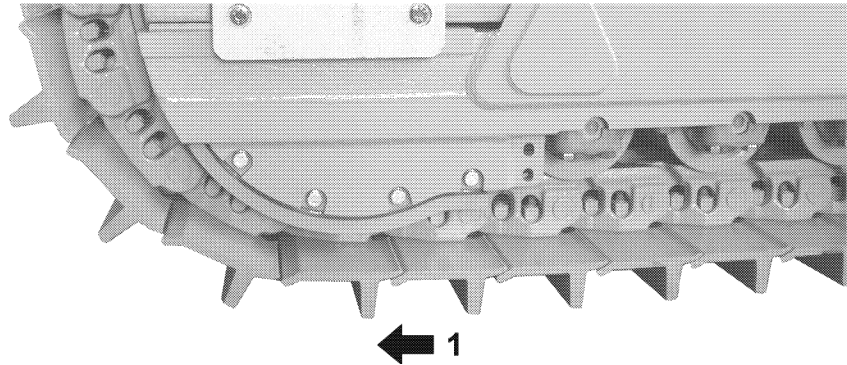
- Only the bushing section 2 can be turned to the outside.

Install a chain with split master link

- Place down the chain by carefully driving forward.

Track chains with master links can be easily installed on the sprocket or idlers.

- Drive the machine back on the placed down chain.
- Make sure that the new chain is free of paint, protective grease or other material. Coat the mating surfaces lightly with grease.
- Clean the bore holes, apply Never Seize (special lubricant) or grease to the track pad bolts.
- Insert the bolts by hand.



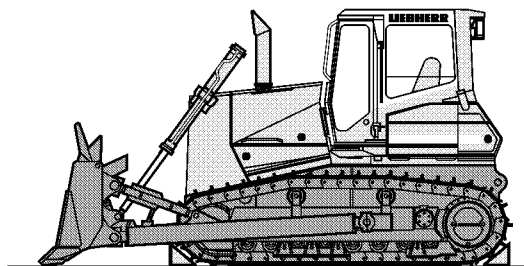
403827

Travel direction forward

Make certain that the chain is installed correctly with the track pads on the correct side (1 = travel direction forward).

On version 3, the chain bracket with the pin section must point to the sprocket, when the new chain is behind the sprocket.

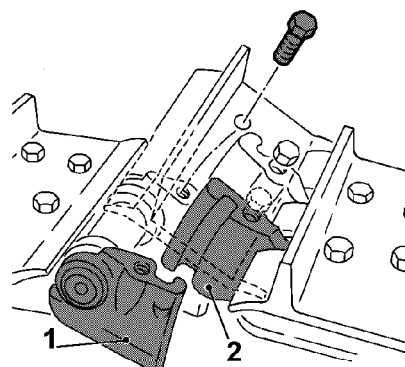
- Place the new chain on the ground and connect it with the old chain with a wire.
- Align the chain to the track roller frame and carefully move the machine forward to the end of the new chain.
- Loosen the new chain from the old one and attach the new chain with the wire to the sprocket.
- Carefully move the machine forward until the chain is on top of the sprocket.
- Release the wire from the chain and the sprocket and continue to drive forward to bring the chain over the carrier rollers and the idler. Stop the machine when the master link is at the same height as the center of the idler.



404014

Place a wooden block

- Secure the chain in front of the idler and behind the sprocket with a wooden block.
- Connect the chain links.



403347

Version 3

For chain version 3, the track pads must be installed with the bushing section before the master link is connected.

- Push the pin end toward the center of the idler, insert the bushing end and slide both parts together until the track pad makes contact. Only the bushing section can be inserted.

– DO NOT hit the mating surfaces with a hammer.

Place the track pad, insert the bolts and torque correctly.

5/8" UNF: 180 Nm + 120°

3/4" UNF: 320 Nm + 120°

7/8" UNF: 350 Nm + 120°

- Tension the chain. See "Chain tension".

