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Operating Manual

Crawler Dozer
PR 764 Litronic

LIEBHERR

en

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PR 764 Litronic

from S/N 6888

Document identification

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Product identification

Manufacturer:	LIEBHERR Werk Telfs GMBH
Product group:	Crawler dozer
Model:	PR 764
Model No.:	688
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 764 max. 80 dB(A) at the work station, according to ISO 6396

Sound emission level LWA PR 764 max. 114 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.

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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.

Reply form

We need your assistance to continuously improve our machine documentation. Please copy this page and fax or mail us your comments, ideas and suggestions for improvement.

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	
Satisfactory	
Unsatisfactory	

Your information:

Machine S/N:

Company:

Name:

Address:

Telephone number:

Dealer:

Thank you very much for your assistance!

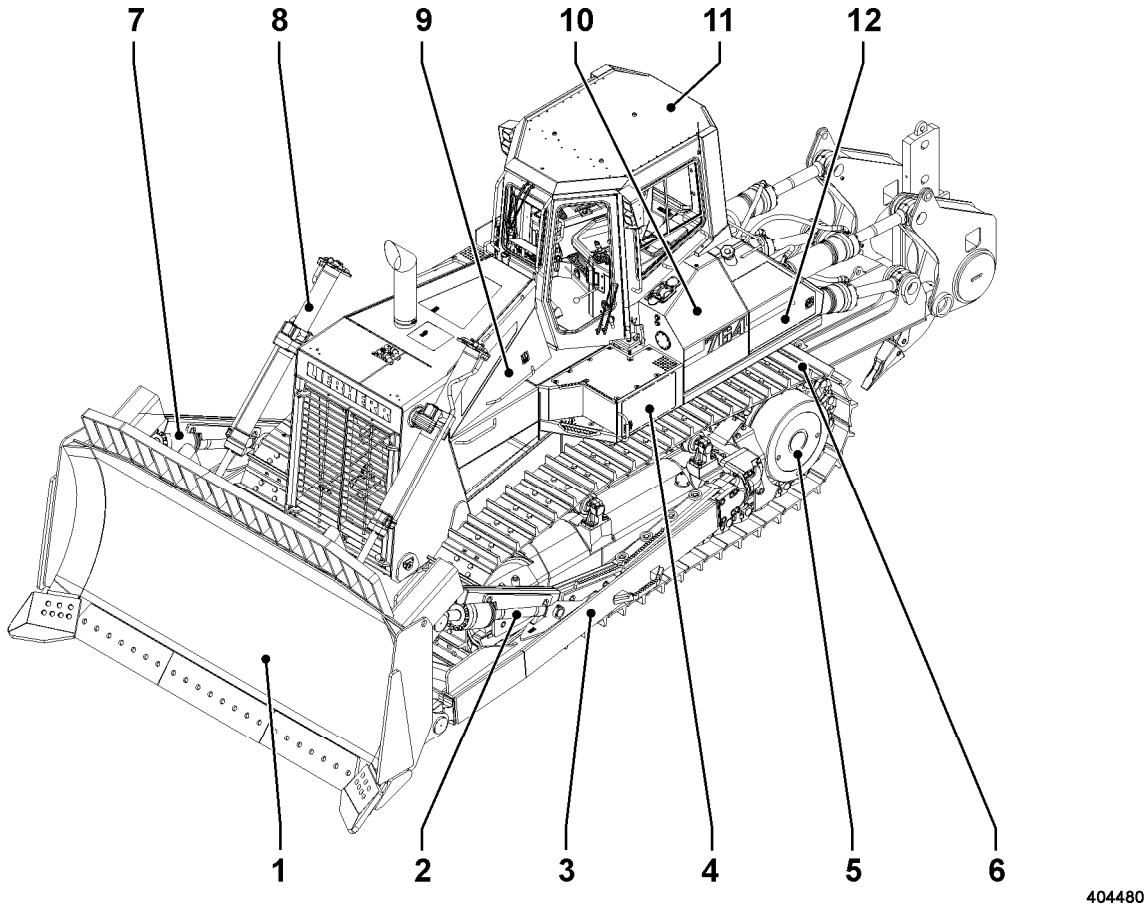
Englisch LWT - TD 9/6/2006

Table of contents

1. Product description

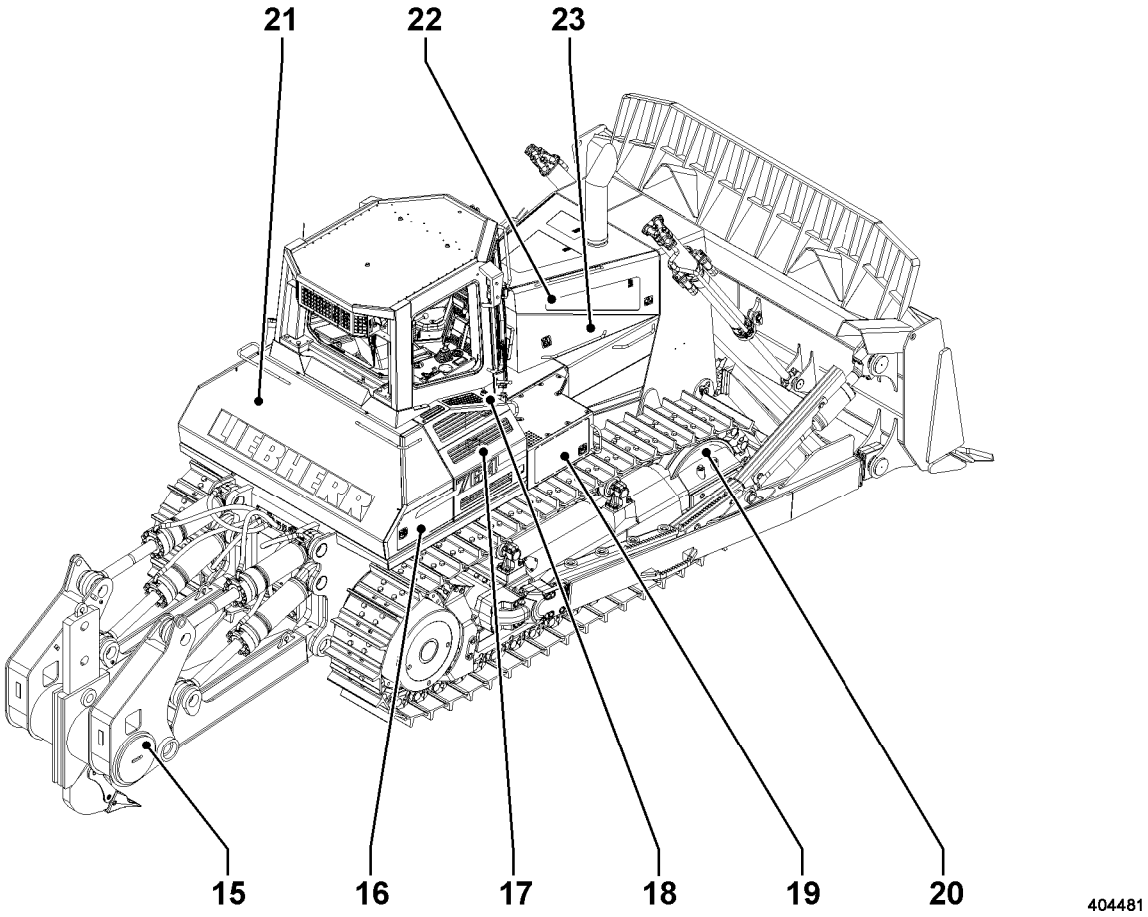
Configuration - overview

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



Overall machine – front view

1 Dozer blade
2 Cutting angle – adjustment cylinder
3 Push frame
4 Air filter, left
5 Travel gear
6 Travel gear
7 Tilt cylinder
8 Lift cylinder
9 Engine compartment door, left
10 Hydraulic tank
11 Operator's cab
12 Battery / central electric compartment



Overall machine – rear view

15 Ripper (optional equipment)
16 Compartment for refueling pump
17 Oil cooler compartment
18 Oil reservoir – seal area
19 Air filter, right
20 Idler
21 Fuel tank
22 Diesel engine with pump installation
23 Engine compartment door, right

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 764 = 52.700 kg

Technical Description
Crawler Tractor

PR 764
Litronic®

Engine Output 310 kW/422 hp
Operating Weight 44,220 – 52,685 kg/97,488 – 116,150 lb

LIEBHERR

Basic machine

Engine

Liebherr diesel engine	D 9408 TI-E Emission regulations according to 97/68/EG Stage II, EPA/CARB Tier 2
Rating (ISO 9249)	310 kW / 422 hp
Rating (SAE J1349)	310 kW / 417 hp
Rated speed	1,800 1/min
Displacement	17.2 l / 1,049 in^3
Design	8 cylinder V-engine (wet-sleeve), water-cooled, turbocharged, intercooled
Injection system	Direct fuel injection
Lubrication	Pressurized lube system, deep oil pan for inclination up to 45-degree
Operating voltage	24 V
Alternator	DC / 80 A
Starter	9.0 kW / 12 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*	Infinitely 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 funtion)
Drawbar pull at 1.5 km/h / 0.9 mph	610 kN / 137,085 lb
Electronic control	Electronic engine speed sensing control automatically adjusts travel speed and drawbar pull to match changing load conditions
Steering system	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	905 l (199.1 gallons)
Cooling system	78 l (17.2 gallons)
Engine oil with oil filters	56 l (12.3 gallons)
Splitter box	6.5 l (1.4 gallons)
Hydraulic tank	330 l (72.6 gallons)
Final drive, each	22.5 l (4.9 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) = 114 dB(A) 2000/14/EEC

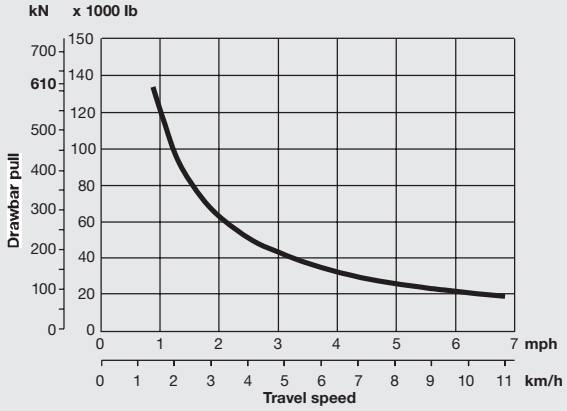
Undercarriage

Design	System 1: rigid undercarriage System 2: single bogie suspension System 3: double link bogie suspension
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	44 each side
Track rollers/ carrier rollers	7/2 each side
Sprocket segments	3 each side
Track shoes standard	610 mm/24" SESS
Track shoes optional	660 mm/26" SESS 710 mm/28" SESS 760 mm/30" SESS

Hydraulic system

System type	Load Sensing proportional pump flow control
Pump type	Swash plate variable displacement piston pump
Pump flow max.	395 l/min / 86.9 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

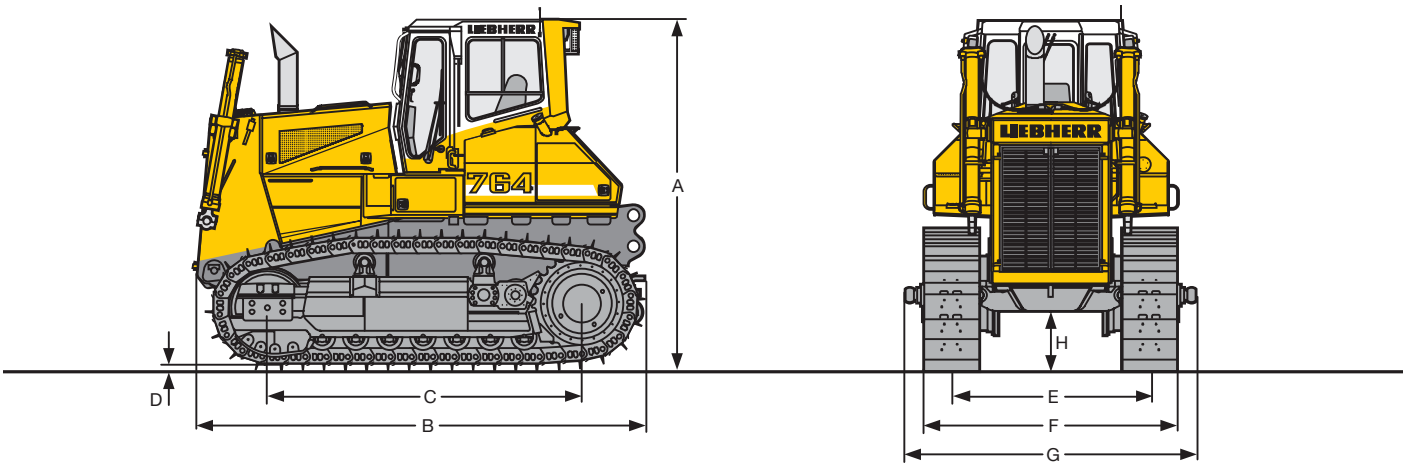
Drawbar pull PR 764



Usable drawbar pull will depend on traction and weight of tractor

* SESS Super Extrem Service Shoes

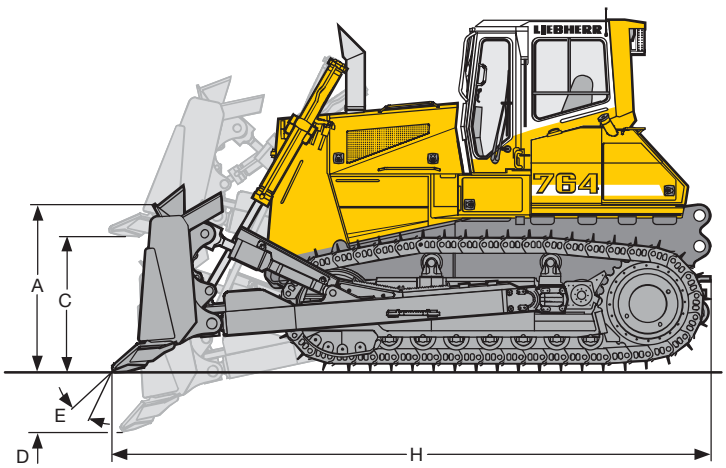
Dimensions

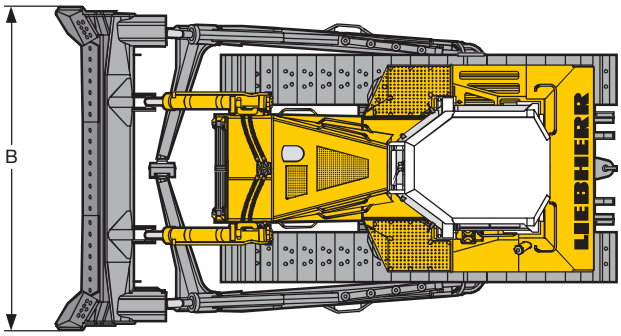


Dimensions		PR 764 rigid undercarriage	PR 764 single bogie suspension	PR 764 double link bogie suspension
A Height over cab	mm	3,935	3,935	3,935
	ft-in	12’11”	12’11”	12’11”
B Overall length without attachments	mm	5,280	5,280	5,280
	ft-in	17’4”	17’4”	17’4”
C Distance idler/sprocket center	mm	3,540	3,540	3,540
	ft-in	11’7”	11’7”	11’7”
D Height of grousers	mm	84	84	84
	inch	3.31”	3.31”	3.31”
E Track gauge	mm	2,240	2,240	2,240
	ft-in	7’4”	7’4”	7’4”
F Total width without trunnions (standard shoe width)	mm	2,850	2,850	2,850
	ft-in	9’4”	9’4”	9’4”
G Total width over blade-mounting trunnions	mm	3,263	3,263	3,263
	ft-in	10’8”	10’8”	10’8”
H Ground clearance	mm	695	695	695
	ft-in	2’3”	2’3”	2’3”
Tractor shipping weight[1]	kg	37,037	37,537	37,937
	lb	81,653	82,755	83,637

[1] Includes coolant, lubricants, 20% fuel, ROPS/FOPS cab and track pads 610 mm/24”

Front attachment

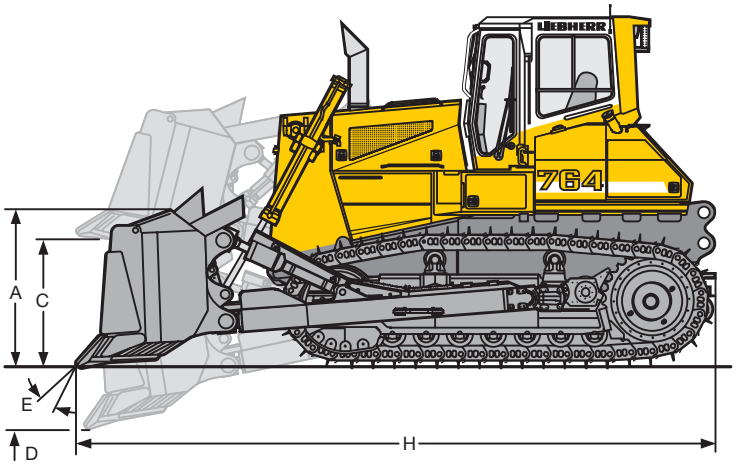


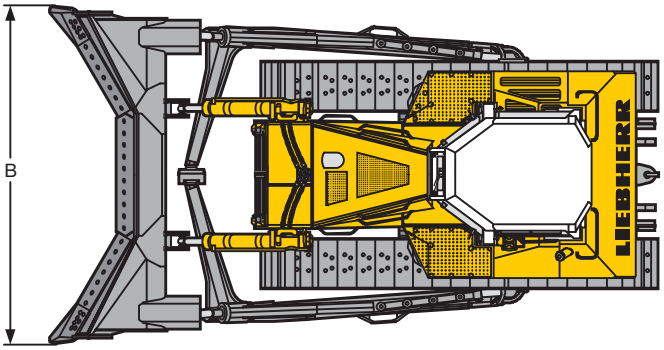


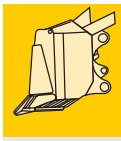
Semi-U blade		PR 764 rigid undercarriage	PR 764 single bogie suspension	PR 764 double link bogie suspension
Blade capacity according to ISO 9246	m^3	14.0	14.0	14.0
	yd^3	18.3	18.3	18.3
A Height of blade	mm	1,950	1,950	1,950
	ft-in	6'5"	6'5"	6'5"
B Width of blade	mm	4,370	4,370	4,370
	ft-in	14'4"	14'4"	14'4"
C Lifting height	mm	1,480	1,480	1,480
	ft-in	4'10"	4'10"	4'10"
D Depth below ground	mm	647	647	647
	ft-in	2'1"	2'1"	2'1"
E Max. blade pitch		9.4°	9.4°	9.4°
Max. blade tilt	mm	1,028	1,028	1,028
	ft-in	3'4"	3'4"	3'4"
H Overall length	mm	7,022	7,022	7,022
	ft-in	23'0"	23'0"	23'0"
Operating weight[1] with track pads 610 mm/24"	kg	44,220	44,720	45,120
	lb	97,487	98,590	99,472
Ground pressure[1] with track pads 610 mm/24"	kg/cm^2	1.02	1.04	1.04
	PSI	14.51	14.79	14.79
Operating weight[1] with track pads 760 mm/30"	kg	44,775	45,275	45,675
	lb	98,712	99,814	100,696
Ground pressure[1] with track pads 760 mm/30"	kg/cm^2	0.83	0.84	0.85
	PSI	11.80	1.94	12.09

[1] Includes coolant, lubricants, full fuel tank, ROPS/FOPS cab, U blade, operator and track pads 610 mm/24" respectively 760 mm/30"

Front attachment



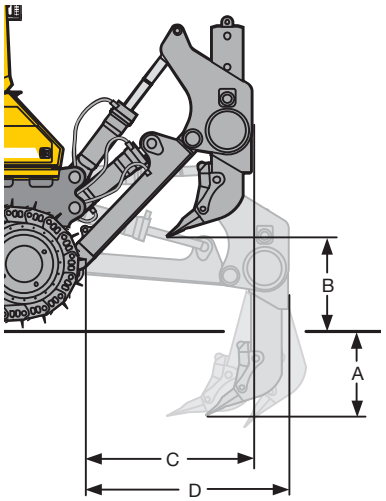


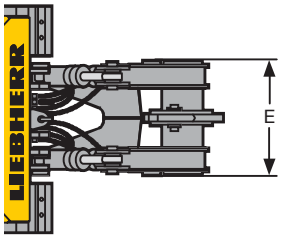
 **U blade***		**PR 764 rigid undercarriage**	**PR 764 single bogie suspension**	**PR 764 double link bogie suspension**
Blade capacity according to ISO 9246	m^3	17.0	17.0	17.0
	yd^3	22.2	22.2	22.2
A Height of blade	mm	1,950	1,950	1,950
	ft-in	6’5”	6’5”	6’5”
B Width of blade	mm	4,650	4,650	4,650
	ft-in	15’3”	15’3”	15’3”
C Lifting height	mm	1,480	1,480	1,480
	ft-in	4’10”	4’10”	4’10”
D Depth below ground	mm	647	647	647
	ft-in	2’1”	2’1”	2’1”
E Max. blade pitch		9.4°	9.4°	9.4°
Max. blade tilt	mm	1,094	1,094	1,094
	ft-in	3’7”	3’7”	3’7”
H Overall length	mm	7,549	7,549	7,549
	ft-in	24’9”	24’9”	24’9”
Operating weight[1] with track pads 610 mm /24”	kg	45,070	45,570	45,970
	lb	99,361	100,464	101,345
Ground pressure[1] with track pads 610 mm/24”	kg/cm^2	1.04	1.06	1.06
	PSI	14.79	15.08	15.08
Operating weight[1] with track pads 760 mm /30”	kg	45,625	46,125	46,525
	lb	100,586	101,688	102,570
Ground pressure[1] with track pads 760 mm/30”	kg/cm^2	0.85	0.86	0.86
	PSI	12.09	12.23	12.23

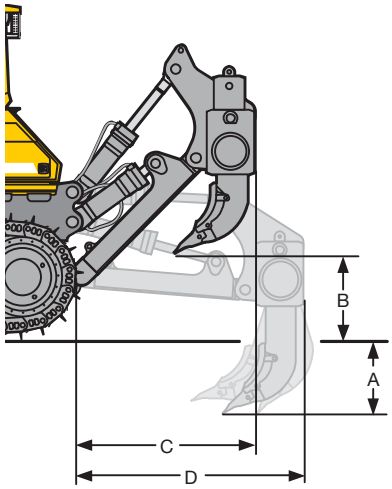
* Counterweight or rear attachment is recommanded for improved performance and balance

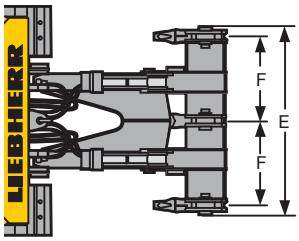
[1] Includes coolant, lubricants, full fuel tank, ROPS/FOPS cab, U blade, operator and track pads 610 mm/24” respectively 760 mm/30”

Rear attachment



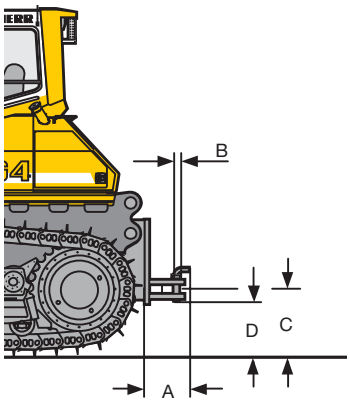


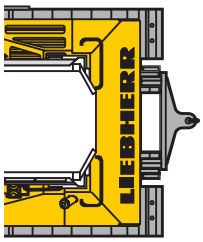




Ripper single-shank			Parallelogram with hydraulic pitch adjustment
A	Ripping depth (max./min.)	mm ft-in	1,300 (560) 4’3” (1’10”)
B	Lifting height (max./min.)	mm ft-in	1,000 (260) 3’3” (10”)
C	Overall length, attachment raised	mm ft-in	1,894 6’3”
D	Overall length, attachment lowered	mm ft-in	2,494 8’2”
E	Ripper width	mm ft-in	1,400 4’7”
	Max. shank pitch		31°
	Maximum penetration force	kN lb	166.9 37,553
	Pryout force	kN lb	291.5 65,588
	Weight	kg lb	4,786 10,551

Ripper multi-shank			Parallelogram with hydraulic pitch adjustment
A	Ripping depth (max./min.)	mm ft-in	900 (520) 2’11” (1’8”)
B	Lifting height (max./min.)	mm ft-in	1,038 (658) 3’5” (2’2”)
C	Overall length, attachment raised	mm ft-in	1,894 6’3”
D	Overall length, attachment lowered	mm ft-in	2,494 8’2”
E	Toolbar width	mm ft-in	2,494 8’2”
F	Distance between teeth	mm ft-in	1,130 3’8”
	Max. shank pitch		31°
	Maximum penetration force	kN lb	176.4 39,690
	Pryout force	kN lb	291.5 65,588
	Weight	kg lb	6,160 13,580





Drawbar			Rigid
A	Additional length	mm ft-in	434 1’5”
B	Socket pin diameter	mm inch	60 2.36”
C	Height of jaw	mm ft-in	678 2’3”
D	Ground clearance	mm ft-in	528 1’9”
	Jaw opening	mm ft-in	105 4”
	Weight	kg lb	750 1,653

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	•	
Undercarriage, single bogie suspension		•
Undercarriage, double link bogie suspension		•
Track frames, oscillating	•	
Pivot shaft, separate	•	
Sprocket segments with recesses		•

Electrical

	s	o
Starter motor 9.0 kW	•	
Working lights, front, 6 units	•	
Working lights, rear, 2 units	•	
Batteries, cold start, 2 units	•	
Battery main switch, electric	•	
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	•	
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	•	

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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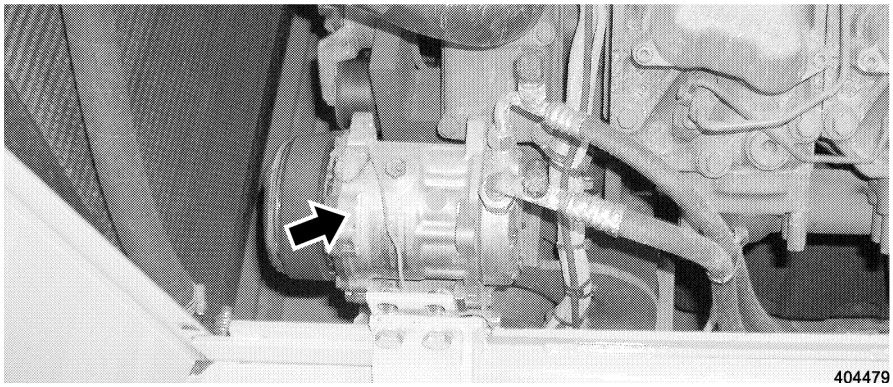
1.1.1 Air conditioning system

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

Technical Data

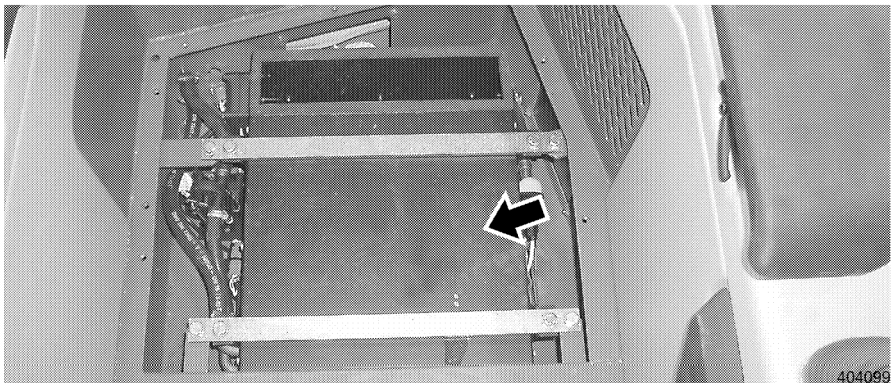
Refrigerant	R134a
Nominal voltage	24 V
Operating voltage	24 V
Blower	3-stage
Filling quantity of complete system	Refrigerant R134a = 1750g
Oil quantity – air compressor	200 ccm

Components of air conditioning system



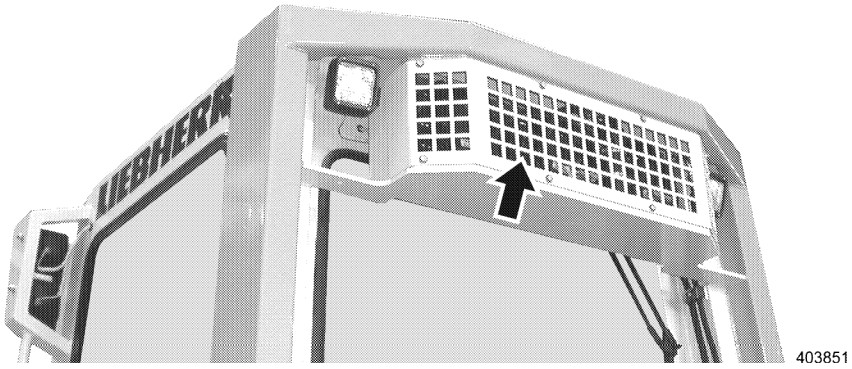
Air compressor

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



Heater unit

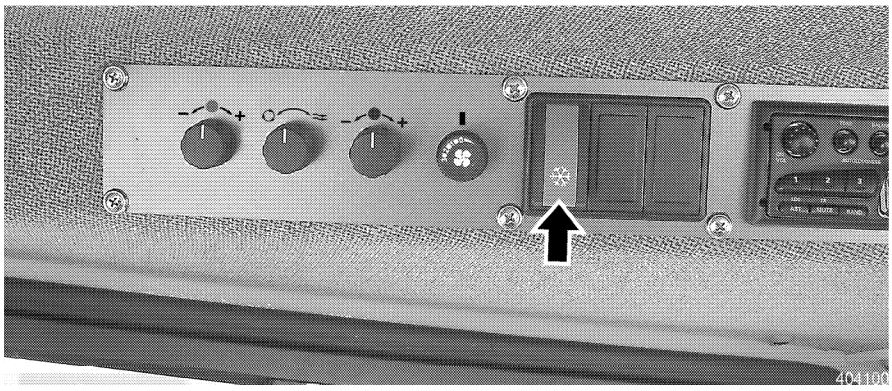
Heater unit The heater unit is located under the seat console in the floorboard area of the operator's cab.



Evaporator unit

Evaporator unit

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



Main air conditioning switch

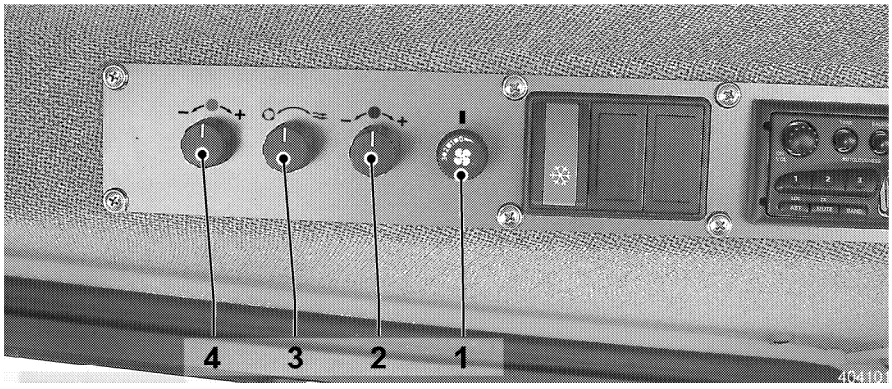
Control elements of the air conditioning system

Main switch

The air conditioning main switch is installed on the left hand side of the roof console (recognizable on the Climate Star).

Control

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



Control

1 Blower switch, 3-stage
2 Knob - heater
3 Knob – air flap
4 Knob – air conditioning system

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 are valid for screws with ”black” surface or phosphated, zinc-plated and DACROMET 500. Screws and nuts with “black” surface, phosphated and galvanized, lightly lubricated. Medium friction µG = 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.

Englisch LWT - TD 9/6/2006

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

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 H

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.

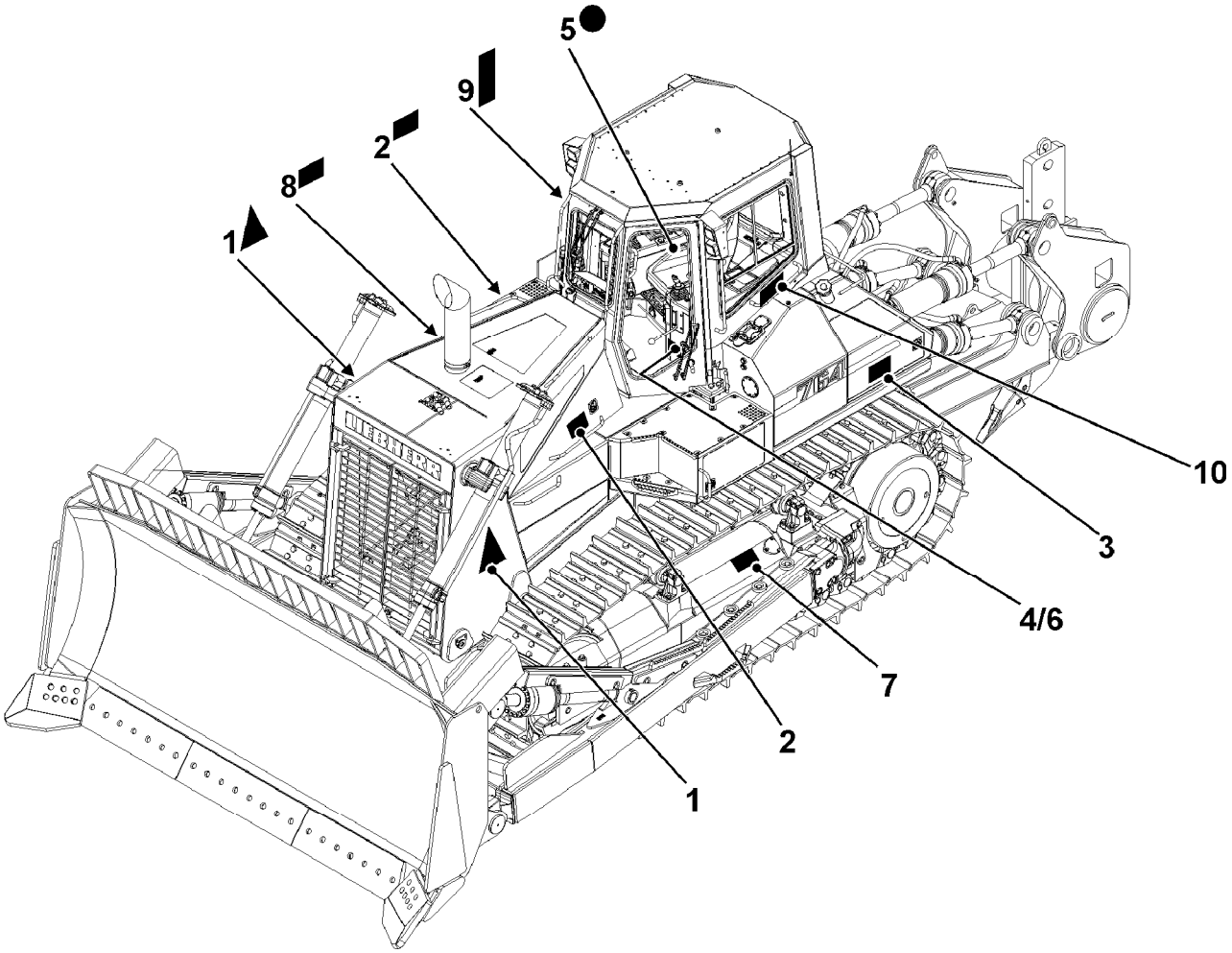
   Types of signs:
   – Safety signs
   – Reference signs
   – Data tags

   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



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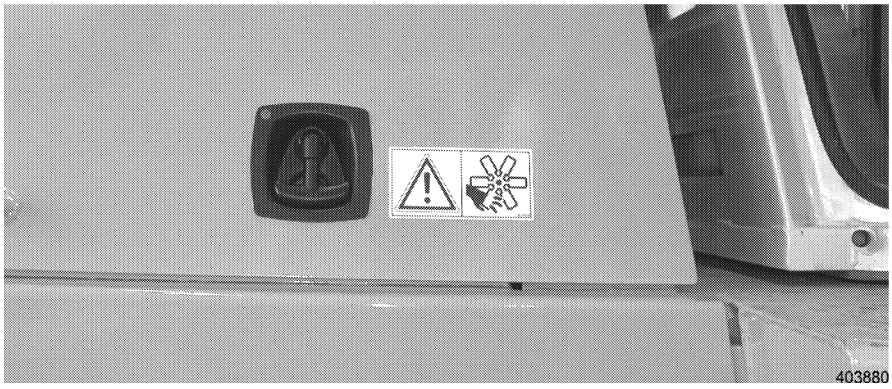
Location of safety signs

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

Warning sign – Stay clear

Warning sign – Stay clear

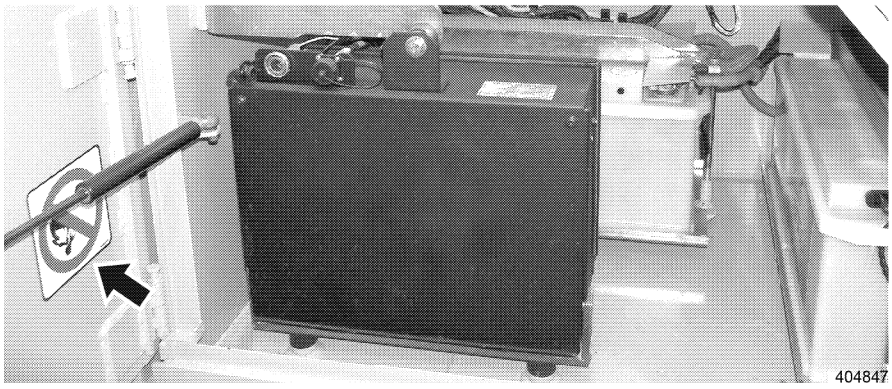
The sign is installed on the outside, on the left and right hand side of the machine.
Warns that a dangerous accident could result in death or severe injury.
Meaning: It is prohibited for anyone to remain in the danger zone!



Sign – engine standstill

Sign – Engine standstill

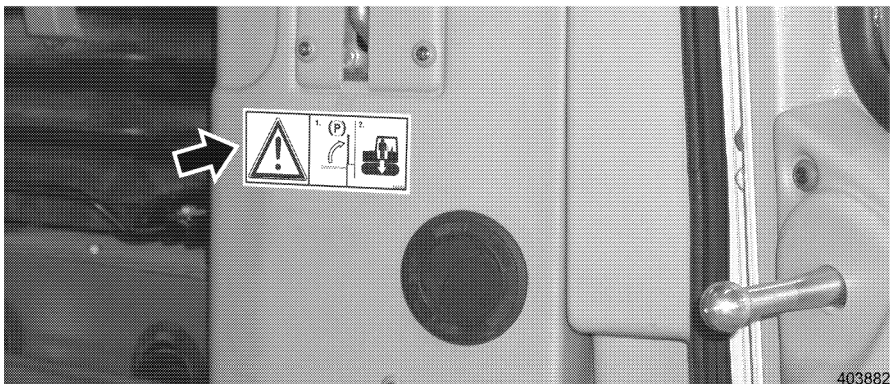
The sign is installed on the left and right hand side on the engine compartment doors.
Warns that a dangerous accident could result in death or severe injury.
Meaning: Open only if the engine is not running!



Sign - Battery

Sign - Battery

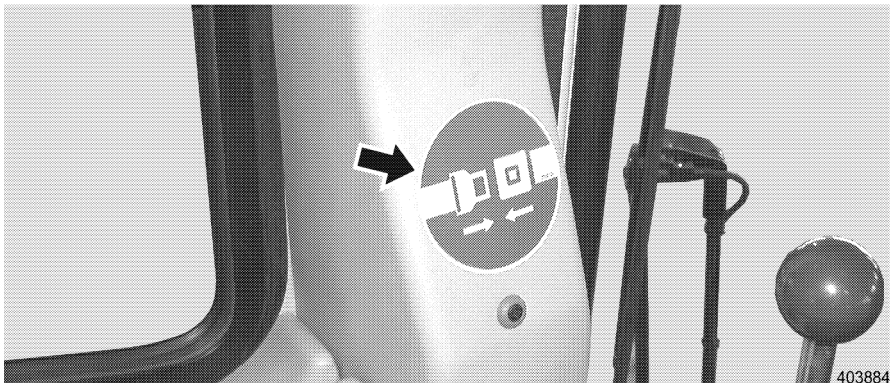
The sign is installed on the battery box.
Warns that a dangerous accident could result in death or severe injury.
Meaning: Do not smoke and avoid an open flame near batteries.



Sign – Safety lever

Sign – Safety lever

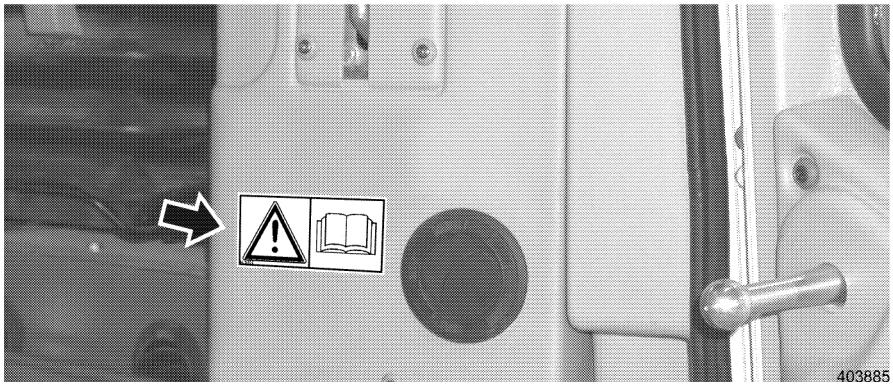
The sign is installed on the front on the operator's platform.
Warns that a dangerous accident could result in death or severe injury.
Meaning: Before leaving the cab, raise the safety lever. In dangerous situations, lower the attachment immediately, then raise the safety lever.



Sign – Seat belt

Sign – Seat belt

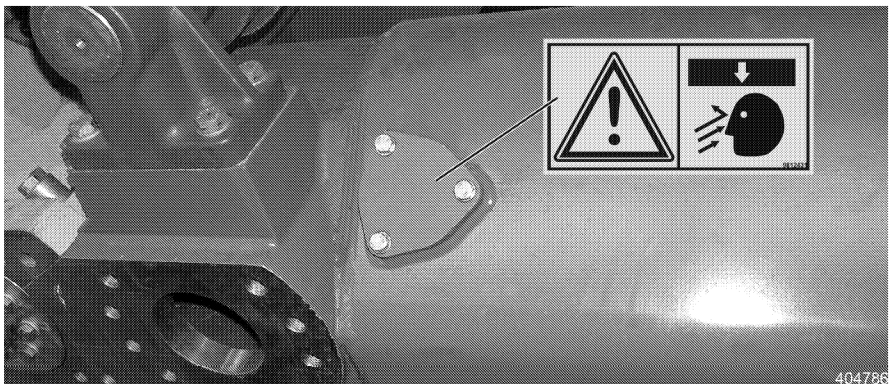
The sign is installed on the left on the operator's platform.
Notes the importance of wearing the seat belt.
Meaning: Always wear the seat belt before operating the machine.



Sign – Accident prevention

Sign – Accident prevention

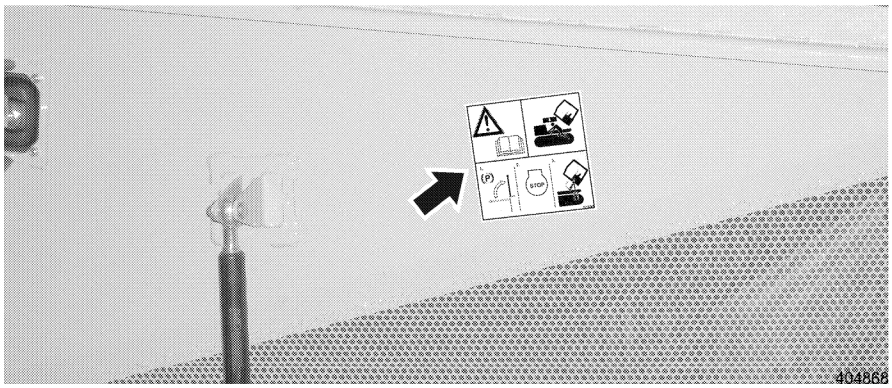
The sign is installed on the front on the operator's platform.
Shows the importance of reading the operating manual and the printed safety regulations for accident prevention.
Meaning: Operate the machine only if you have read and understand the operating manual.
When operating the machine, the accident prevention guidelines printed in the operating manual must be strictly observed!



Sign – Chain tension

Sign – Chain tension

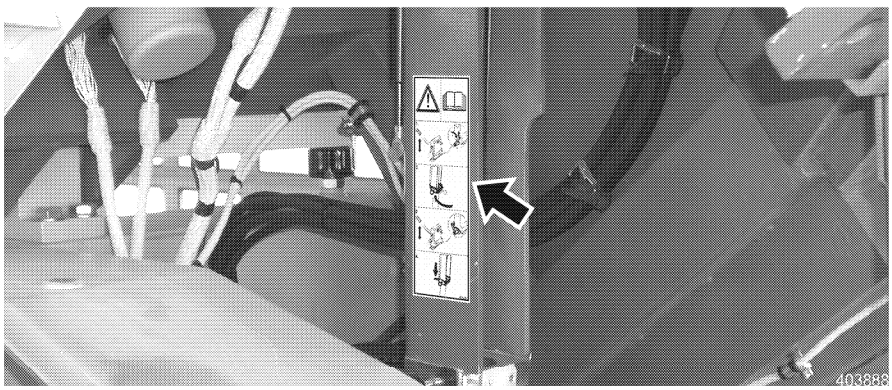
The sign is installed on the left and right hand side in the track roller frame, on the underside of the cover, at the grease cylinder.
Warns that a dangerous accident could result in death or severe injury.
Meaning: When releasing the chain tension, keep your head clear of the track roller frame – the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

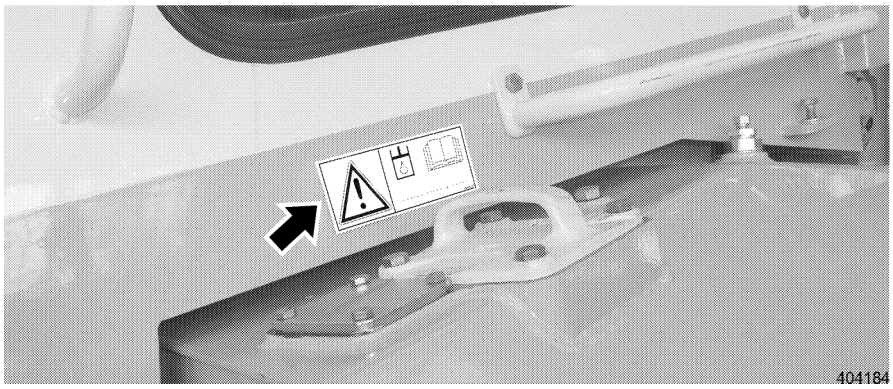


Sign – Cab support

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

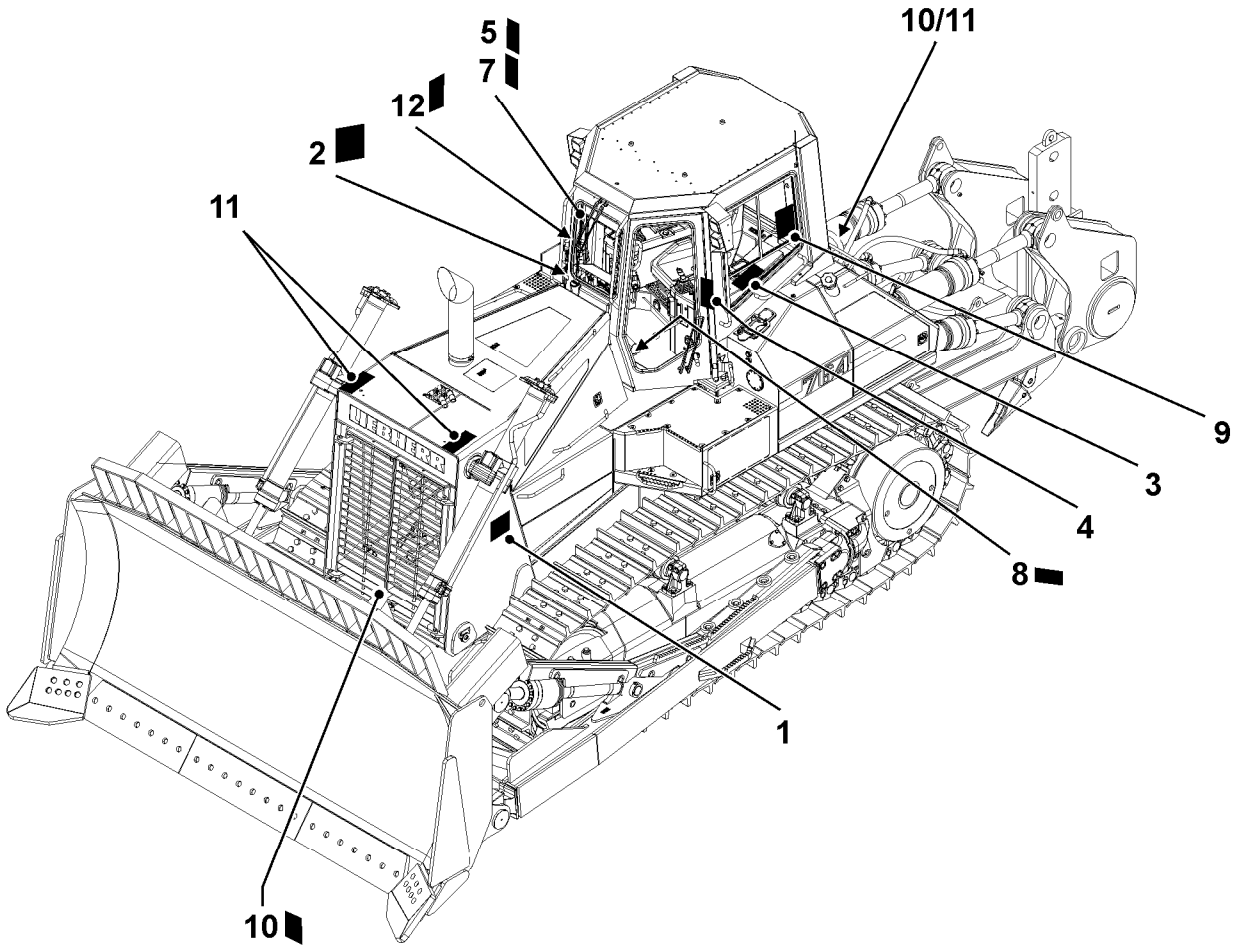
Sign - Bio Hydraulic oil

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



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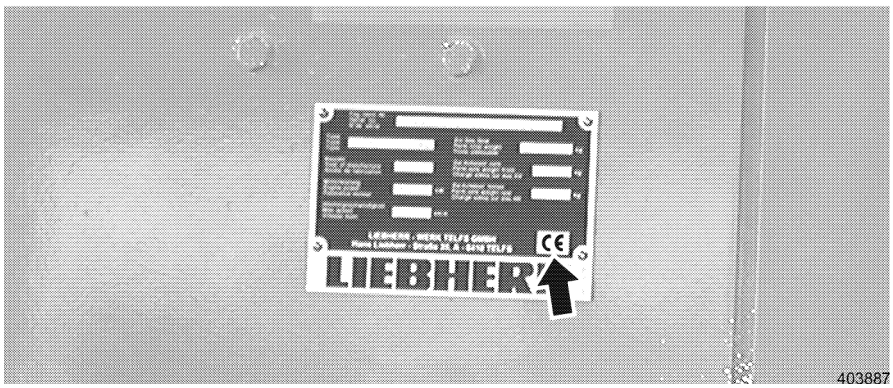
Location of reference signs

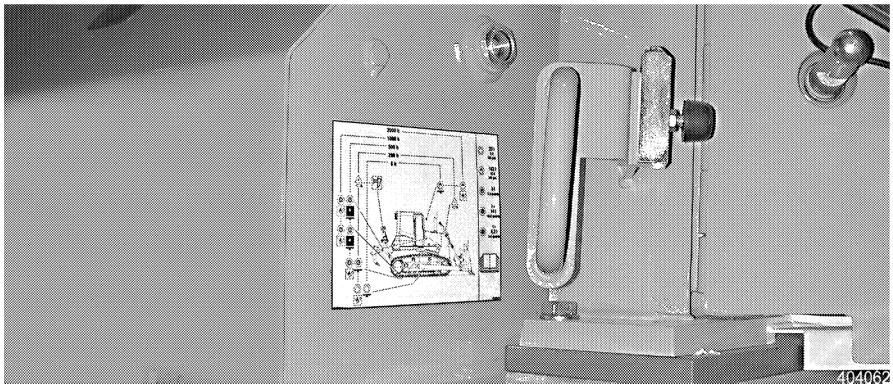
1 Data tag /CE mark
2 Lubrication chart
3 Sign – engine operation
4 Sign – travel hydraulic
5 Sign – working hydraulic
7 Sign - ripper
8 Sign - Rops / Fops
9 Sign – sound protection
10 Sign – rigging point
11 Sign – lifting points
12 Sign – emergency exit



CE mark

Sign – conformity mark - CE

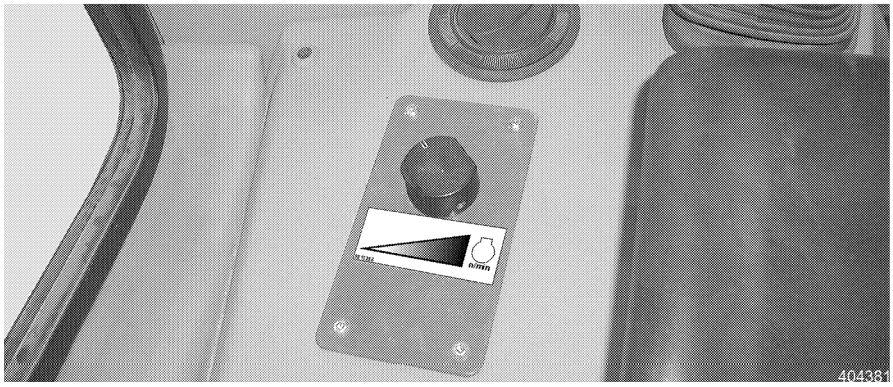
The sign is included in the data tag on the left hand side on the main frame.
Shows the conformity to EU machine regulations.



Sign – lubrication chart

Sign – lubrication chart

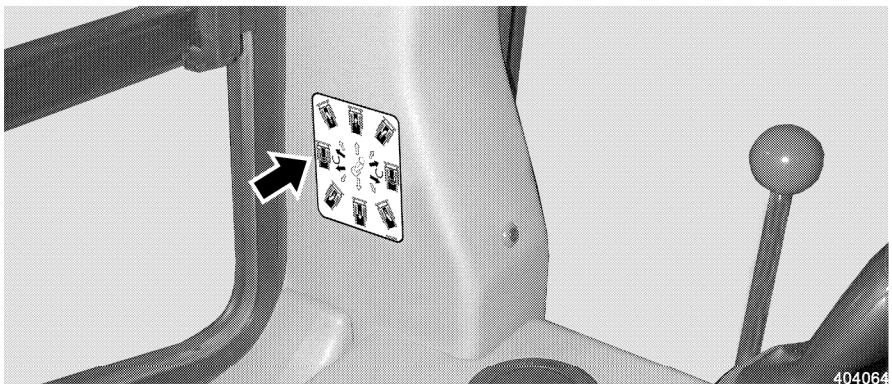
The sign is installed on the battery box.
The lubrication chart shows all components which use oil or grease as well as the inspection and change intervals for these parts.



Sign – engine operation

Sign – engine operation

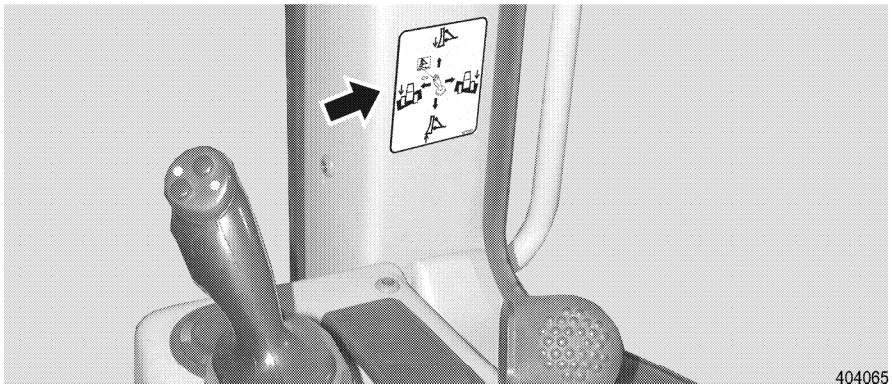
The sign is installed on the left on the operator's platform.
Shows the operation of the throttle control lever.



Sign – travel hydraulic

Sign – travel hydraulic

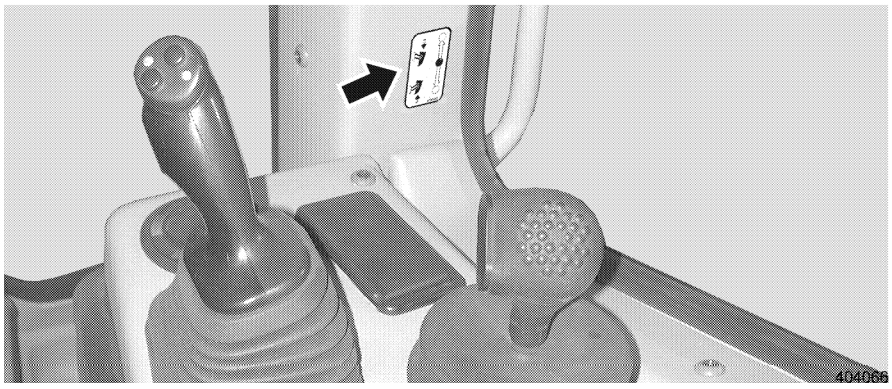
The sign is installed on the left on the operator's platform.
Shows the operation of the travel joystick for the travel functions of the machine.



Sign – working hydraulic

Sign – working hydraulic

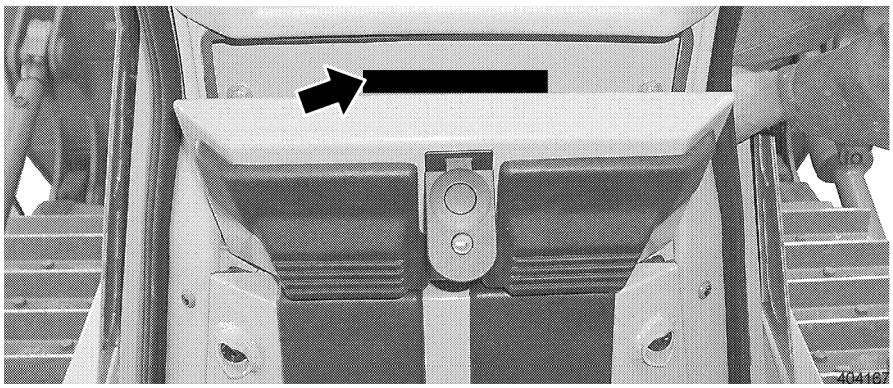
The sign is installed on the right on the operator's platform.
Shows the operation of the dozing attachment of the machine.



Sign - ripper

Sign - ripper

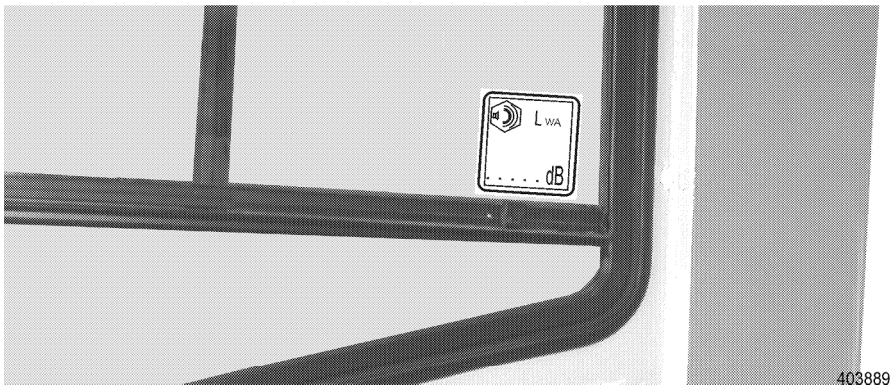
The sign is installed on the right on the operator's platform.
Shows the operation of the ripper.



Sign - Rops / Fops

Sign - Rops / Fops

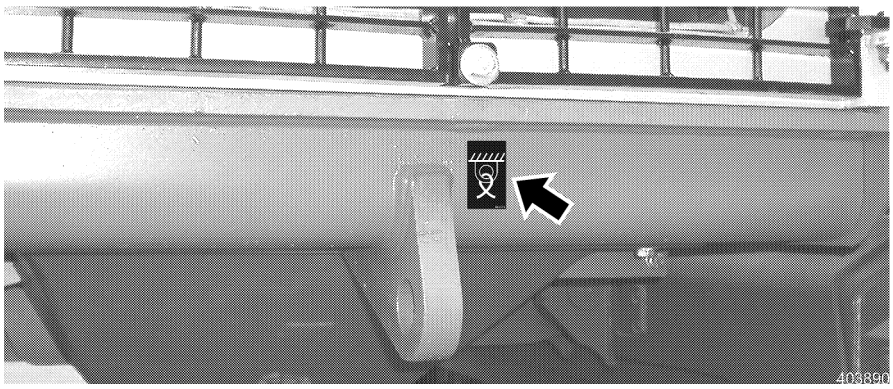
The sign is installed in the compartment for the machine documentation.
Shows the maximum load for roll over protective structure.



Sign – sound protection

Sign – sound protection

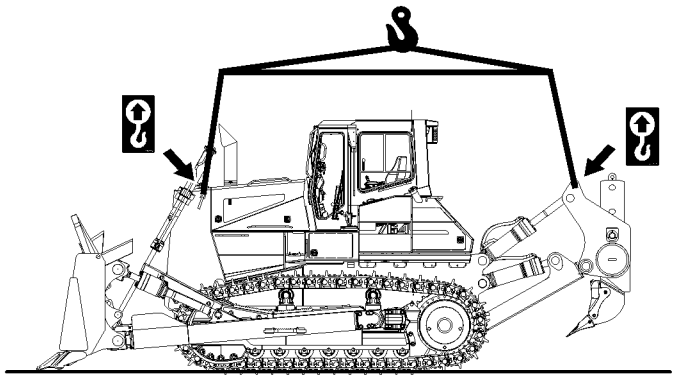
The sound protection sign is installed inside on the operator's cab windshield.
LWA = Sound output level (sound output level emitted to the surrounding area).



Sign – rigging point

Sign – rigging point

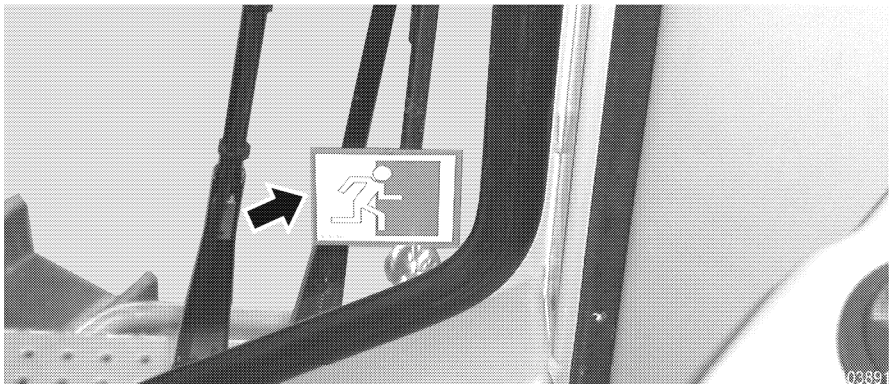
The sign is located on the rigging points of the machine.
Shows the machine's rigging points.



Sign – lifting points

Sign – lifting points

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



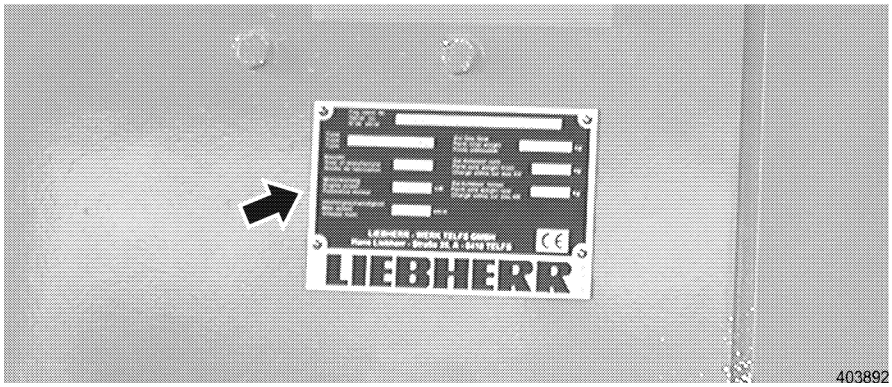
Sign – emergency exit

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 indictor 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. Before starting to work, make sure that you area aware of any special conditions at the jobsite, as well as special regulations, federal, state and local safety requirements and warning signals. The work environment includes any obstacles in the working and traffic area, the load carrying capacity of the ground, and any necessary guard rails to protect the jobsite from close-by traffic.
2. Always keep sufficient and safe distance to overhangs, walls, drop offs and unstable ground.
3. Be especially alert in changing ground conditions, unfavorable visual conditions and changing weather.
4. Be aware of utility lines and the location of supply lines on the jobsite and work especially careful near them. If necessary, check with the appropriate agency for details.
5. Keep sufficient distance to electrical wires. When working near high voltage lines, do not get near them with the attachment.
   – There is a **DANGER OF LOSS OF LIFE!**
   – You must inform yourself of proper distances to assure your safety while working.
6. **If you do touch a high voltage wire:**
   – Do not leave the machine!
   – If possible, move the machine a sufficient distance away 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 somebody 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 the power has been turned off!

7. Before moving or working, make sure you always check that the attachments can be operated safely.
8. When traveling or moving the machine on public roads, highways, or properties, make sure to observe all applicable laws, rules and regulations. After moving the machine, it may become necessary to reassemble it and to bring it back to proper operating conditions.
9. Always turn on the light if visibility is poor or as dusk approaches.
10. Never allow another person to ride along on the machine.
11. Always work while seated in the operator's seat and with the seatbelt secured.
12. In the event the machine should tip, remain in the operator's seat with the seatbelt securely fastened. Experience has shown that it is safest 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 before resuming operation.
14. Be certain that no one is endangered by moving the machine.
15. Never get up and leave the operator's seat as long as the machine is still moving.
16. Never leave the machine unattended, with the engine 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 drivable incline / side slope of the machine depends on the installed attachment as well as the ground conditions!
19. Avoid any working movements, which could cause the machine 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 and carefully on rocky, rough or slippery ground or on a slope.
21. Always adapt the travel speed to the working conditions.
22. Never travel on slopes that exceed the maximum permissible gradeability of the machine.
23. Drive downhill only at low speed 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 the low speed range before reaching a downhill slope, never move onto a slope and then change to the low speed range.
24. When loading a truck, the driver of the truck must leave the cab, even if the cab is FOPS protected.
25. The machine must always be equipped with the proper protective devices designed for specific purposes, especially when it is utilized in 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 operators. The person giving signals must be visible to the operator or equipped with two way radios.

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 liens 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, catwalks, 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

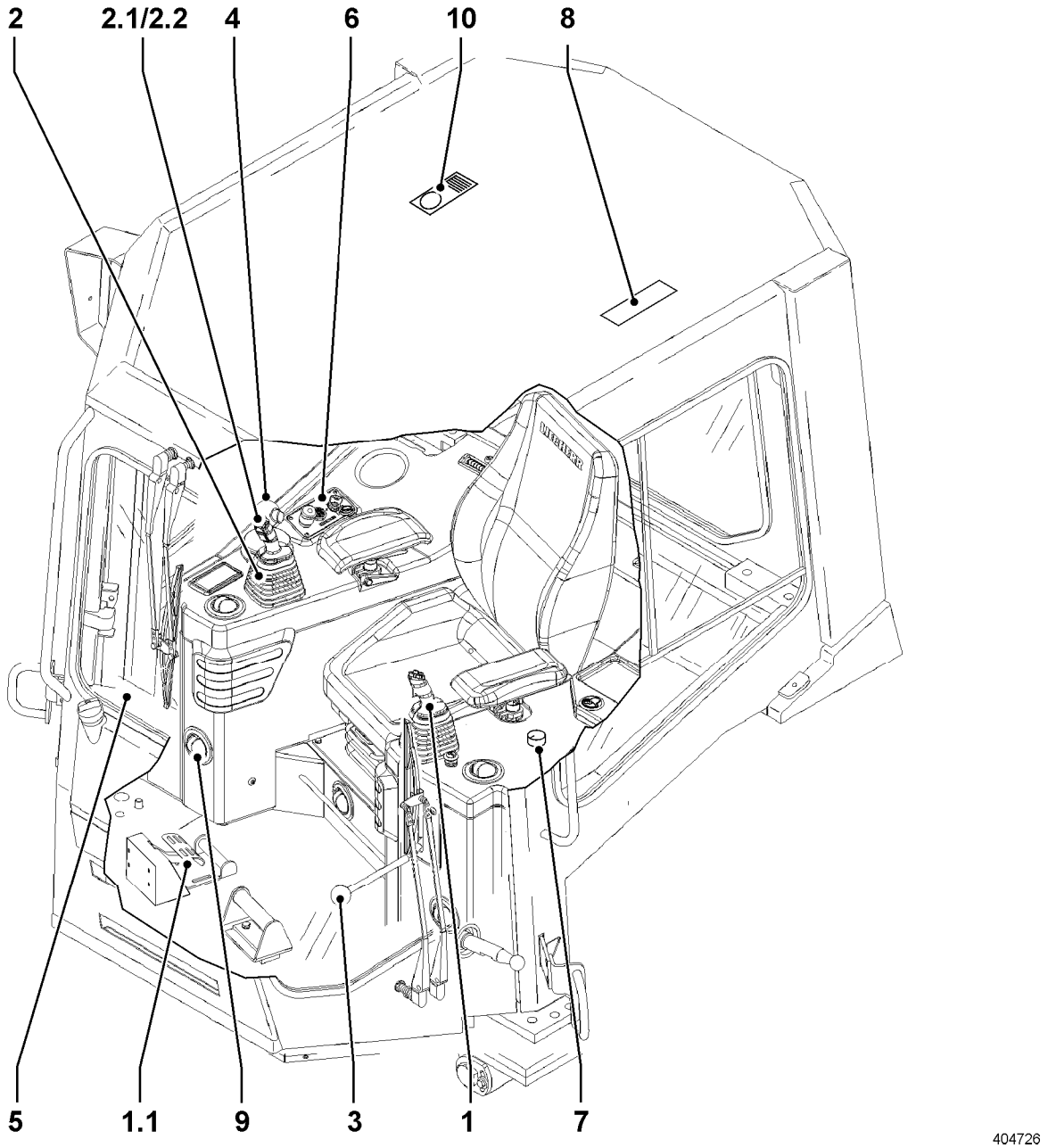
1. Attachments and installations from other sources or parts which have not been approved by LIEBHERR for installation may not be installed on the machine without prior written permission by LIEBHERR.
2. The necessary technical documentation must be forwarded to LIEBHERR.

3. Control, instrumentation

3.1 Location of controls and instrumentation

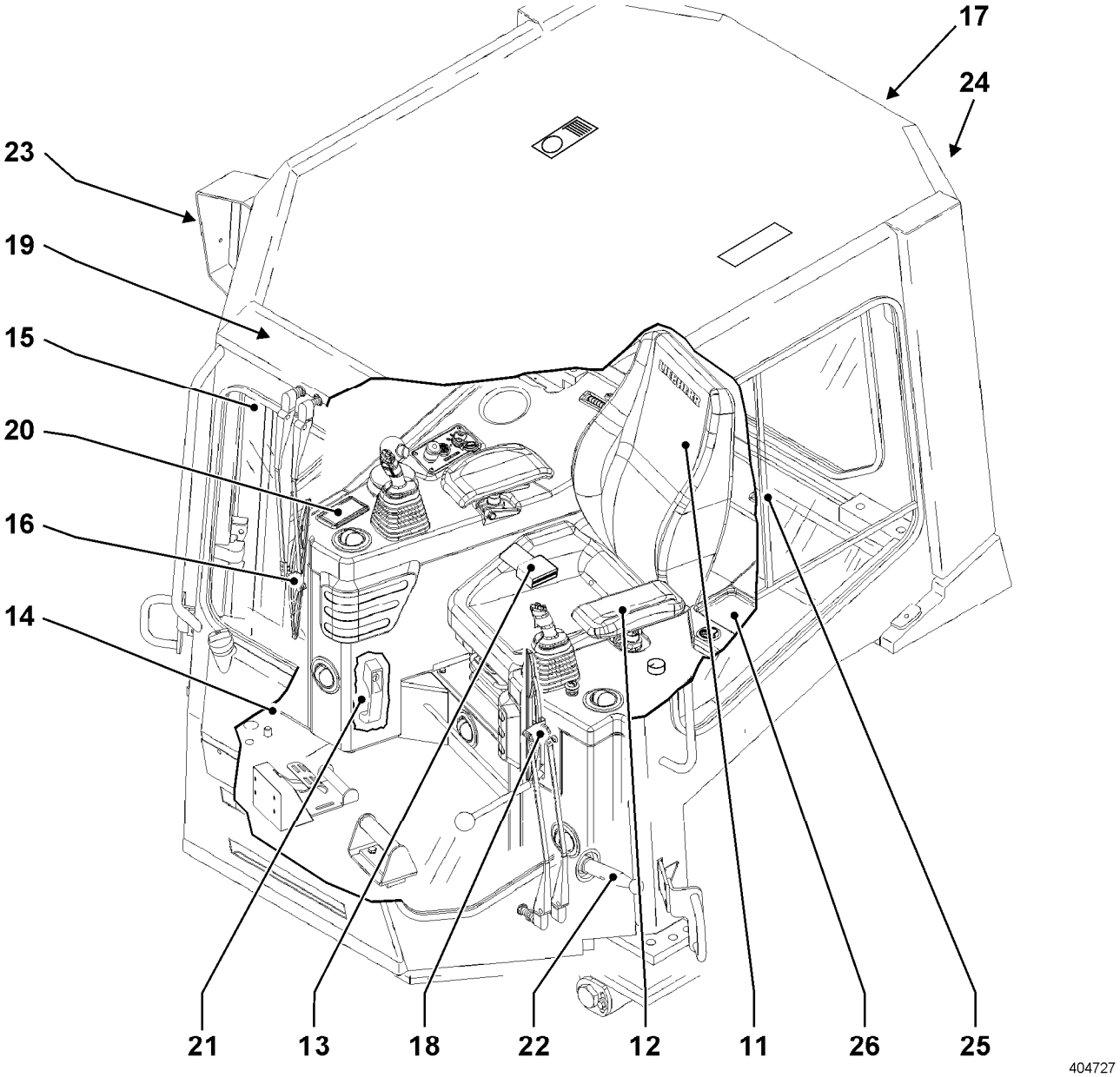
Englisch LWT - TD 9/6/2006

3.1.1 Operator's cab



Interior view – operator's cab

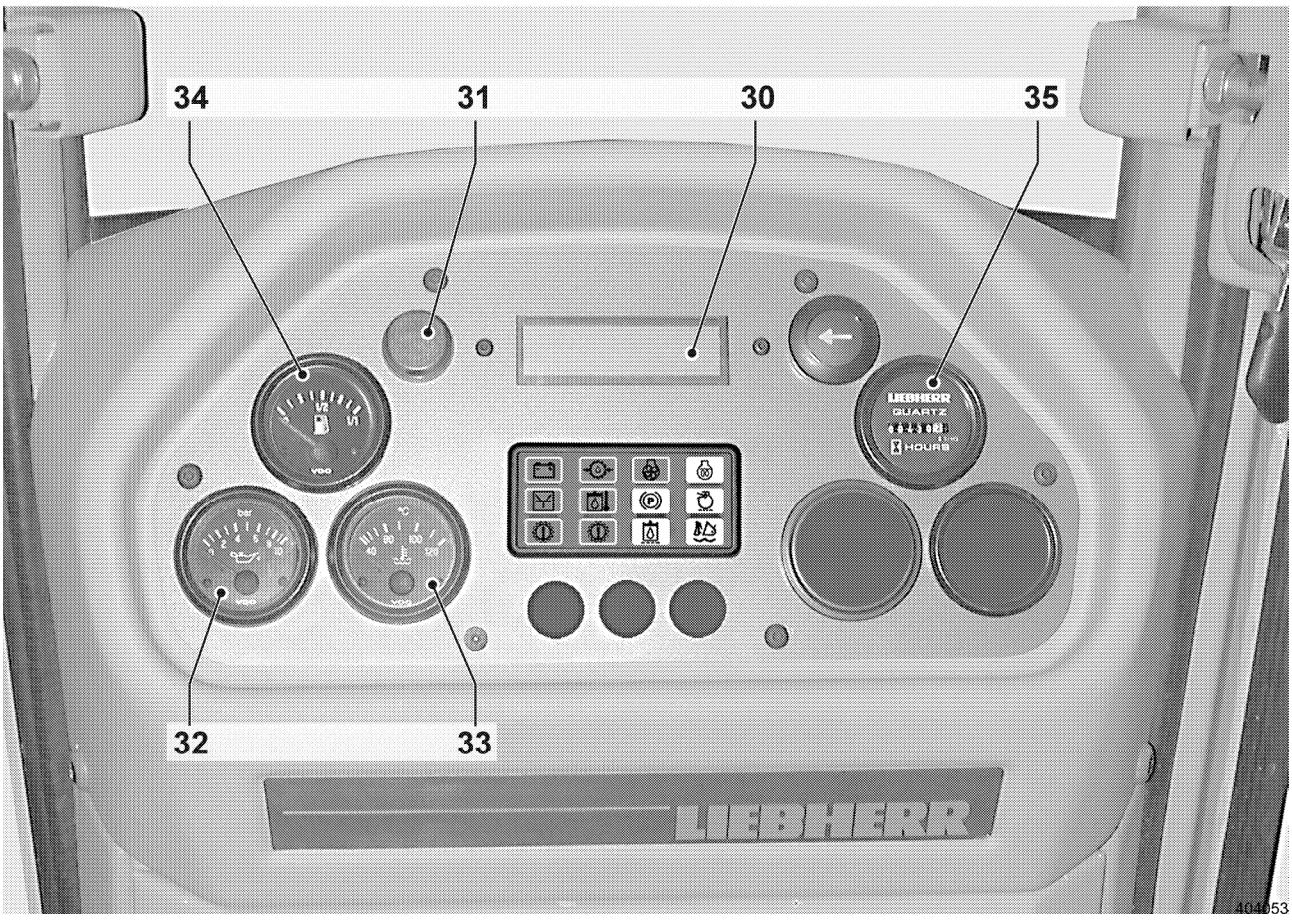
1 Travel joystick
1.1 Speed reduction pedal (optional equipment)
2 Blade control lever
2.1 Button – float position
2.2 Button – cutting angle adjustment (optional equipment)
3 Safety lever
4 Ripper control lever
5 Instrument panel, front
6 Start panel
7 RPM regulator
8 Control elements – heater / air conditioning system
9 Heater vents
10 Interior lights



Interior view – operator's cab

11 Operator's seat
12 Arm rests
13 Seatbelt
14 Compartment – operating instructions
15 Sunshade
16 Windshield wiper – front window
17 Windshield wiper – rear window
18 Windshield wiper - doors
19 Rear view mirror
20 Ashtray
21 Door lock
22 Door latch
23 Headlight - front
24 Headlight - rear
25 Window lock
26 Glove compartment

3.1.2 Indicator elements on the operator's platform

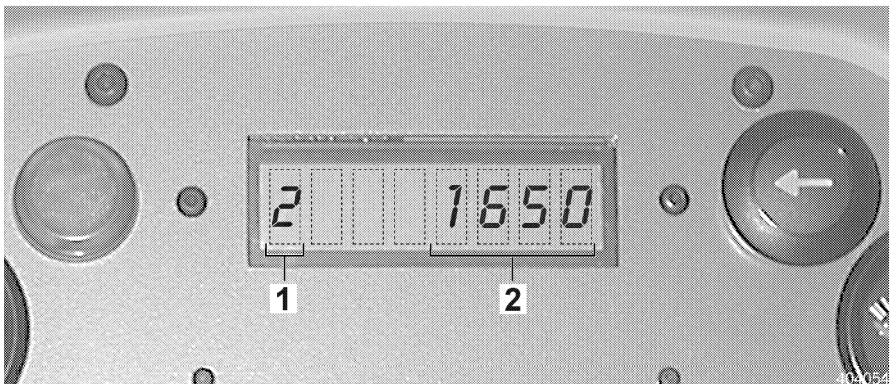


Indicator elements on the instrument panel

30 LCD display

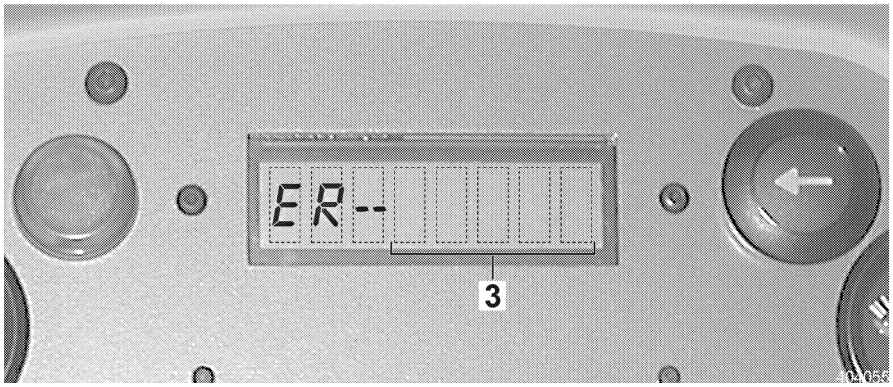
Shows:
- the travel speed stage,
- the Diesel engine RPM,
- the Service codes.

In case of an error, the LCD-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 again. If the Service code in the LCD-display does not disappear, then Liebherr Service must be contacted immediately.



LCD-display / Travel speed - RPM

1 Display of selected travel speed stage
2 RPM display



LCD – display Service codes

3 Display Service code

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

31 Warning light – Operator's cab

Warning light lights up:
- at increased Diesel engine coolant temperature
- in case of a drop in engine oil pressure
- in case of a drop in pump replenishing pressure
- in case of failure of the speed reduction pedal
- 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.

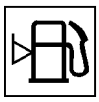
32 Engine oil pressure display

Shows the oil pressure of the Diesel engine.
The oil pressure may not fall below the following values:
At low idle RPM: 1 bar

At full load: 3.5 bar
If the engine oil pressure is below these values, turn the Diesel engine off immediately and remedy the problem (possibly change engine oil and filter).

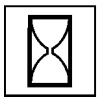
33 Coolant temperature display

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).



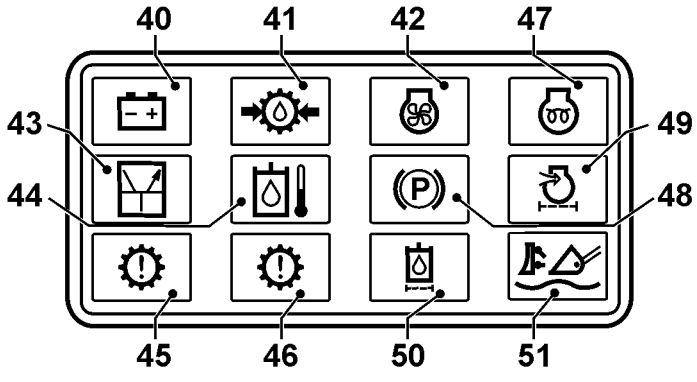
34 Fuel gauge

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.

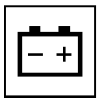


35 Hour meter

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

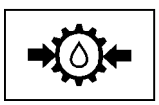


Indicator lights



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.



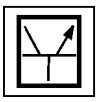
41 Indicator light – pump replenishing pressure

Color: red

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

42 Indicator light - fan control

Not assigned.



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.

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.

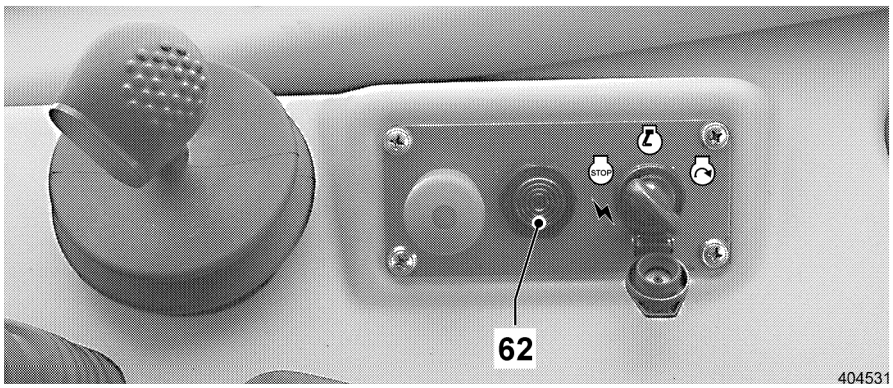
50 Indicator light – return filter

Color: yellow
– Lights up if the hydraulic oil return filter element is dirty (hydraulic oil at operating temperature).

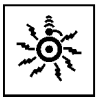
Perform hydraulic oil return filter element maintenance.

51 Indicator light – float position

Color: yellow
– Lights up if the float position is turned on.



Buzzer

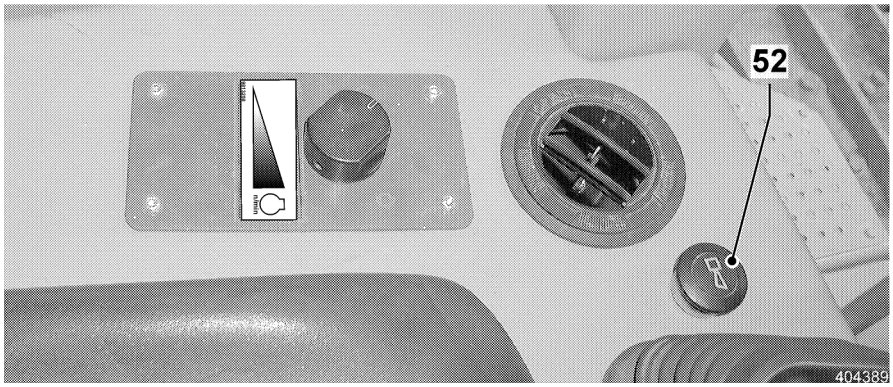


62 Buzzer

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. 5 sec. (Self check - buzzer)

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

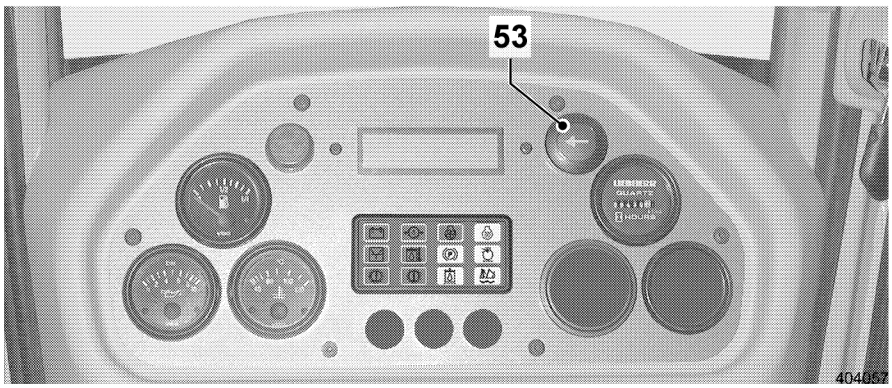
3.1.3 Control elements – operator's platform



Horn - button

52 Horn - button

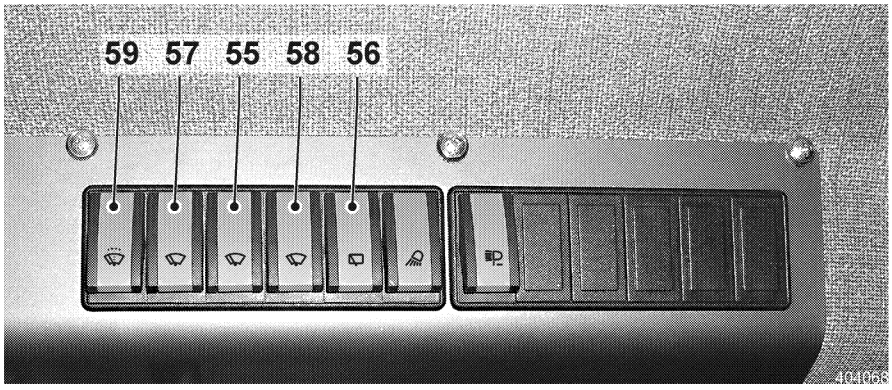
- The horn is activated by pushing the button.



Scroll key

53 Scroll key

– The service codes can be called up by pressing the scroll key, with the starter key in contact position. The service codes are shown in the LCD display. Maximum 10 service codes are saved in the memory. The current service code moves the previous one back by one place. After 30 seconds, the display changes automatically to standard display (speed stage / RPM).



Roof console, right

55 Switch windshield wiper, front

Turn on / off

56 Switch windshield wiper, rear

Turn on / off

57 Switch windshield wiper, left door

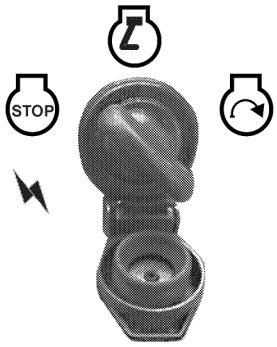
Turn on / off

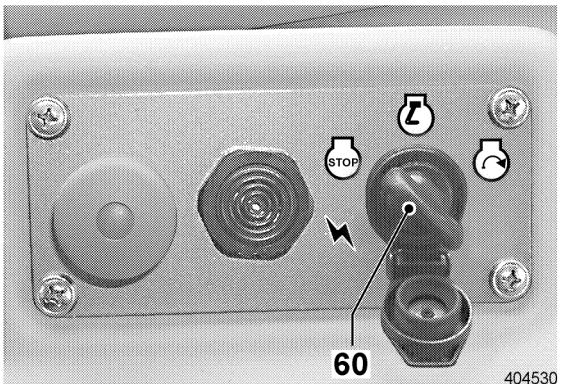
58 Switch windshield wiper, right door

Turn on / off

59 Switch windshield wiper intermittent / washer system

Stage 1: Continuous wipe
– The windshield wiper turned on with switches 55, 56, 57 and 58 is changed from intermittent wipe to continuous wipe.
Stage 2: Button – windshield washer system





Starter switch

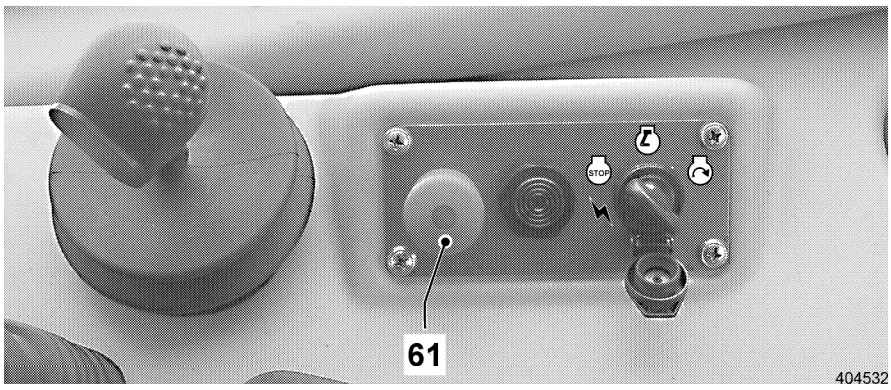
60 Starter switch

Zero position

Contact position

Start position

Parking position

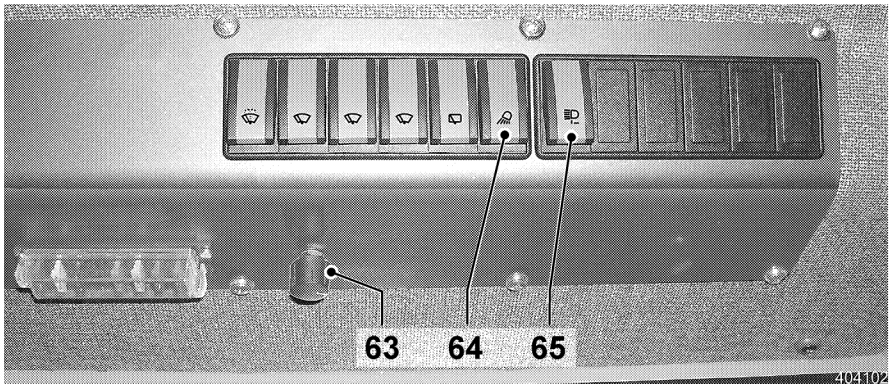


Emergency off button

61 Emergency off button

– The machine stops immediately when the emergency off button is pressed.

The working attachment can still be operated.



Roof console, right

63 Knob – windshield wiper intermittent control

– With the knob, the timing for intermittent wipe can be regulated.

64 Switch – working floodlight

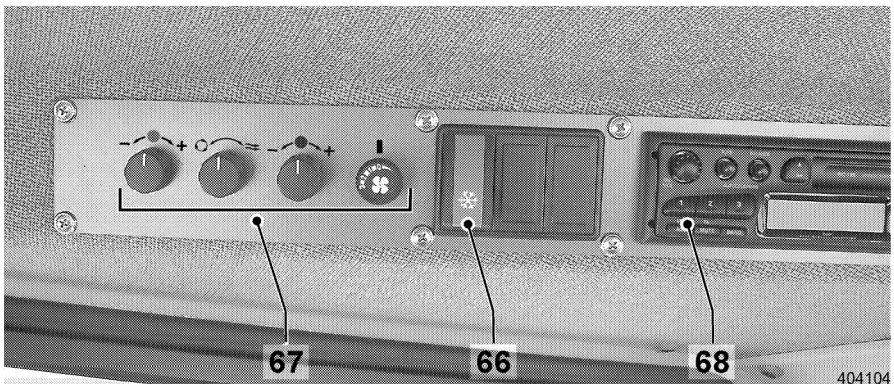
Turn on / off

Press the switch to turn the working floodlights on / off.

65 Switch – auxiliary floodlight

Turn on / off

Press the switch to turn the auxiliary floodlights on / off.



Roof console, left

66 Air conditioner master switch

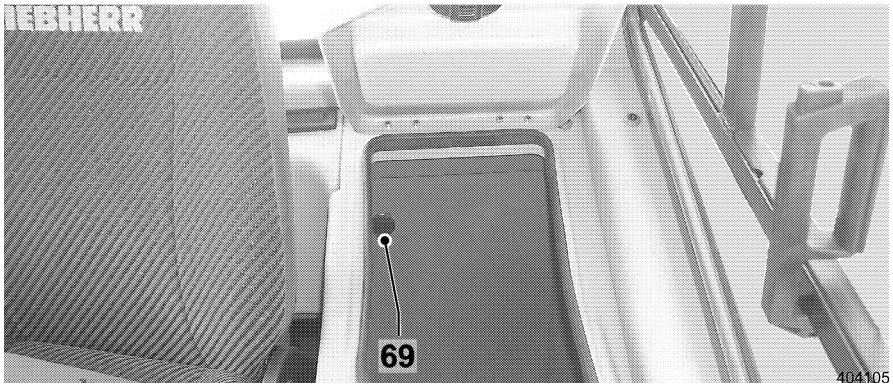
– The air conditioning system is turned on / off by pressing the switch.

67 Operation heater / air conditioning system

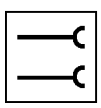
– Location of control elements. For operation, see section "Heater, ventilation" or “Air conditioning system”.

68 Radio

– The operation of the radio is described in the separate radio operating manual.



Electrical socket

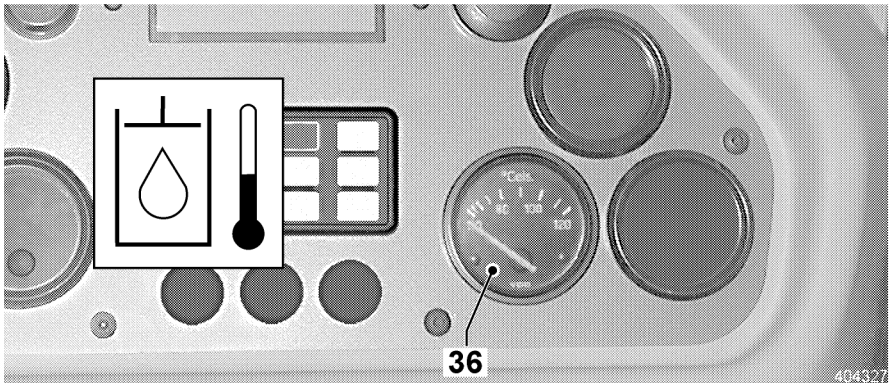


69 Electrical socket 12 V

– The 12 V electrical socket is installed on the left of the operator’s seat in the glove compartment.
– Auxiliary units (max. load 10A) can be connected via the integrated 24V electrical socket.
– Only usable if the starter key is in contact position.

3.1.4 Hydraulic oil temperature gauge

(Special equipment)



Display – hydraulic oil temperature

36 Hydraulic oil temperature gauge

– 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 remedy the problem (for example, clean the oil cooler).

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

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

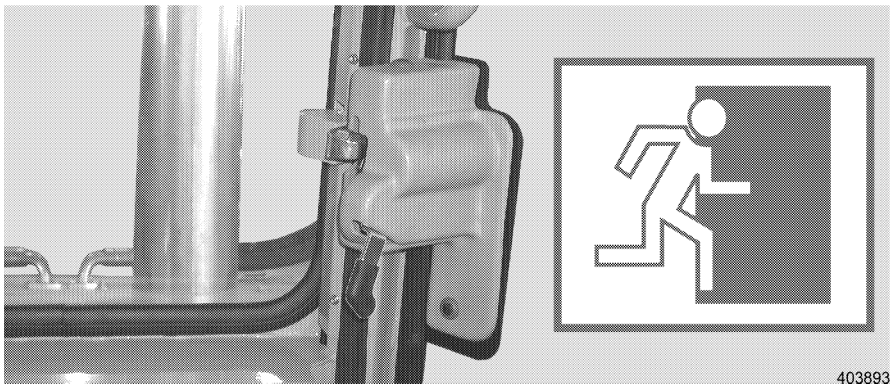
Danger of injuries due to inadvertent movement of the machine!

! 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

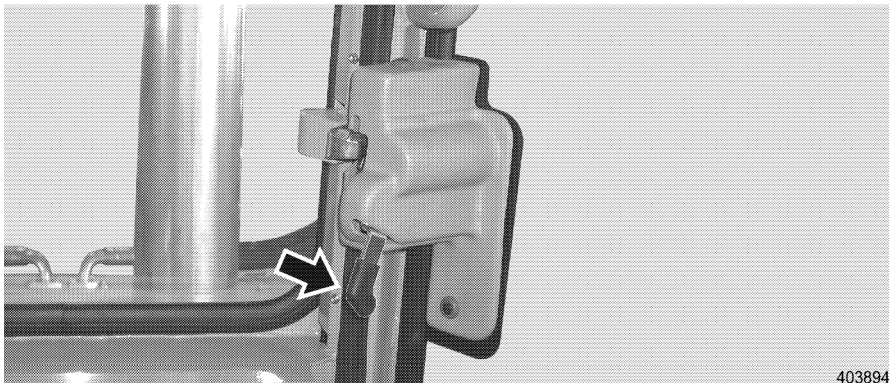
Always enter and exit the operator's cab via the left operator's cab door.



Emergency exit

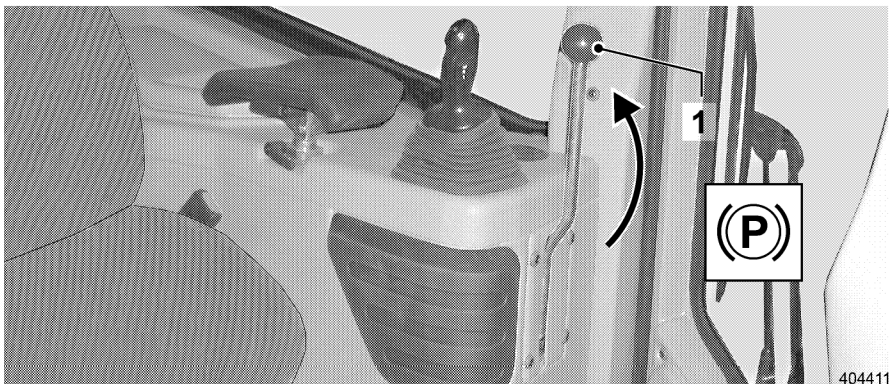
Exit the cab via the emergency exit

The right operator's cab door is intended as the emergency exit and should 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 easily exited from the inside through the right operator's cab door.
- Open the operator's cab door: Push the lever on the door lock up.



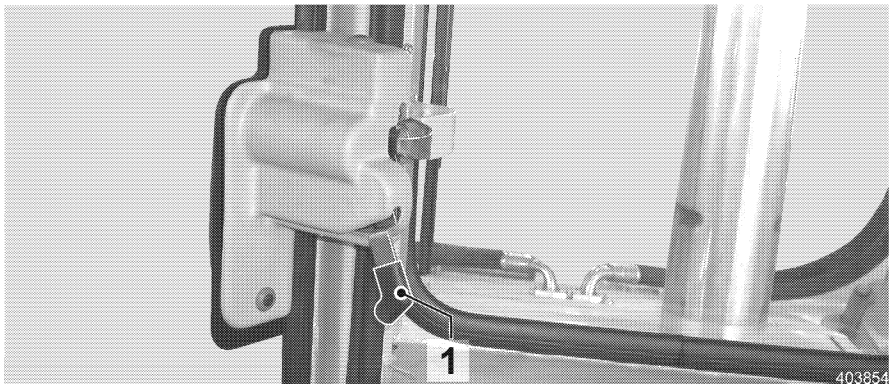
Safety lever up

- Before leaving the operator's cab, always 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.