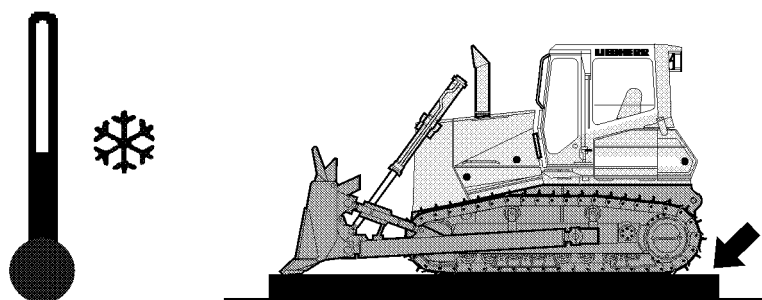
5.14.7 Clean the tracks

Make sure that:

- the machine is in maintenance position.

DO NOT operate the machine, if rocks, wood or metal pieces, wires or cables are stuck in the tracks.

Dried or frozen mud as well as rocks or other foreign matter in the track sections can cause severe damage, if the machine is put in operation or if the operator tries to free the machine by force.



404015

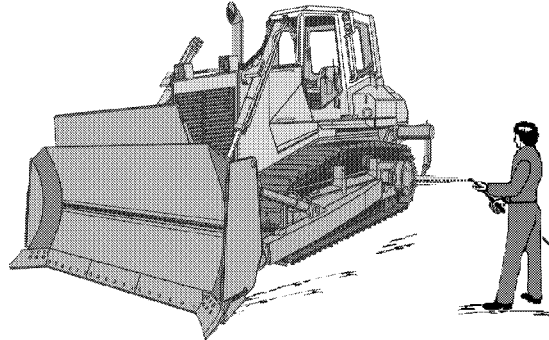
Turning the machine off in freezing temperatures

If temperatures are below freezing, park the machine on wooden boards to prevent the chains from freezing to the ground.

If the machine is frozen to the ground, heat the track pads carefully to free the machine.

Never try to move a frozen machine by force, this can cause significant damage.

- Check the tracks, clean or repair as necessary.



404138

Wet cleaning

After cleaning the machine with hot water or steam, all grease points on the machine must be re-lubricated!

- Clean the machine with steam.
- Grease all lube points on the machine.

5.14.8 Check track wear

The tracks are maintenance free, except for the wear of some parts. Track wear increases due to improper operation or if tolerances are not observed.

Visual inspections or wear checks must be made to recognize wear in time and to be able to overhaul and continue to use these parts.

Make sure that:

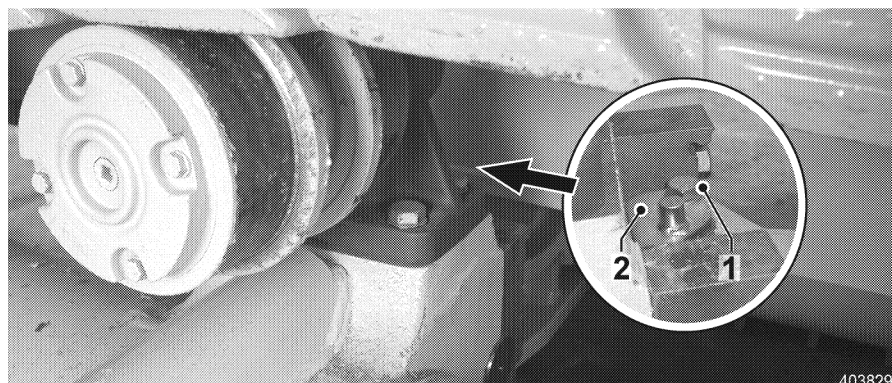
- the machine is in maintenance position.

Check track component wear

- Check chains, chain guides, track pads and sprockets for wear.

5.14.9 Grease the oscillating axle bearing

The outer oscillating axle bearings are equipped with a grease fitting and must be lubricated according to the Maintenance and Inspection Schedule.



403829

Grease point - Oscillating axle bearing

- Clean the oscillating axle bearing around the cover.
- Loosen the hex head screw 1 and turn the cover to the side.
- Lubricate the grease points with the manual grease gun.
- Reposition the cover 2 again and tighten the hex head screw 1.
- Repeat the lubrication procedure on the second oscillating axle bearing.

5.15 Working attachment

5.15.1 Check the attachment

Make sure that:

- the machine is in maintenance position,
- a torque wrench is available.

- Check the condition of the attachment.
- Visually check for damage and wear.
- Check the mounting screws for tight seating (note the tightening torques).

Make sure the machine is equipped with the proper attachment for the job.