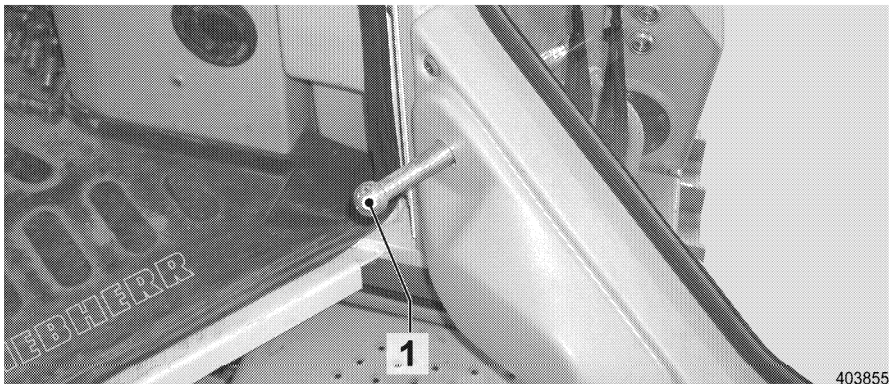
Open the operator's cab door

To open the door from the inside

- Push the lever 1 on the door lock up.

Door latch

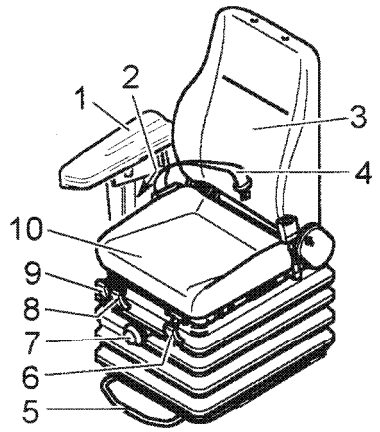
The fully opened cab doors are held in this position by the door latch 1.



Release the door latch

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

3.2.4 Operator's seat



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Operator's seat - main components and control elements

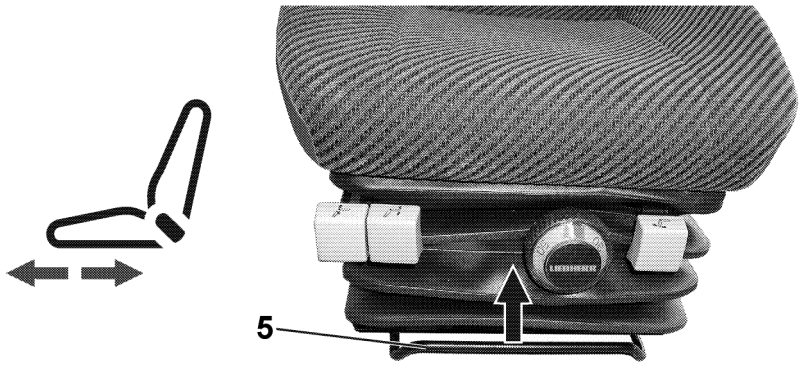
1 Armrest
2 Arm rest adjustment
3 Backrest
4 Seat belt
5 Lever - horizontal adjustment
6 Lever - backrest adjustment
7 Knob - seat suspension
8 Lever - incline adjustment forward
9 Lever - incline adjustment backward
10 Seat surface

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.



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Horizontal adjustment

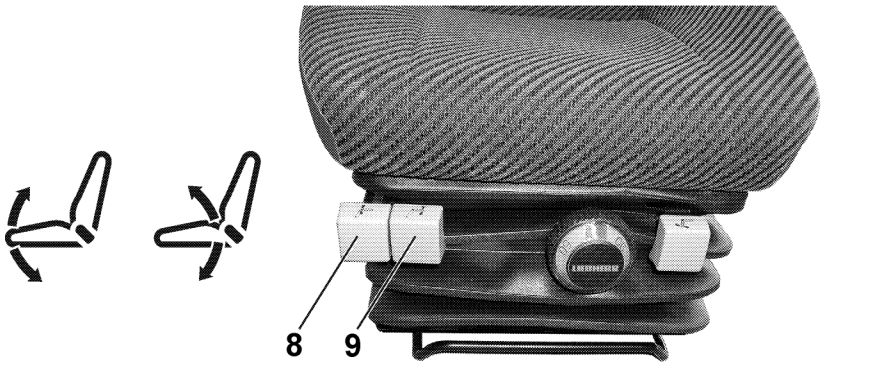
5 Lever - Horizontal adjustment

- 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 incline

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



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.

Adjustment - backrest

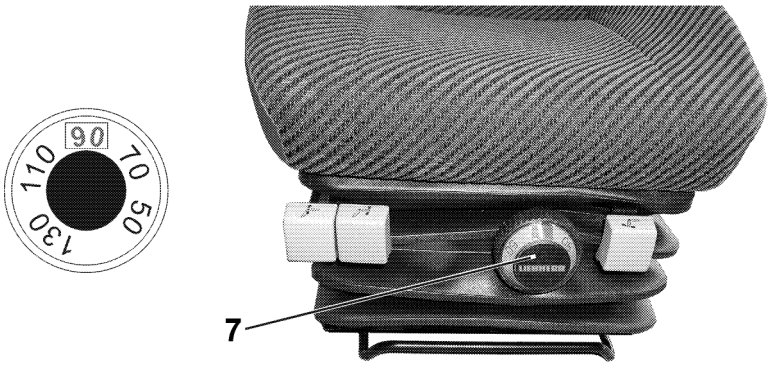
3 Lever - backrest adjustment

- 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.



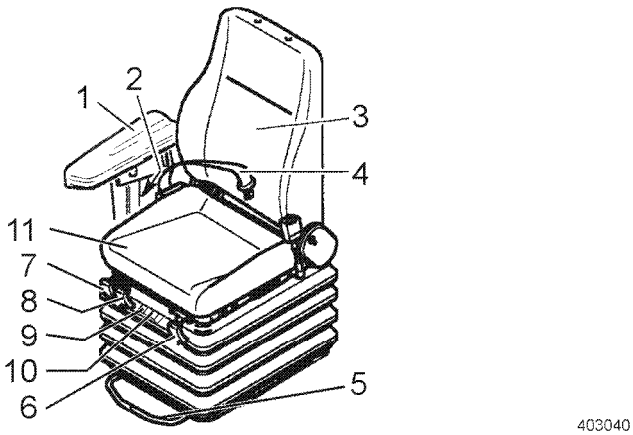
Adjustment - seat suspension

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

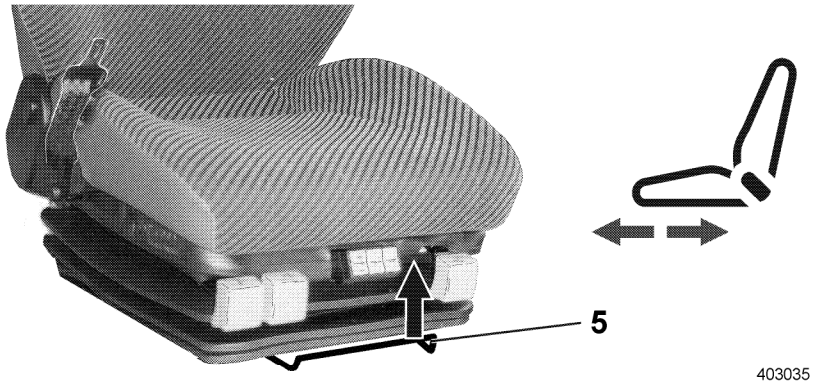
1 Armrest
2 Adjustment - armrest
3 Backrest
4 Seatbelt
5 Lever - horizontal adjustment
6 Lever - adjustment - backrest
7 Lever - incline position - front
8 Lever - incline position- rear
9 Button - seat suspension
10 Button - back support
11 Seat surface

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.



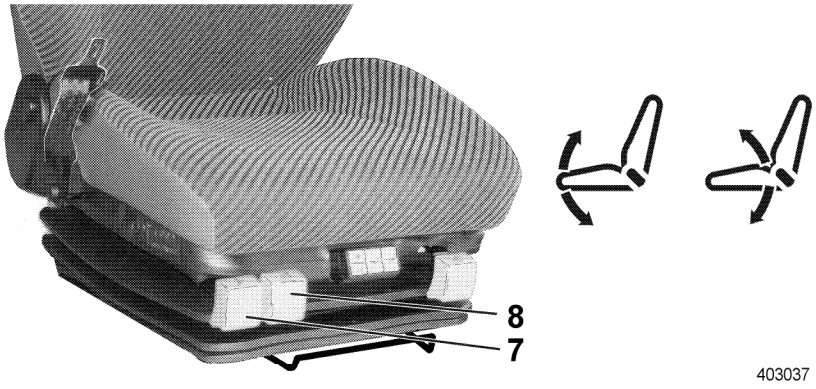
Horizontal adjustment

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.



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.

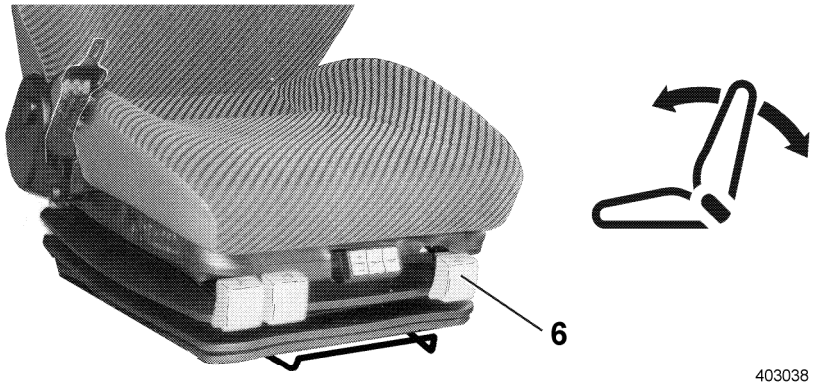
Adjustment of seat height

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.



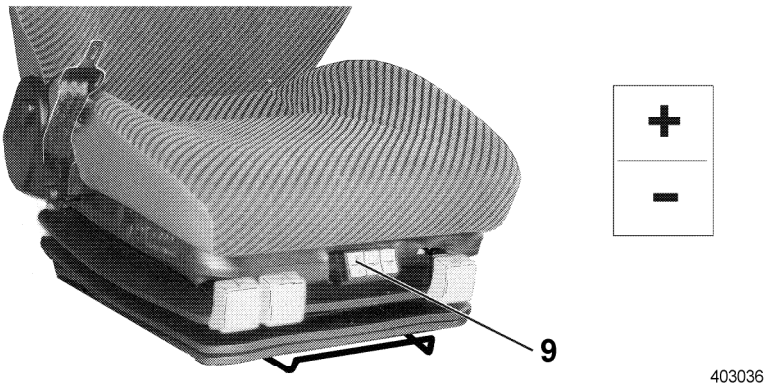
Adjustment - backrest

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.



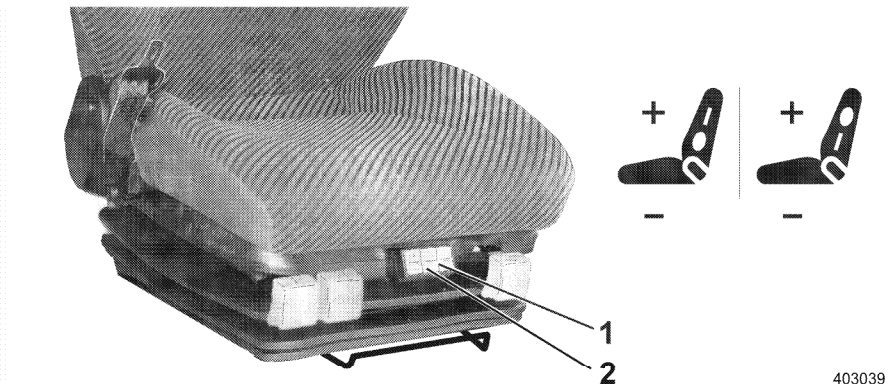
Adjustment - seat suspension

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

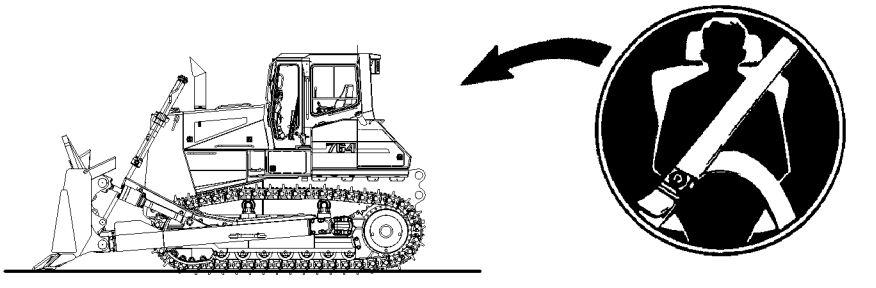
The installed seat conforms to ISO 7096.

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 roll over protection - **ROPS** .
The roll over protection - ROPS only provides safety action for the operator if he also wears the seatbelt.
In this section, the safety aspects for wearing the seat belt are described.



Seatbelt obligation

Caution

Danger of injury if seatbelt is not worn! If the machine is slowed down or if it is stopped abruptly, a serious accident with severe injuries can occur if the seatbelt is not worn!
! Always wear the seat belt before operating the machine.

Danger

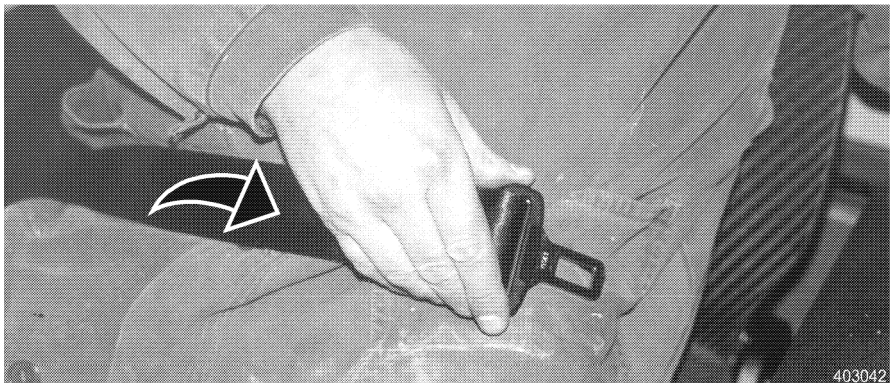
Danger of injury if seatbelt is not worn! If the machine tips or rolls over and the seatbelt is not worn, then an accident with mortal injuries can occur as a result!

! Always wear the seatbelt before operating the machine.

- To ensure the safety: Regularly check the condition, function and mounting of the belt and replace defective parts immediately.
- Make sure that the seatbelt is not twisted!

Fastening the seatbelt

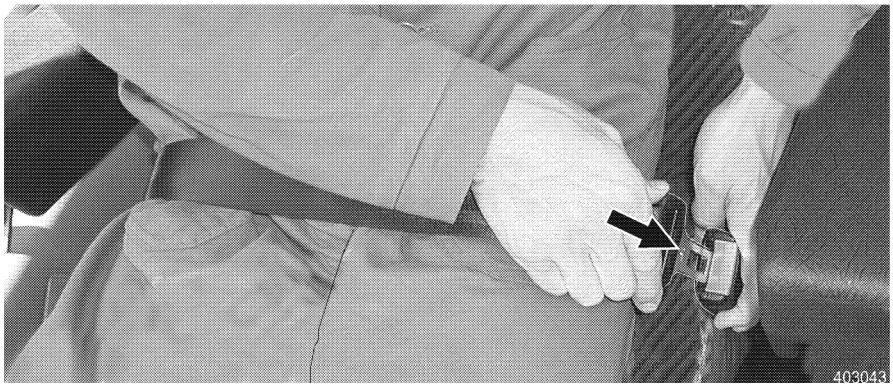
The seatbelt is an automatic belt. It is not necessary to adjust the length of the belt.



Fasten the seatbelt

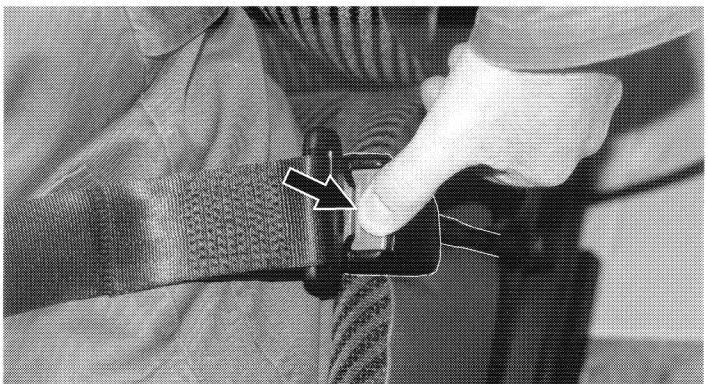
- Hold the belt buckle with your right hand and pull the belt slowly from the belt retainer.

NOTE: If the belt is pulled out too quickly, then the belt retainer blocks the belt.



Close the belt

- Hold the buckle with the left hand and pull the belt over your lap.
- Insert the belt buckle into the housing and pull on the belt buckle to make sure it is locked.



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Release the belt

Release the seatbelt

- To release the seatbelt: Push the lock on the buckle down with the thumb.

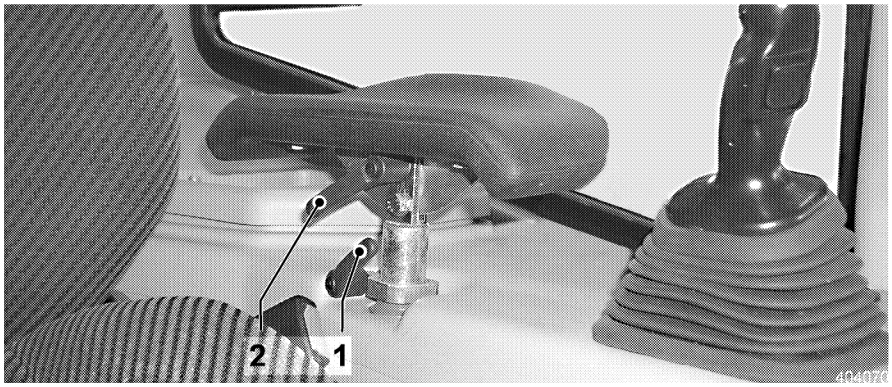
Adjustment of armrest

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

- Adjustment: Loosen handle 1, adjust the height and incline and tighten.

3.2.8 Armrests

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

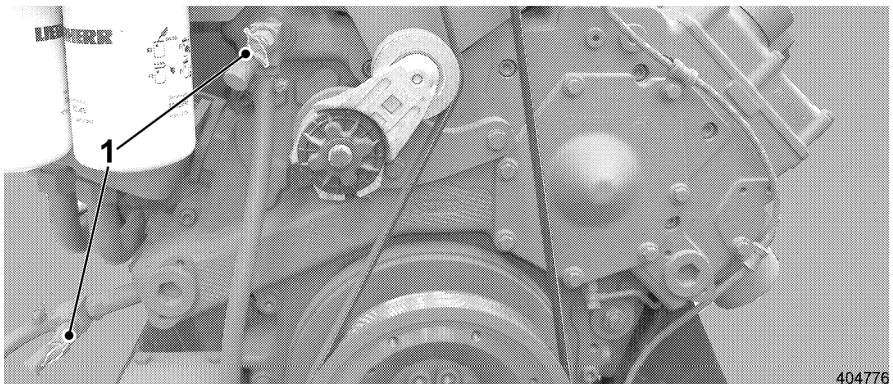


Adjustment - arm rest

- 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.

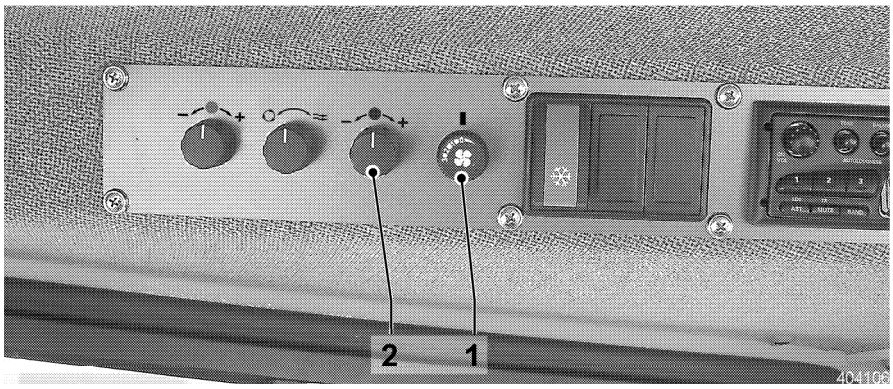


Shut off valves

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

Turn the heater on / off

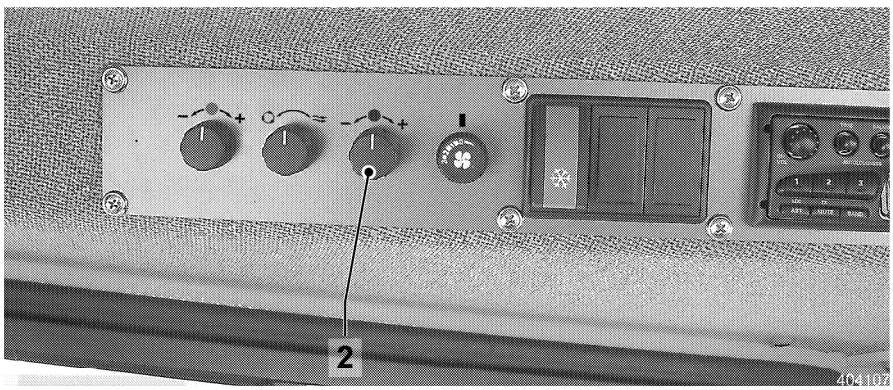
Control elements of heater:
1 - Knob - blower
2 – Knob - temperature



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.

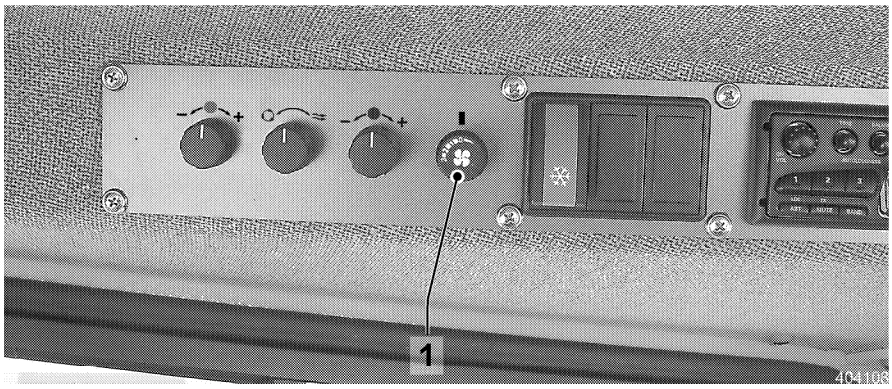


Temperature regulator

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

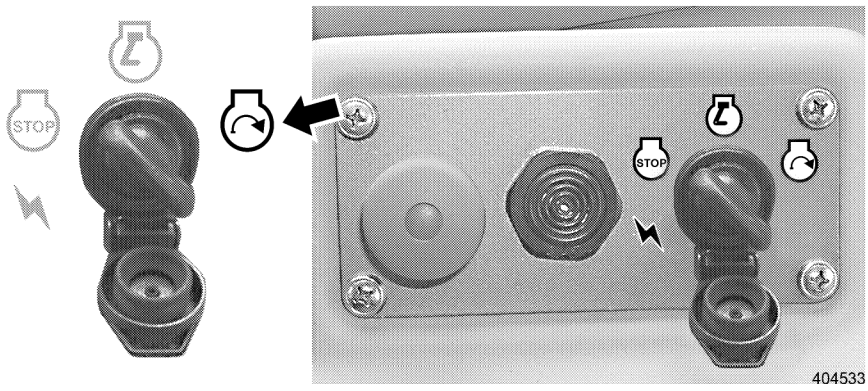
Blower stages:
Stage 0 – OFF position
Stage 1 – weak air flow
Stage 2 – medium air flow
Stage 3 – strong air flow

- 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

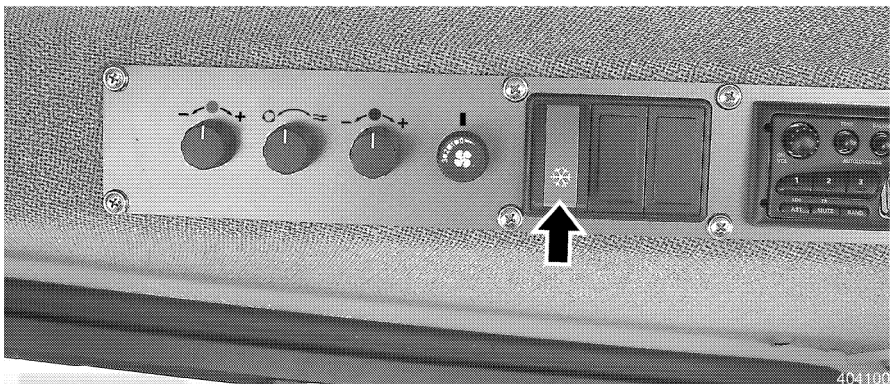
To ensure the continued function of the air conditioning system. we recommend to put the air conditioning system into operation at least once every 2 weeks.
During the operation of the air conditioning system the shaft seal ring in the air compressor is also lubricated. This prevents loss of refrigerant from the air compressor.
On damp days, the air conditioning system can dehumidify the air in the cab (use heater and air conditioner simultaneously).
With the heater, the cool air is compensated again. The temperature in the cab becomes more comfortable and the windows will not fog up.



Start the Diesel engine

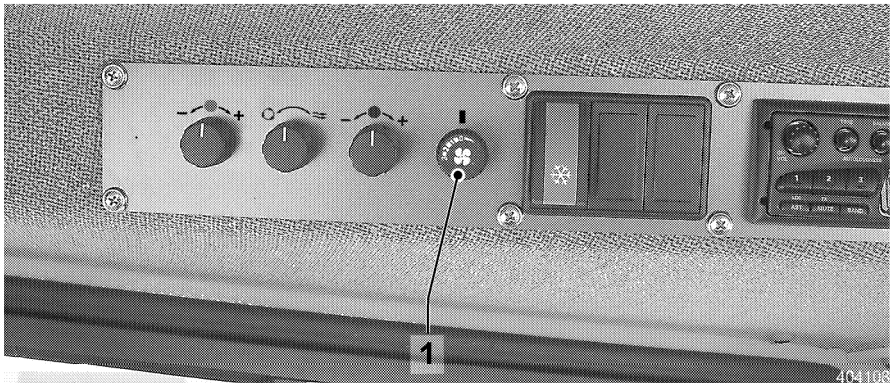
Turn on the air conditioning system The air conditioning system works only if the Diesel engine is running.

- Start the Diesel engine.



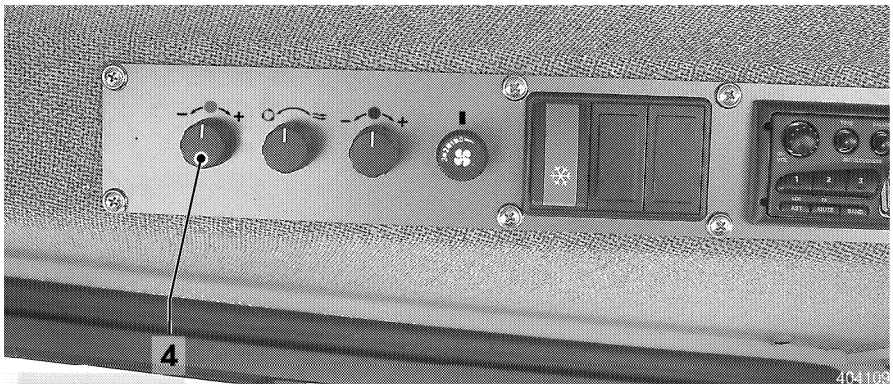
Main air conditioning switch

- Press the main air conditioning switch in the instrument panel.



Blower knob

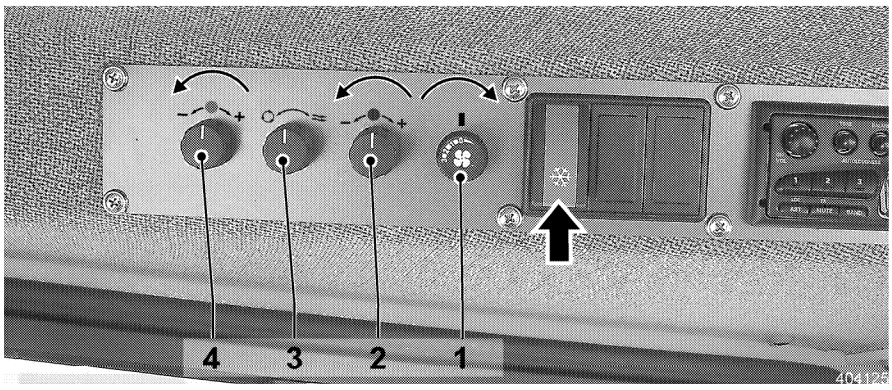
- Set the blower switch 1 at least to stage 1.



Knob – air conditioning system

- Select the desired air temperature with the knob 4 for the air conditioning system.

The output of the air conditioning system is increased by turning the knob in counterclockwise direction. The temperature in the operator's cab is reduced.
The higher the cooling output is selected with the knob, the larger the blower stage must be set.
Due to the integrated de-icing protection, the evaporator will not up.



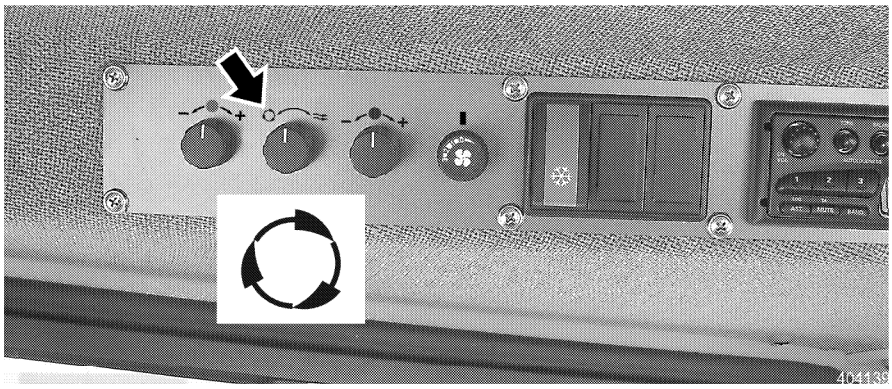
Air conditioning system – full power

Air conditioning system – full power

To obtain the greatest cooling effect in the cab:

- Turn the knob – air conditioning system in counterclockwise direction to the stop.
- Set the highest blower stage.
- Turn the heater off.
- Close the windows.
- Use the air vent knob to change from fresh air operation to air circulation.

Air circulation

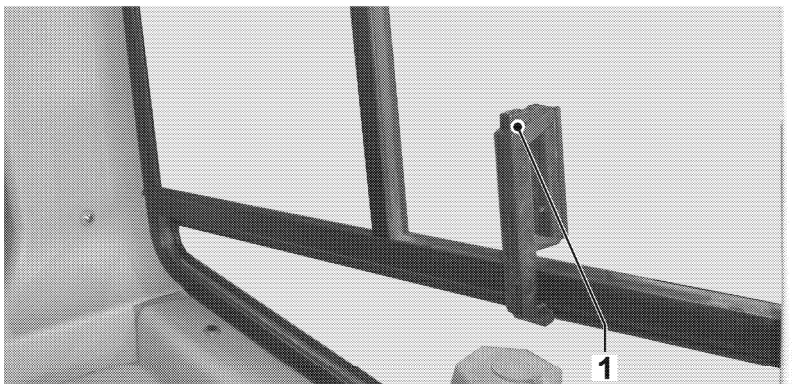


Air circulation

In air circulation operation, the outside air supply is shut off and the air in the interior of the cab is circulated. This prevents dirty outside air from infiltrating inside the cab. Do not work too long in this position.

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.



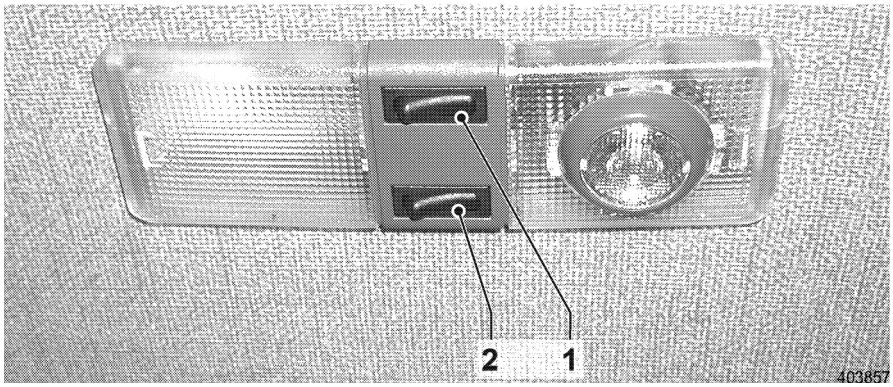
Open / close the sliding window

- 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.



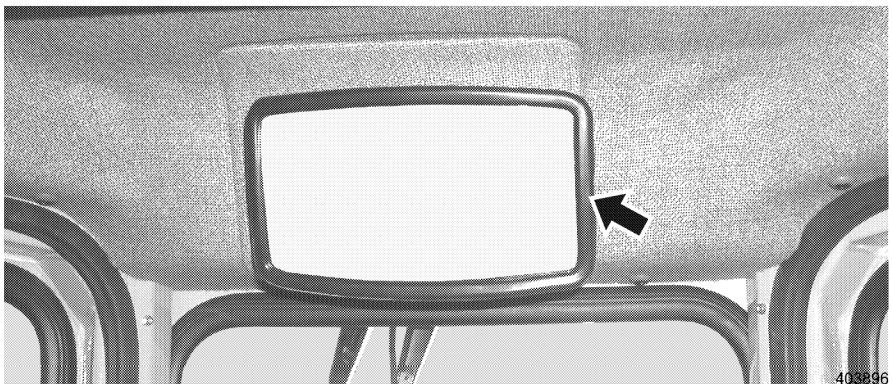
Interior light - reading lamp

- 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.



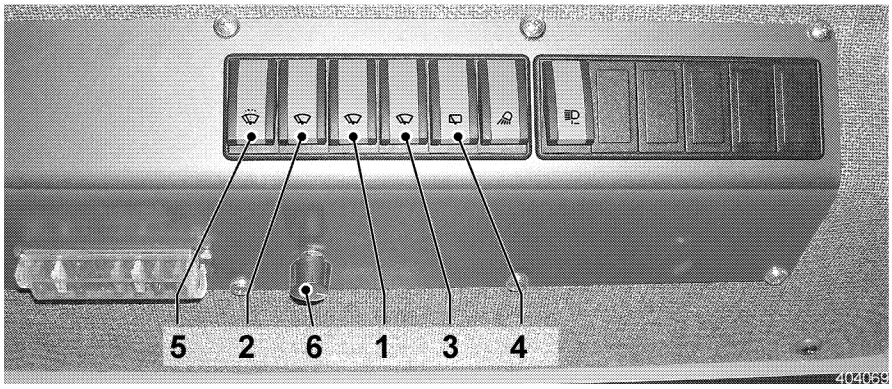
Adjustment - mirror

- 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 the 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 windshield washer fluid.
Make sure that the machine's electrical system is turned on before operating the windshield wiper and washer system.

In case of frost, before turning the windshield wipers on for the first time, check the wiper blades to ensure that they are not frozen to the window pane.

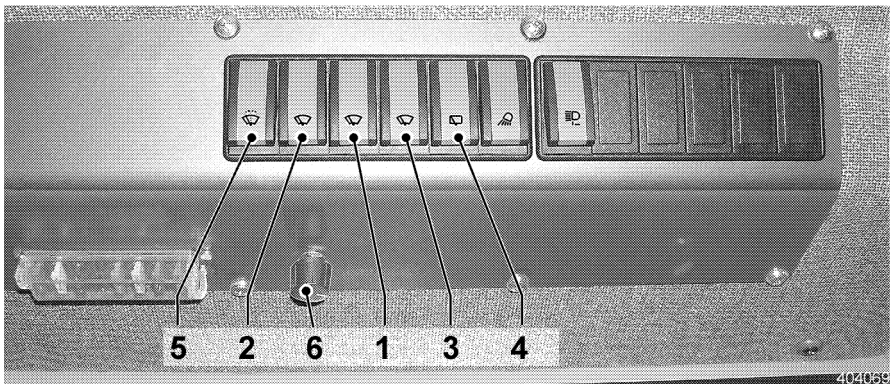


Switch windshield wiper and washer system

Operation of the windshield wiper and washer system

The windshield wiper system is actuated by switch 1, 2, 3, 4.

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



Switch - windshield wiper and washer system

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

To wipe the window

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

Intermittent / continuous wipe

Functions switch 5:
– Switch pressed on top: intermittent wipe
– Switch in center position: continuous wipe
– Switch pressed on the bottom: wipe / wash function

- Windshield wiper continuous wipe: Set switch 5 to stage 1 (center position). The windshield wiper which had been turned on with switch 1, 2, 3 or 4 is switched over from intermittent wipe to continuous wipe.

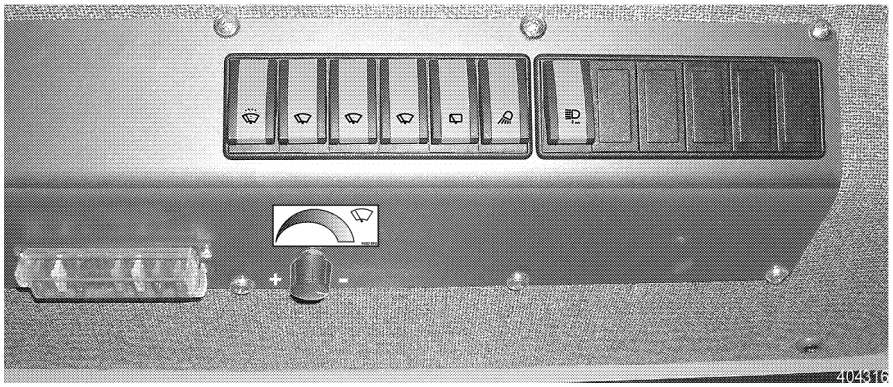
To wash the window

- Press switch 5 and hold it down.

The windshield washer fluid is sprayed onto the window through the nozzles.

Timing for intermittent wipe

The time intervals for intermittent wipe can be infinitely adjusted with the knob 6.



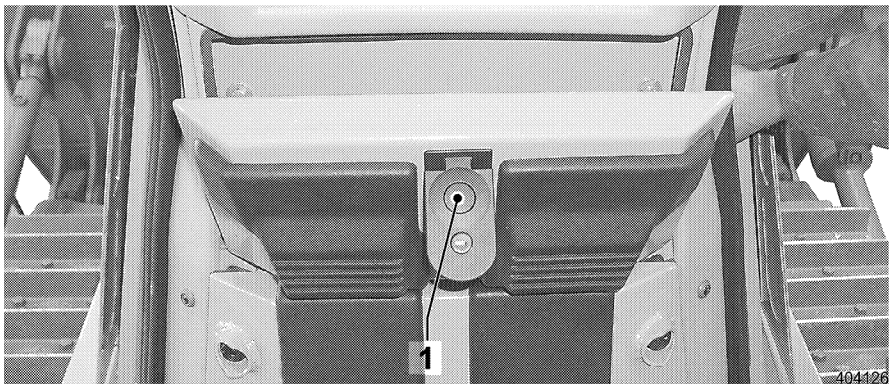
Knob – intermittent wipe

– Turn the knob to the right: short interval for wipe.
– Turn the knob to the left: long interval for wipe.

• Adjust the knob 6 to the desired time interval.

3.2.15 Compartment for documentation

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



Compartment

Open the compartment for the machine documentation

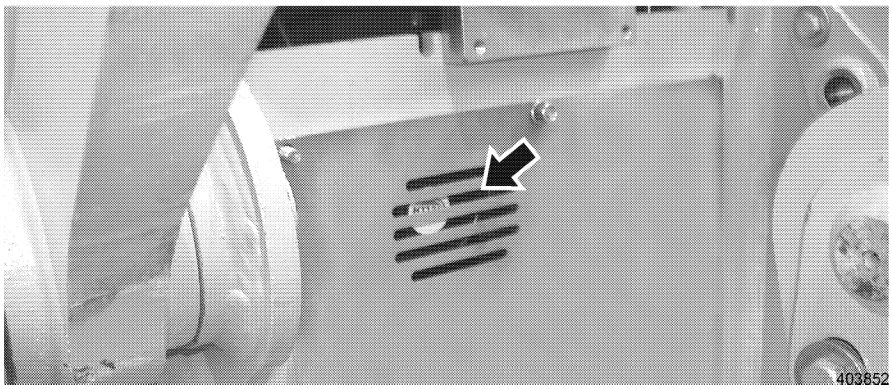
• Push the button 1 on the lock and open the cover.

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

(Optional equipment)

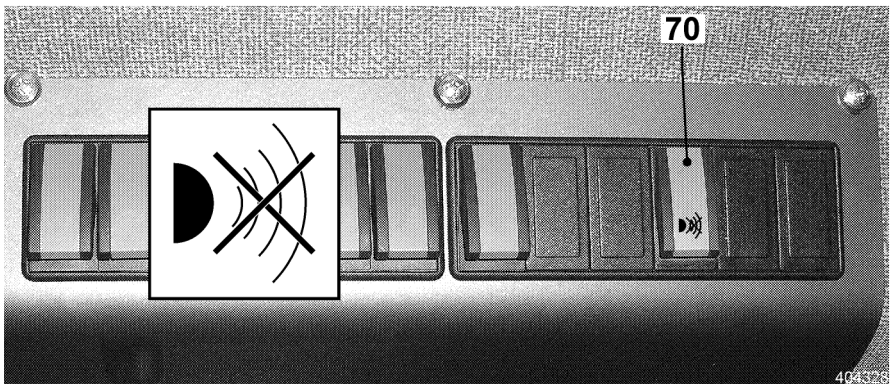


Back up alarm

The back up alarm can be heard if the travel joystick is moved to "reverse travel" position.
– The alarm warns personnel behind the machine.
The backup alarm is in the rear of the machine, the sound level is set automatically.

3.2.17 Backup warning device - disengageable

(Special equipment)



Switch - backup warning device

70 Backup warning device, disengageable

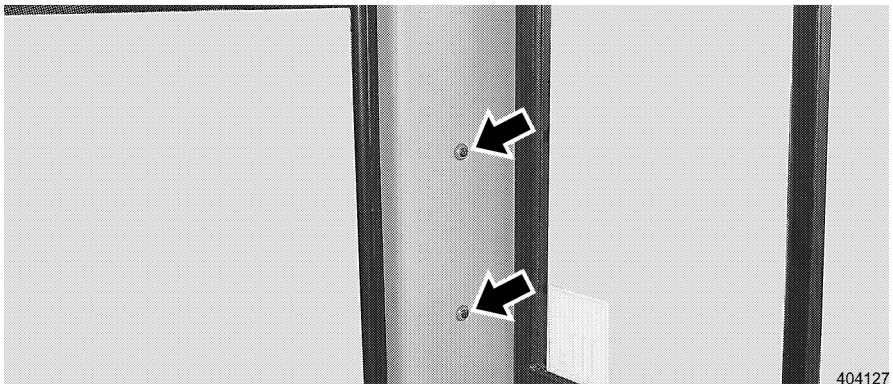
The acoustical signal of the "backup warning device" can be turned off by pressing switch 70 on the right roof console.

– The backup warning device is a safety device to warn personnel in the vicinity acoustically as soon as the machine drives backwards.

! The backup warning device should be turned off only in exceptional cases.

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.

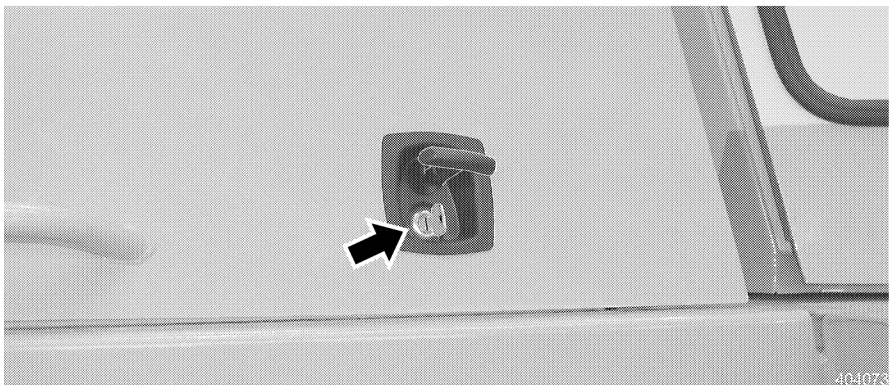
3.3 Operation

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.
– The machine is fully refueled. See section "Add Diesel fuel".

Operating position

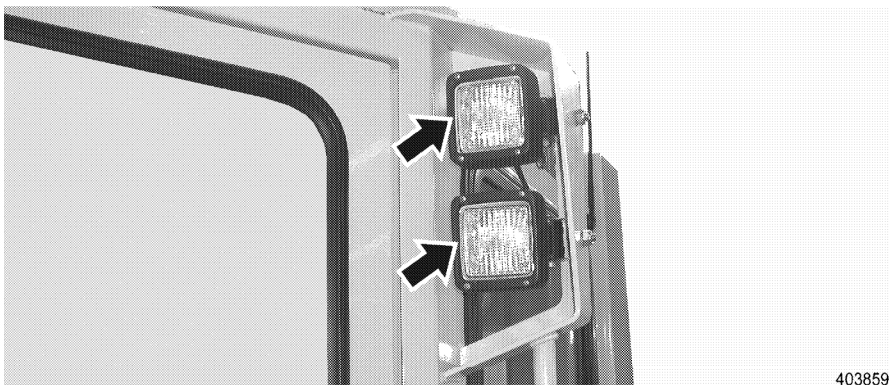
To bring the machine into operating position, proceed as follows.



Lock all doors

Close the service doors, flaps and hoods

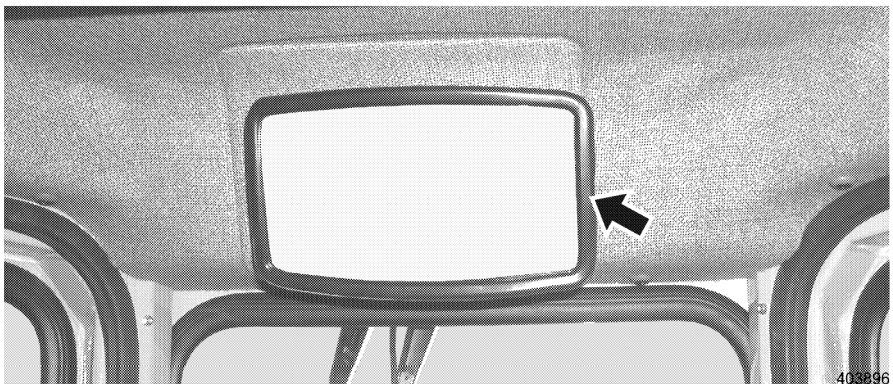
- Close all service doors, flaps and hoods and lock, if possible.



Floodlight adjustment

Check the lighting system

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

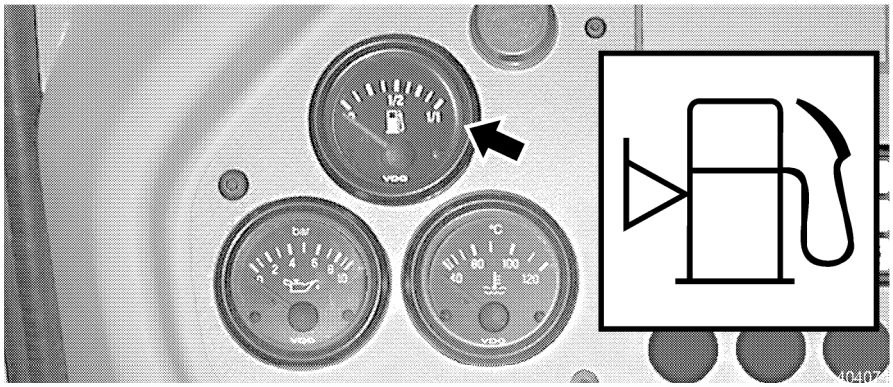


Rear view mirror

Adjust the rear view mirror

- Adjust the rear view mirror.

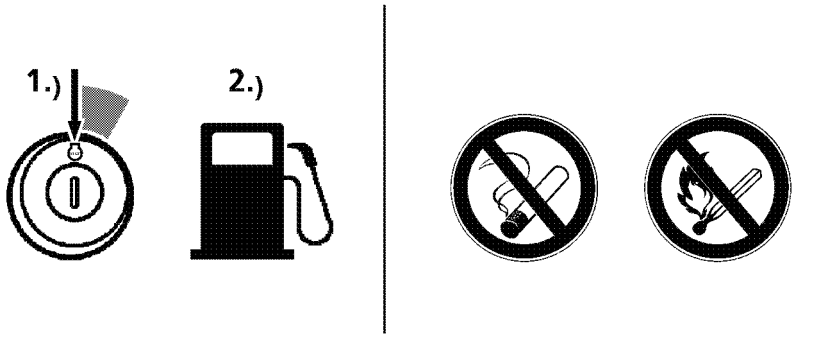
Add Diesel fuel



Fuel gauge

Fuel gauge

- Set the starter switch to contact position.
- Check the fuel gauge display to see if there is sufficient Diesel fuel in the tank.

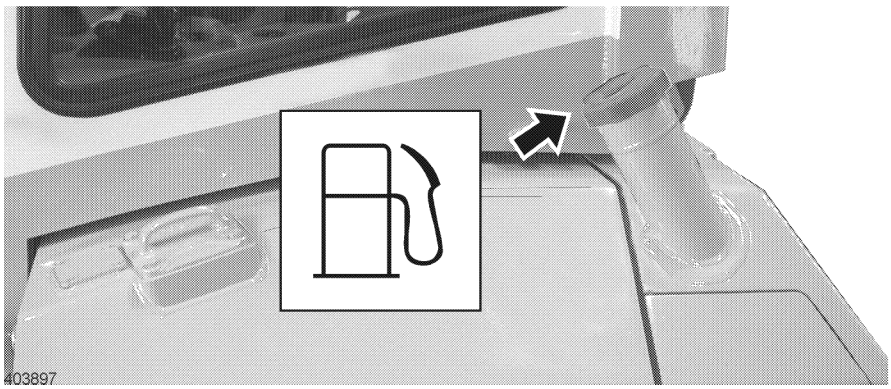


Refueling safety

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

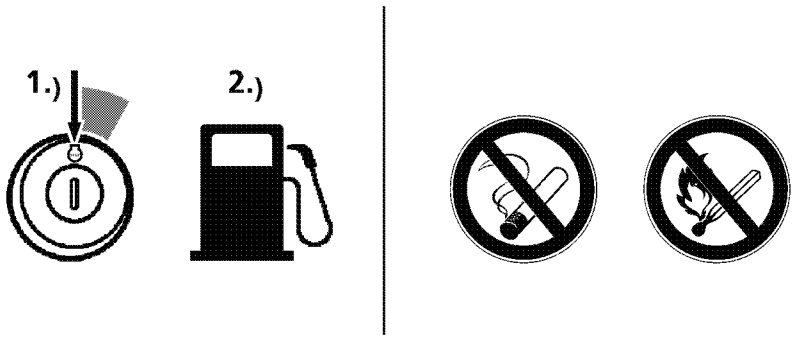
- Unscrew the tank cover 1.
- Add only clean Diesel fuel.

– 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

Special equipment

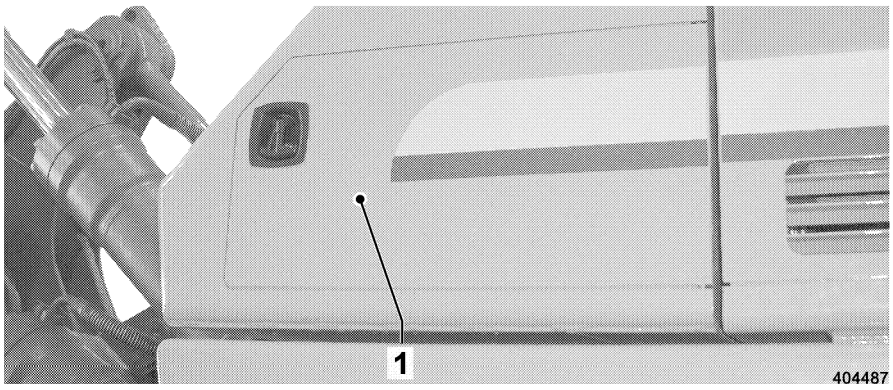


Refueling safety

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.

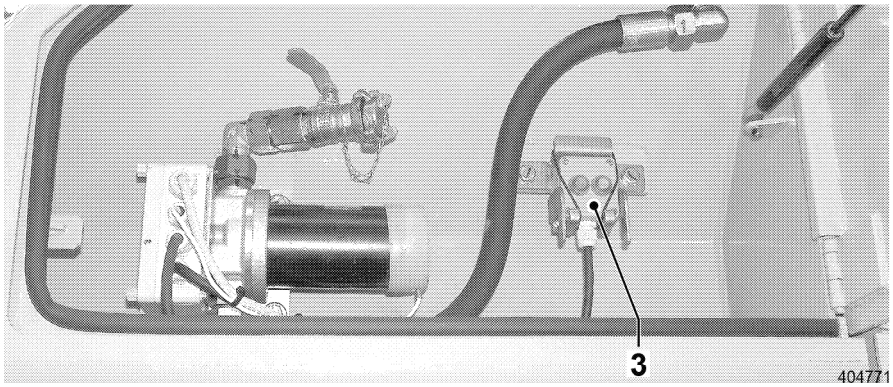


Access – refueling pump

Refueling procedure

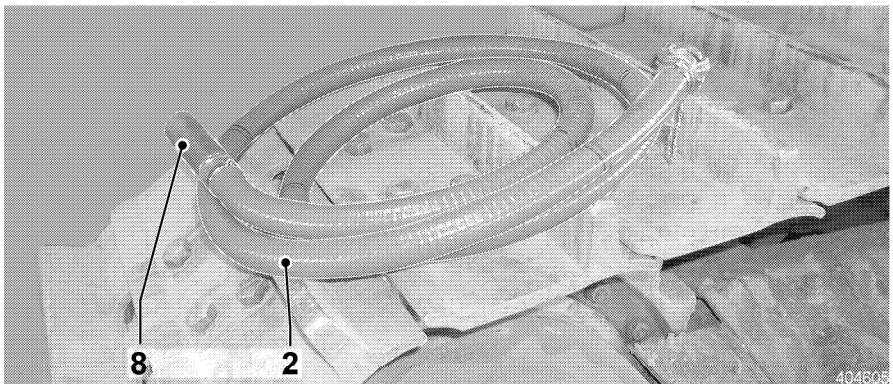
The refueling pump is located on the right hand side in the compartment.

- Open the compartment door 1 on the right rear.



Control – refueling pump

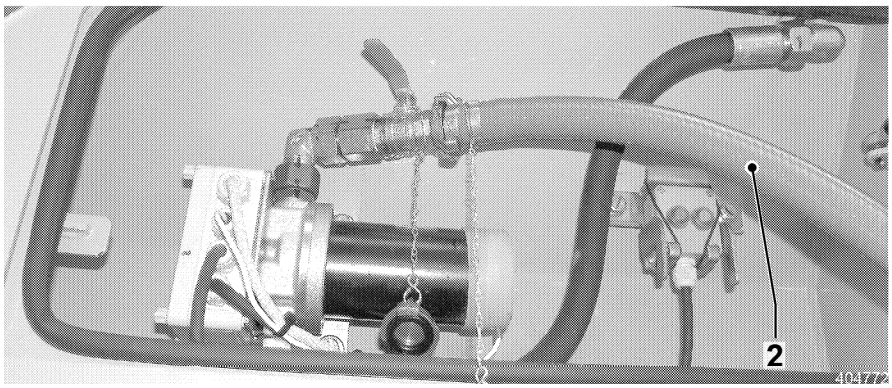
– The control 3 is removable.



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.



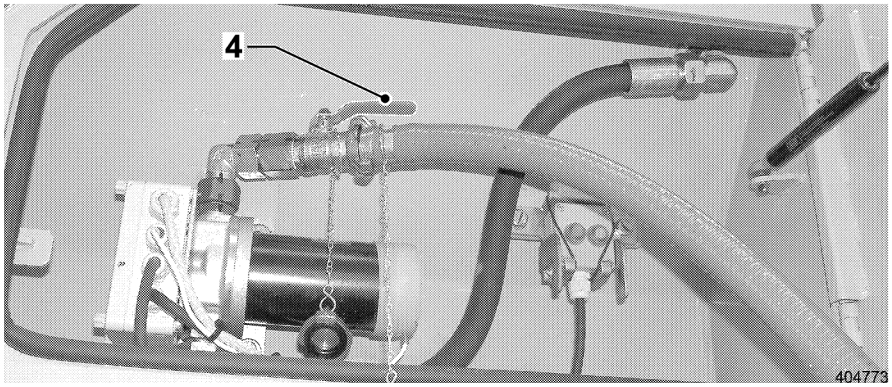
Suction hose

- Connect the suction hose 2 to the connection of the refueling 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.

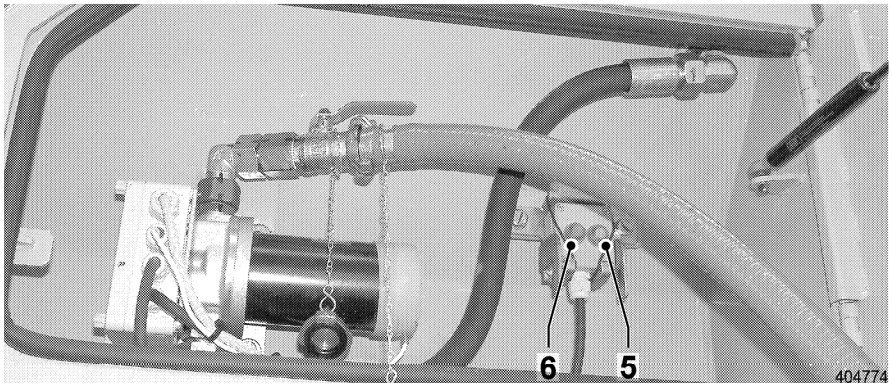


Shut off valve

- Open the shut off valve 4 on connection of the refueling 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!



Switch – refueling pump

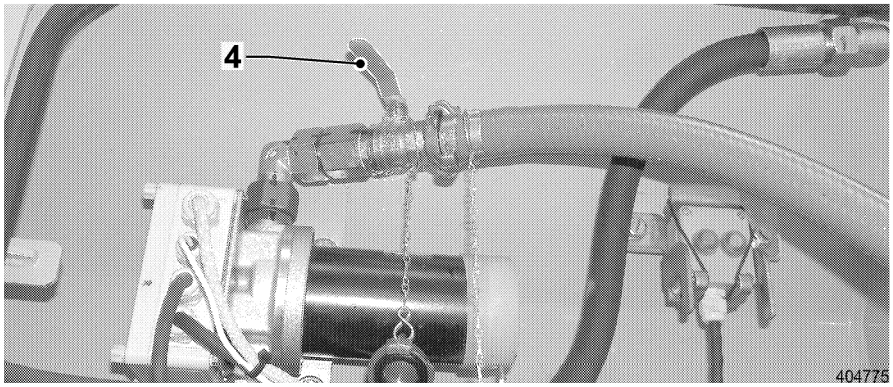
- Remove the control with cable from the retainer.

- 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 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.



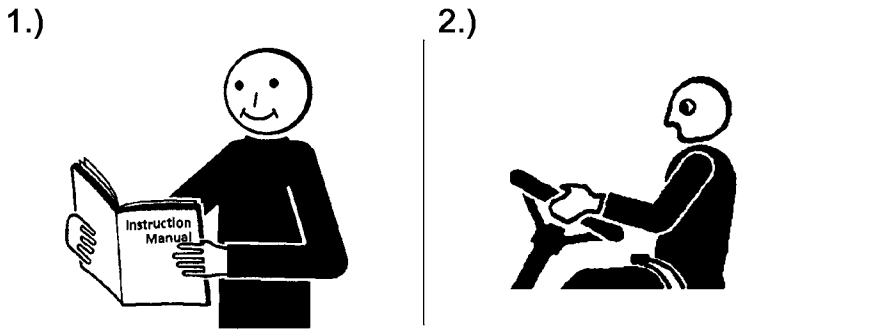
Shut off valve

- 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 blind couplings.
- Close the compartment 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



Operating instructions

1.) read and understand
2.) travel and work
Operate the machine only if you have read and understand the operating instructions!

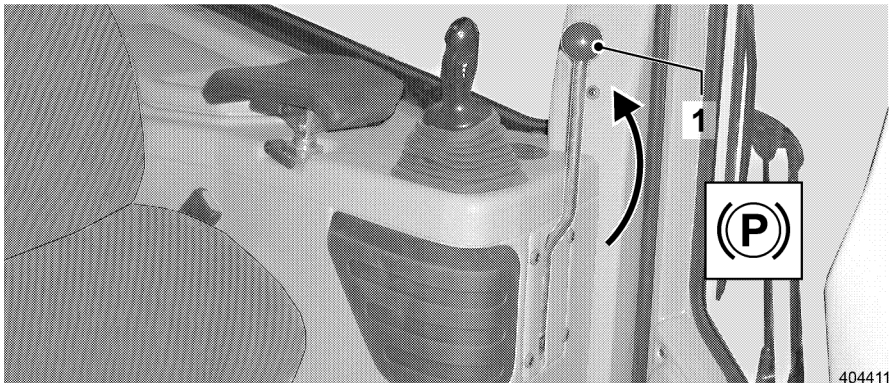
Notes for travel drive of the machine:
– The machine is equipped with a hydrostatic travel drive.
– The Diesel engine cannot be started by pushing or towing the machine.

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.

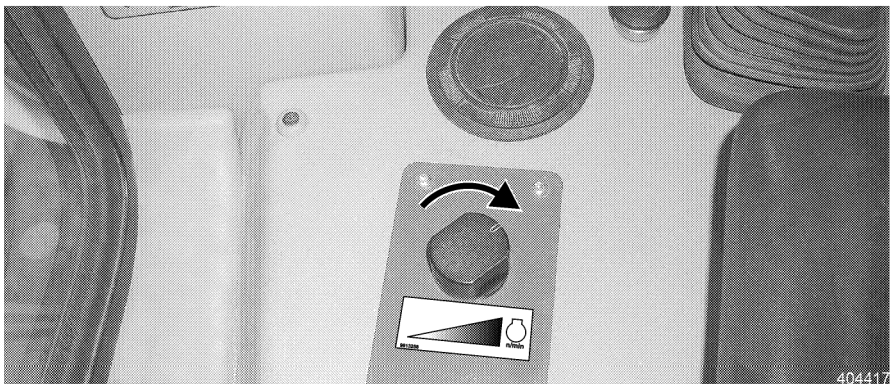


Safety lever up

- Move the safety lever 1 up.

Check the joystick position

- The joystick must be in neutral position.



Throttle control – 1/3 full load

- Set the throttle control 1/3 of full load.

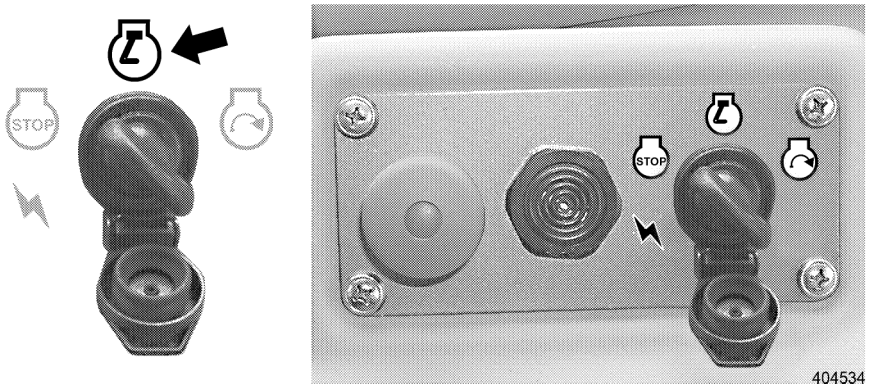
– Turn the throttle control to the right.
– Work with the machine always at full engine RPM. Only in some cases should the machine be operated at reduced engine RPM.

The machine has now ready to travel.

Starting procedure

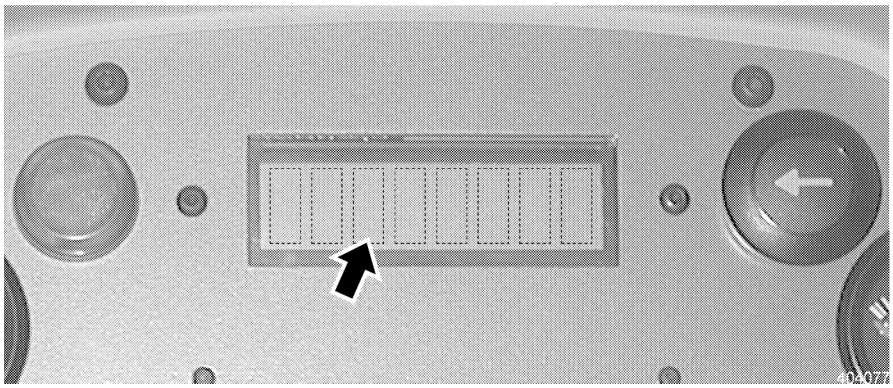
Check indicator lights

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.



LCD display

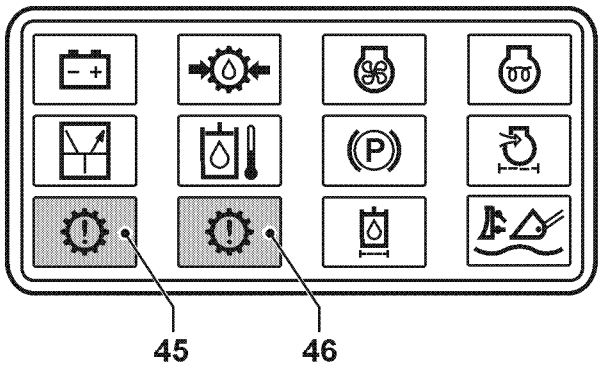
LCD display

When the board electronic is being checked, the following initialization messages appear one after the other in the LCD display:

– INIT OK
– RAM OK
– PROM OK
– FRAM OK
– 0 __ 0

Indicator lights

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

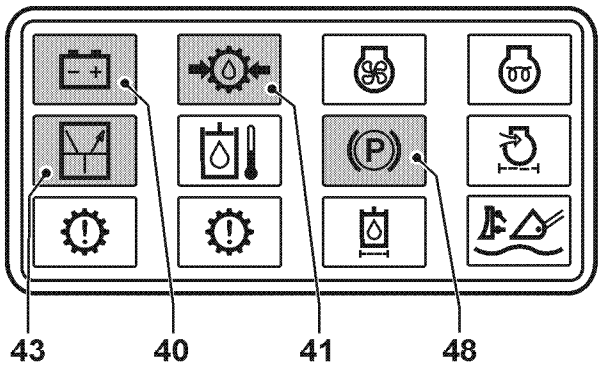


403942

Indicator lights

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

The following indicator lights must still light up:



403943

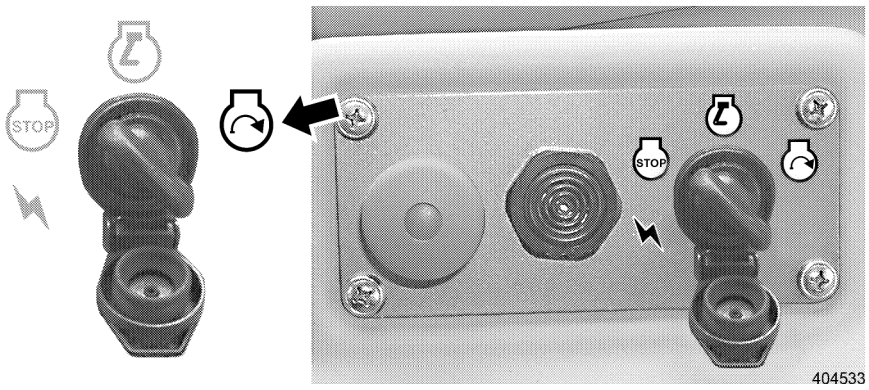
Indicator lights

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

- Wait until the indicator light – preheat system turns off. When the indicator light turns off, the preheat time is over.

– The engine is ready to start.



Starter switch – Starting position

- 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:

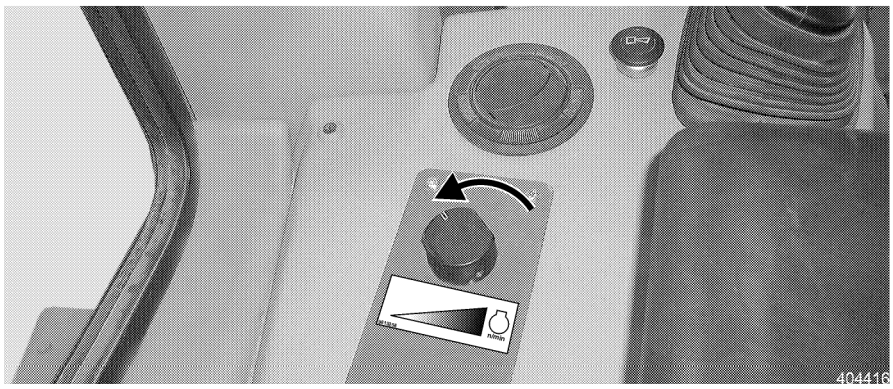
- Turn the starter switch back to off position.

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.



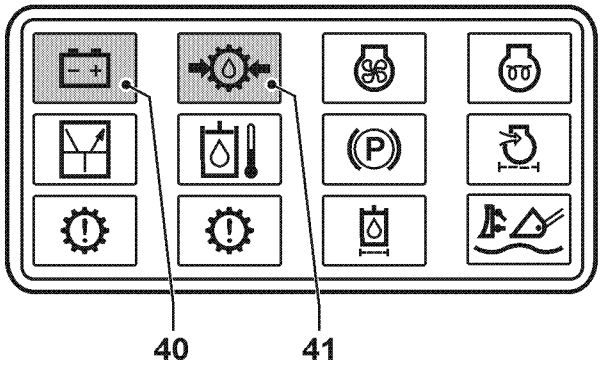
Throttle control – low idle

- 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.

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



403941

Indicator lights turn off

31 Warning light – Operator's cab
40 Indicator light – battery charge
41 Indicator light – pump replenishing pressure

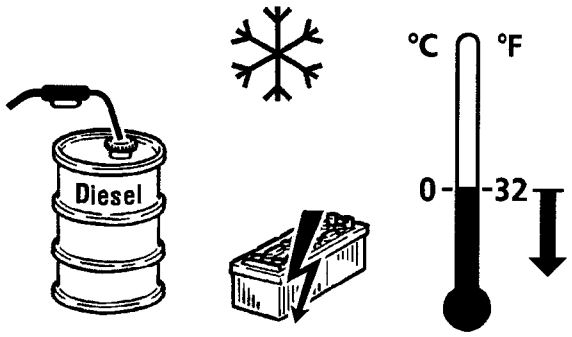
Problem remedy

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 behavior at low ambient temperatures.



403046

Winter operation

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 system, there is a danger of explosion!
! Do not use ether based starting aids.

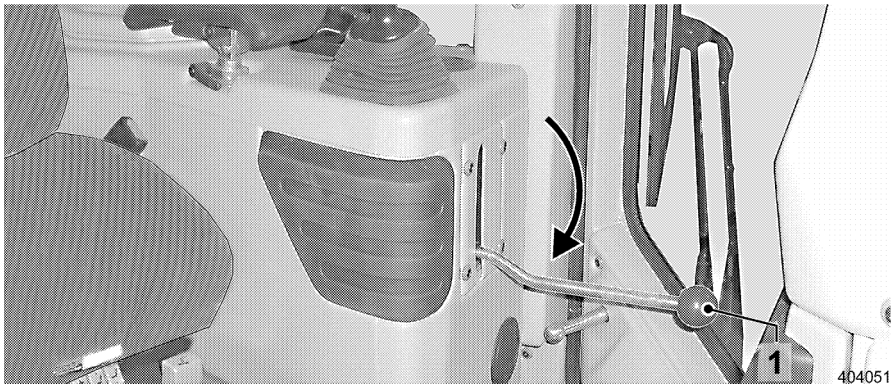
- Carry out the preparations for starting at freezing temperatures.

! After the starting procedure, 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.

3.3.4 Travel operation

Preparations for travel operation

The preparations for travel operation must be carried out in the given sequence.
Make sure that the machine is first in operating position.
See section "Operating position".



Safety lever down

- Move the safety lever 1 down.

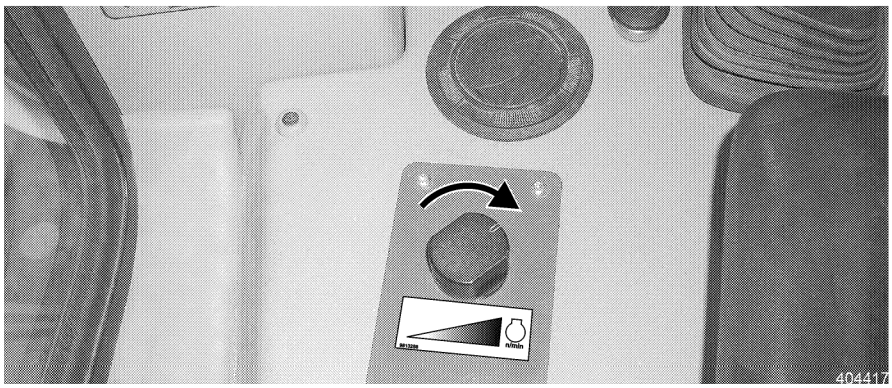
Self-check of electronic system

- After approx. 3 seconds, the indicator light – electronic lights up for a short time.

– Wait until the indicator light – electronic lights up before deflecting the travel joystick. The electronic system runs through a self-check.

Operating temperature

If the hydraulic oil is too cold, the machine reacts sluggishly.
– Bring the hydraulic oil to operating temperature by repeatedly moving the working hydraulic cylinders to stop.



Throttle control – full load

- Set the throttle control to full load.

– Turn the throttle control to the stop to the right.
– Work with the machine always at full engine RPM. Only in some cases should the machine be operated at reduced engine RPM.

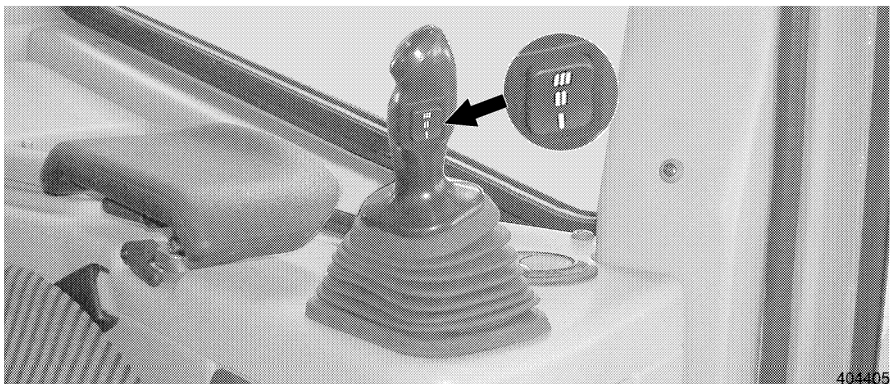
The machine has now ready to travel.

Preselection of speed ranges

The machine is equipped with a rocker switch on the travel joystick to preselect the travel speed. By switching to positions "II" or "I", the full travel speed can be reduced. The preselected travel speed range is shown in the LCD display. The speed ranges can also be selected during travel.
When shifting back from full travel speed range, the machine is hydrostatically slowed down.

Low speed range

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



Rocker switch – speed ranges

Selectable speed ranges

Full speed range

- Push the rocker switch on top - Position "III".

– Speed 0 - 11 km/hr.

Medium speed range

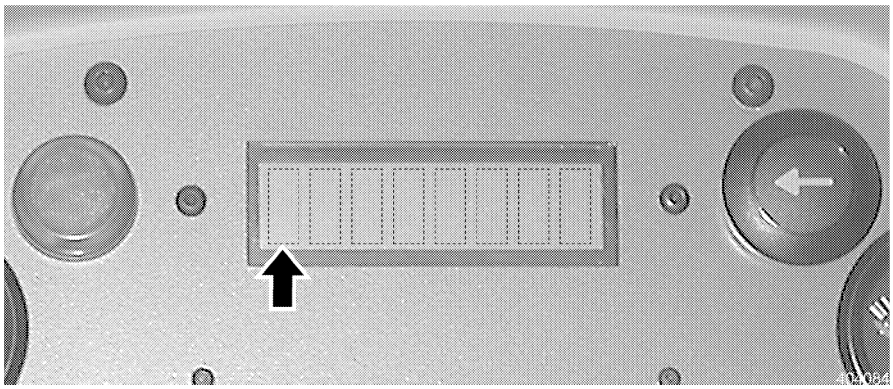
- Rocker switch in center position - Position "II".

– Speed 0 -7.8 km/hr.

Low speed range

- Push the rocker switch on bottom - Position "I".

– Speed 0 -4.5 km/hr.



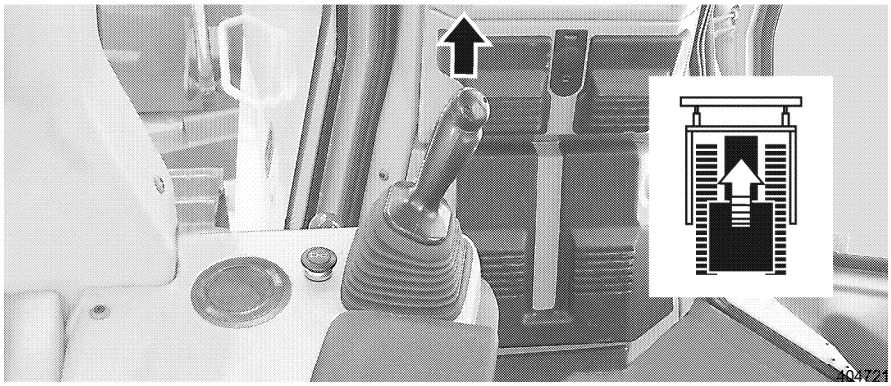
Display speed ranges

The selected speed range is shown in the LCD display.

– 3 = full speed range
– 2 = medium speed range
– 1 = low speed range

3.3.5 Travel

Straight travel



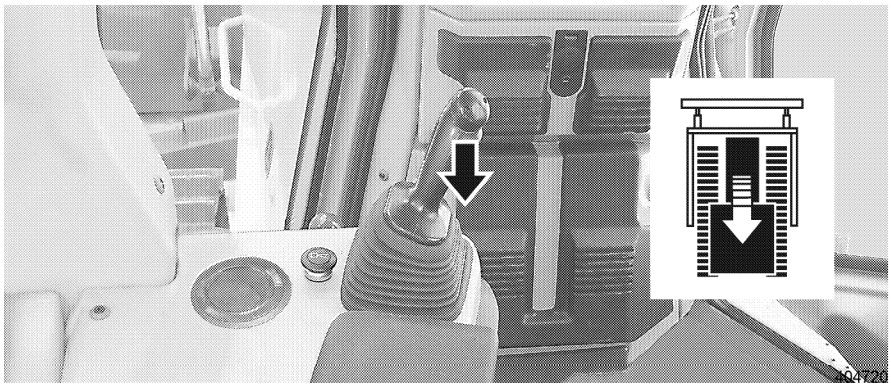
Forward travel

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

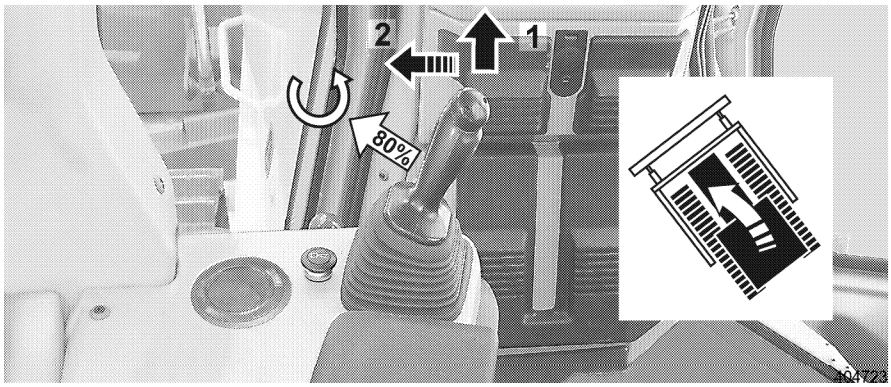
- Pull the travel joystick slowly backward.

– 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.



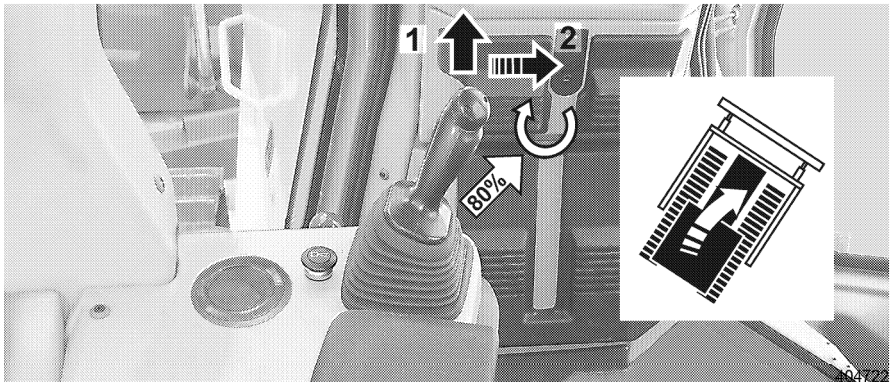
Left hand turn

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 approx. 5 seconds. The working attachment can still be moved.

Caution

Danger of accident due to careless braking of the machine!
Resetting the travel joystick to the neutral position too fast causes the machine to stop abruptly.
! Always wear the seat belt before operating the machine.

Speed reduction pedal

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,
! Danger of damaging 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 adjusted to match the corresponding requirements.

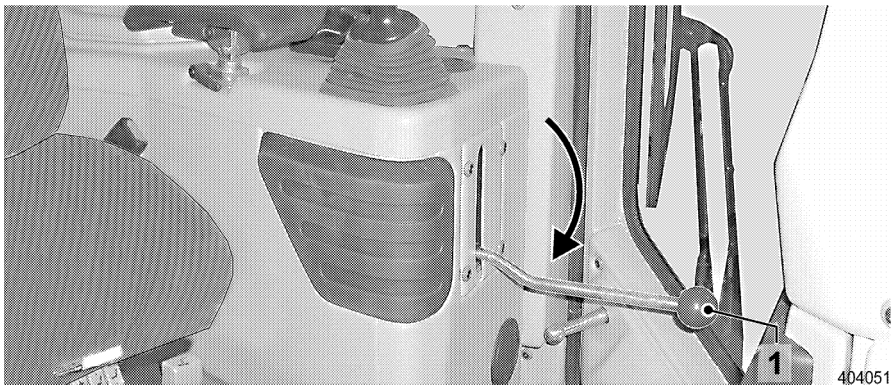
Caution

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

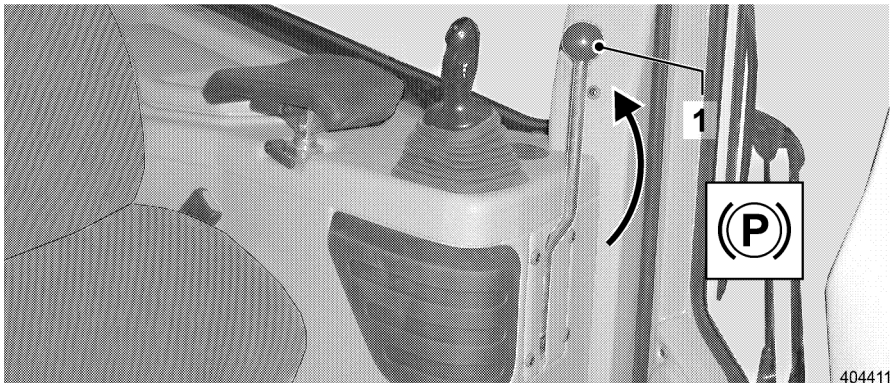
Release the parking brake

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

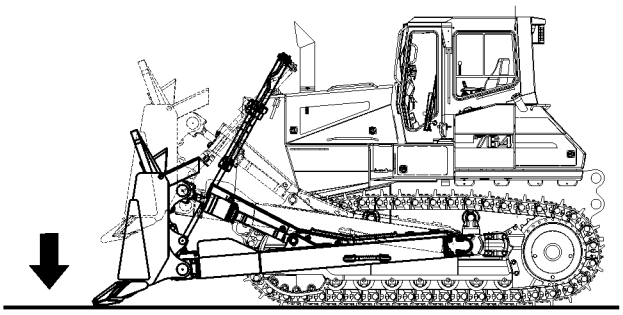
- Move the safety lever 1 up.

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

3.3.7 Taking the machine out of service

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

Working attachment



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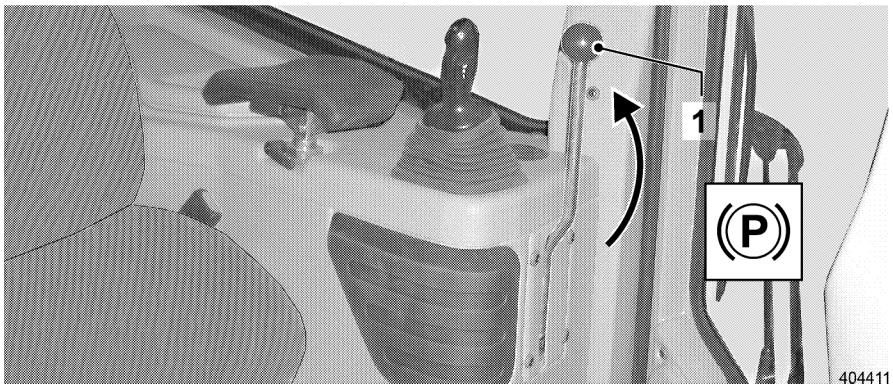
Lower the working attachment

- Lower the working attachment.

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



404411

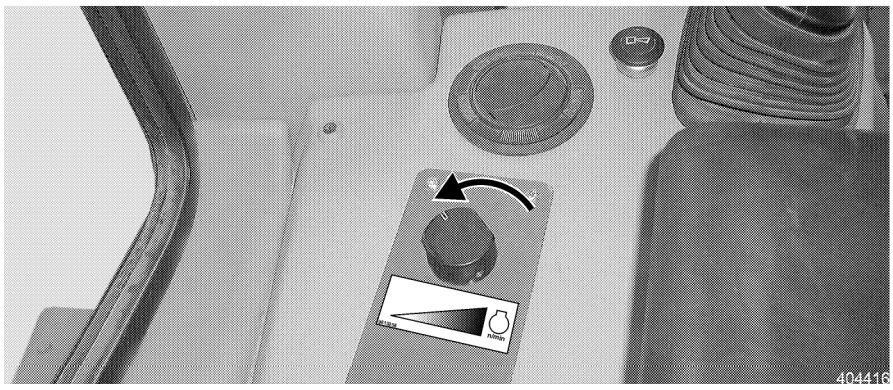
Safety lever up

- Move the safety lever up.

– The indicator light – travel brake lights up.

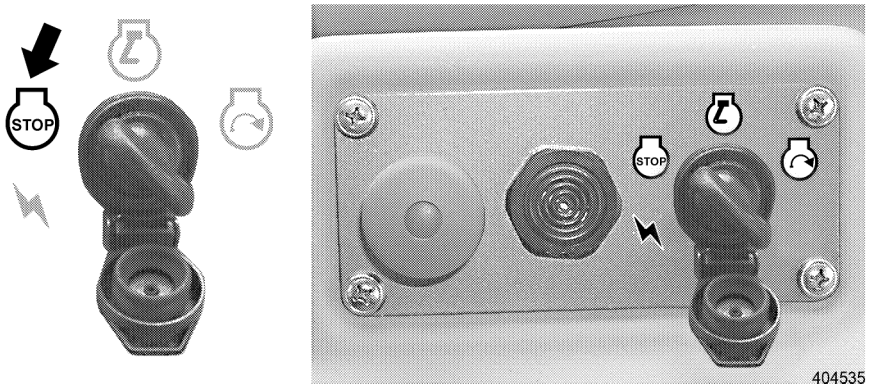
Turn the Diesel engine off

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.



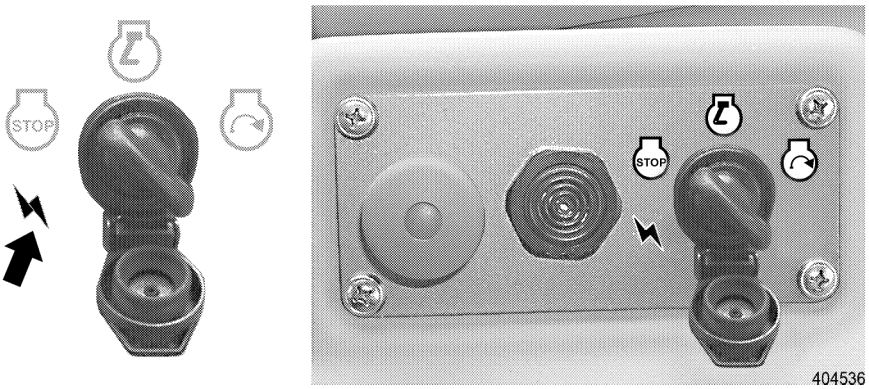
Starter switch – off position

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

– All indicator lights turns off.
– In the LCD display appears "SHUTDOWN" for approx. 3 seconds.

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.

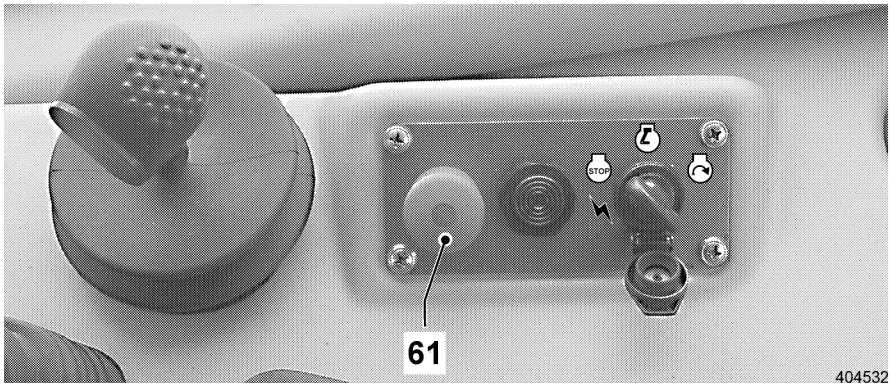
Emergency off button

Caution

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

Stop the travel drive

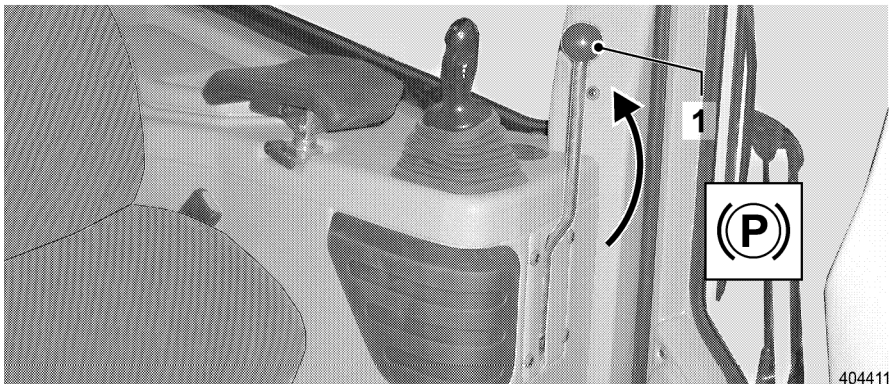
In dangerous or unclear situations, the travel drive can be stopped by pressing the emergency off button.



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.



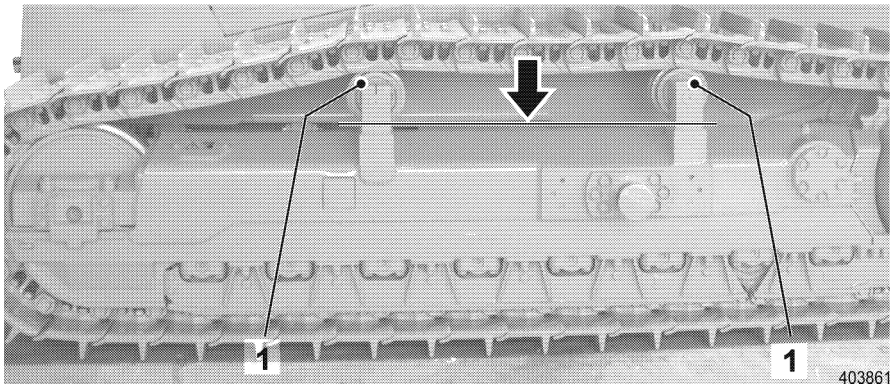
Safety lever up

Continue to work

- Move the travel joystick to neutral position.

- Move the safety lever 1 to the uppermost position.
- Lift the emergency off button until it engages.
- Move the safety lever down.
- Deflect the travel joystick into the desired direction. See also section "Travel".

3.3.8 Guidelines for working in water



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.

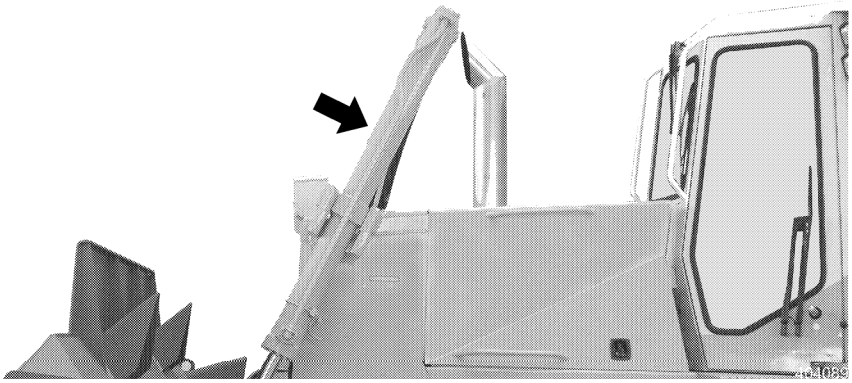
Never exceed the maximum fording depth (lower edge of carrier roller).

3.3.9 Working with the attachment

Danger

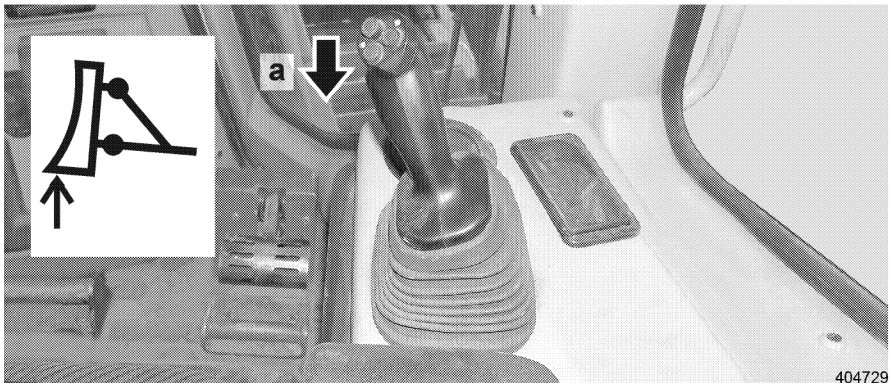
Danger of accidents due to raised attachment.
! Never work under the raised working attachment!
– Always support the working attachment properly from below or place it on the ground.

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.

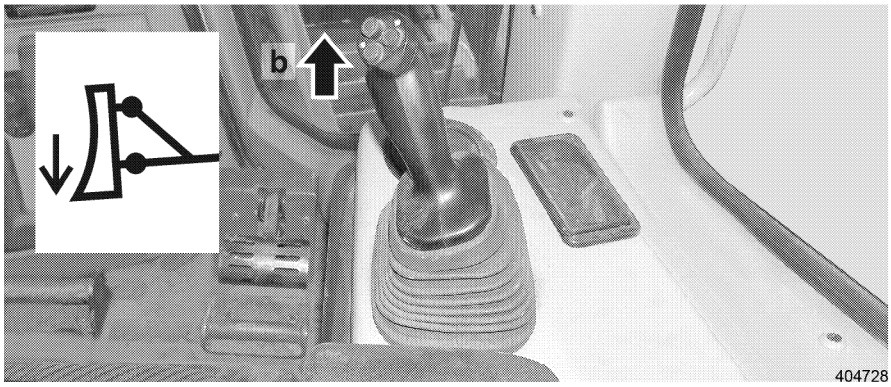


Lift the dozer blade

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.

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 -.

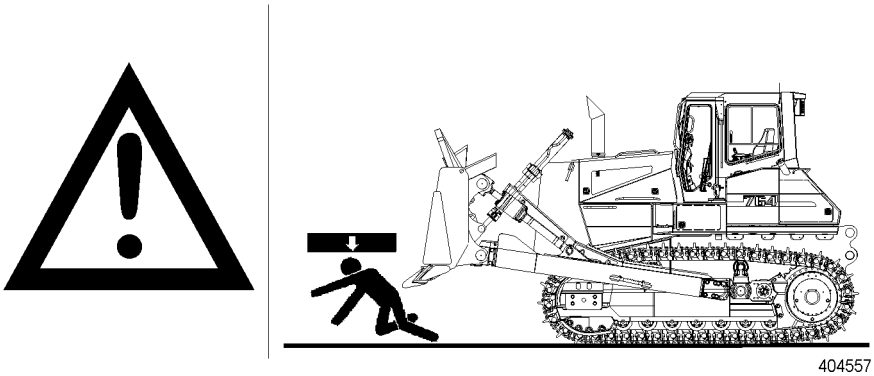
Caution

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.

– Use this function only when driving the machine in reverse, to smooth out the ground.



404557

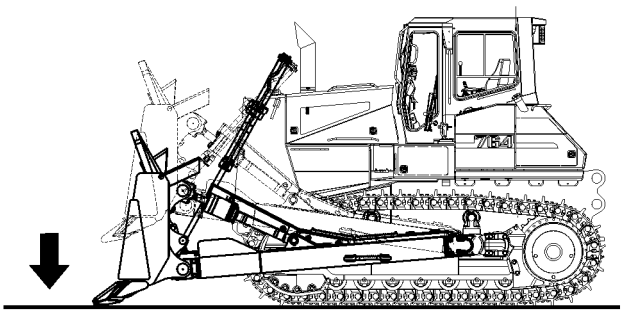
Danger situation

Danger

Danger of accident due to quick dropping attachment!
By activating the float position, the raised attachment drops quickly and cannot be slowed down!
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!

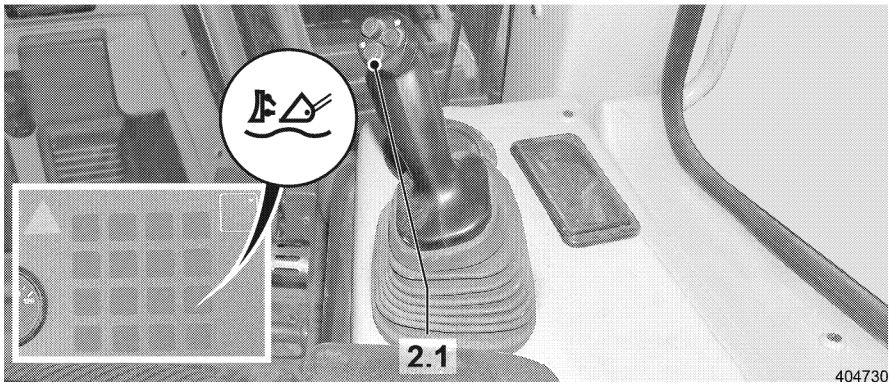


404556

Lower the working attachment

Actuate the float position

- Lower the dozer blade to the ground.



Button – float position

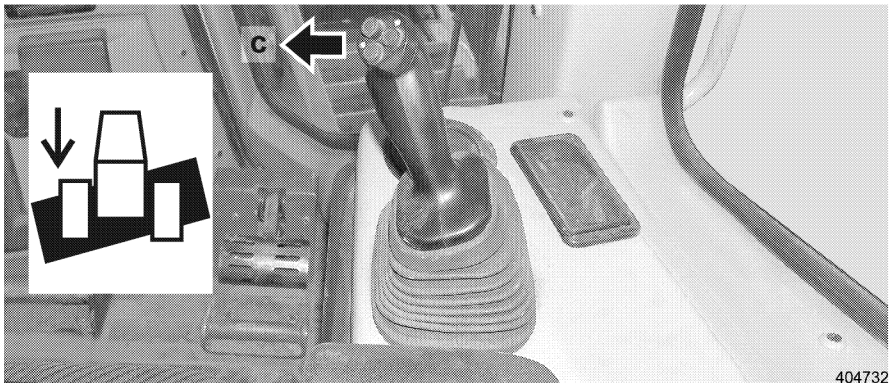
- Press the button 2.1 on the blade control lever and deflect the blade control lever in direction "down".

– The float position function is thereby activated.

By pressing the button again, the float position function is turned off again.

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.