Check for wear

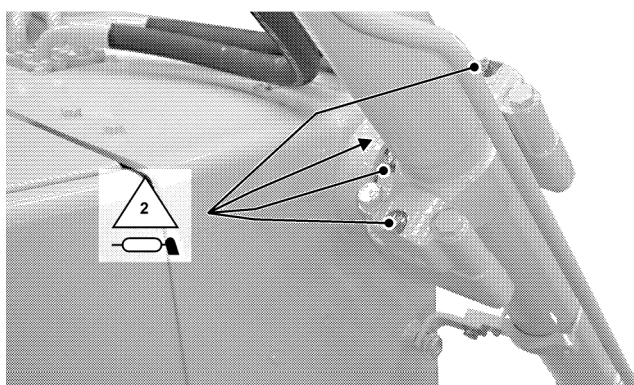
To prevent damage to the blade or tooth retainers, the cutting edges must be replaced before the wear limit is reached.

- Check the attachment for wear, replace worn parts, if necessary.

5.15.2 Lift cylinder bearing

The lift cylinders are connected via a rotating fork with the main frame of the machine.

These bearing points are filled with special grease.





Lift cylinder bearing

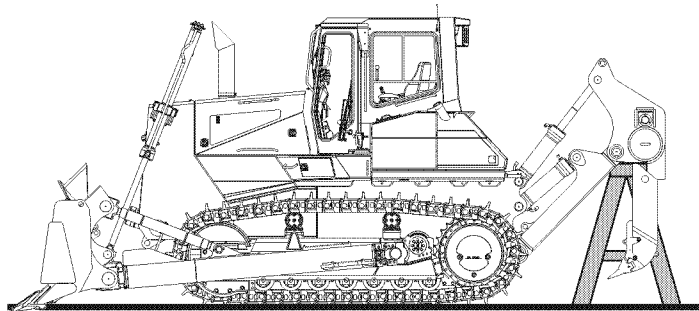
403937

- Lubricate the bearing points with the manual grease gun.

5.15.3 Replace the ripper teeth

Danger  ! Never work under the raised attachment if it is not properly supported.
Lower the attachment to the ground or support it properly from below.

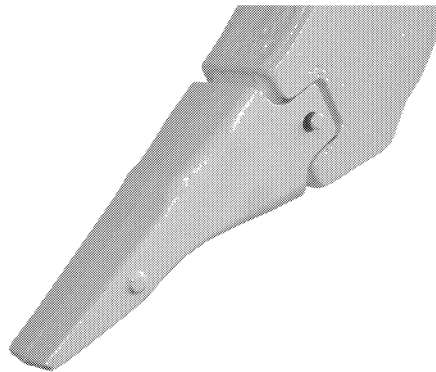
Caution  ! When knocking out the safety elements, there is a danger of injury due to material chipping off.
– Wear safety glasses and protective clothing.
– Make sure no personnel is within the danger zone.



404845

Support the ripper

- Support the ripper properly from below.



403615

Ripper - tooth

- Knock out the safety pin with a hammer and punch.
- Remove the tooth.
- Clean the tooth adapter and safety pin.
- Install new ripper tooth.

5.15.4 Check the bearing play

Pins

Radial play The radial play on all bearing points may be no more than 2 mm. If the maximum value is exceeded, then the bushings in the bearing points must be reworked.

Axial play The axial play on all bearing points except on the hydraulic cylinders, may not exceed 3 mm.
Axial play on hydraulic cylinders = maximum 5 mm.
If the play exceeds these maximum values, add shims.

Blade attachment

To check the bearing plays, the blade system must be fully actuated.

Maximum permissible bearing plays

Push frame linkage on travel gear and blade: max. 4 mm.

Linkage pull rod, tilt and angle cylinder: max. 3.5 mm.

5.16 Total machine

5.16.1 Check the machine for external damage

Make sure that:

- the machine is in maintenance position.

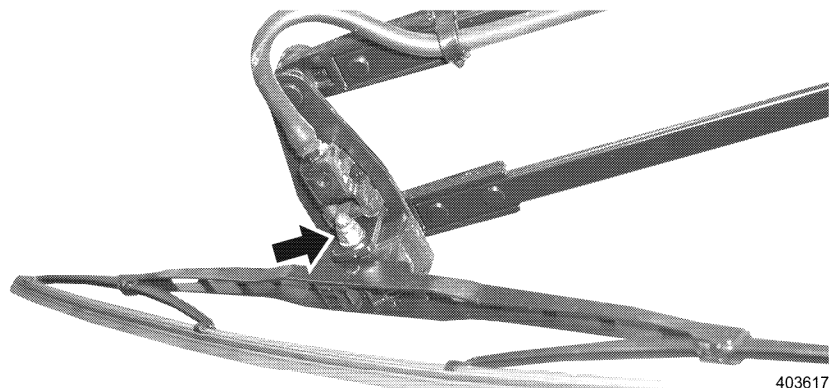


Visual inspection

403350

- Before operating the machine, check the machine for external damage, which could affect operating safety.
- Fix any safety relevant damage immediately!

5.16.2 Windshield wiper



403617

Windshield wiper

Change the windshield wiper blade

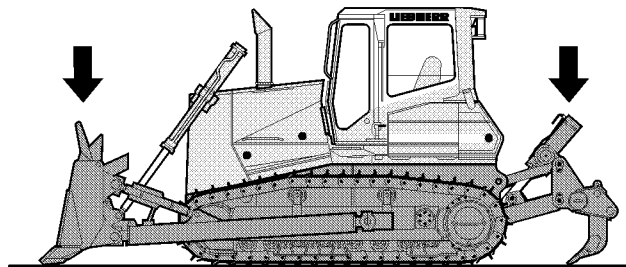
- Fold the wiper arm up.
- Remove the nut of the mounting screw.
- Remove the spring ring and washer and pull out the mounting screw.
- Remove the wiper blade and change it.

Correct the windshield wiper position

- Loosen the lock screw on the windshield wiper arm and set it vertically by changing the length of the guide arm for the wiper blade.

5.16.3 Piston rod preservation

For the preservation of the piston rod, we recommend LIEBHERR anticorrosion grease CTK. See "Lubrication and Service fluids".



404016

Maintenance position for piston rod preservation

- The machine should be operated at least once every two weeks, according to the Operating manual.
 - The Diesel engine and the hydraulic system must reach operating temperature. Actuate all travel and working hydraulic functions. The piston rods must be fully retracted and extended several times. Check the oil level, lube points and electrical system.
- Park the machine in such a way, that all piston rods are retracted as much as possible in the cylinders.

- Coat exposed piston rods thickly with acid free anticorrosion grease.

If the machine is moved for transport, check the piston rods again after the machine has been loaded, since the anticorrosion grease may have been removed by the wiper rings.

If the machine is transported:

- Check the piston rods again after loading to ensure that the piston rods are sufficiently coated.

5.16.4 Taking the machine out of service

If the machine is scheduled to be stored for an extended period of time, consult your LIEBHERR Service representative.

5.17 Cab - tilting device

To replace, clean or check components between the engine compartment and the reservoir, the cab can be tilted.

Danger

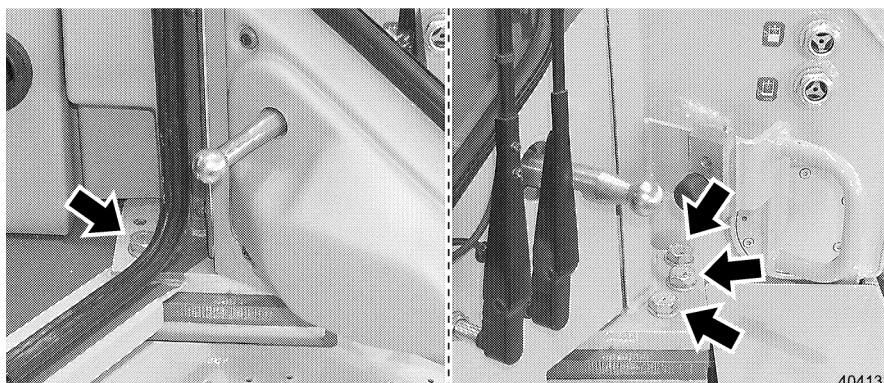


The cab may only be tilted if the machine is at a standstill!
No persons may be in the tilting range when tilting the cab either way.
No one may remain under the tilted cab unless the machine is at a standstill and the safety bar on the hydraulic cylinder is in place.
! The machine may NOT be started or driven when the cab is tilted.
The safety lever must remain in the uppermost position.

5.17.1 Raise the operator's platform

Make sure that:

- the machine is in maintenance position,
- the extension pipe to control the hand pump is available.