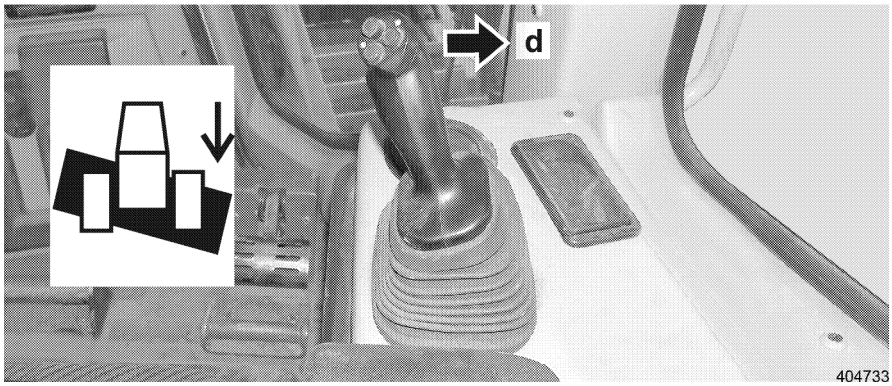


Tilt the dozer blade to the left

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

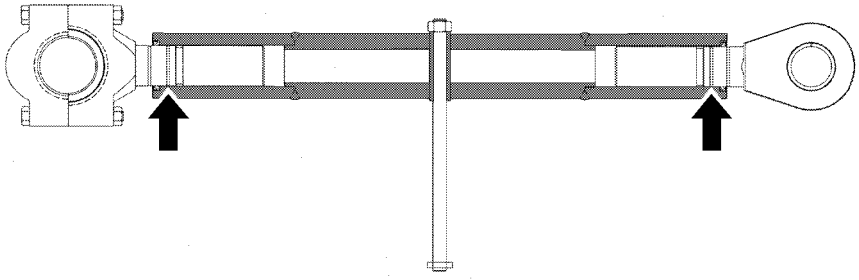
Push the blade control lever to the right in direction - d -.
The dozer blade is tilted to the right.

Cutting angle adjustment - mechanical

The cutting angle of the dozer blade can be matched to the corresponding ground conditions by changing the length of the screw jack.

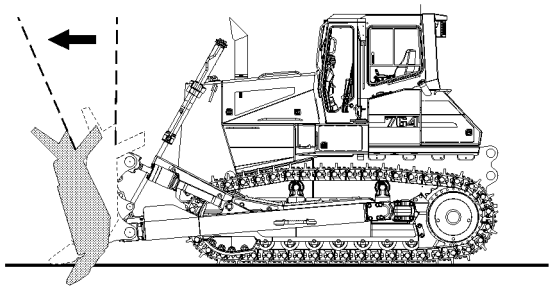
Caution

! Danger of damage of the attachment!
The screw jack may not be turned out further than to the max. mark.
– Adjust the screw jack according to the following instructions.



Straight blade – max. mark

Turn the screw jack out no further than to the point where the inner mark becomes visible.

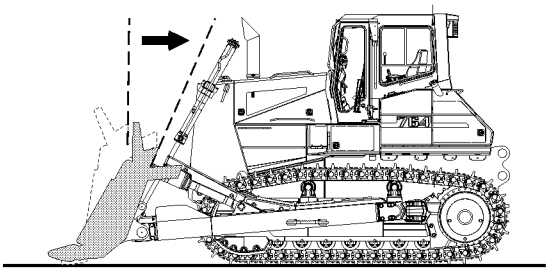


Steep cutting angle

Steep cutting angle

For hard ground, set a steep cutting angle.

- Turn the screw jack in counterclockwise direction until the desired blade pitch is reached.



404491

Flat cutting angle

Flat cutting angle

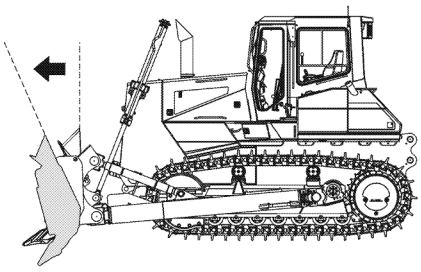
For soft ground, set a flat cutting angle.

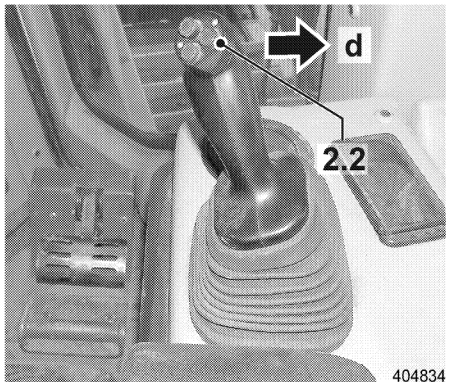
- Turn the screw jack in clockwise direction until the desired blade pitch is reached.
- After the adjustment procedure, lock the adjustment lever on the push frame.

The dozer blade is tilted by changing the blade pitch. Align the dozer blade again parallel to the ground with the tilt cylinder.

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.





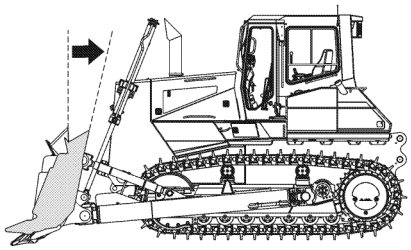
404834

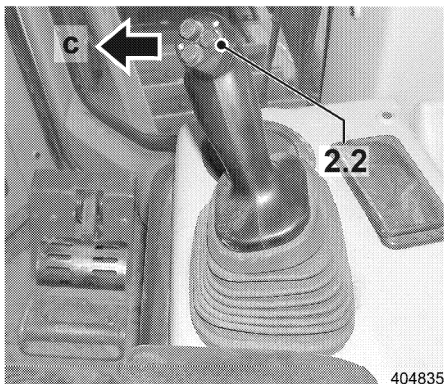
Steep cutting angle

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.

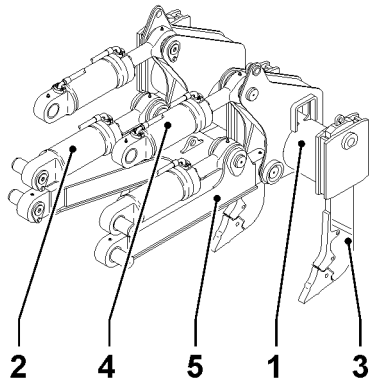
- Press the button 2.2 on the blade control lever and hold it down.
- Push the bucket control lever to the left in direction - c - until the desired blade pitch is reached.

The dozer blade is tilted by changing the blade pitch. Align the dozer blade again parallel to the ground with the tilt cylinder.

3.3.10 Working with optional attachments

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

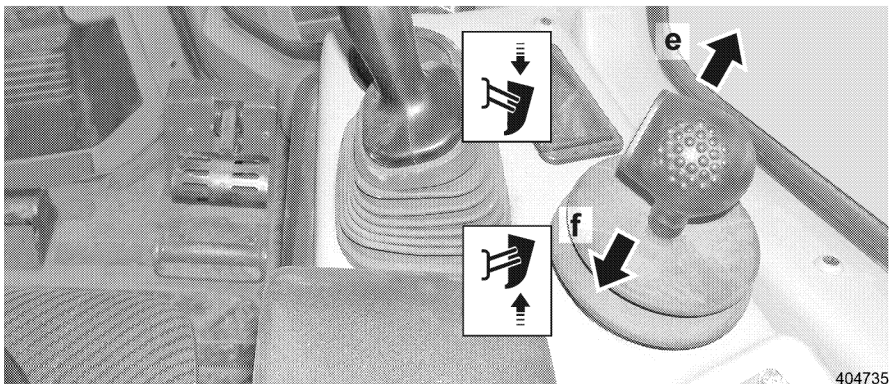
Control of ripper



Ripper

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

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.

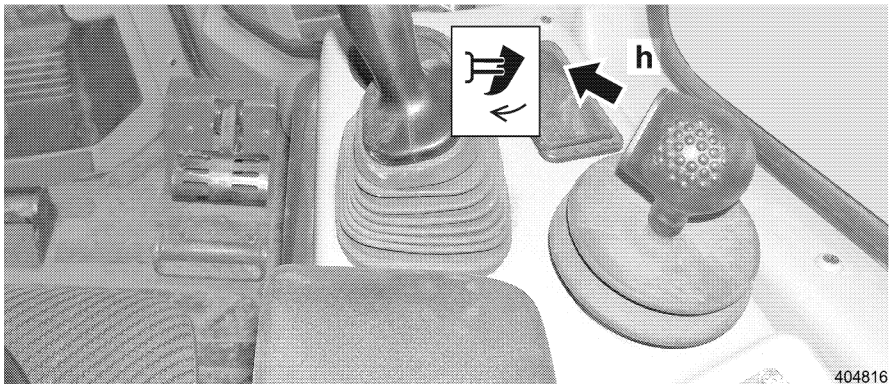
Raise the ripper

- 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.



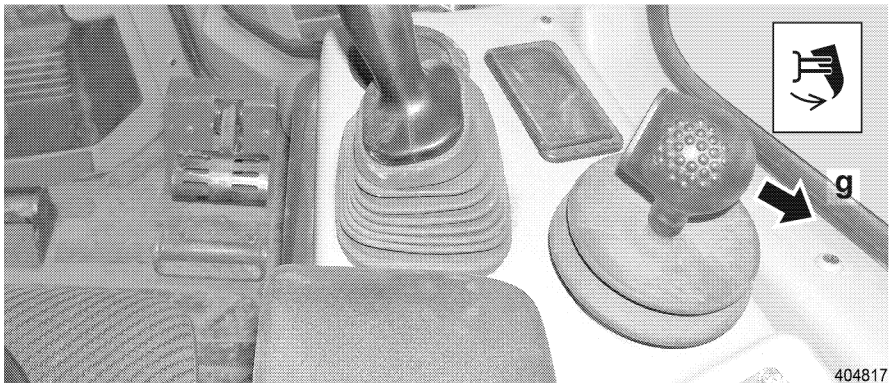
Steep tooth angle

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.



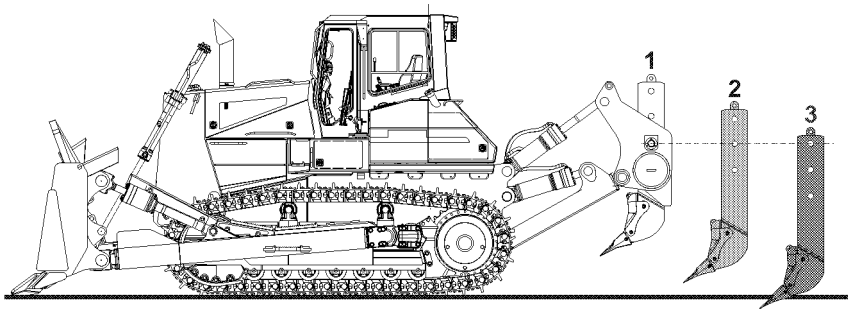
Flat tooth angle

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

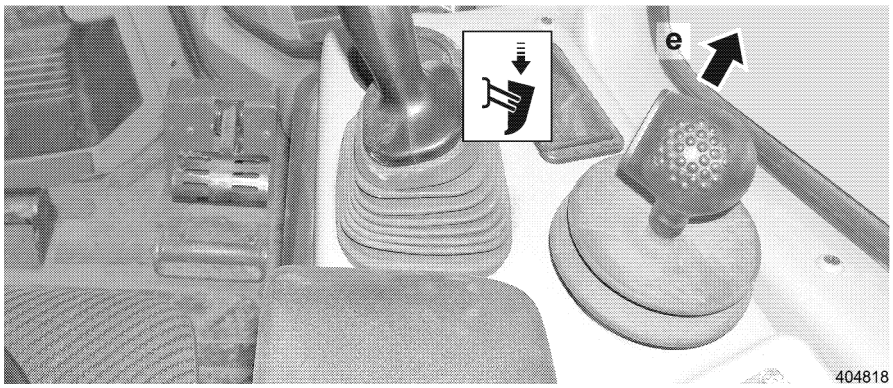
1 – tooth ripper

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.

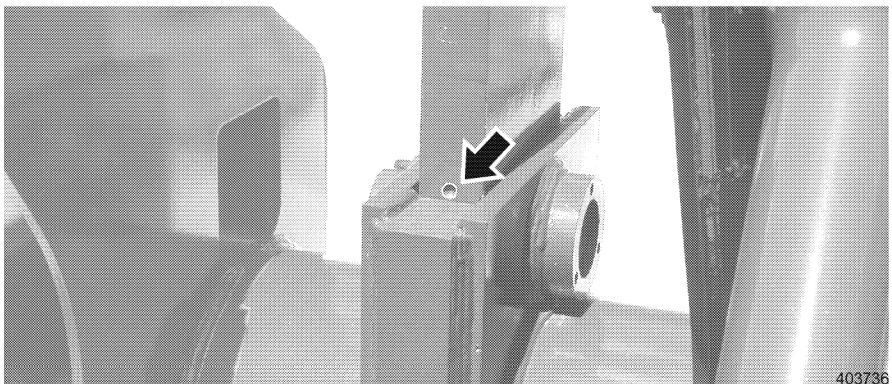


404818

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.

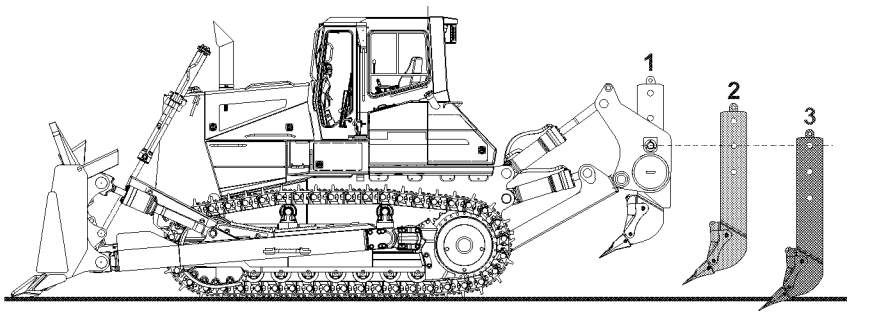
Lift the ripper only to the point where the tooth cannot fall from the guide.

- 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.



Individual tooth length adjustment

Tooth length adjustment - hydraulic

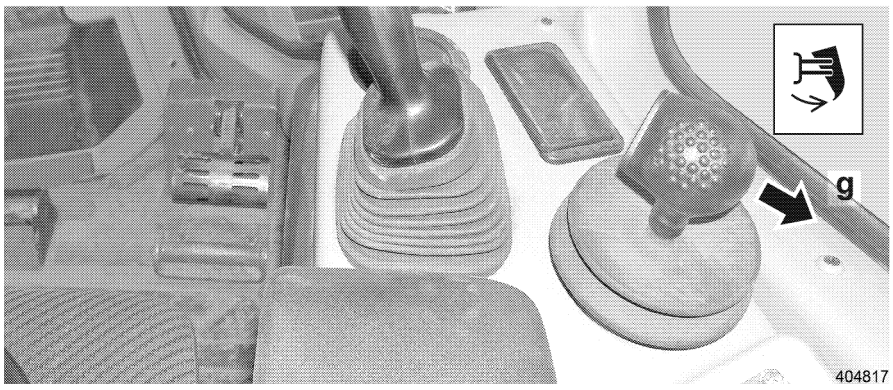
1 – tooth ripper

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!

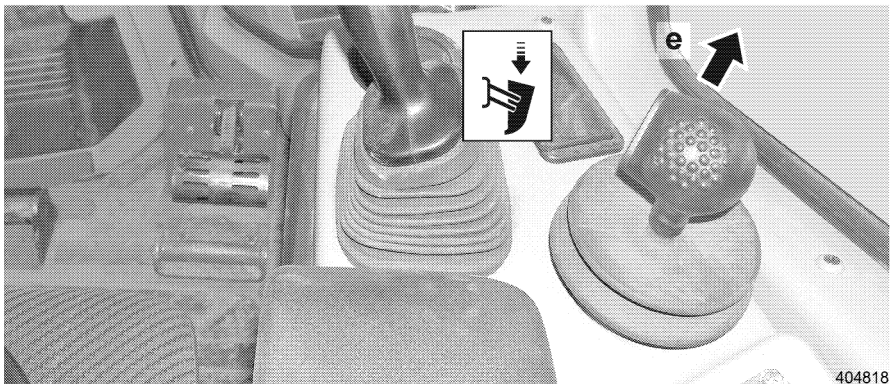
! The tooth length adjustment may only be made on solid ground.



Retract the cylinder

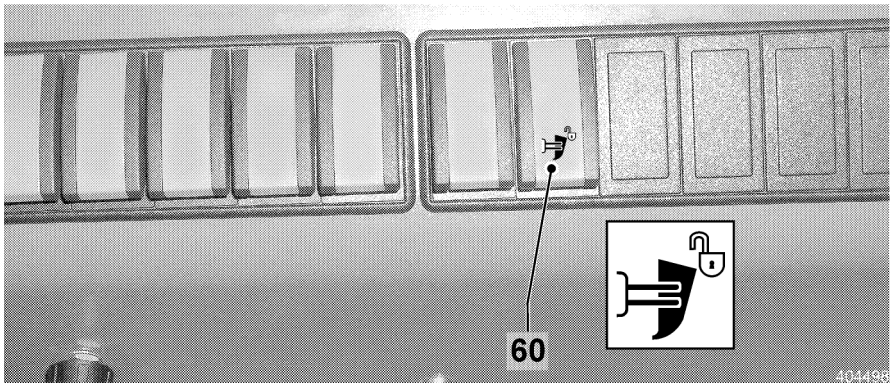
Adjustment procedure:

- 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.



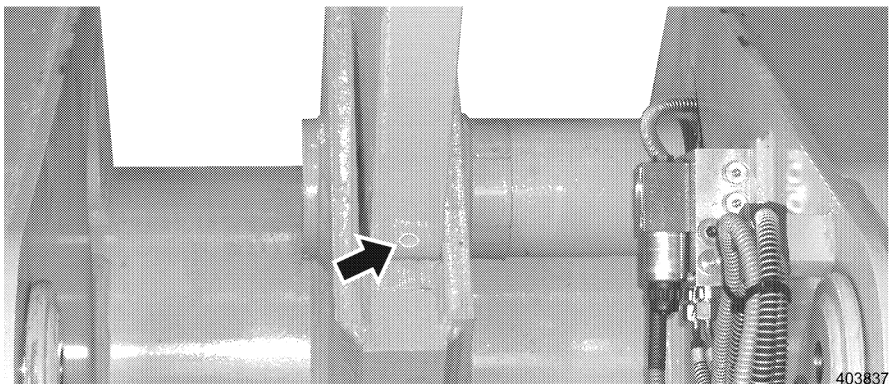
Button – pin puller

- 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.

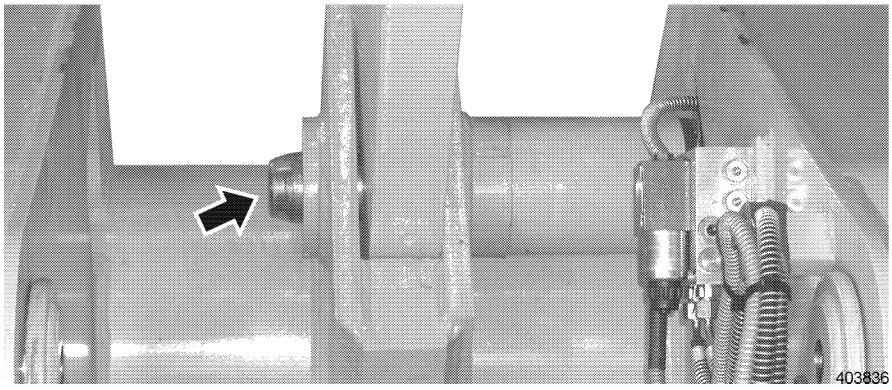
- Adjust the desired tooth length, with the button – pin puller 60 held down, by lifting or lowering the ripper.

– 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.

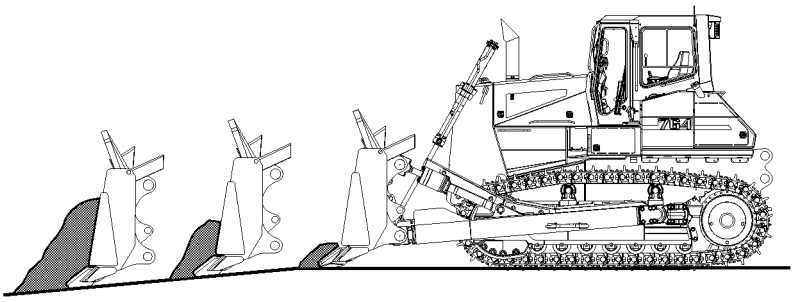
For installation of the protective grills, contact Liebherr.

3.4 General operating methods

Routine operating methods are described in this section.

3.4.1 Grading

To doze or push any materials, depending on the ground conditions, different operating methods can be used.

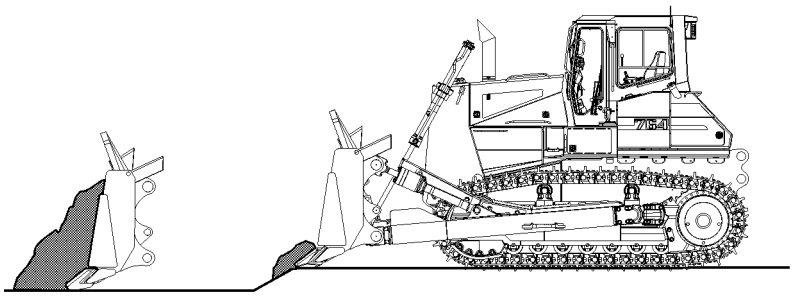


404496

Increasing blade volume

Increasing blade volume

For increasing blade volume, material is added over the total dozing distance.
This working method is normally used successfully when working with heavy, dense material.



404538

Dozing with a full dozer blade

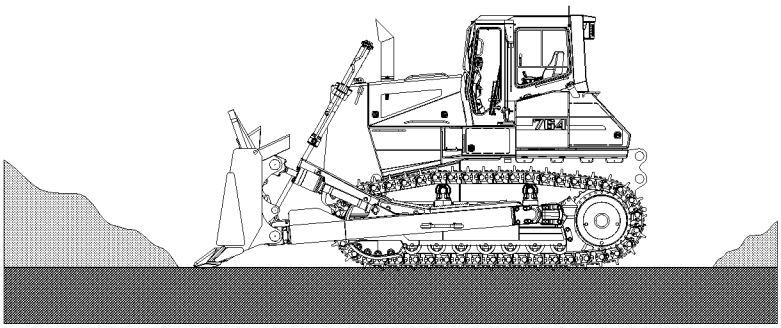
Dozing with a full dozer blade

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

- The dozer blade is filled with material at the beginning of the dozing distance.

– If the chains start to slip, lift the dozer blade slightly to counteract.

3.4.2 Fine grading



404539

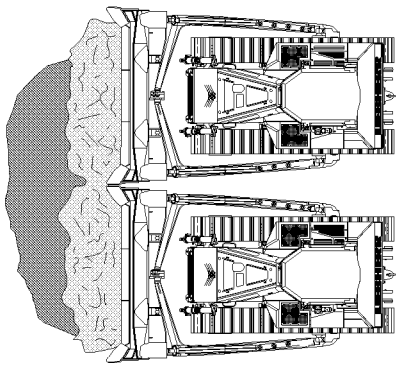
Starting surface – fine grading

Starting surface

To establish a fine grade, start out with an even platform, which should be at least as long as the travel gear of the machine, and at the same level of the desired surface.
Starting from this initial surface, the material can be incorporated for the desired fine grade.
To remove machine track marks, use the blade float position to regrade.

– The blade corners required for fine grading are available as accessories.

3.4.3 Using several machines



404540

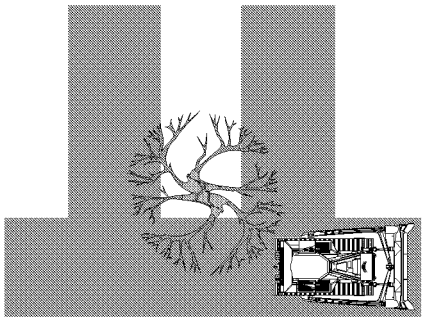
Parallel operation with two machines

Parallel operation

If two crawler dozers are used simultaneously to move larger amounts 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.



404543

Dozing in paths

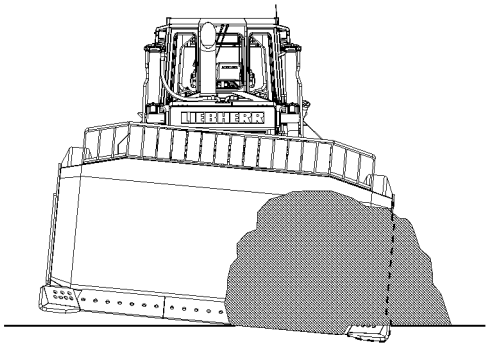
Dozing in paths

Dozing in paths is predominantly used for transporting large amounts of material over long distances.

- To start a path, push the first blade volume approx. 10-20 m along the intended path. Move the machine back, fill the blade again and push with the already pushed material to the end of the required path.

– By using this procedure, little material will fall from the blade to the side and blade volume can be significantly increased per operation.

3.4.4 Pulling or backfilling a trench



404542

Pulling a trench

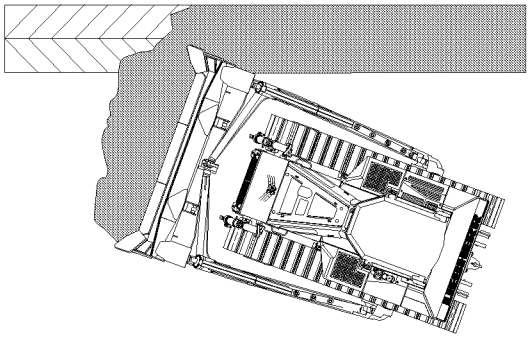
Pulling a trench

- 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.

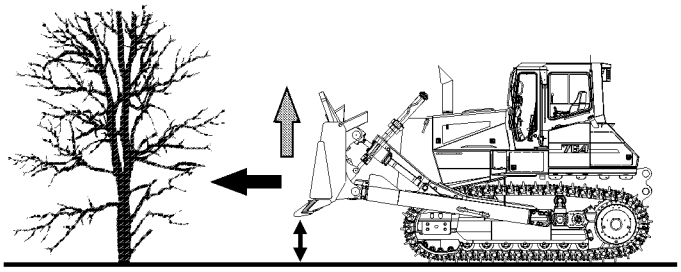
For a more efficient way, use a tilt angle blade attachment.

- 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

Removing hedges to medium size trees

- Pull hedges from the ground by lowering the blade 5 to 10 cm under the ground level and moving forward.
- Lift the blade to allow the soil to fall from the roots.

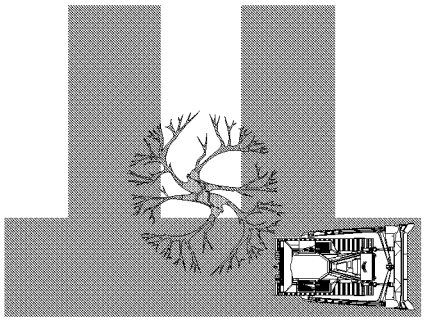


404559

Push tree over

High hedges and medium size trees

- Approach the tree, holding the blade at a height of 30-40 cm and push the tree over. Continue to lift the blade while moving forward.



404543

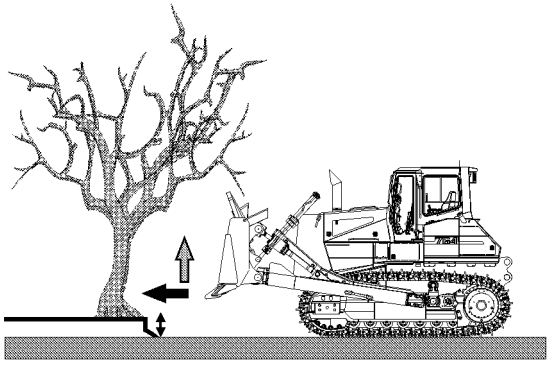
Cut the roots

Felling trees

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

Caution

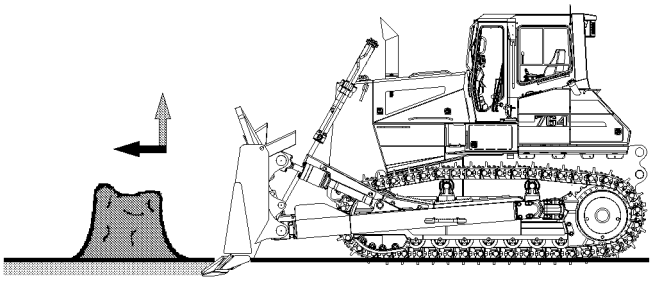
Danger of accident due to falling tree.
! As soon as the tree starts to fall, move back immediately!
! Do not move on top of the root system of the falling tree.



404560

Felling a tree

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



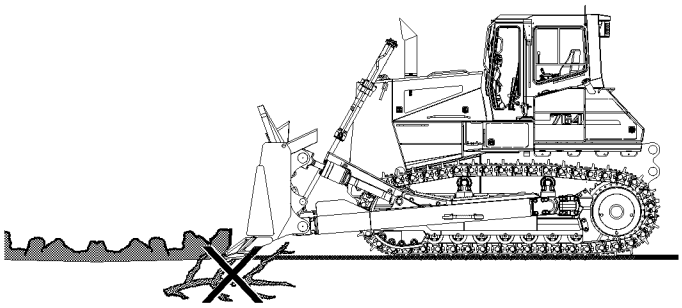
404544

Remove the tree stump

Removing tree stumps

- Move towards the tree stump with the blade below ground level and rip if 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 of the machine, watching for protruding tree stumps and rocks!



404545

Covering removed material

Covering of removed material

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

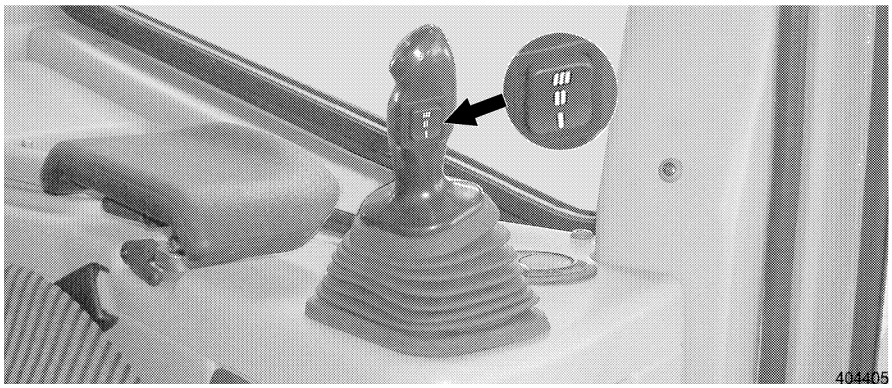
If branches and roots are too close to the surface, any parts sticking out can be ripped to the surface again when grading.

Working area

Generally the following applies:
The working area should be established as level as possible, for efficiency and ease of machine operation.

3.4.6 Ripper operation

Use the ripper only at low travel speed.



404405

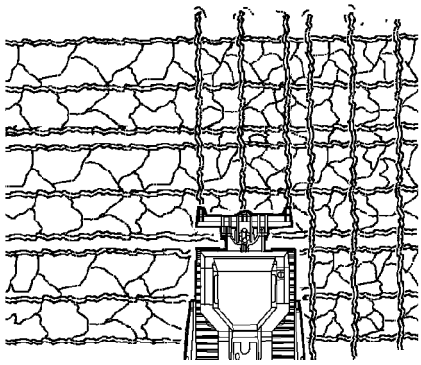
Turn on low speed range

- Set the rocker switch to position "I", low speed range.

– The selected speed range is shown in the LCD display.

With multi-teeth rippers it is usually more advantageous to install multiple teeth than to select a higher travel speed.
Use only one ripper tooth to rip out difficult or large sized material.
Easy to rip material, which breaks into smaller pieces can be removed with two or three teeth.
During the ripper application, always make sure that both tracks are fully on the ground at all times. If necessary, prepare the site accordingly.

The ground should be ripped as deep as possible. If the ground is layered, proceed to rip one layer at a time. To reach the desired depth, it might be necessary to run over the same track several times.
The distance of the ripper tracks depends on the desired size the material is to be cut into.



403018

Cross cuts

In some cases it might be necessary to cut crosswise.
On slopes, always rip going downhill.

Caution

Do not turn the machine or drive in reverse when the ripper teeth are in the ground.
! The teeth can be damaged due to the high rotational stress.

- Check the ripper teeth often for wear and any damage.

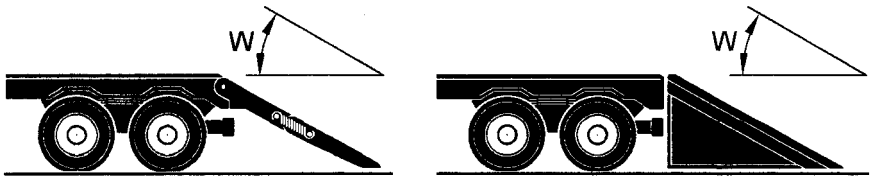
3.4.7 Transporting the machine

Transporting the machine by truck or rail

Before driving on the loading surface

Before driving onto the loading surface, proceed as follows:

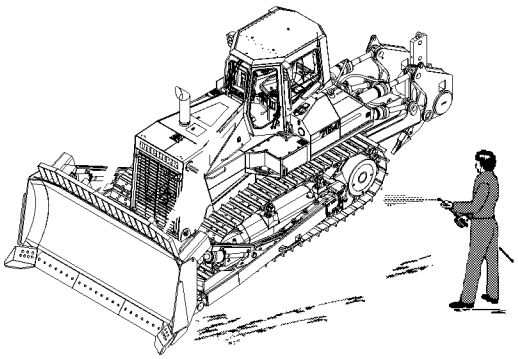
If necessary, remove part of the attachment of the machine for the duration of transport.
– Have suitable tension cables or chains ready for rigging.



403048

Ramp incline

Have a suitable ramp ready to drive onto the loading surface. The ramp incline angle - **W** - may not be more than maximum 30°.



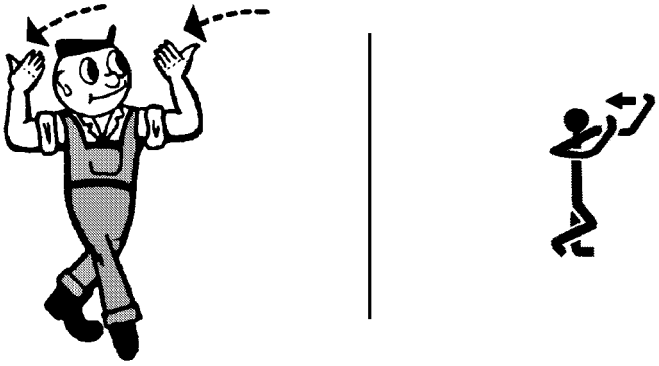
404546

Wet cleaning

Before driving onto the ramp, clean the chains of the machine to remove ice or mud.

Driving onto the loading surface

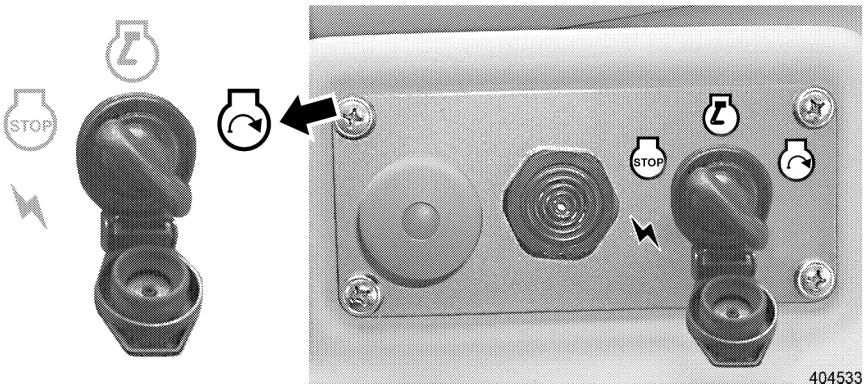
For detailed description, see section "Control, operation". When driving onto the loading surface, use a guide to signal you!
Make sure that a guide is available to signal the operator.



403050

Guide

Any persons who serve as guides must always be positioned to the side of the machine!

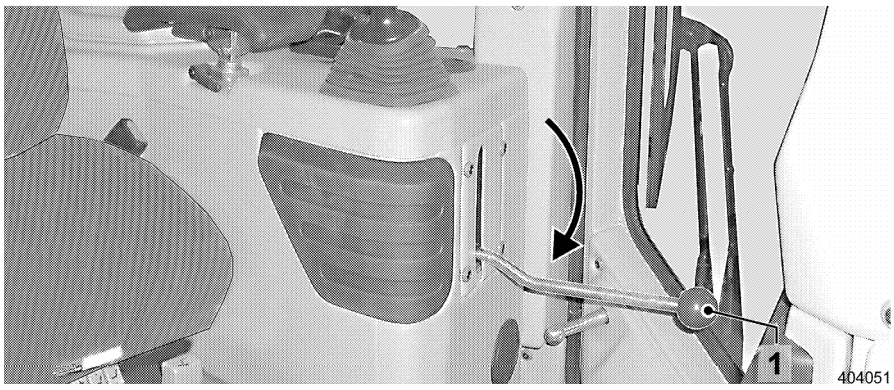


404533

Starting procedure

- Start the Diesel engine.

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



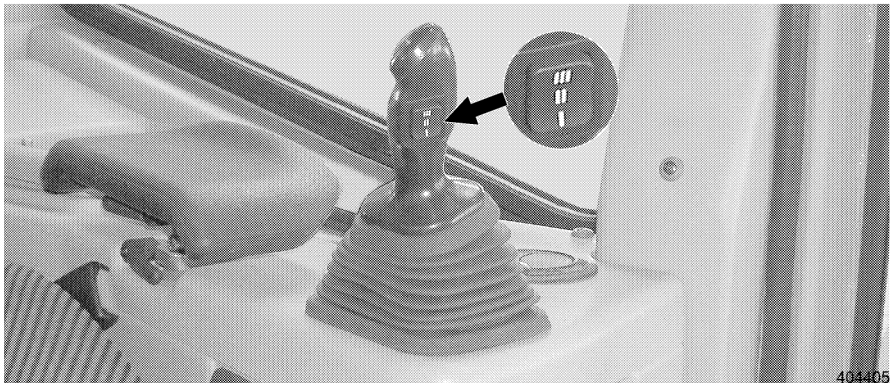
Safety lever down

- Move the safety lever 1 down.

Danger

Danger of accidents due to careless travel!
Careless travel increases the dangers of accidents for loading personnel, the guide, as well as for the machine operator.
! Always drive carefully when loading the machine!

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



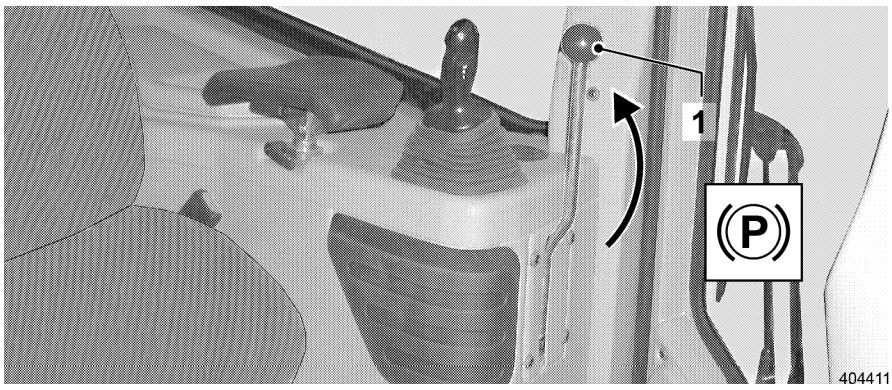
Low speed range

- Select low speed range: Move the rocker switch to position "I".
- Start the machine out carefully.

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

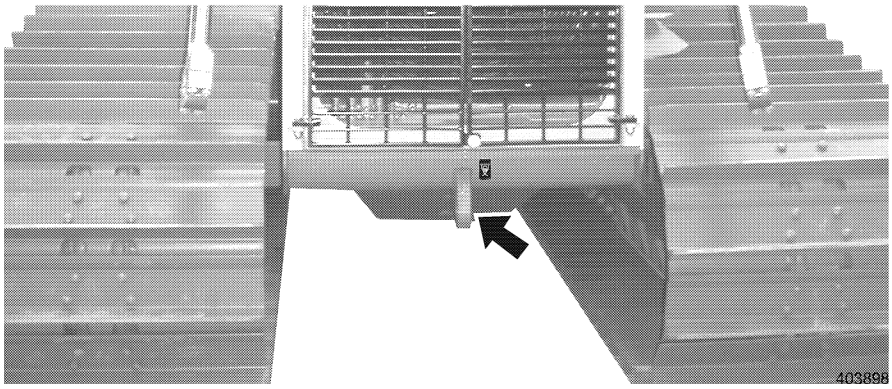
Before driving on the loading surface

- Stop the machine.
- Lower the attachment and set down the attachment level on the loading surface.

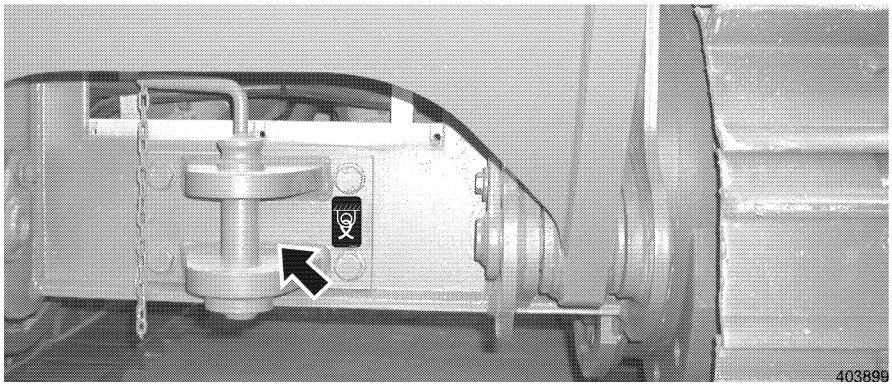


Safety lever up

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



Rigging point, front



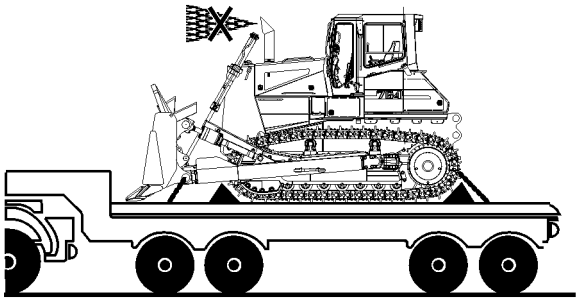
Rigging point, rear

- Secure the machine to prevent it from slipping: Use wedges as well as tension ropes or tension chains.
- Attach the tension ropes or tension chains on the marked rigging points on the machine.

If the machine is positioned against the transport direction for transport, then wind could enter through the smoke stack.
As a result, the wind could drive the turbocharger of the Diesel engine.
To prevent damage to the turbocharger during transport, proceed as follows.
This is especially important when transporting the machine by rail, because the travel direction is not known in advance!

Caution

Danger of damage to the turbocharger due to external factors!
Penetration of wind into the smoke stack can drive the turbocharger of the Diesel engine.
If the engine is not running, the turbocharger is not lubricated.
Without lubrication, the turbocharger will be damaged.
! Prevent wind from getting into the smoke stack!



404547

Smoke stack cover

- To insulate the smoke stack opening: Step on the machine only only via the ladder and select a safe position.
- Cover the smoke stack opening with windproof material. Make sure the cover doesn't slip or blow off.

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.

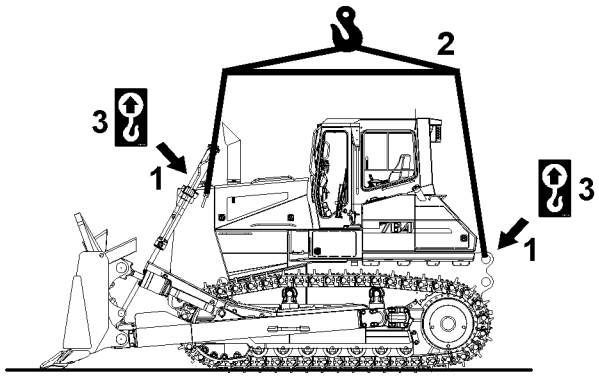
Danger

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

Machine without 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.



Rigging – lifting points

- Attach / hang the suspension 2 on the intended rigging – lifting points 1 on the machine.

– The rigging – lifting points are marked with sign 3.

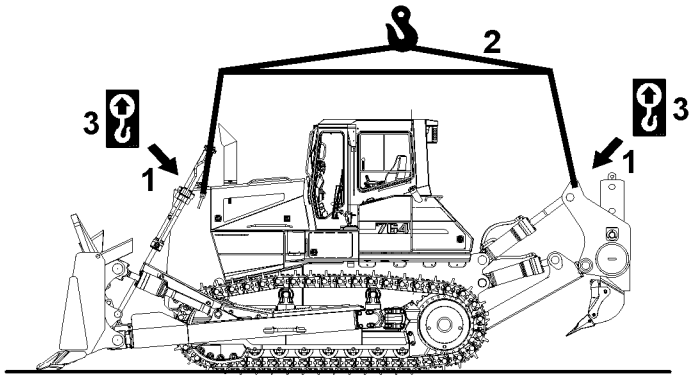
- Carefully lift the machine and load.

Machine without 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 is installed on your machine (ripper, ballast weight, …), eyehooks are installed on these attachments to lift the machine.
These eyehooks are marked with sign 3.



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

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!

3.6 Emergency operation

In case of a problem on the machine, it might become necessary to tow the machine from a danger zone.
The following towing instructions apply only for exceptional cases, to move the disabled machine to a location where it can be repaired or loaded for transport.
Towing speed and distance:

– The max. towing speed is no more than 2 km/hr. (step by step speed).
– Permissible only for a short distance to remove the machine from a danger zone.

Always haul the machine over long distances!

3.6.1 Towing the machine

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.

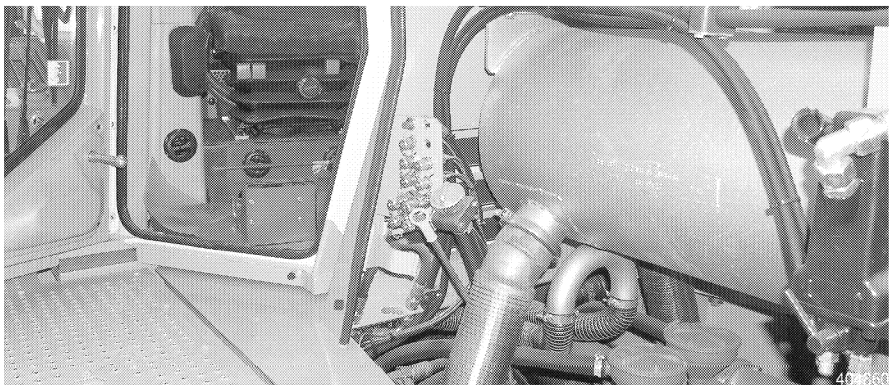
Towing

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.

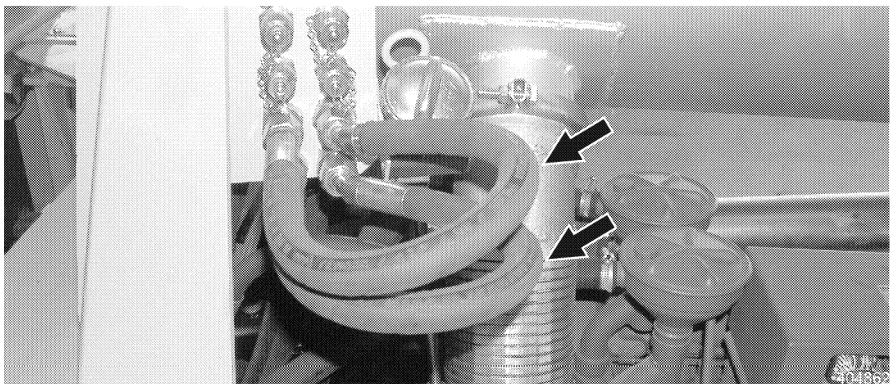


Open the right engine compartment door

- Open the right engine compartment door.

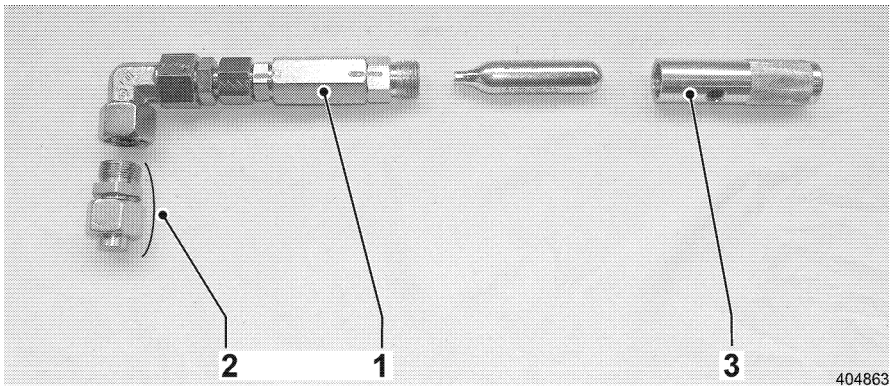
Remove the test fittings

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



Short circuit the connections

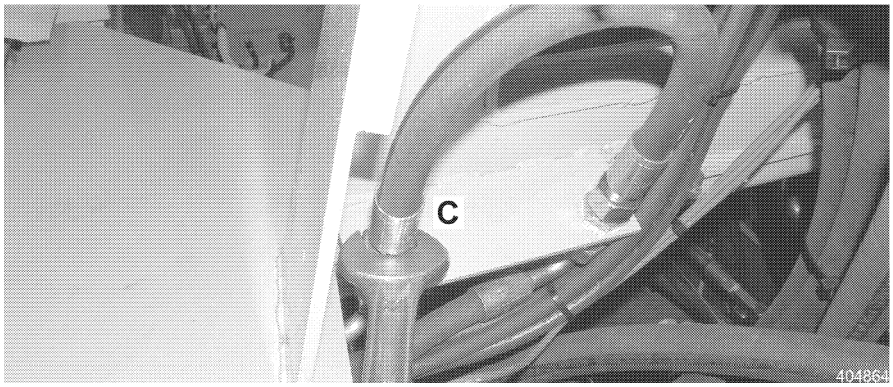
- Short circuit the connections "ML1-ML2" and "MR1-MR2" with the hydraulic lines.



Brake adapter

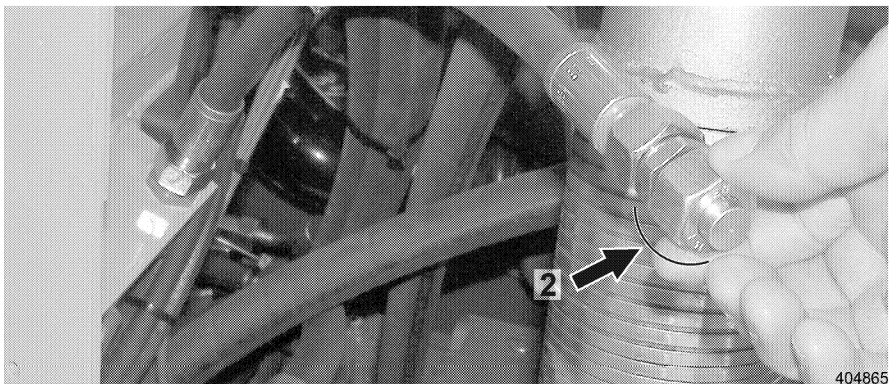
1 Brake adapter
2 Fittings
3 Cartridge holder

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



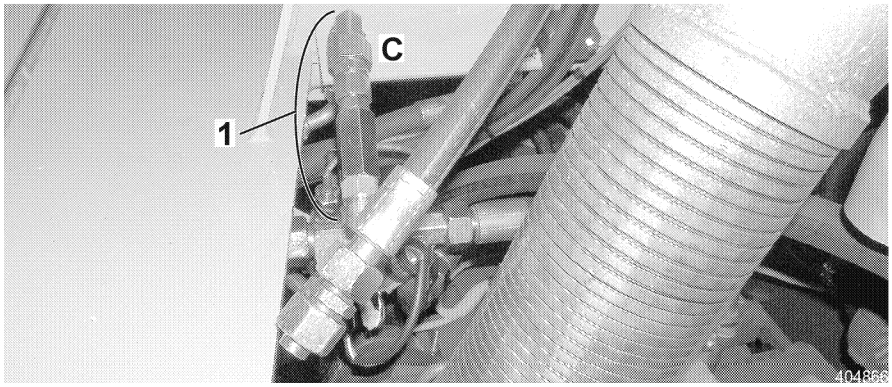
Remove the hose

- In the engine compartment below the test console, remove the hose from connection "C".



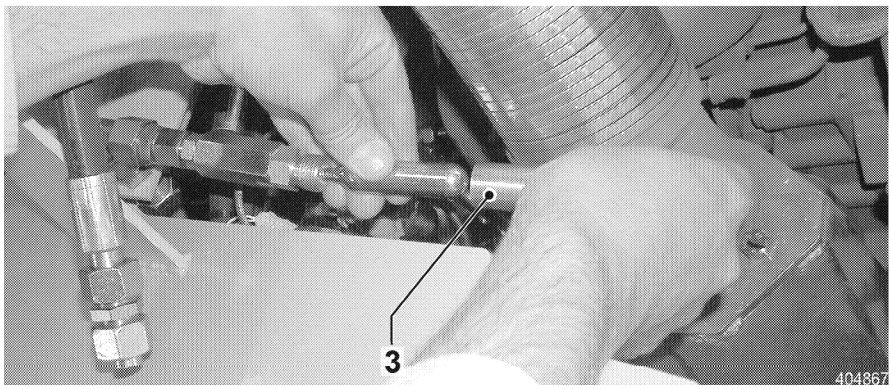
Close off the hose

- Close off the removed hose with fitting 2 of the brake adapter.



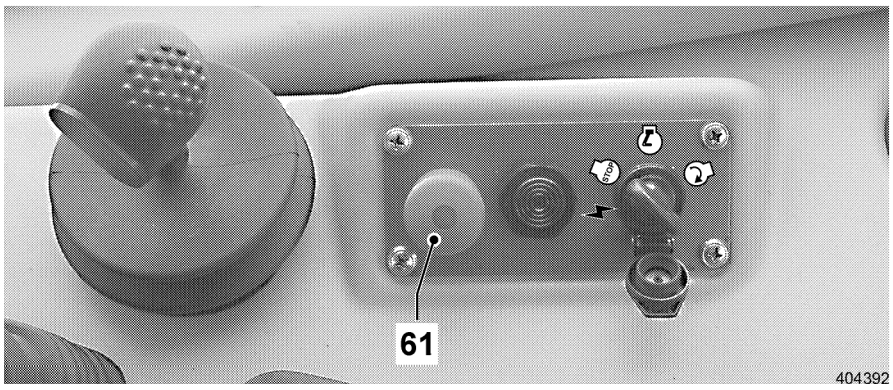
Connect the brake adapter

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



Install the cartridge holder

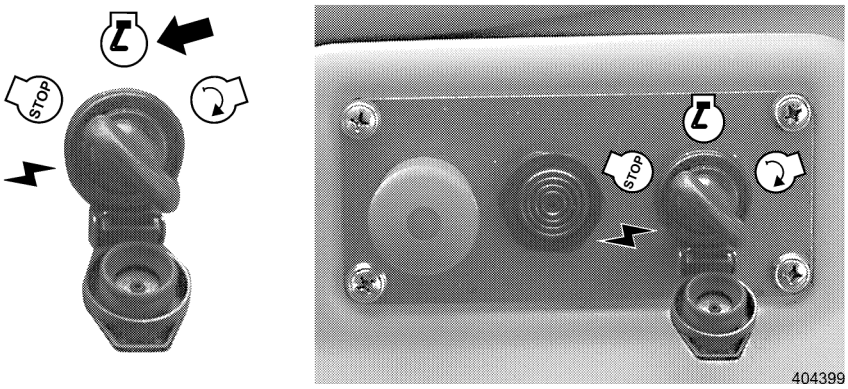
- Insert a new air pressure cartridge into the cartridge holder 3 and install the cartridge holder on the brake adapter.
- Access the operator's platform.



Emergency off button raised

- Check the position of the emergency off button 61.

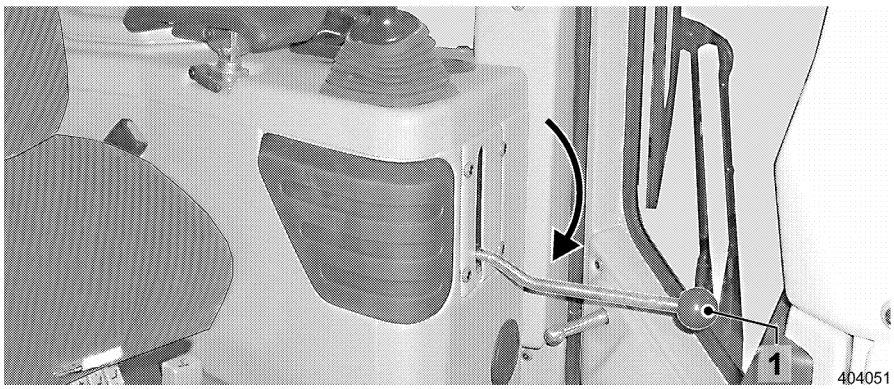
– For the towing procedure, the emergency off button 61 must be in operating position (Emergency off button raised).



Starter switch – Contact position

- Set the starter switch to contact position

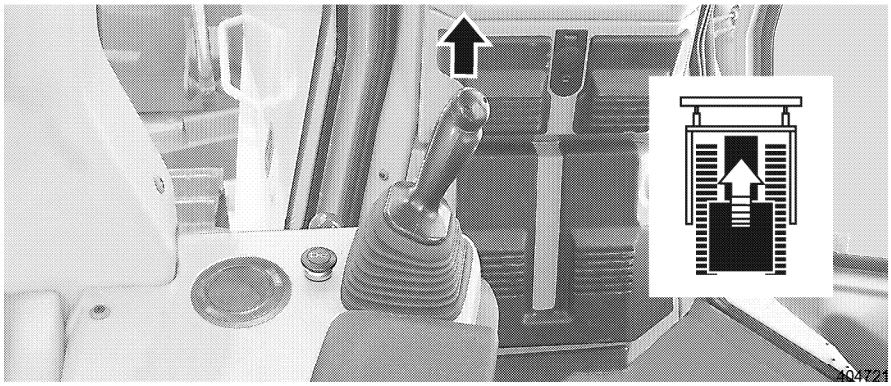
The following indicator lights light up:
– Indicator light – Travel brake
– Indicator light – pump replenishing pressure
– Charge indicator light
– Indicator light – electronic problem



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.

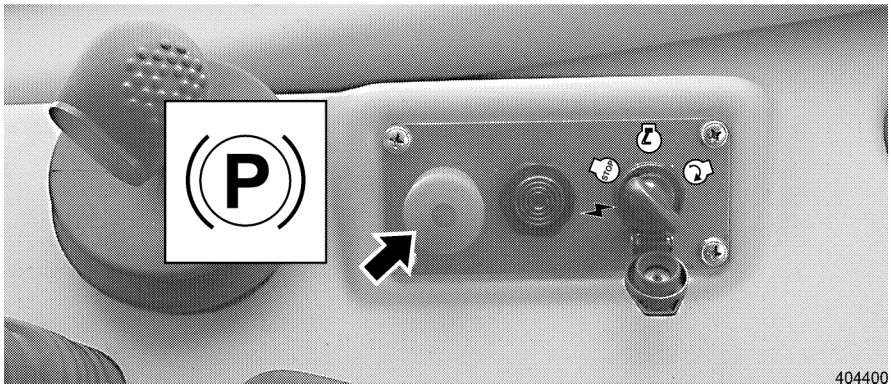
Stop the machine

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.

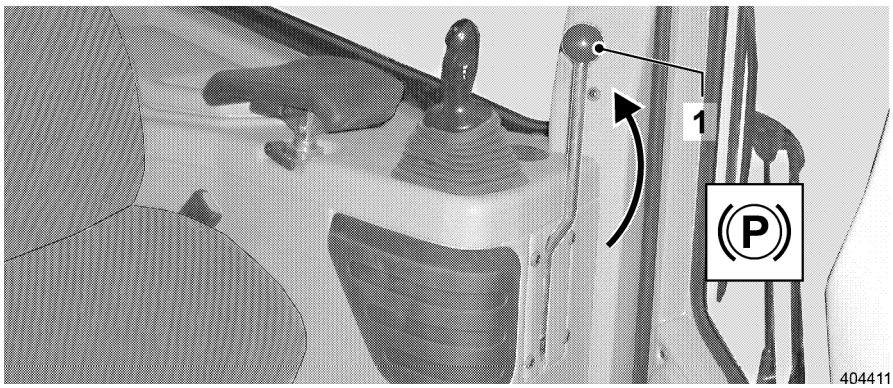


Press the emergency off button.

- Press the emergency off button.

– The parking brake is applied.

To continue towing, raise the emergency off button.
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.



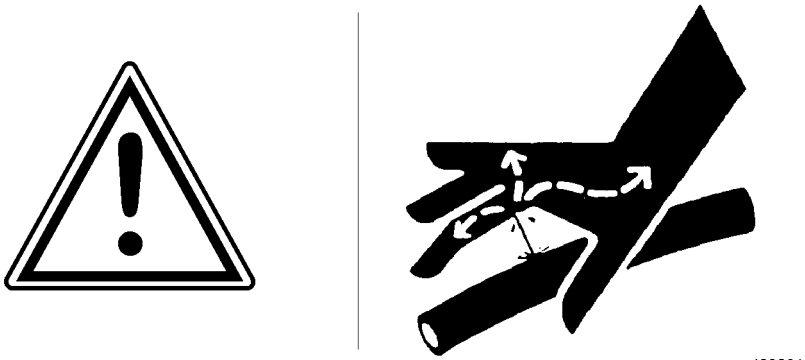
Safety lever up

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

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

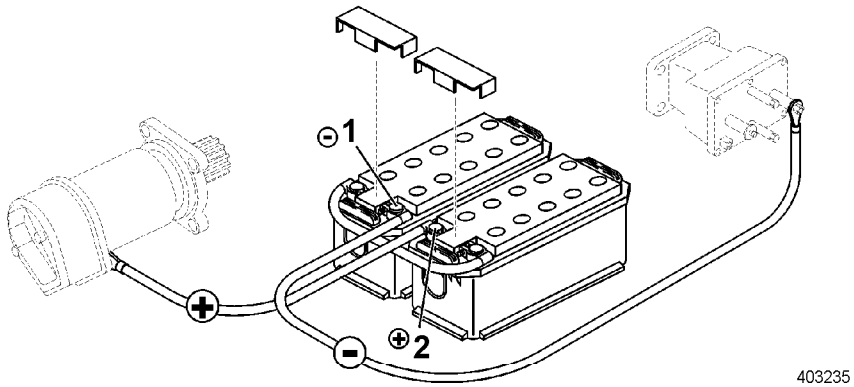
In case of starting problems due to old batteries, the machine can also be started with an external battery.
Make sure that the following safety preparations have been made.

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 indictors 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.

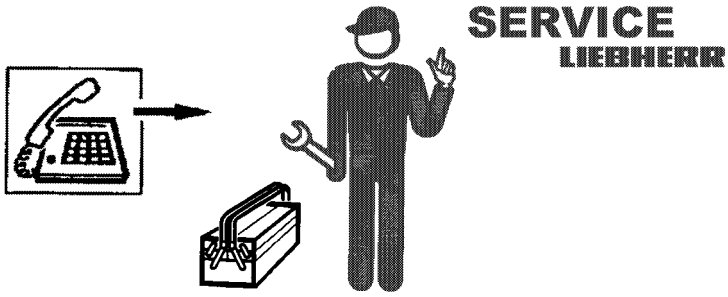
For that reason, always read the corresponding section in the Operating Manual if a problem occurs.

– 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 and fuel system

Problem / error	Cause	Remedy
The engine does not start	The safety lever is in lowest position	Move safety lever up
	Fuel tank is almost or completely empty	Add fuel and bleed the fuel system
	Shut off valve in fuel line is closed	Open shut off valve
	Fuel filter displaced	Clean or change filter and bleed the system, drain fuel / clean tank
	Ambient temperature below 0°C	Control and operation for special climatic conditions, see Operating Manual
	Starter does not operate	Check the line connections
	Starter does not operate	Overhaul the starter or change the starter ring (Inst)
	Battery power is low	Recharge / replace
Engine starts but stops again or runs unevenly	Fuel tank is empty	Add fuel and bleed the system
	Fuel pre-cleaner is dirty	Clean and bleed the system
	Fuel filter is dirty	Clean the filter and bleed the system (tank)
	Especially in winter: engine oil is too viscous	Use engine oil recommended for the ambient temperature.
	Air filter is dirty	Clean or change the main filter element
	Air in fuel system	Bleed the system
	Vent on fuel tank is plugged	clean
	Fuel line is kinked	Check and fix line
Exhaust is gray or black	Air filter is dirty	Clean or replace the filter
Exhaust is white (vapor)	Water in combustion chamber	Call Service Dept.
Engine does not reach full RPM	The throttle control lever is not set to full load	Set the throttle control lever to full load

	Dry air filter is dirty	Clean or replace filter
	Bad fuel supply	Check fuel pre-cleaner, fuel filter, lines, drain tank
Engine is getting too hot	Not enough coolant	Add coolant, check for leaks
	Water pump is defective	Check for leaks / fix
	Thermostats do not work	Change thermostats
	Radiator is dirty	Clean radiator
Engine oil pressure is insufficient **NOTE:** Turn the engine off immediately!	Oil level is too low	Correct oil level
	Oil pressure gauge is defective	Change oil pressure gauge
Engine uses too much oil	External leak on engine	Retighten screws, replace seals if necessary
Oil in coolant or coolant in oil		Call Service Dept.
Whistling noise on exhaust side	Exhaust system is not tight, leaks	Check exhaust system / repair

Hydraulic system

Problem / error	Cause	Remedy
Indicator light for replenishing oil pressure does not turn off after starting the engine **NOTE:** Turn the engine off immediately	Increased leakage	Call Service Dept.
Abnormal noise on hydraulic pumps **NOTE:** Turn engine off immediately!	Shut off valve on hydraulic tank is closed	Open shut off valve
	Hydraulic pumps draw in air	Check the oil level in the hydraulic tank, check the suction lines for leaks
No reaction if travel lever is deflected	Safety lever in uppermost position or emergency off switch is pressed	Move the safety lever down / pull the emergency off switch
No reaction when actuating the blade up function	Blade float position is turned on	Turn off blade float position

Tracks / travel gear

Problem / error	Cause	Remedy
Oil emerges on track rollers, carrier rollers or idlers	Seal is defective	Replace seal

Deficient chain guidance on idler	Idler guide on track roller frame has too much play	Adjust the play of the idler guide
Chain jumps off or over	Chain tension too low / sprocket is worn	Adjust / replace chain tension
Correctly tensioned chain looses tension quickly during operation	Chain tension cylinder is defective	Check chain tension cylinder, replace, if necessary or reseal (only by authorized personnel)
Track roller or carrier roller is stuck	Track is extremely dirty	Clean

Electrical system

Problem / error	Cause	Remedy
Charge indicator light does not turn off	V-belt for alternator is loose or broken	Tension or replace V-belt
	Alternator is defective	Change alternator
Batteries are not charging or insufficiently charged	Batteries are defective	Change batteries
	Battery terminals are dirty / corroded	Clean battery terminals
	Cable is loose or defective	Connect or replace cable
No function or erroneous function of an indicator light or gauge	Bulb is burnt out, gauge is defective	Replace defective part
Failure of some or all instrument panel functions	Plug connector is unplugged or defective, ground is interrupted, short circuit - fuse is defective	Connect or change plug connector, fix short circuit, replace fuse

Heating system

Problem / error	Cause	Remedy
Heater does not put out warm air	Shut off valves on coolant line on engine are closed	Open shut off valves
	Engine is not at operating temperature	Bring engine to operating temperature
Heater blower is not running	No power supply	Check fuse and check wires / fix if defective
	Blower motor is defective	Change blower motor
Insufficient fresh air in operator's cab	Fresh air filter is dirty	Clean air intake openings, replace fresh air filter

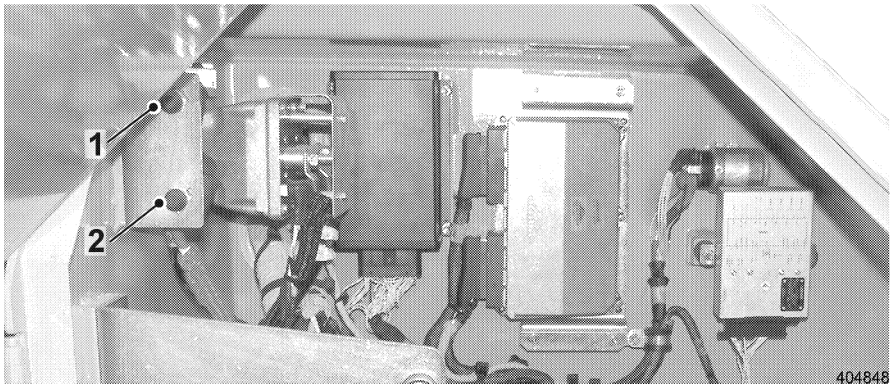
Working attachment

Problem / error	Cause	Remedy
Cylinder gives way under load	Piston seal in cylinder is defective	Overhaul cylinder
PR- chain scrapes on push frame	Blade adjustment incorrect	Adjust correctly
Increased bearing play on attachment	Bearing points worn	Replace bearing sections

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 left hand side in the battery compartment.

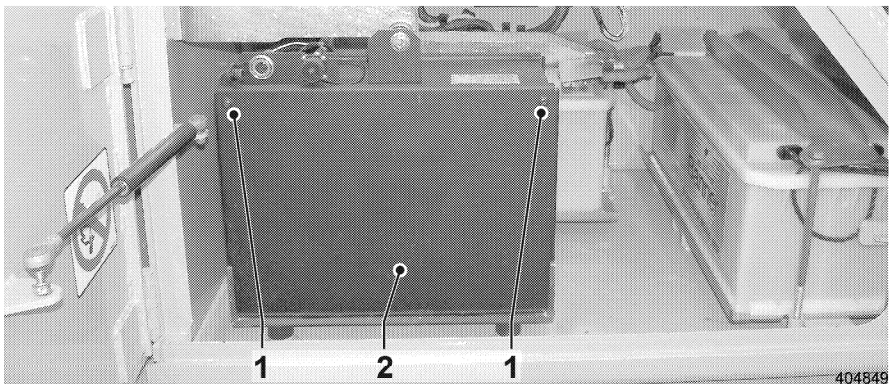
Fuse - flame glow system

The fuse for the flame glow system 2 (45A) is installed on the left hand side 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

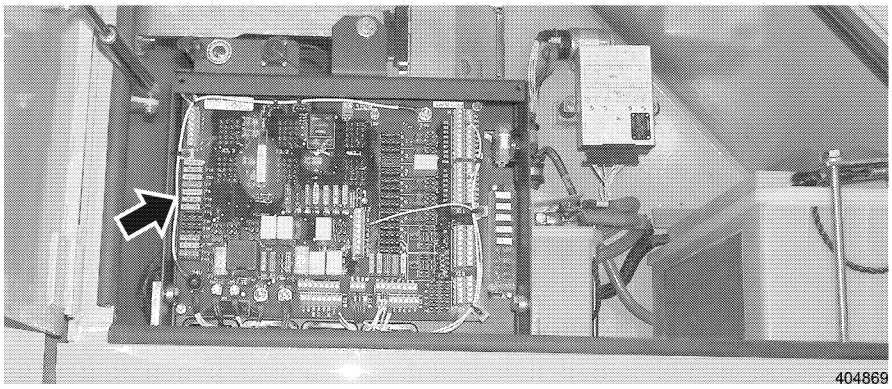
The additional fuses are located in the central electric housing on the left rear in the compartment.



Central electric housing

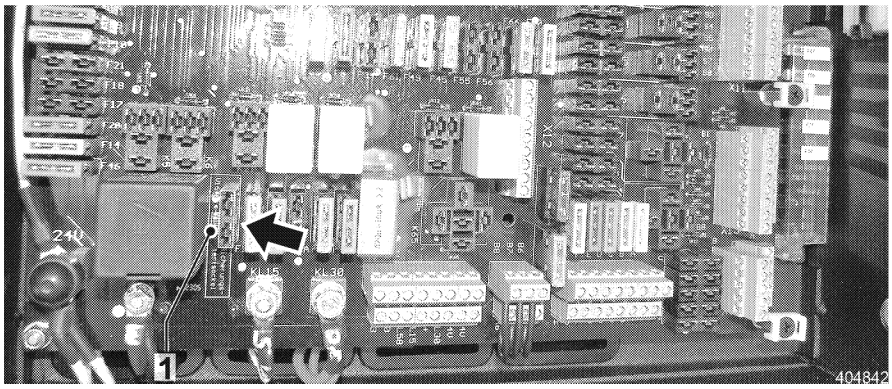
Access to the fuses is provided after removing the screws and the cover.

- Remove screws 1 and remove cover 2.



Location of fuses F3 to F56

- 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.

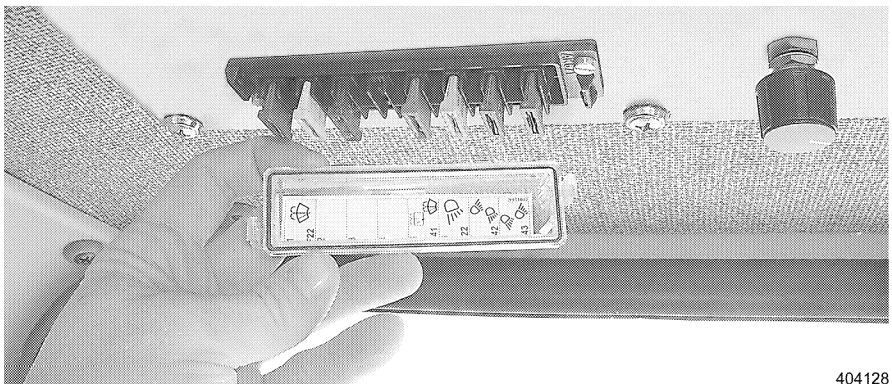
If the fuse is not defective, the bulb 1 on the test base lights up. Otherwise, change the defective fuse.

Fuse listing in central electric housing

SI = Special installation

Fuse	Value	Unit	Description / function
F 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
F 13	5	A	Electronic fan control
F 14	5	A	Solenoid valve quick drop
F 15.a	3	A	Solenoid valve float position
F 15.b	5	A	Solenoid valve float position ripper (SI)
F 16	5	A	Button – blade control lever
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, 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	2	A	Pin puller - ripper (SI)
F 35	30	A	Operator's cab
F 37	5	A	Auxiliary heater (SI)
F 38	15	A	Auxiliary heater (SI)
F 45	3	A	Cab interior lighting
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 53	3	A	Control motors Heater / air conditioner
F 55	3	A	Evaluation electronic Terminal 15
F 56	5	A	Evaluation electronic Terminal 30
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 69	10	A	Power supply ECU
F 70	10	A	Power supply ECU
F 73	1	A	Reversible fan (SI)
F 74	7.5	A	Reversible fan (SI)
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 90	5	A	Float position
F 92	3	A	Diagnostics plug



Fuses in roof console

Fuse listing in roof console

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

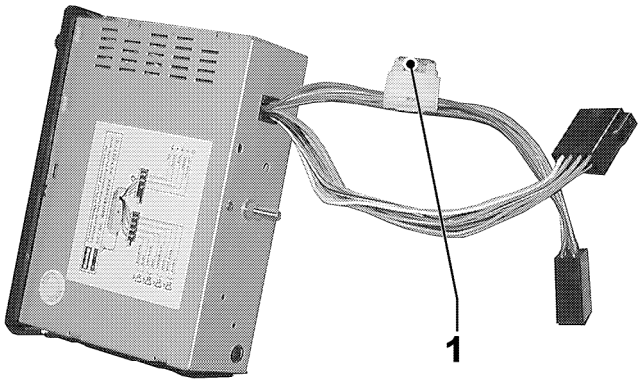
- Remove the cover and change the defective fuse.

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	Control motors Heater / air conditioner

Fuse Radio

The radio is secured with a separate fuse in the wiring harness.



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

Englisch LWT - TD 9/6/2006

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	**by maintenance personnel** ❑ first and only interval ❍ Repeat interval **by authorized expert personnel** ■ first and only interval ● Repeat interval **OM - Operating instructions** **SM - Service Manual** **hrs. – operating hours**	
							Diesel engine	
❍	❍	❍	❍	●	●	●	Check oil level and oil pressure	OM
❍	❍	❍	❍	●	●	●	Check the coolant level	OM
	❍	❍	❍	●	●	●	Check engine, cooling system and belly pan for contamination / clean if necessary	OM
	❍	❍	❍	●	●	●	Check fuel water separator / empty if necessary	OM
		❍	❍	●	●	●	Drain condensation and sediments from fuel tank - at least 1x weekly	OM
			❍	●	●	●	Change engine oil [1)] - at least 1x a year	OM
				●	●	●	Change lube oil filter [1)] - at least 1x a year	OM
				●	●	●	Check radiator cap and fan	OM
				●	●	●	Replace coolant filter, check antifreeze and DCA4 ratio of coolant	OM
				●	●	●	Check V-belt condition	OM
❍				●	●	●	Check oil, coolant and fuel system for leaks and condition	OM
❍				■	●	●	Check intake and exhaust system – mounting and leaks	OM
				■	●	●	Check mounting tightness of engine brackets	OM
				■	●	●	Check / adjust engine RPM	
				●	●	●	Replace fuel prefilter filter element	OM
				●	●	●	Check the mounting of the control units, check condition of sensory and cable connections	OM
					●	●	Check / adjust valve play - with cold engine	
					●	●	Check and service mechanical actuation to injection pump.	OM
					●	●	Change fuel filter cartridges	OM
					●	●	Grease gear ring on flywheel	
					●	●	Check flame glow system - before start of cold season	
					●	●	Take oil sample before oil change and send it in for analysis	OM
							Replace air filter inserts - as necessary / once a year	OM
							Replace oil separator - every 2 years	OM
							Replace coolant with antifreeze and DCA4 - every 3000 hrs. / at least every 2 years	OM
							Check / adjust fuel injectors - as necessary / every 3000 hrs.	

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 **by authorized expert personnel** ■ first and only interval ● Repeat interval **OM - Operating instructions** **SM - Service Manual** **hrs. – operating hours**	
							Hydraulic system	
❍	❍	❍	❍	●	●	●	Check oil level in hydraulic tank	OM
❍	❑	❑		●	●	●	Clean magnetic rod (also after repairs) - up to 50 hrs. daily	OM
				●	●	●	Drain condensation and sediments from hydraulic tank - at least every 6 months - Weekly when using an "environmentally friendly hydraulic medium"	OM
				●	●	●	Check / clean oil cooler for contamination	OM
				●	●	●	Replace hydraulic filter (insert) – replenishing circuit	OM
				■	●	●	Replace main return filter element or as soon as the indicator light lights up	OM
❍				■	●	●	Check working and travel hydraulic system for function and leaks, check hose routing for chafing	OM
				■	●	●	Check / adjust all hydraulic pressure according to adjustment check list	
				■	●	●	Check mountings and fittings for tight seating	OM
					●	●	Check all flushing circuit return filter inserts for deposits	OM
					●	●	Take oil sample before oil change and send it in for analysis	OM
						●	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	
❍			❍	●	●	●	Check oil level	OM
				●	●	●	Replace gear oil - at least every 2 years	OM
							Electrical system	
❍	❍	❍	❍	●	●	●	Check function of system, incl. displays and instruments	OM
❍				●	●	●	Check battery electrolyte level - at least 1x a year	OM
				■	●	●	Clean / check / grease battery terminals	OM
				■	●	●	Check cable routing and connections	OM
				■	●	●	Check / adjust all control system according to adjustment check list	
					●	●	Check battery charge - before start of cold season	

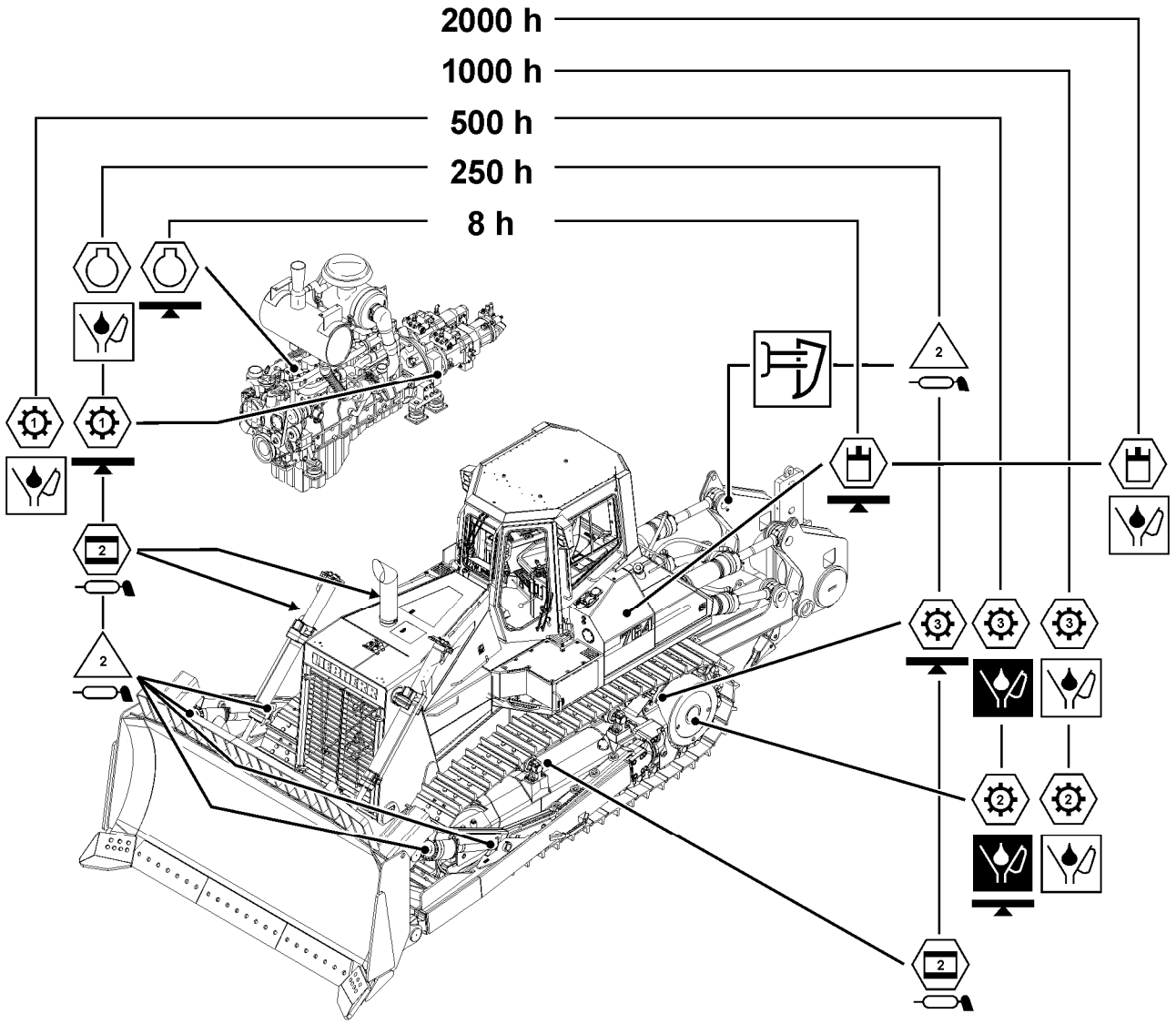
Maintenance / inspection at operating hours							Work to be carried out	Performance guidelines
at delivery	every 8 - 10	every 50	every 250	every 500	every 1000	every 2000	**by maintenance personnel** ❑ first and only interval ❍ Repeat interval **by authorized expert personnel** ■ first and only interval ● Repeat interval **OM - Operating instructions** **SM - Service Manual** **hrs. – operating hours**	
							Heater / ventilation	
❍				●	●	●	Check system for function and leaks - at least every 3 months	OM
				●	●	●	Check antifreeze level and moisture indicator - at least every 3 months	OM
							Replace fresh air filter and air circulation filter - as necessary	OM
							Air conditioning system inspection by expert HVAC personnel 1x a year	
							Travel gear	
❍			❍	●	●	●	Check oil level for seal area	OM
❍				●	●	●	Check 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 carrier rollers, track rollers, idlers for leaks	OM
			❑	●	●	●	Check oil level of support axle bearings	OM
			❍	●	●	●	Lubricate center equalizer bar bearing - shorten intervals as necessary	OM
				●	●	●	Check / adjust idler guides, replace parts as necessary	OM
❍							Adjust chain tension to suit application - as necessary	OM
							Clean travel gear - 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 **by authorized expert personnel** ■ first and only interval ● Repeat interval **OM - Operating instructions** **SM - Service Manual** **hrs. – operating hours**	
Working attachment								
❍	❍	❍	❍	●	●	●	Check cutting edges, corners and ripper teeth for wear - make sure attachments are suited to application	OM
❍		❑		●	●	●	Check blade center position and mounting tightness of bracket - and at every installation	OM
				●	●	●	Check all bearing points for play / wear	OM
		❑		●	●	●	Check screws, nuts and pin retainers for tight seating	OM
				●	●	●	Check attachment for damage	OM
General								
❍			❍	●	●	●	Lubricate all lube points according to the lubrication chart - shorten intervals as necessary	OM
❍				●	●	●	Check complete machine for proper maintenance and condition	OM
❍							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

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 as well as quantities, see section "Lubricants and service fluids".



Lubrication chart - view

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, quantities

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.

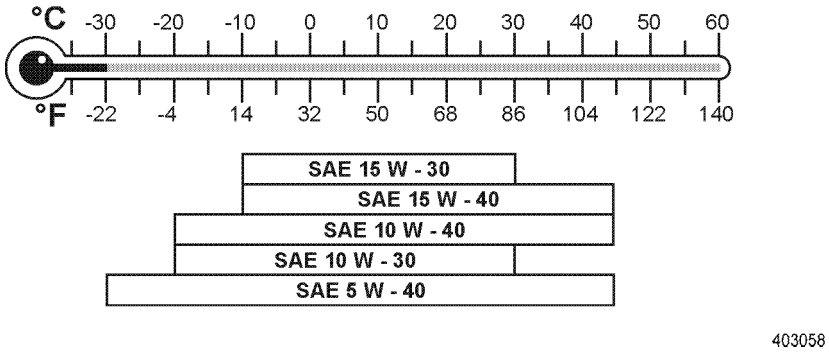
Specifications

Explanation:

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

Diesel engine

Quantities	Service fluids	Specification
56 l (14.8 US gal.)	Engine oil, viscosity per SAE	API CF-4, CG-4, CH-4 ACEA E2, E3, E4, E5, (D4, D5)



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 intervals:
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	E2, D4, CS4, CF4, CH4	E3, E4, E5, D5
Climate - normal, to -10°C	to 0.5 % above 0.5 %	250 hrs. 125 hrs.	500 hrs. 250 hrs.
below -10°C	to 0.5 % above 0.5 %	125 hrs. --	250 hrs. 125 hrs.

Fuel system

Quantity	Service fluids	Specification
900 l (238 US gal.)	Fuel	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. 350 mg/kg = max. 0.035 % 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.

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.
Additional approved Diesel fuels:
Diesel fuel according to DIN EN 590 with up to 5 % Vol. FAME* according to DRAFT prEN 14214 (previously: DIN 51606)

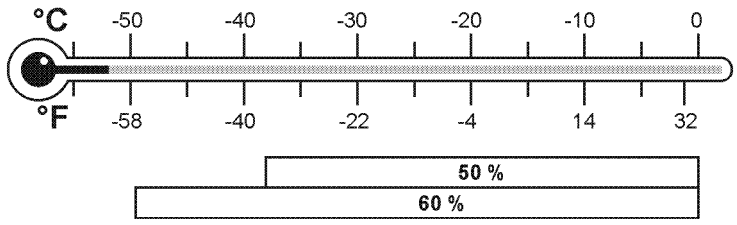
* FAME Fettsäuremethylester (=fatty acid methyl ester) (generic term EU-standard)

The following fuels are not approved:
- Kerosene (F34 / F35 / F44 / F63 / JET A1 / JP5 /JP8) *
- FAME (DIN 51606 > 5 Vol. %) *
- Diesel fuel with additive for exhaust after-treatment(e.g. additive on Cer-, iron basis)
- Heating oil (DIN 51603 / BS 2869 D / ASTM D936) *
- Marine distillate fuels *
- Diesel with un-dissolved water and water emulsions
- Alcohol *
- Petroleum *
- Benzene *

* Incl. additives to Diesel fuel

Cooling system

Quantity	Service fluids	Specification
80 l (21.1 US gal.)	Corrosion inhibitor / antifreeze fluids	For corrosion inhibitor / antifreeze fluids, refer to chart



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Percentage % of corrosion inhibitor / antifreeze fluids

Coolant with DCA4

(DCA4 = Diesel Coolant Additives)
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.

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.

The mixing ratio of the corrosion inhibitor / antifreeze fluid must be checked during maintenance work and corrected, as necessary.
The DCA4 concentration must be between 0.3 and 0.8 units per liter.
To check, we recommend the test kit CC2602 M by Fleetguard.
The given change interval for coolant is 2 years.

Fresh water guidelines

When preparing coolant, use water which is not too hard. Often, but not always, drinking water meets these requirements. Not suitable are sea water, brackish water, brine and industrial waster water.

Fresh water quality

Sum of alkaline earths (water hardness): 0.6 to 2.7 mmol/l (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

Refilling the cooling system

Before adding new coolant, check the cooling system for cleanliness, flush, if necessary.
When filling or refilling the cooling system after repairs, in addition to the DCA4 concentration in the water filters, DCA4 in liquid form must be added to the corrosion inhibitor / antifreeze fluid (see chart).
– Premix the coolant in a suitable container.

Mixing ratio

Machine type	Quantity	Part water	Part corrosion inhibitor / antifreeze fluid	Part liquid DCA
PR 764	approx. 80 l	38 l	38 l	4 l

Use of DCA4 without corrosion inhibitor / 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.
To protect the cooling system from corrosion also in this case:
– use twice as much DCA4 as compared with the mixing ratio of corrosion inhibitor and antifreeze fluid.
– The DCA4 concentration must be between 0.6 – 1.06 units per liter.
The DCA 4 – concentration must be checked during maintenance work and corrected, if necessary.
The coolant must be changed once a year.

Caution

When using water and DCA4, no coolant refiners (corrosion protective oils) may be used.

Disposal of corrosion inhibitors / antifreeze fluids

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

Approved corrosion inhibitors / antifreeze fluids

Brand	Manufacturer
Agip Antifreeze Plus	Agip Petroli S.p.A Rome, Italy
Agip Langzeit-Frostschutz	Autol Werke GmbH, Würzburg
Antigel DB 486	Sotragal SA, St. Priest/France
Aral Kühler Frostschutz A	Aral AG, Bochum
Avia Frostschutz APN (G48-00)	Deutsche Avia - Mineralöl GmbH, Munich
BP anti-frost X 2270 A	Deutsche BP AG, Hamburg
BP Napgel C 2270/1	BP Chemicals Ltd., London/England
Caltex Engine Coolant DB	Caltex (UK) Ltd., London/England
Caltex Extended Life Coolant	Caltex (UK) Ltd., London/England
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 International GmbH (DSI), Köln
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
Glycoshell AF 405	Shell
Glycoshell N	Shell
Glysantin (G 48-00)	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 - Kühlerfrostschutzmittel	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, premixed corrosion inhibitors / antifreeze fluids

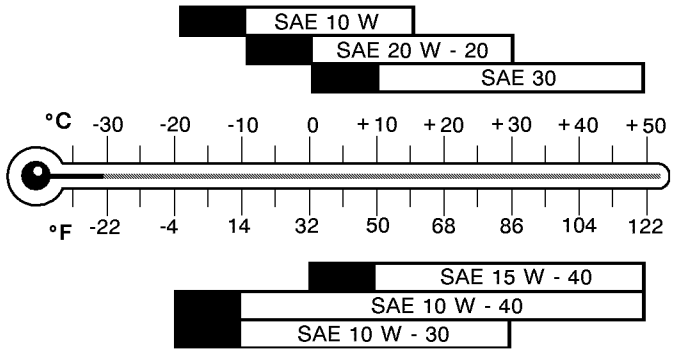
Corrosion inhibitor / antifreeze fluids for Diesel engine cooling systems in mixing ratio 50:50 (PREMIX)

Brand	**Manufacturer**
Liebherr Anti-Freeze APN Mix Id. No. 8611045 - 20l 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

Hydraulic

Quantity	Service fluids	Specification
Hydraulic tank 190 l (50 US gal.)	Engine oil, viscosity per SAE In the hydraulic system, only Diesel engine lube oils or especially approved may be used.	API: CF-4, CF, CG-4, CH-4 ACEA: E2, E3, E4, E5
Hydraulic system approx. 330 l (87.2 US gal.)		

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.



Temperature dependent selection of SAE classification

Warm up procedure

1. 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.
2. At even lower temperatures:
– Before starting the Diesel engine, preheat the hydraulic oil tank, then carry out warm up procedure as outlined in paragraph 1.

Splitterbox

Quantity	Service fluids	Specification
6.8 l (7.2 quarts)	Gear oil, viscosity per SAE SAE 85 W 140 EP SAE 80 W 90 EP SAE 90 EP SAE 90 LS	API GL-5 and MIL-L-2105 B,C or D

Travel gear

Quantity	Service fluids	Specification
PR 764 2 x 22,5 l (6 US gal.)	Gear oil, viscosity per SAE SAE 85 W 140 EP	API GL-5 and MIL-L-2105 B,C or D

Slip ring seal – travel gear

Quantity	Service fluids	Specification
7.5 l (8 quarts)	Hydraulic oil, viscosity per SAE See Hydraulic system (use same oil quality and viscosity as in hydraulic system)	

Equalizer bar bearing

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

Lube points on attachments, chain tensioner and door hinges

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

Hinges and joints

	Service fluids	
	Engine oil, viscosity per SAE	

Windshield washer system

Quantity	Service fluids	
9.5 l (10 quarts)	Commercially available window cleaning fluid	

Rubber seal on doors and covers

	Service fluids	
	Silicon spray or Talcum powder	

Corrosion protection

	Service fluids	
	Corrosion protective grease To conserve and protect exposed piston rods, apply a thick layer of acid free corrosion protective grease.	LIEBHERR Anti-corrosion grease CTK Id.No.861331301

5.3.3 Change from mineral oils to environmentally friendly hydraulic fluids

To operate the LIEBHERR crawler with "environmentally friendly hydraulic fluids", we recommend **Panolin HLP Synth 46**.

Caution

Danger of damage to the hydraulic system of the machine!
Mixing "environmentally friendly hydraulic fluids" with "mineral oils" can cause a strong reaction, which can damage the hydraulic system.
! Avoid mixing "environmentally friendly hydraulic fluids" with "mineral oils".

Change over guidelines

- Contact LIEBHERR service before changing the machine to "environmentally friendly hydraulic fluids"!

Request and follow the instructions in the "**Instruction sheet**" and the "**Change over guidelines**"!

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

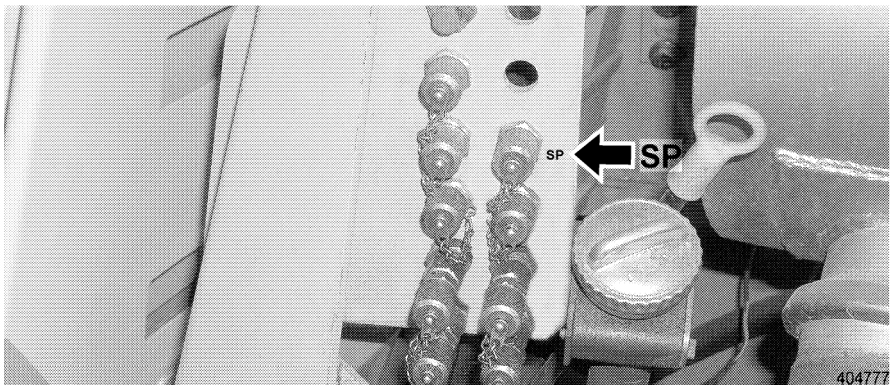
According to the data in the Maintenance and Inspection schedule.

Taking oil samples

Take the oil sample:
– 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.

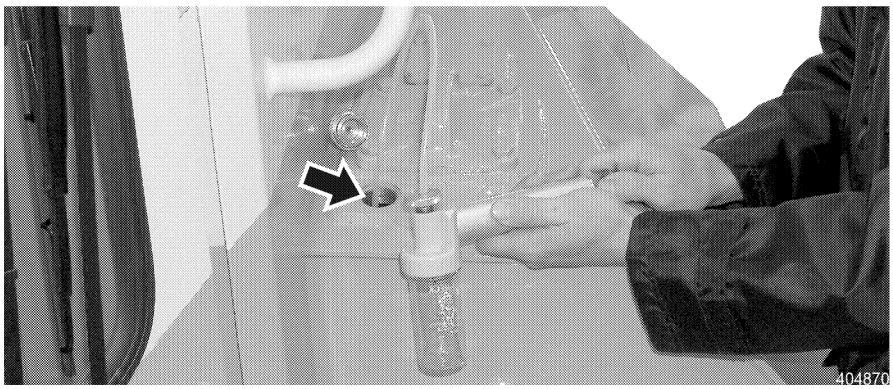
Locations to take sample



SP - connection

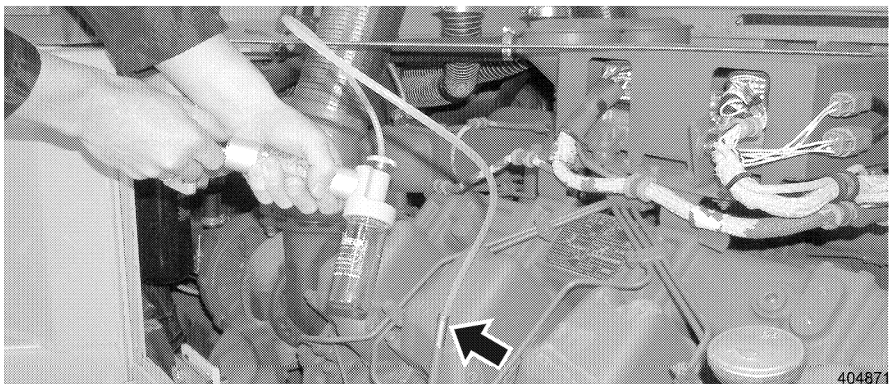
Hydraulic system

a) On the SP-connection with mini test hose (recommended method) or



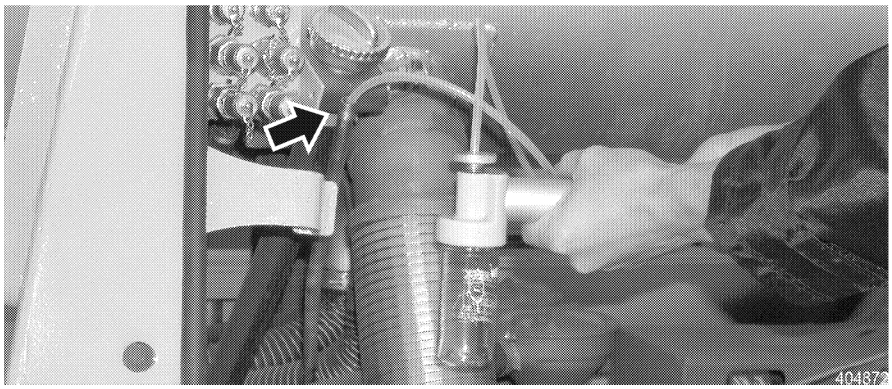
Breather screw

b) Remove the breather screw on the hydraulic tank and take oil sample with suitable manual suction pump.



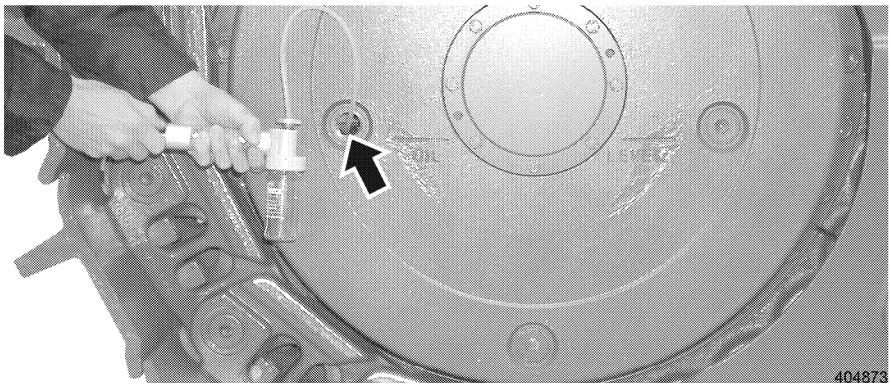
Dipstick tube

Diesel engine a) With manual suction pump via dipstick tube or
b) take oil sample during oil change from discharging oil flow.



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 are 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).

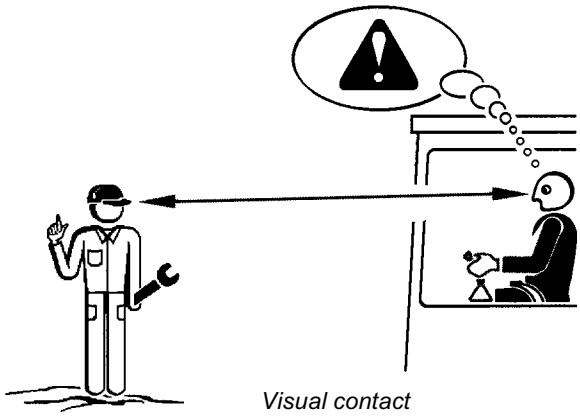
5.4 Preparations for maintenance

Before carrying out diverse maintenance tasks on the machine, bring the machine into maintenance position, it 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.



Visual contact

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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.

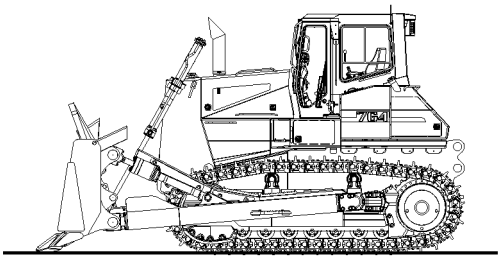
- Alert the operator before stepping into the danger zone of the machine!

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".