Mounting screws – operator's platform

- Remove 4 hex head screws on each side on the operator's platform.
- Close both cab doors.
- Open the right engine compartment door.



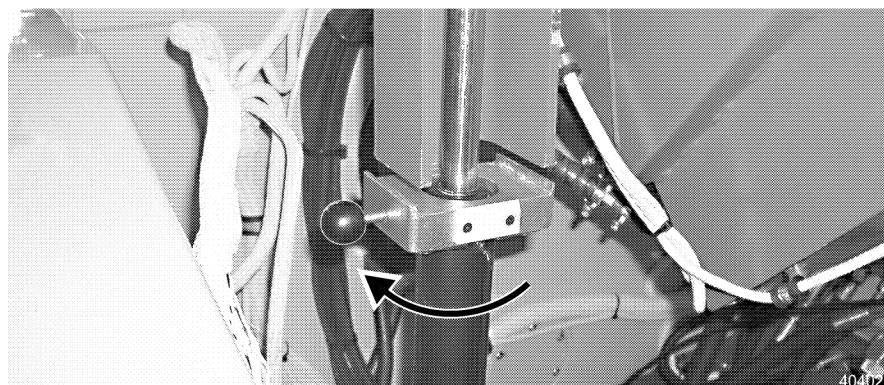
Hand pump "Up"

- Set the lever on the hand pump to "Up".



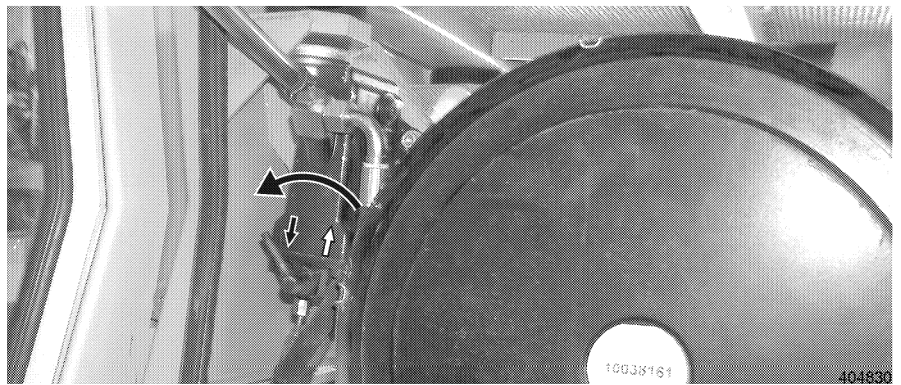
Actuate the hand pump

- Insert the extension pipe into the hand pump.
- Actuate the hydraulic hand pump until the piston has reached the end position (intermediate positions are prohibited!).



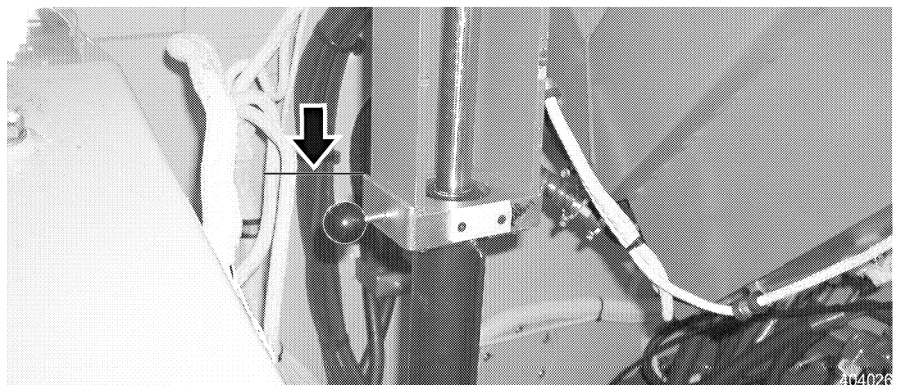
Turn the support plate by 90°

- Turn the mechanical support plate on the hydraulic cylinder in clockwise direction by 90°.
- The handle on the support plate is then positioned transverse to the travel direction of the machine.



Hand pump "Down"

- Then set the lever on the hand pump to "Down".