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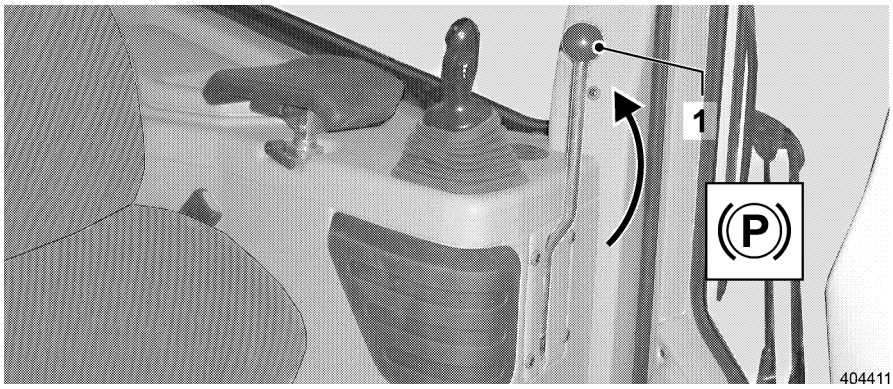
Maintenance position

- Park the machine on level ground.
- Lower the working attachment.



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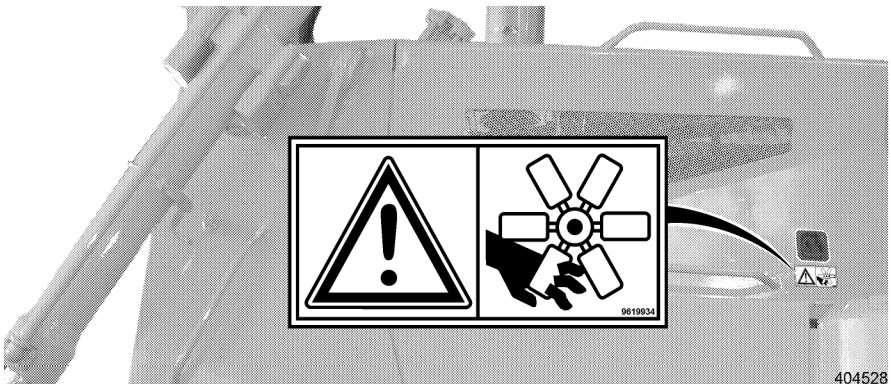
Safety lever up

- Move the safety lever up.
- Turn the Diesel engine off.
- Pull the starter key.

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

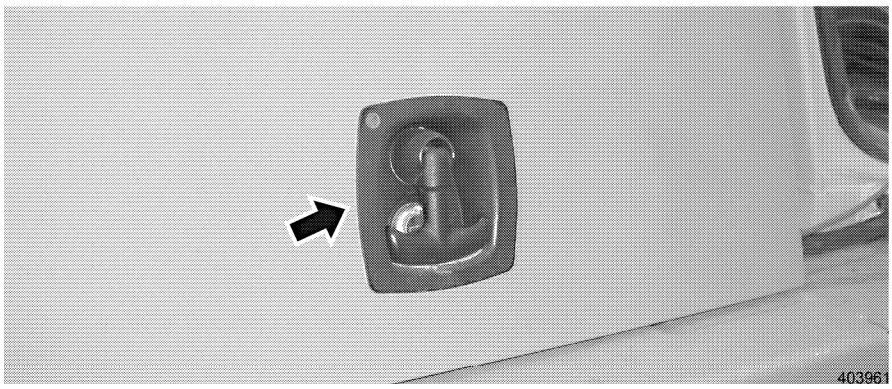


Open only if the engine is not running!

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.

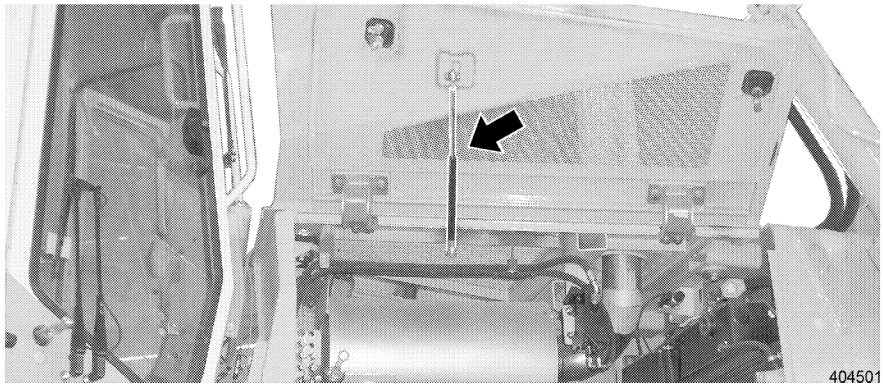


Open the engine compartment doors

- 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 the safety catch.



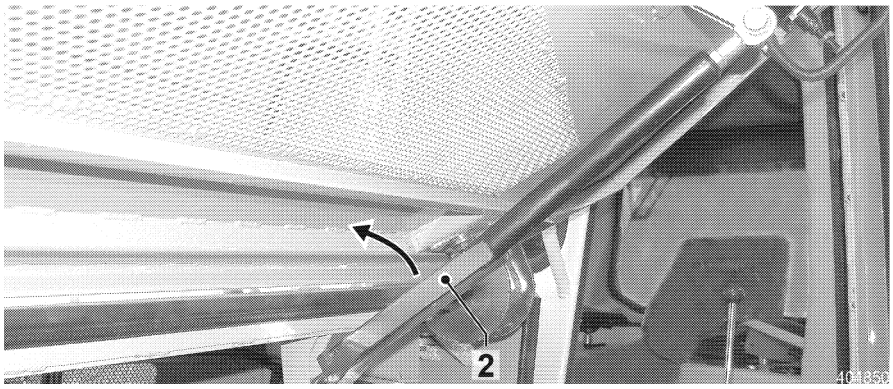
Gas cylinder

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 safety catch.

– If the function is not ensured, then the problem must be remedied immediately.



Safety catch

- Do close the engine compartment door press the safety catch 2 up.

5.4.2 Electrical system

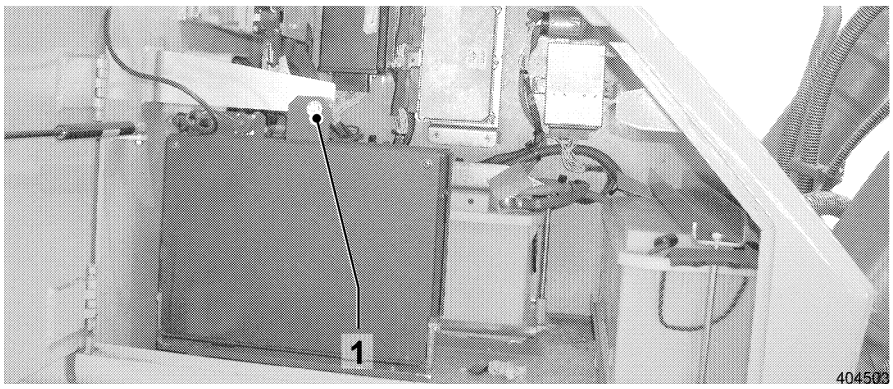
When working on the electrical system of the machine and for all welding work, the battery must be disconnected.

- Disconnect the negative terminal (-) first and reconnect it last.

For arc welding, in addition to disconnecting the battery, also disconnect the electronic boxes.

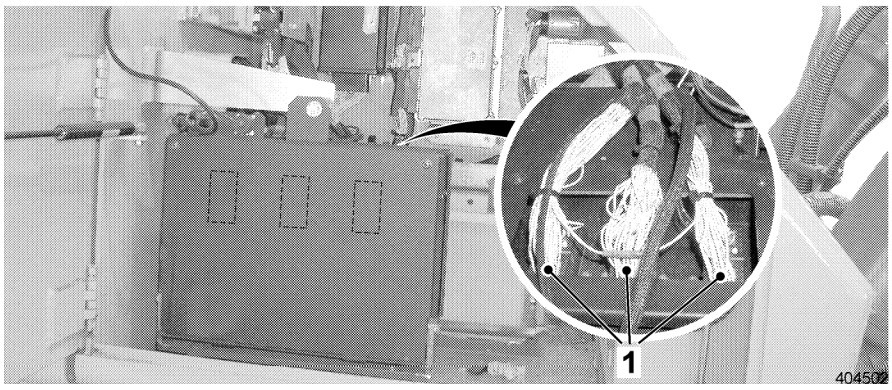
Electronic boxes

The electronic boxes are installed in the central electric housing.



Central electric housing

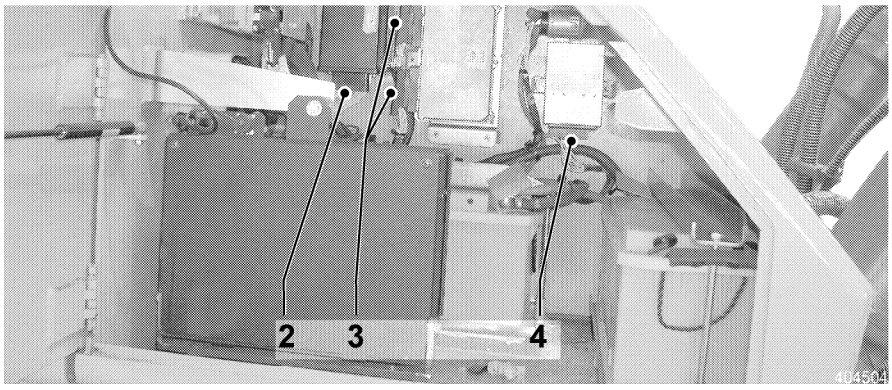
- Remove the screw 1 on top of the central electric housing.
- Fold the central electric housing forward.



Electronic box

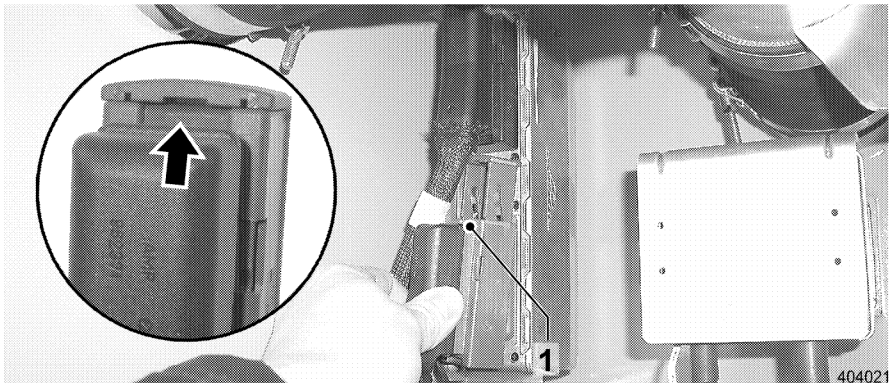
Unplug the electronic box

- Unplug the plugs 1 on the central electronic box.



Central electric box

- Unplug plugs 2, 3 and 4 on the remaining electronic boxes.



Unplug plugs

- With a screw driver in the recess, push the plug lock 1 up and unplug the plugs.

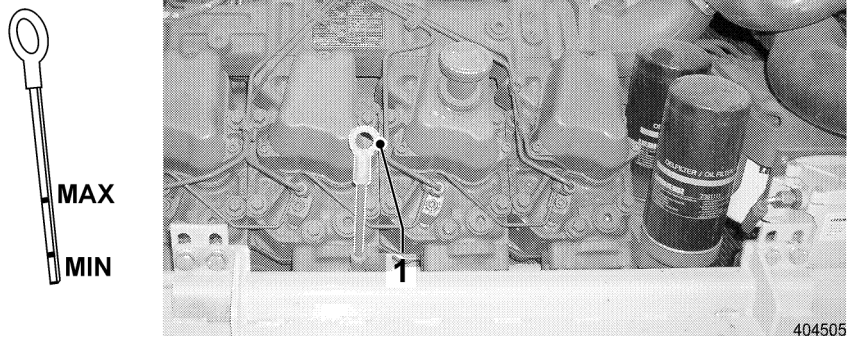
Caution

! When plugging the plugs back in, make sure they are correctly connected and locked.
– The plugs cannot be mixed up due to the plug coding.

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.

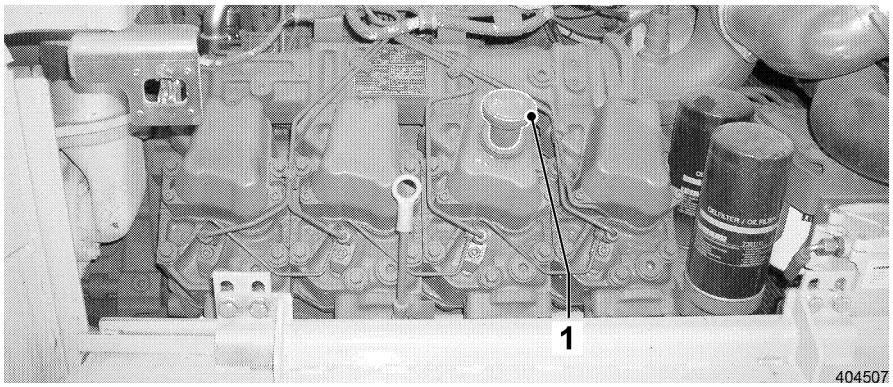


Oil dipstick

After turning the engine off, wait for a short time until the oil has collected in the oil pan.

- Pull out the dipstick 1, wipe it off 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

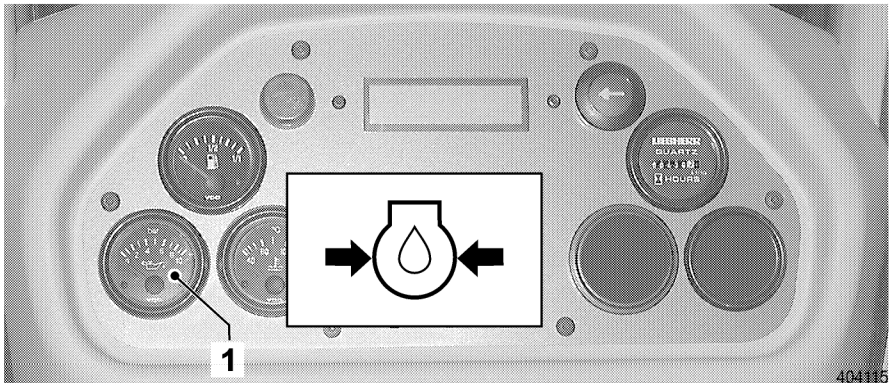
If the oil level is too low:

- Remove the oil filler cap 2 and add oil. For oil specification, see chapter "Lubricants and service fluids".
- Add oil via the filler neck.

- Recheck the oil level, do not fill the Diesel engine past the "MAX" mark.
- Clean the filler cap, place it on the filler neck and tighten.

5.5.2 Check the engine oil pressure

- Start the Diesel engine



Engine oil pressure gauge

The oil pressure is shown on the oil pressure gauge 1.
The oil pressure may not fall below the following values:
– at low idle RPM 1 bar
– at full load 3.5 bar

Troubleshooting

If the engine oil pressure is below these values, turn the engine off immediately and find the problem (change the engine oil and filter, if necessary).

5.5.3 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

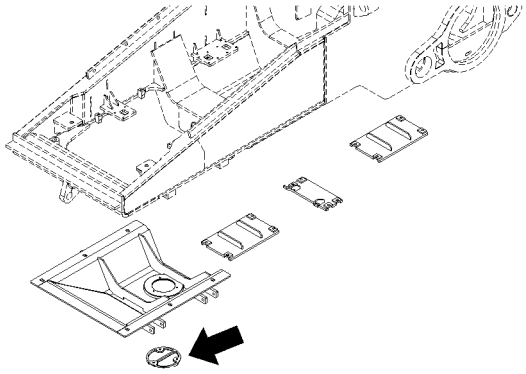
Danger of damage to the Diesel engine!
Infiltrating moisture can cause corrosion and failure of the measuring function.

! Do not subject electrical sending units, such as oil pressure switch to a direct water or steam blast.

- Carefully clean the engine with steam.

5.5.4 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.



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Belly pan cover

- Unscrew the belly pan cover.

– In case of heavy deposits in the belly pan area, the belly pans must be removed and cleaned.

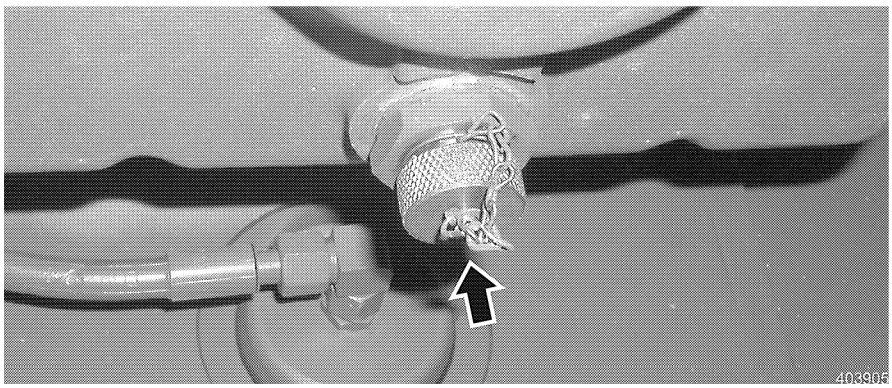
Danger

! 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.

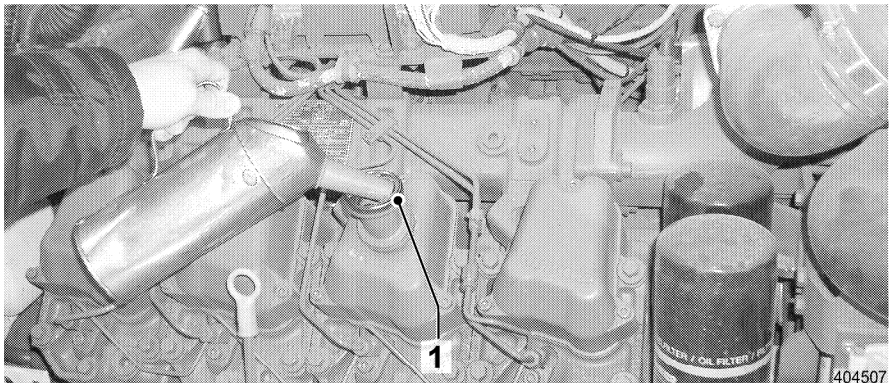
Caution

! 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.

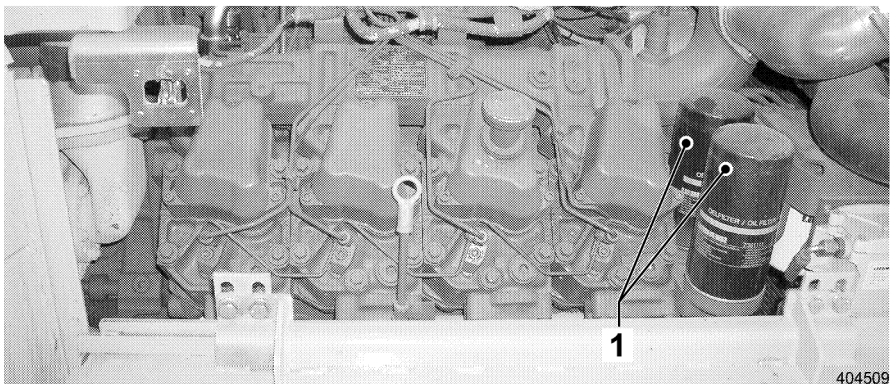


Add oil

- 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 and check the oil pressure.
- Turn the Diesel engine off and check the oil level on the dipstick after approx. 1-2 minutes. Correct the oil level, if necessary.

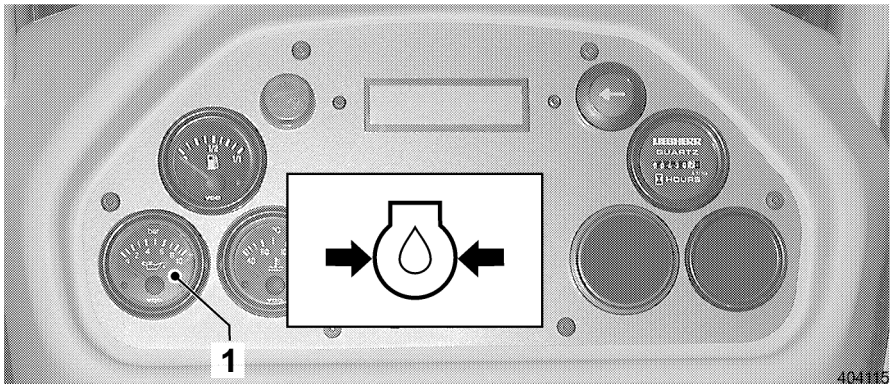
5.5.5 Change the lube oil filter

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open,
– two LIEBHERR oil filter cartridges are available.



Filter cartridges

- Loosen the filter cartridge 1 with a filter wrench and unscrew it.
- Clean the sealing surface on the filter bracket.
- Lubricate the rubber seal rings on the new filter cartridges thinly with engine oil.
- Install the new filter cartridges on the filter bracket and tighten by hand.

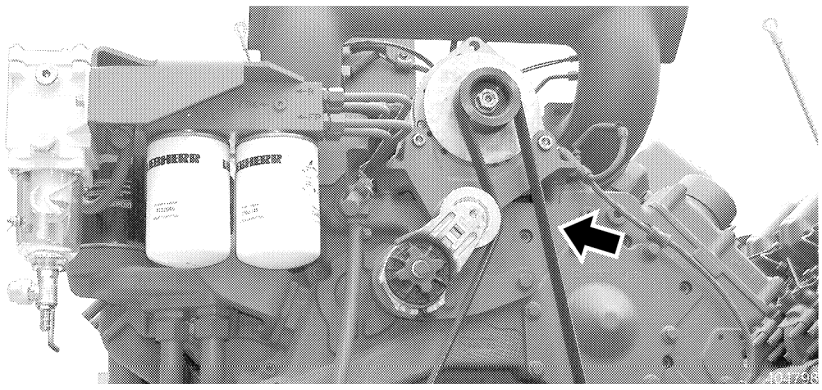


Engine oil pressure display

- Start the Diesel engine and check the oil pressure on the display unit - engine oil pressure.
- Turn the engine off, check the oil filter for leaks and check the oil level. If necessary, correct the oil level.

5.5.6 Check / change the V-belt

The V-belt is self-tensioning and maintenance free. Only the V-belt and the tension pulleys have to be checked for damage and wear.
Access is possible from the left side of the engine.
Always replace torn or damaged belts with new belts.
Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.

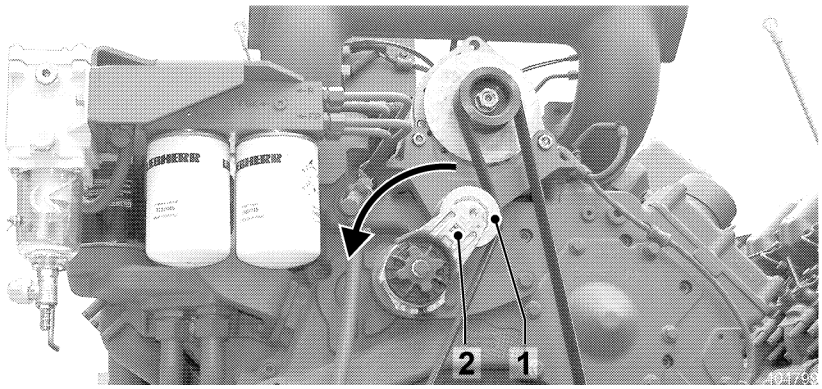


V-belt

Check the V-belt location

- Check the V-belt for cracks or damage.
- Check the belt pulleys and the tension pulley for proper condition and play (for example wear of V-belts, damage of tension pulley).

– If any parts are damaged, replace them immediately!



Change the V-belt

Change the V-belt

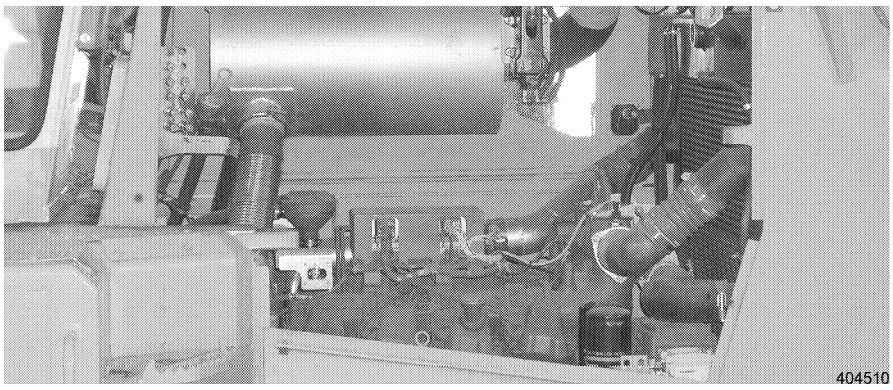
- Insert a ratchet according to DIN 3122 D 12,5 (1/2") into the square hole 1 of the tensioning device 2.
- Swing the tensioning device 2 against the spring force in counterclockwise direction to the stop and remove the V-belt.
- Check the pulleys and the tension pulley for proper condition and play (such as wear of the pulleys, damage to the tension pulley).

– If any parts are damaged, replace them immediately.

- Place the new V-belt with the tensioning device 2 swung back, on each pulley and the tension pulley.
- Return the tensioning device 2 again into tension position.

5.5.7 Check the Diesel engine assembly for leaks and condition

Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.

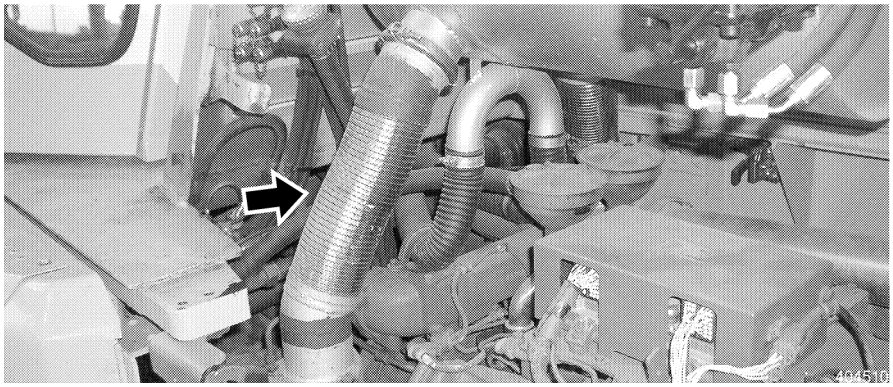


Diesel engine assembly

- Check the complete engine assembly for condition and leaks.
  – Be especially watchful for the leaky fuel lines.
- Replace damaged seals immediately.

5.5.8 Check the mounting of suction and exhaust lines

Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.



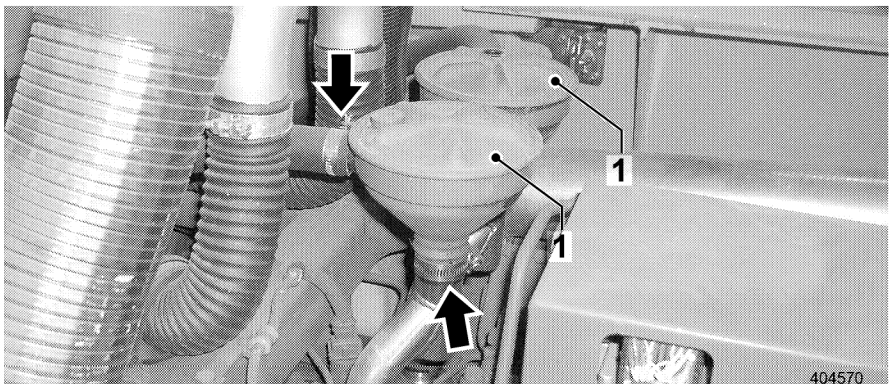
Suction – exhaust lines

- 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.

5.5.9 Oil separator

Change oil separator

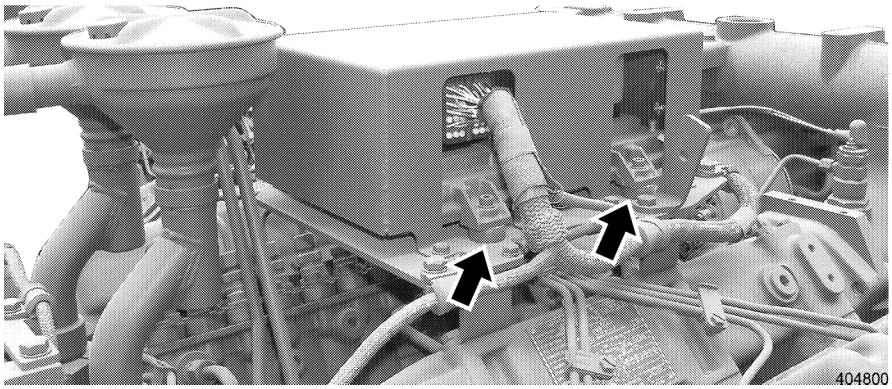
A damaged or crushed oil separator can be compromised. The oil separator must then be replaced. The oil separator must also be replaced if oil fumes emerge from the vent hole on the cover.
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



Oil separator

- Release the mounting clamps on the oil separators 1 and on the hose and remove the oil separator.
- Insert a new O-ring into the oil separator.
- Place the new oil separator and tighten the mounting clamp.
- Push on the hose and tighten the hose clamp.
- Avoid infiltration of cleaning fluid (for example when cleaning the engine).

5.5.10 Diesel engine electrical system



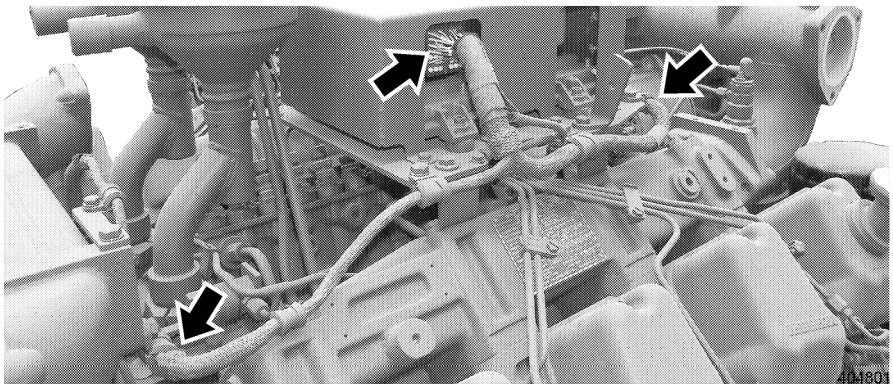
Control mounting

Check the mounting condition of the controls

- Check the mounting of the controls for damage and tight seating.

If damaged mountings are found:

- do not start the Diesel engine,
- replace all mountings.



Sensory and cable connections

Check the condition of the sensory and cable connections

- Check all sensors and cable connections for tight seating and condition.
- Check all cables and wiring harness to ensure they are not damaged and that they are routed to prevent them from rubbing and chafing and that they are attached properly.

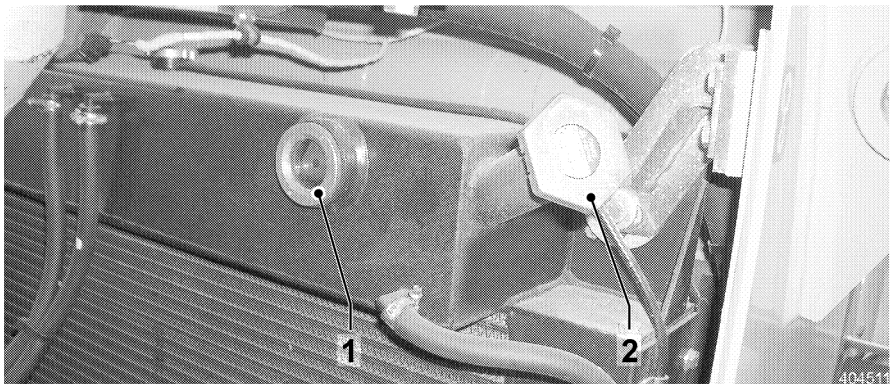
If any damage on cable connections, wiring harness or sensors is found:

- do not start the Diesel engine,
- replace the defective parts.

5.6 Cooling system

5.6.1 Check the coolant level

The coolant expansion tank with the filler neck is located on the upper side of the cooler 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,



Sight gauge - coolant

- With the Diesel engine turned off, the coolant must be visible in the sight gauge.
- If the coolant is not visible in the sight gauge, add coolant.

Antifreeze concentration

The coolant to be added must provide the correct antifreeze concentration and DCA-4 concentration. For detailed description, see "Check antifreeze and DCA-4 concentration in coolant".

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 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.

Add coolant

- Open the right engine compartment door.
- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open.

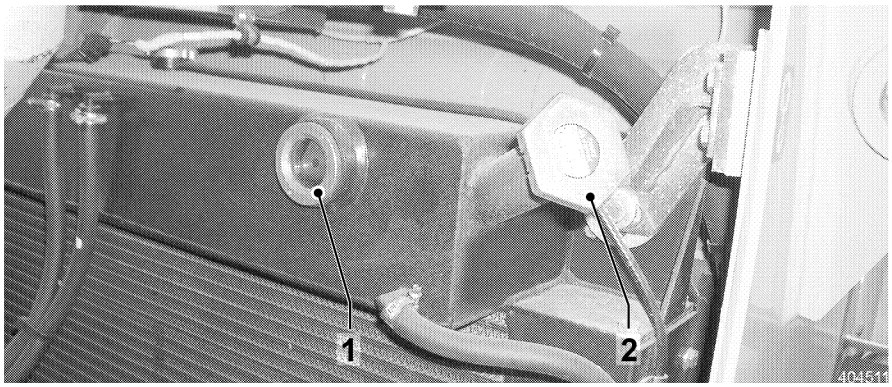
Caution

! Avoid skin contact with coolant!

! Observe the manufacturer's instructions.

– When mixing coolant, wear rubber gloves and safety glasses.

– In case of an accidental splash, flush eyes or skin immediately with plenty of water.



Add coolant

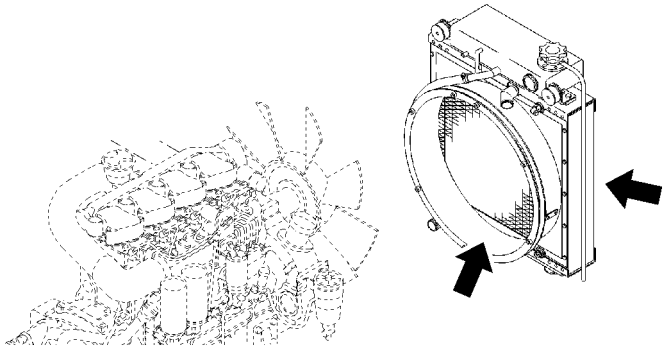
- Add coolant to the center of sight gauge 1.
- Place the cap 2 on the filler neck and tighten.

5.6.2 Clean the cooling system

To ensure proper cooling function, it is necessary to clean the cooler. In dusty job applications, check the cooler daily and clean, if necessary.
Dirty cooling units can cause overheating, which will trigger an acoustical and visual warning.
Dust and other dirt can be removed from the cooling fins with water spray, steam or air pressure. We recommend the use of pressurized air.
Make sure that:
– the machine is in maintenance position,
– the engine compartment doors are open.

Caution

Be careful not to damage the cooling fins.
! Do not use hard objects or high water pressure for cleaning.



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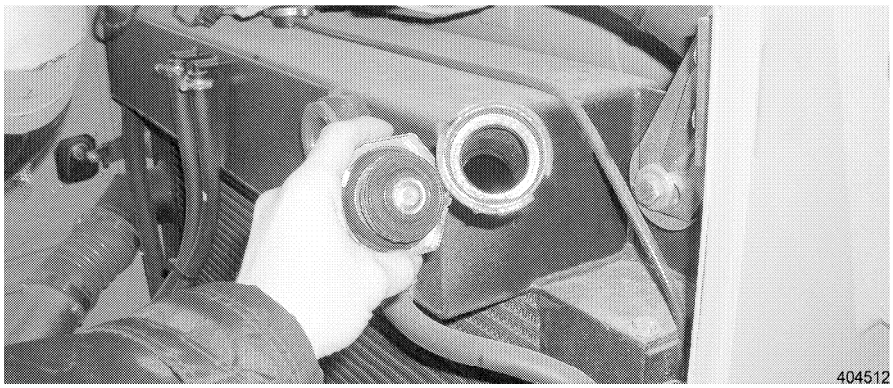
Cooler

- Clean the cooler units with air pressure, 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.



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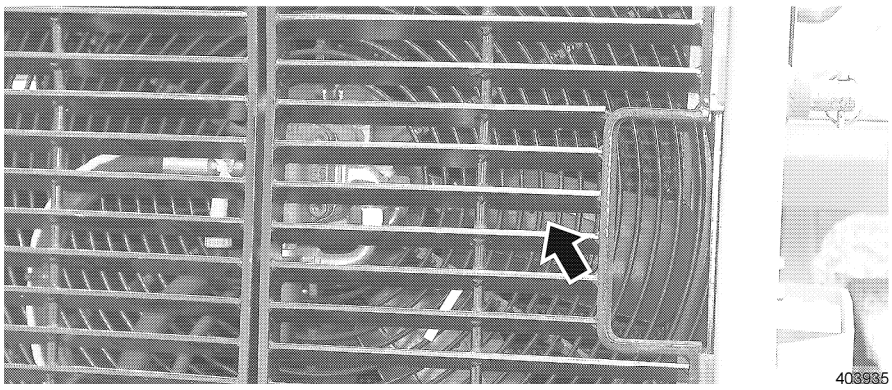
Radiator cap

Check the radiator cap

- Check the radiator cap for leaks



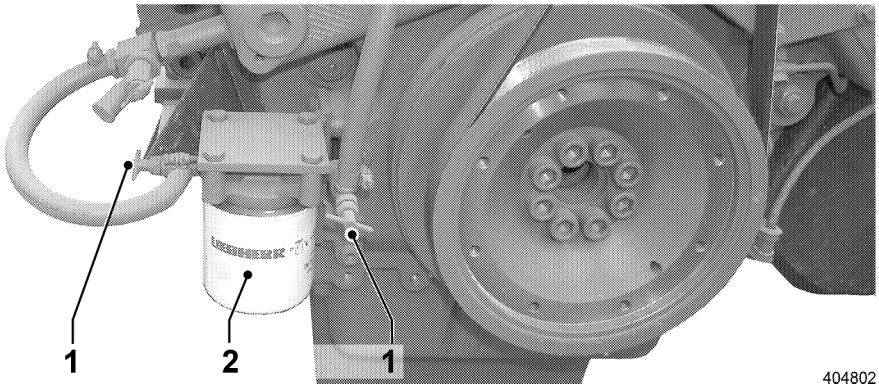
Fan

Check the fan

- Check the fan for damage.

5.6.4 Change the coolant filter

Make sure that:
– the machine is in maintenance position,
– the left engine compartment door is open.



Coolant filter

- Close shut off valves 1.
- Loosen the water filter 2 with a filter wrench and unscrew it.
- Clean the sealing surface on the filter bracket to remove all seal residue.
- Lightly lubricate the rubber seal ring on the new water filter with engine oil.
- Screw the new water filter 2 on the filter console until it is seated and tighten by hand.
- Open the shut off valve 1.

(The handle on the shut off valve is then in horizontal position).

5.6.5 Check the antifreeze and DCA-4 concentration in the 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. The coolant must contain the correct DCA-4 concentration. The correct DCA-4 concentration is between 0.3 - 0.8 units per liter.
Make sure that:
– The test kit CC 2602 M by Fleetguard for the DCA-4 concentration and the antifreeze concentration in the coolant is available.

Caution

Danger of scalding due to splashing coolant!
! Open the cap on the filler neck 1 only if the engine is cooled off - the coolant temperature gauge on the segment field of the indicator unit should be in the lower third of the segment field.

- Carefully open the cap on the filler neck.
- Check the antifreeze concentration and the DCA-4 concentration with test kit CC 2602 M by Fleetguard.
- If the concentration deviates from the correct value:

Add antifreeze and DCA-4 until the nominal value is obtained.
See "Lubricant and service fluid specification".

5.6.6 Change the coolant

Make sure that:
– the machine is in maintenance position,
– the engine compartment door is open,
– the heater valves are open.
– a container is available,
– the required amount of coolant with DCA4 is available (for mixing ratio, see "Lubricants and operating 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 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.

Drain coolant

- Turn the cap on the filler neck a little in counterclockwise direction to relieve the pressure, then open.

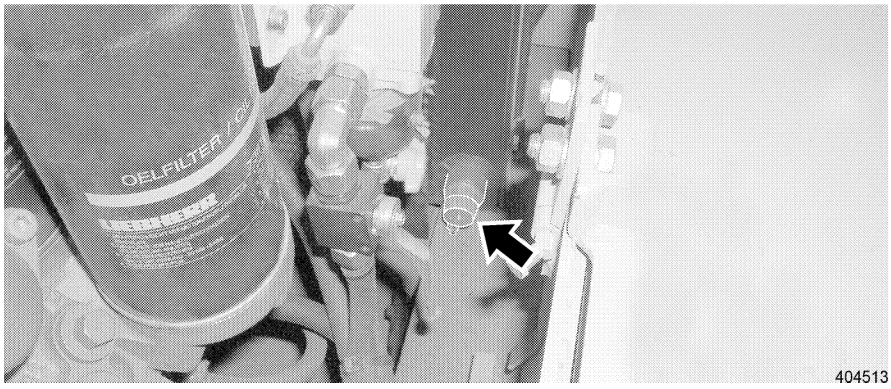
Caution

! Avoid skin contact with coolant!

! Observe the manufacturer's instructions.

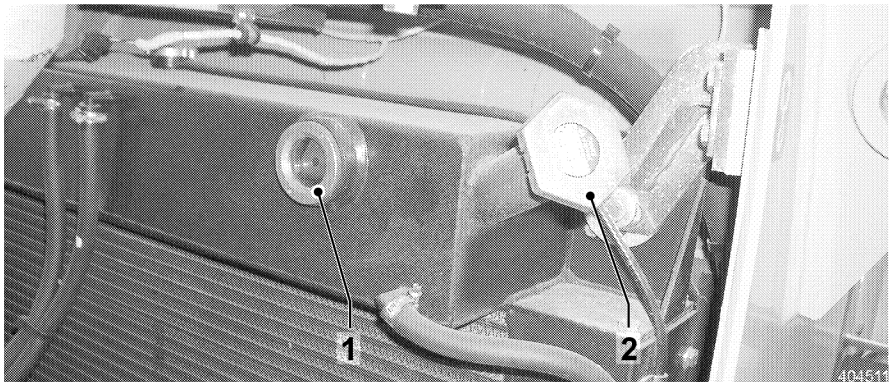
– When mixing coolant, wear rubber gloves and safety glasses.

– In case of an accidental splash, flush eyes or skin immediately with plenty of water.



Drain valve

- Open the left engine compartment door.
- Place a container under the drain valve.
- Remove the cap on the drain valve.
- Install the drain hose (part of the tool box) on the drain valve and drain the coolant into a suitable container.
- Remove the drain hose and reinstall the cap on the drain valve.

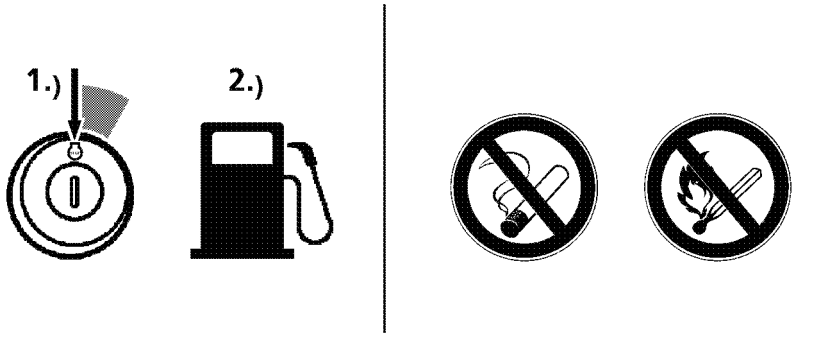


Add coolant

Add coolant

- Add the premixed coolant, which was premixed according to "Lubricants and service fluid chart" via the filler neck to the center of sight gauge 1.
- Place 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, if necessary.

5.7 Fuel system



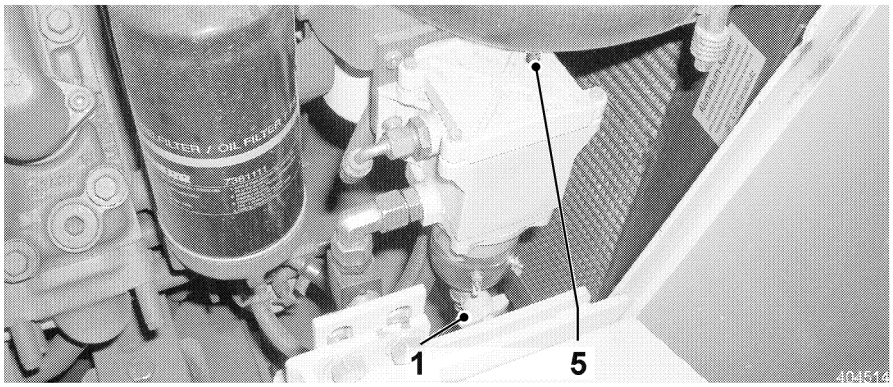
Danger of fire

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 separator condensation

Make sure that:
– the machine is in maintenance position,
– a suitable container with the required capacity is available.



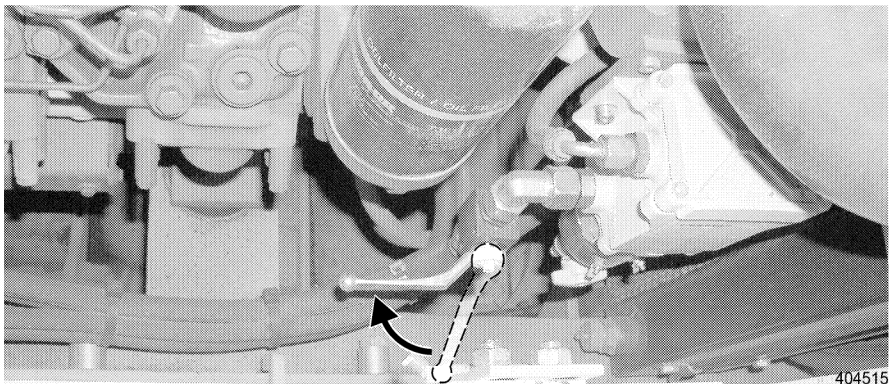
Fuel separator

- Open the breather screw 1.

- Open the drain valve 5 and drain the condensation into a suitable container until clean fuel emerges.
- Close the drain plug 5 and the breather screw 1 again.

5.7.2 Drain condensation and sediments from fuel tank

Make sure that:
– the machine is in maintenance position,
– a suitable container with the required capacity is available.



Fuel system - shut off valve

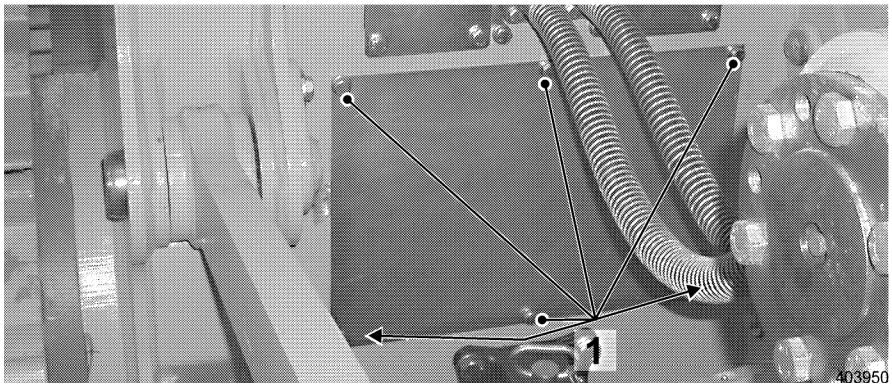
The shut off valve is accessible via the right engine compartment door.

- Close the shut off valve - fuel system.

Access to the shut off valve is possible on the rear of the machine after removing the cover plate.

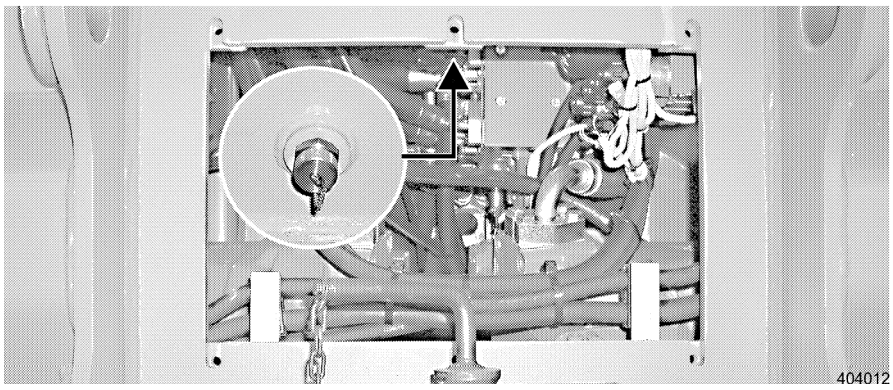
Danger

Danger of accidents due to raised attachment.
! Never work under the raised working attachment!
– Support the attachment first properly or place it on the ground.



Cover plate

- Remove the hex head screws 1 and remove the cover plate.

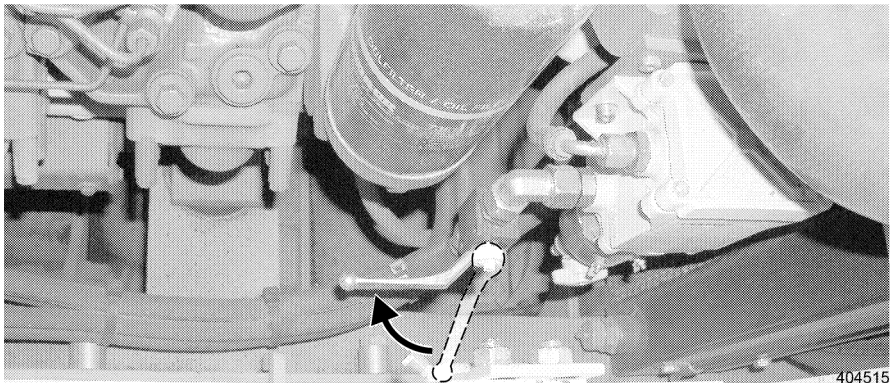


Drain valve – fuel tank

- Unscrew 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 reinstall the cap on the drain valve and tighten.
- 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 becomes dirty often, the fuel tank must be emptied and cleaned.
Make sure that:
– the machine is in maintenance position,
– a suitable container with the required capacity is available.



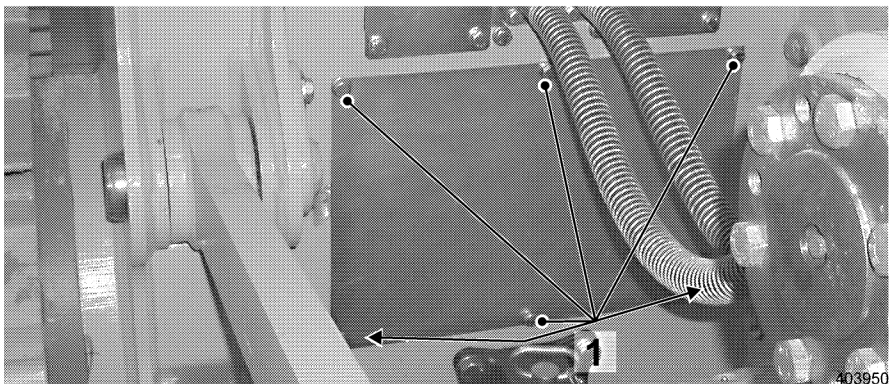
Fuel system - shut off valve

- Close the shut off valve - fuel system.
- Unscrew the tank cover.