Safety support

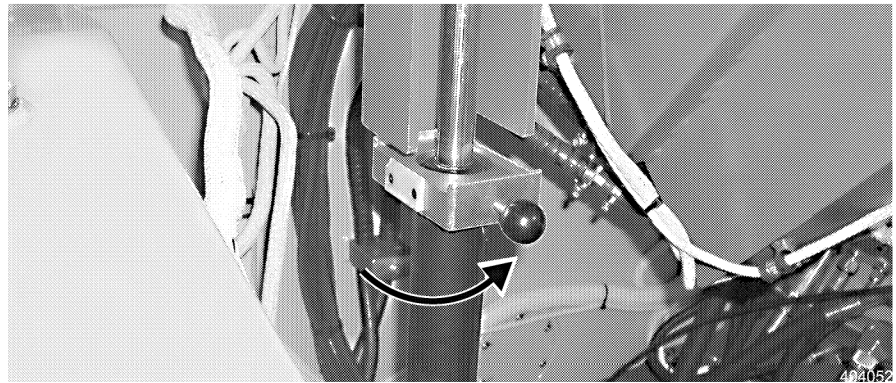
- Lower the operator's platform by actuating the hydraulic hand pump, until it is seated on the support plate by the mechanical safety support.

5.17.2 Lower the operator's platform



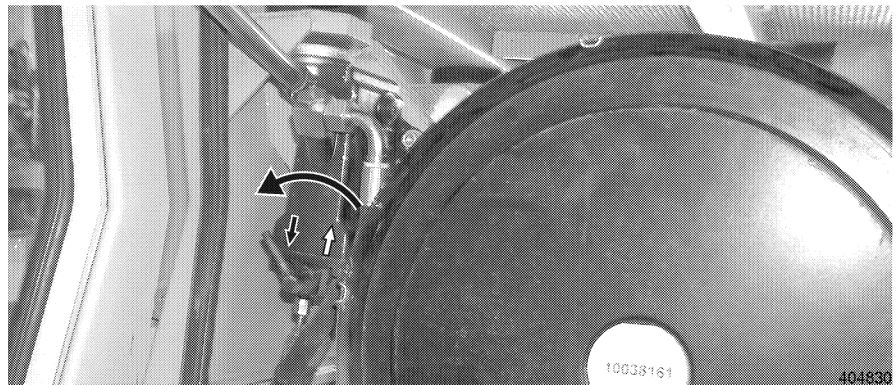
Hand pump "Up"

- Set the lever on the hand pump to "Up".
- Lift the operator's platform by actuating the hydraulic hand pump.



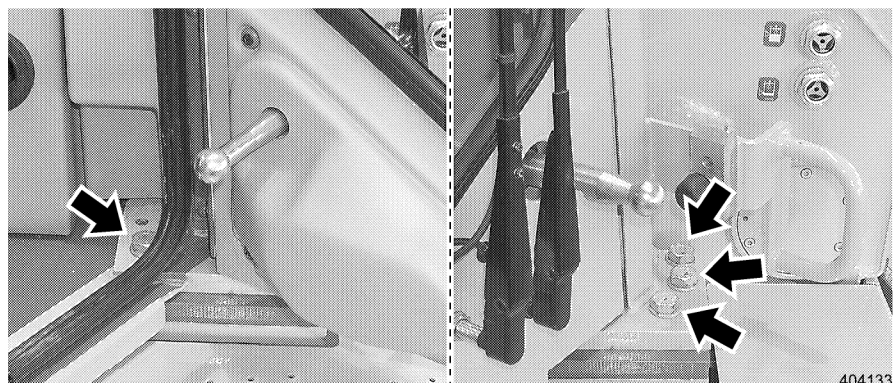
Turn the support plate by 90°

- Relieve the safety support with a slight thumb pressure and turn the support plate on the handle, in counterclockwise direction by 90° to the front.
- The handle on the support plate is then positioned in travel direction, forward.



Hand pump "Down"

- Then move the lever to "down". The operator's platform is lowered by actuating the hydraulic hand pump.
- ! As soon as the operator's platform is seated on the operator's platform bearing, the hand pump must be actuated until the pressure relief valve in the cylinder is actuated (whistling noise). This ensures that the hydraulic cylinder for the operator's cab tilt device is completely retracted and relieved.



Mounting screws – operator's platform

Danger



In any case, it is strictly prohibited to start the Diesel engine before the operator's platform has been lowered and reattached.

- Attach the operator's platform with 4 hex head screws per side.

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