Access to the shut off valve is possible on the rear of the machine after removing the cover plate.

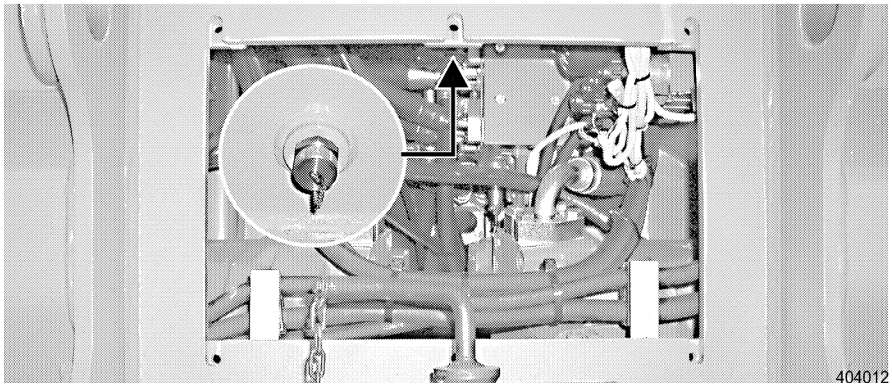
Danger

Danger of accidents due to raised attachment.
! Never work under the raised working attachment!
– Support the attachment first properly or place it on the ground.



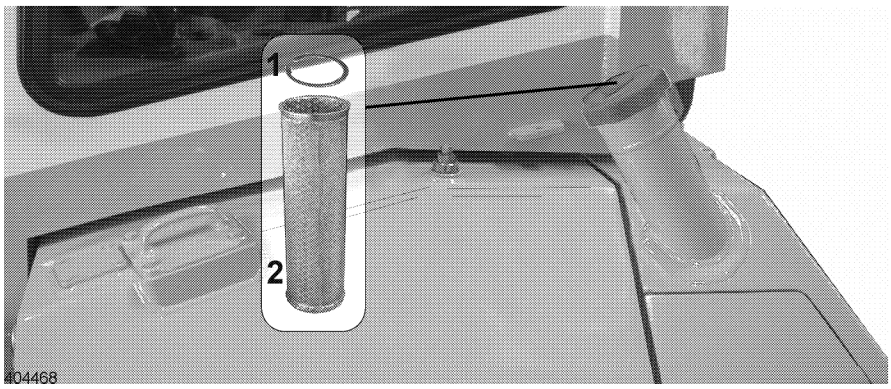
Cover plate

- Remove the hex head screws 1 and remove the cover plate.



Drain valve – fuel tank

- Unscrew the cap on the drain valve on the underside of the Diesel fuel tank.
- Place a container with sufficient capacity under the drain valve.
- Install the drain hose on the drain valve.
- Drain fuel into a suitable container.
- Remove the drain hose and reinstall the cap on the drain valve and tighten.
- 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.

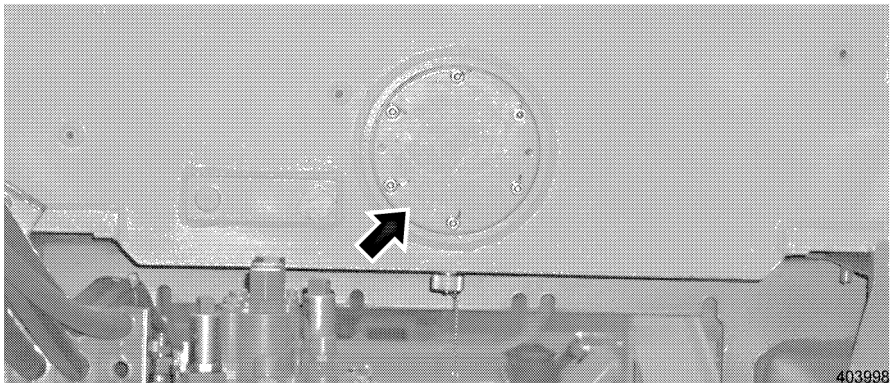
- Check the fuel tank.

Problem remedy

If the fuel tank is dirty, then it must be cleaned.
If cleaning is not needed, reinstall the strainer and the retaining ring.

Clean the fuel tank

- Empty the fuel tank completely.



Cleaning cover

- Raise the operator's platform as described before.

– Access to the cleaning cover is only possible if the cab is tilted.

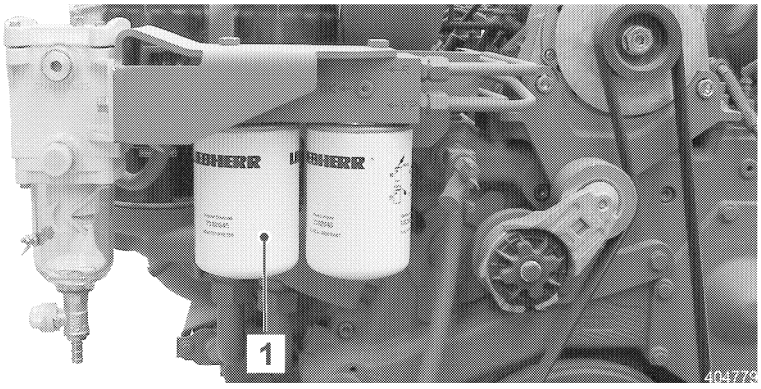
- Remove the cleaning cover.

– Check the O - ring on the cleaning cover and replace it, if necessary.

- Clean the fuel tank.
- Install the cleaning cover with O - ring.
- Fill the fuel tank.
- Open the shut off valve - fuel system.

5.7.4 Change the fuel filter elements

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.

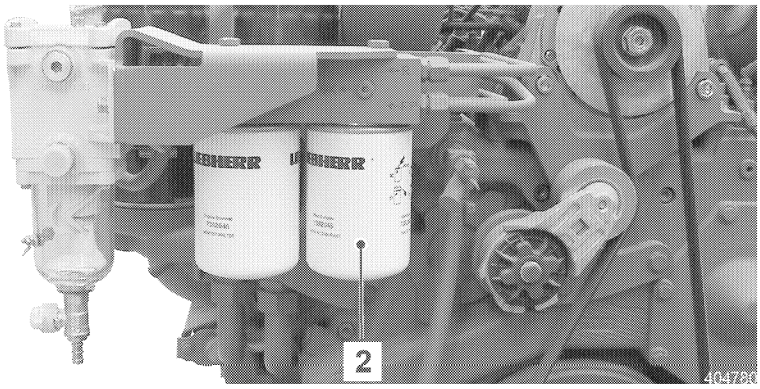


Fuel fine filter

Fuel fine filter

- Close the shut off valve - fuel system.
- Loosen the filter cartridge 1 with a filter wrench and remove.
- Clean the sealing surfaces on the filter console.

- Apply a thin layer of engine oil to the rubber seal rings on the new filter elements.
- Install the new filter element to the filter console and tighten by hand.
- Open the fuel system shut off valve and bleed the fuel fine filter.



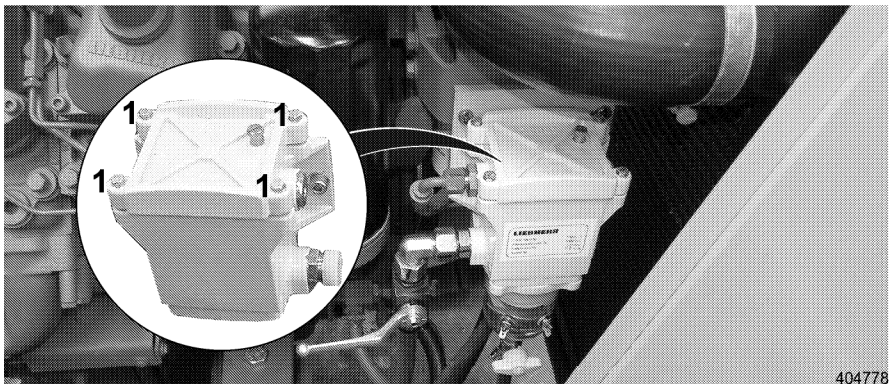
Fuel pre-filter

Fuel pre-filter

- Close the fuel system shut off valve.
- Loosen the filter cartridge 2 with a filter wrench and remove.
- Clean the sealing surface on the filter console.
- Apply a thin layer of engine oil to the rubber seal rings on the new filter elements.
- Install the new filter element to the filter console and tighten by hand.
- Open the fuel system shut off valve and bleed the fuel pre-filter.

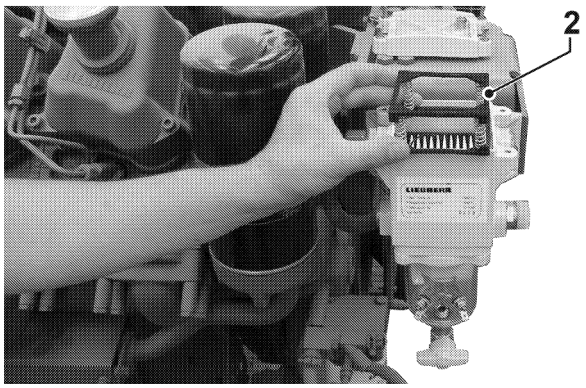
5.7.5 Clean the fuel separator

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.



Remove the cover

- Remove screws 1 on the on the water separator.
- Set the cover with seal aside.



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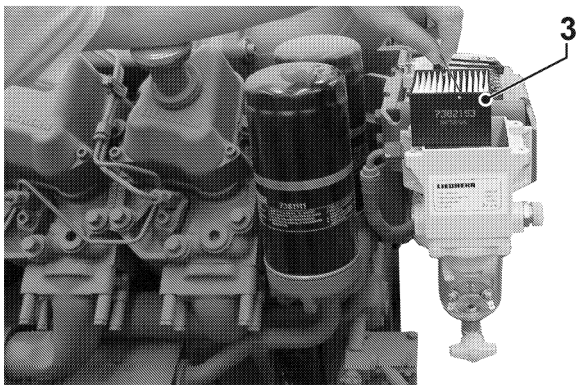
Remove the spring cartridge

- Remove the spring cartridge 2.



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Remove the strainer

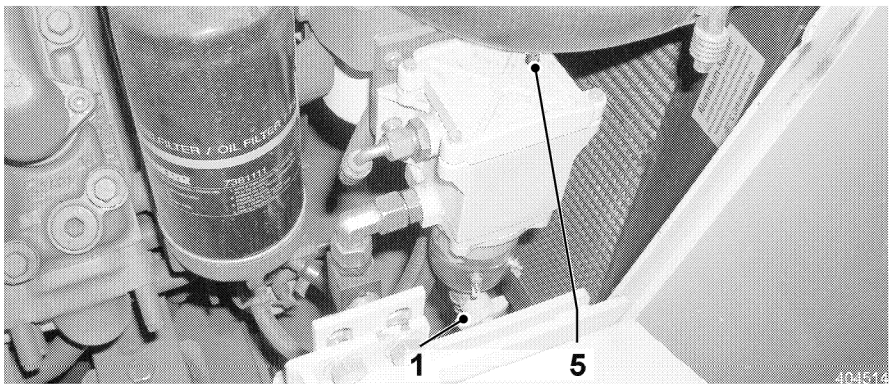
- Remove the strainer 3 and clean or replace it.
- Drain the fuel from the water separator.
- Refill the fuel water separator with clean fuel.
- Check the seal and reassemble the water separator in reverse order.

5.7.6 Bleed the fuel system

Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open.

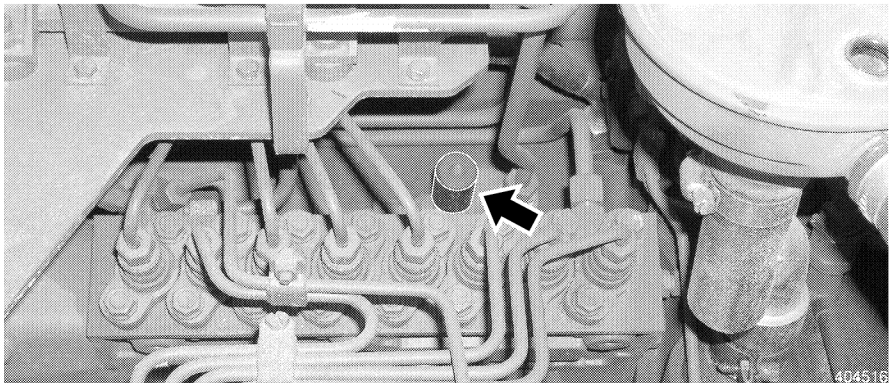
Bleeding the fuel system is necessary after:

- Changing the fuel filters.
- Cleaning the fuel tank.
- Repairs on the fuel system.
- Emptying the fuel tank.



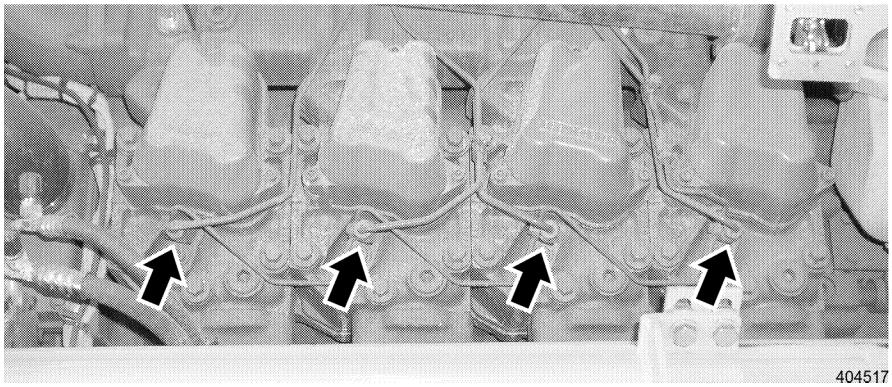
Breather screw – fuel water separator

- Back out the breather screw 1 on the fuel water separator by 2-3 turns.



Hand pump

- Actuate the hand pump until fuel free of air bubbles emerges on the breather screw 1.
- Tighten the breather screw 1 again.



Union nuts

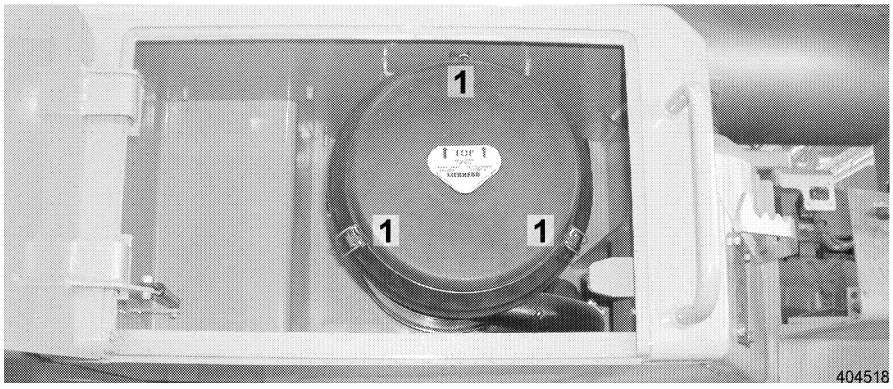
- Loosen the union nuts on the injection valves.
- Close the engine compartment doors.
- Actuate the starter switch until fuel free of air bubbles emerges. Retighten the union nuts tighten.

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

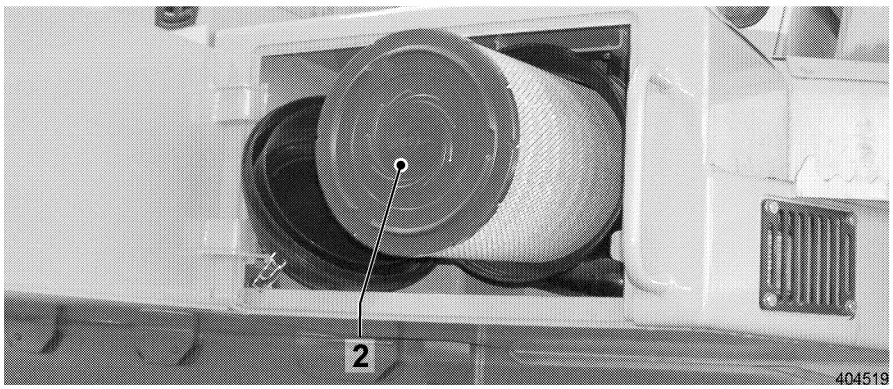
5.8.1 Clean / change the air filter

Clean or change the main elements 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 elements, then the safety elements must also be changed.
Make sure that:
– the machine is in maintenance position.
The air filters are installed in the steps on the left and right hand side.



Mounting clamps

- Remove the mounting clamps 1 on the service cover and remove the cover.



Main filter element

Main filter element

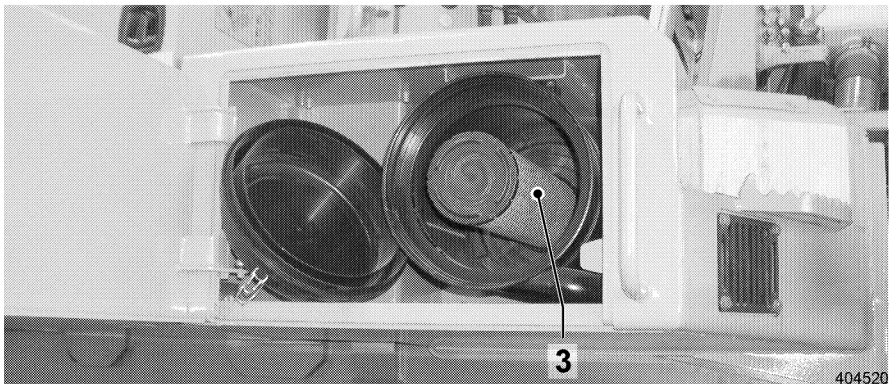
- Remove the main filter element 2, clean or change it.

Clean the main filter element

403283

Blow out 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.



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Safety element

Safety element

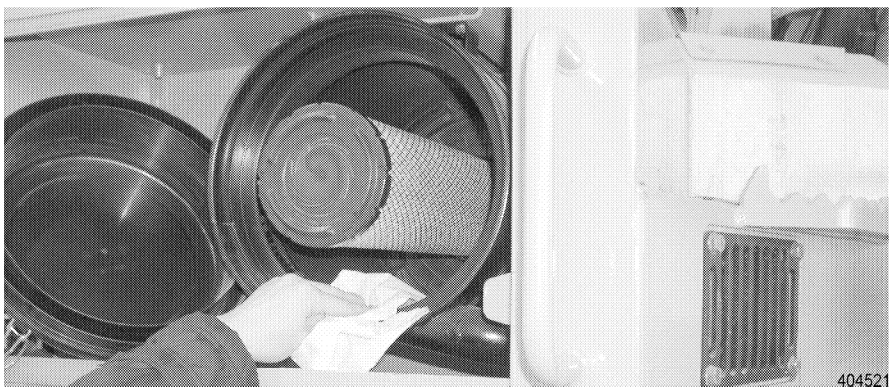
- The safety element 3 should be replaced at every third cleaning or whenever the main filter element 2 is being replaced.

– 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.



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Clean the filter housing

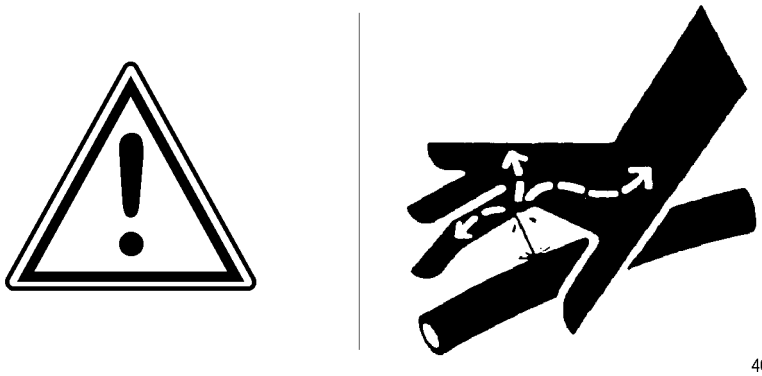
Clean the filter housing

- 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



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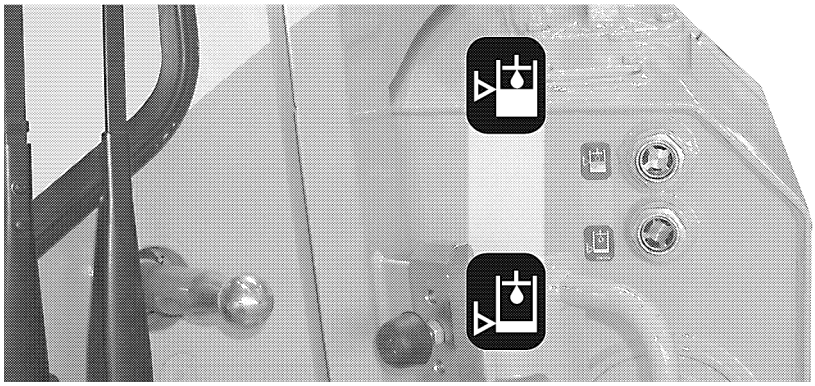
Hydraulic pressure

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.



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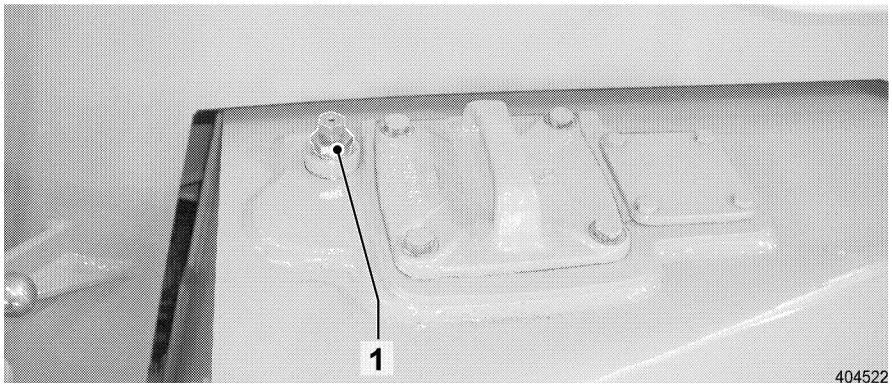
Sight gauges

Check oil level

- Check the oil level on the sight gauges.

– With retracted hydraulic cylinders, the oil level may not 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.

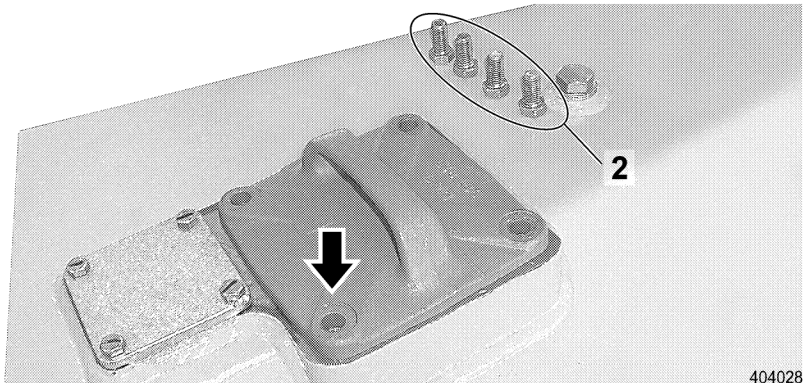


Hydraulic tank – breather screw

Add hydraulic oil

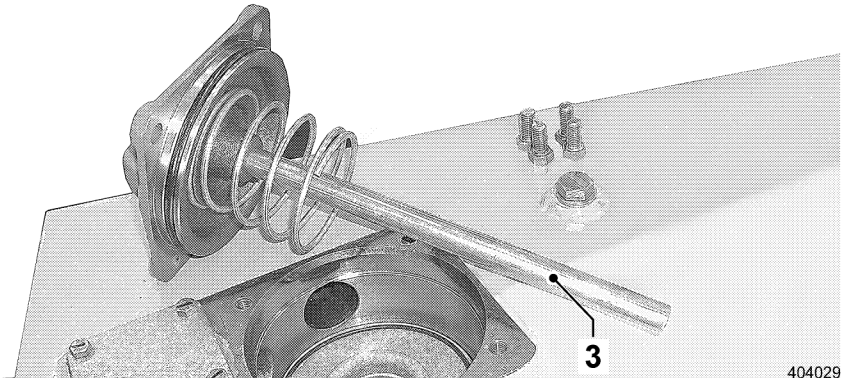
- Relieve tank pretension: Back the breather screw 1 on the hydraulic tank out by two turns.

Add hydraulic oil only via the return filter.



Filter cover

- Loosen the screws 2 on the filter cover and remove.
- Remove the filter cover with the magnetic rod.



Magnetic rod

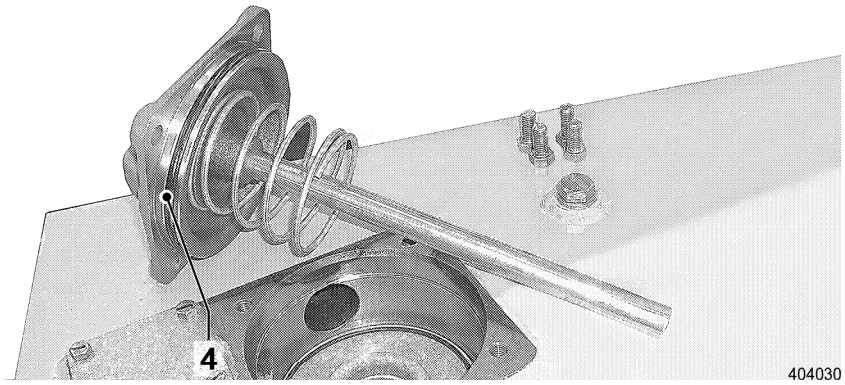
- Check the magnetic rod 3 and clean it, if necessary.

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.

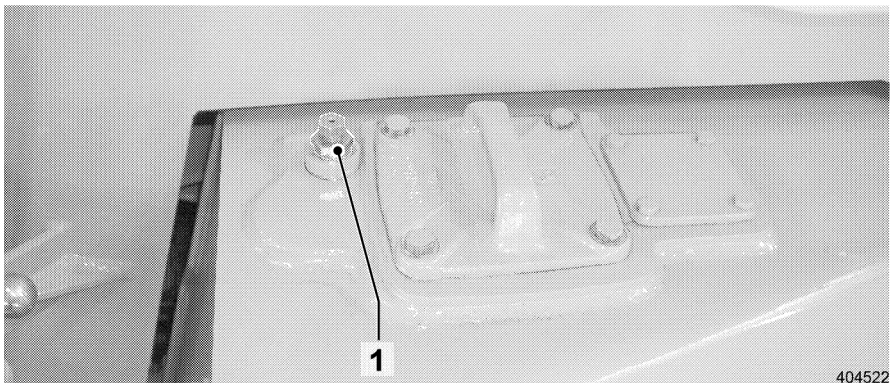


O - ring

- 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.

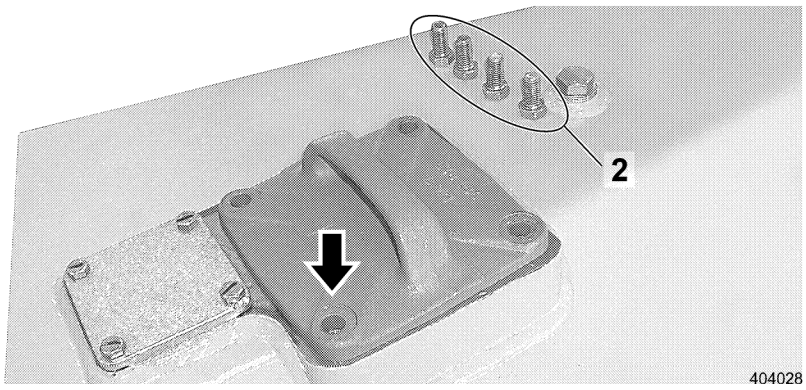
5.9.2 Clean the magnetic rod on the hydraulic tank

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.



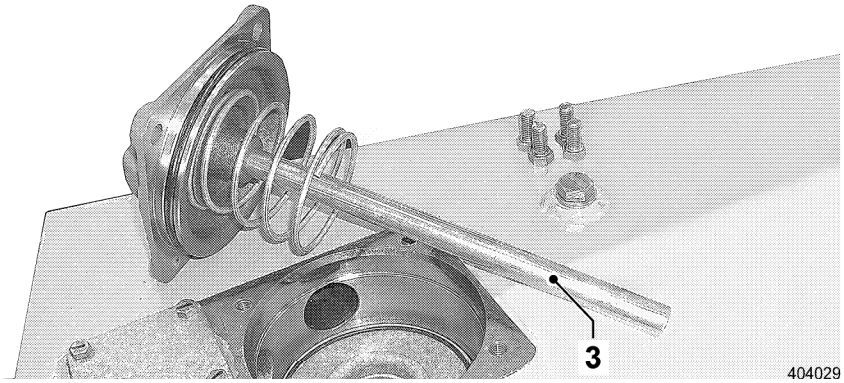
Filter cover

- 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.

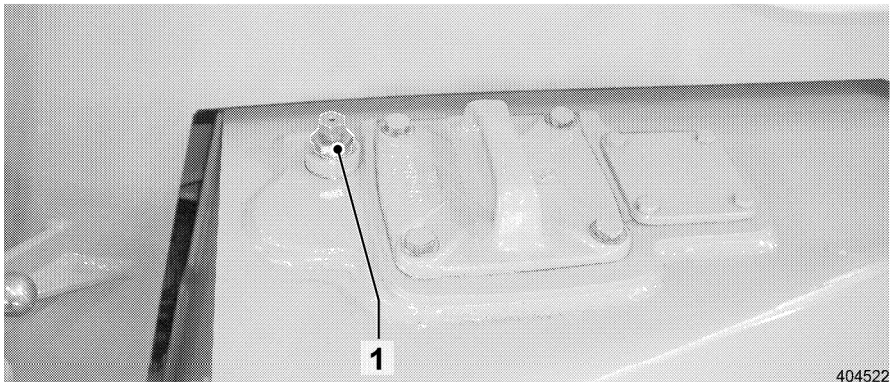


Magnetic rod

- 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.

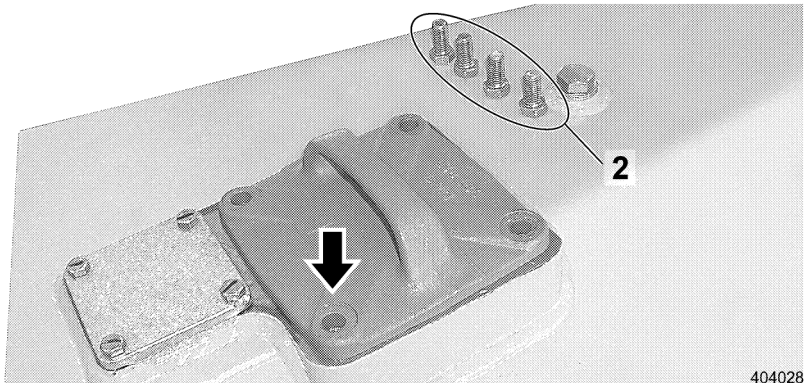
5.9.3 Change the return filter element

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.



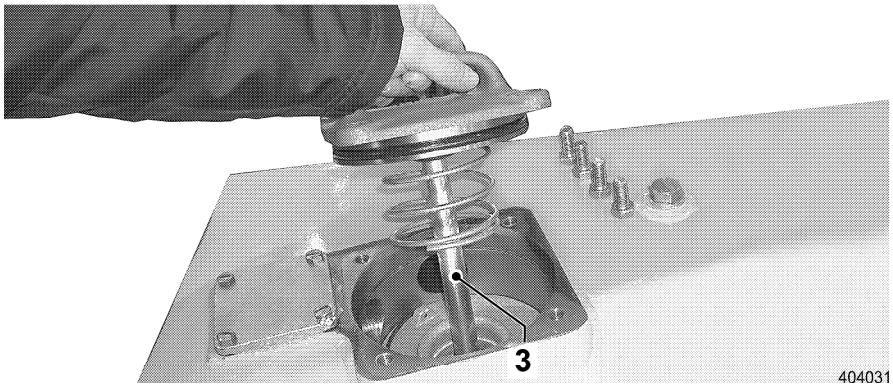
Filter cover

- Loosen screws 2 on the filter cover and slowly remove the filter cover with the magnetic rod.

Problem remedy

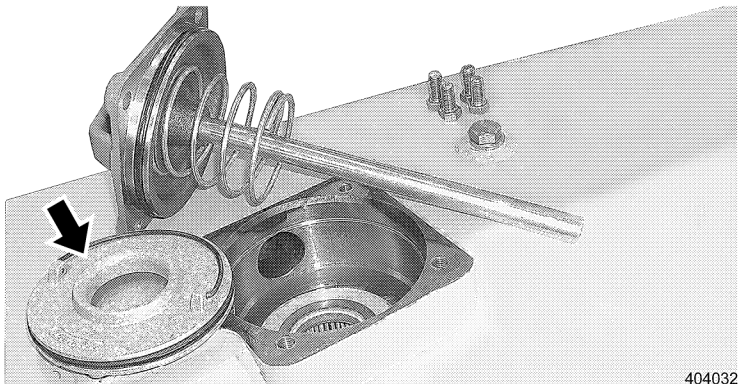
Heavy dirt deposits or larger metallic particles on the magnetic rod can point to damage in the hydraulic system.

- In this case,find the cause and remedy the problem in the hydraulic system.



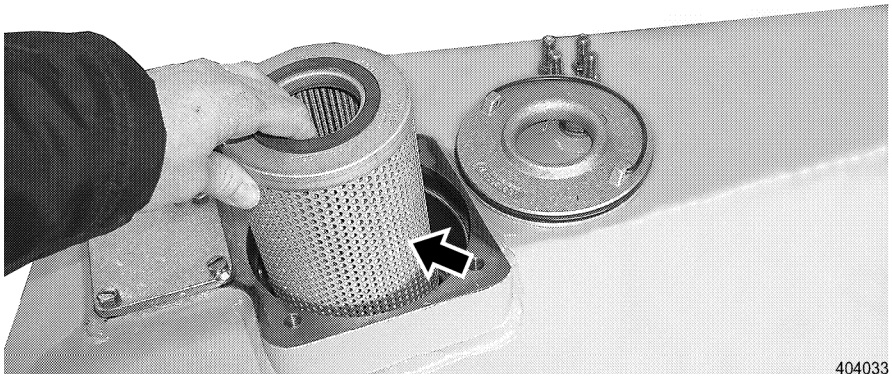
Magnetic rod

- Remove the filter cover with spring and magnetic rod 3.



Pressure plate

- Remove the pressure plate.

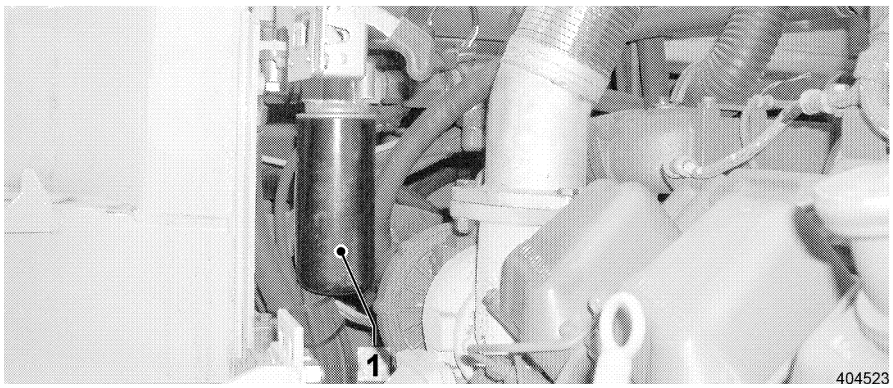


Return filter

- 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

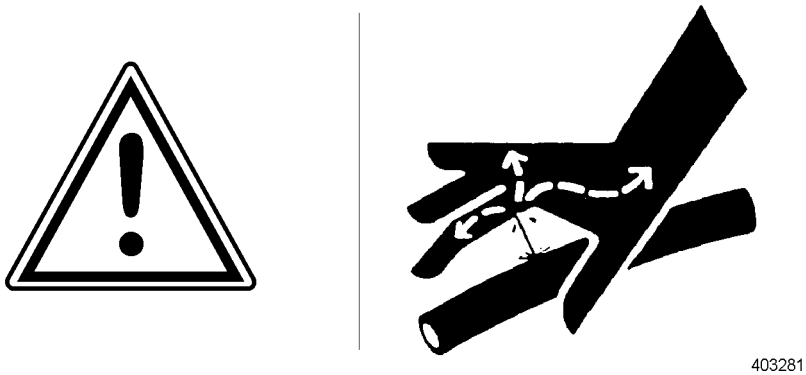
Make sure that:
– the machine is in maintenance position,
– the right engine compartment door is open,
– a LIEBHERR oil filter cartridge is available.



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 the 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 were 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 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.
Dust and other dirt can be removed with pressurized water, steam or pressurized air from the cooling fins. Use of pressurized air is recommended.
Make sure that:
– the machine is in maintenance position.

Caution

Careless treatment can damage the cooler fins.
! Do not use hard objects or excessive water pressure for cleaning.

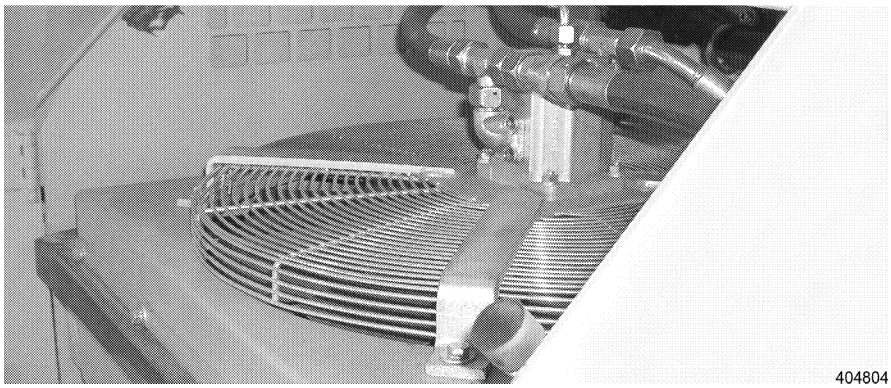
Reservoir - oil cooler

- Open the door of the oil cooler reservoir.
- The oil cooler reservoir must be secured with the door latch to prevent it from closing inadvertently.

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 door latch.

– If the function is not ensured, then the problem must be remedied immediately.

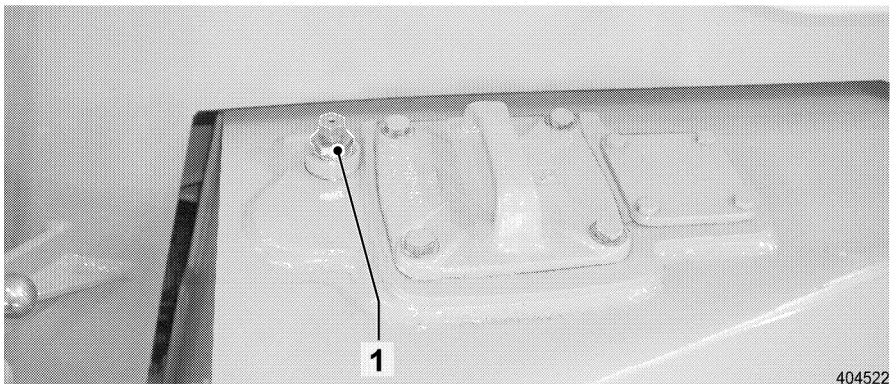


Oil cooler

- Clean cooler units with pressurized air, steam or water.
- Close the door of the oil cooler reservoir.

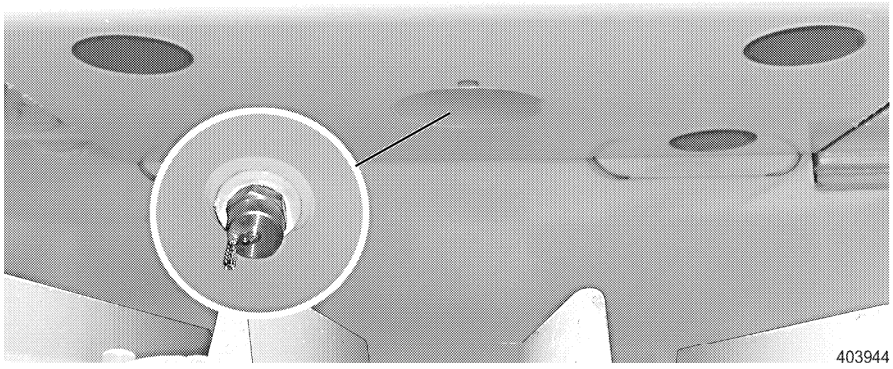
5.9.7 Change the hydraulic oil

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.



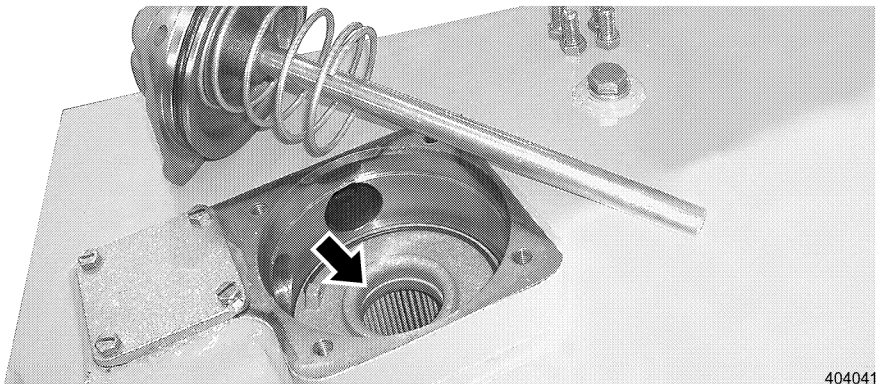
Hydraulic tank – breather screw

- Relieve tank pretension: Back out the breather screw 1 by two turns.



Hydraulic tank - oil drain valve

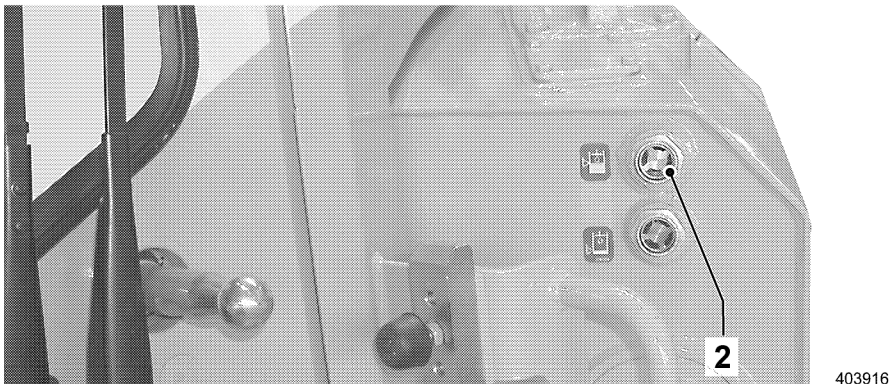
- Unscrew the cap on the drain valve on the underside of the hydraulic tank.
- Install the drain hose on the drain valve.
- Drain the hydraulic oil into a suitable container.
- Remove the drain hose and reinstall the cap on the drain valve tighten.



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.

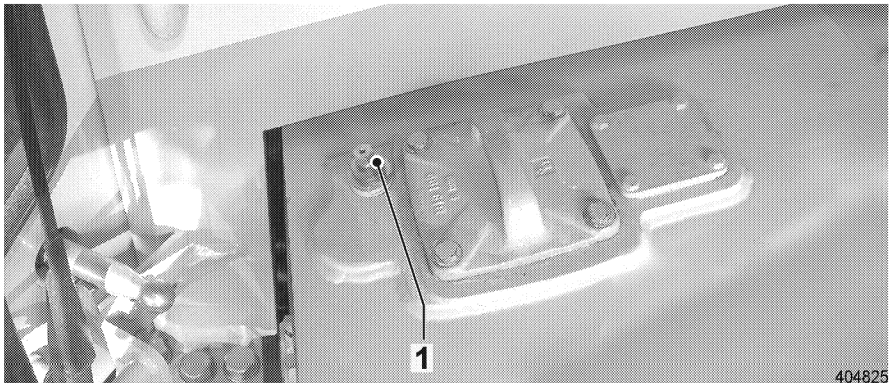


Oil level mark

- 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.

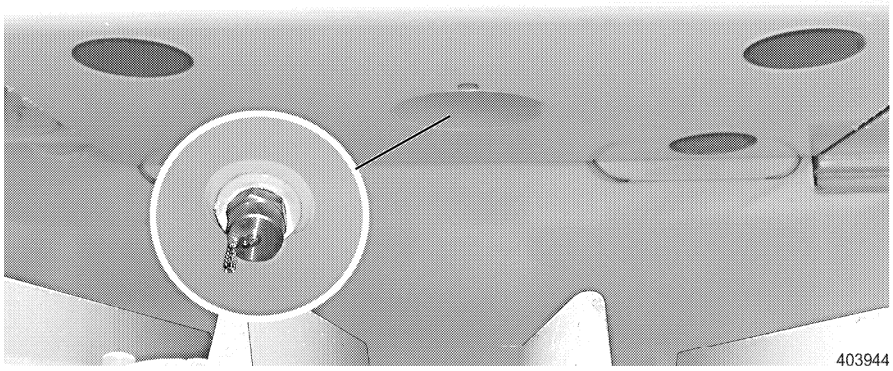
5.9.8 Drain condensation and sediments in the hydraulic tank

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.



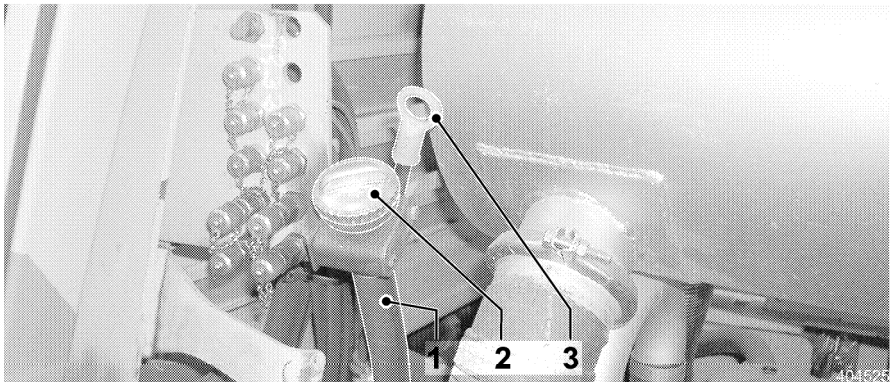
Drain valve - Hydraulic tank

- 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 2 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:

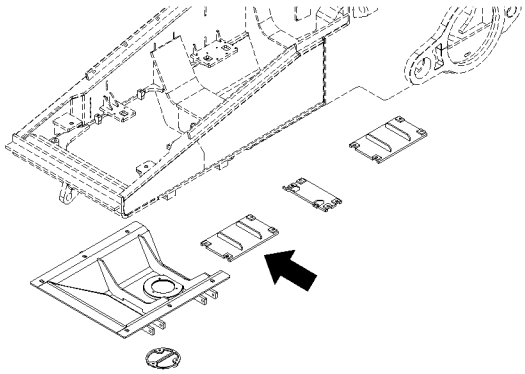
- Remove the oil filler cap 2 from the oil filler neck 1 and add oil.

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.



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Belly pan cover

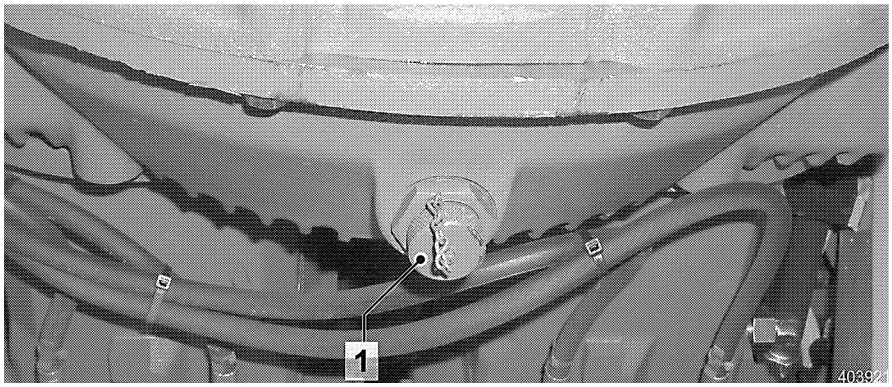
- Unscrew the belly pan cover.

– 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.



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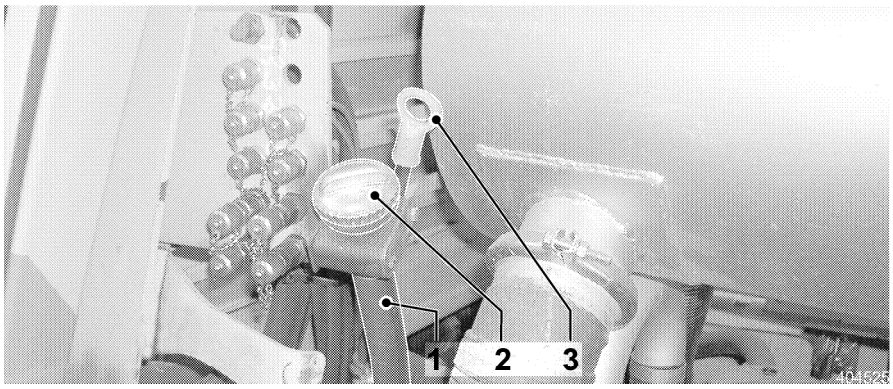
Oil drain valve

- 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

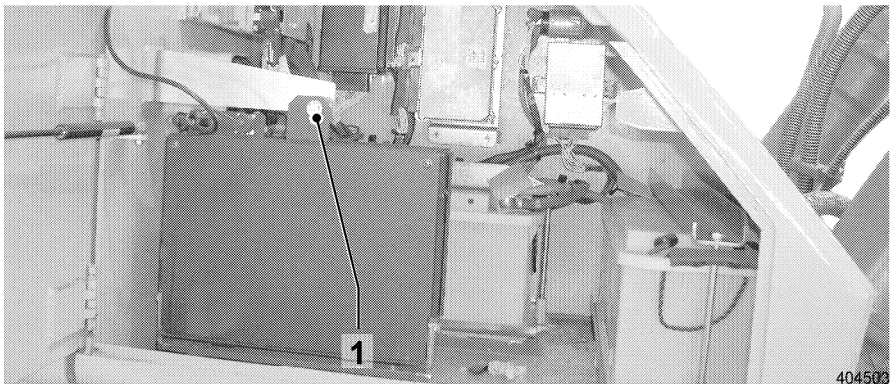
When working on the electrical system of the machine and for all welding work, the battery must be disconnected.

- Disconnect the negative terminal (-) first and reconnect it last.

For arc welding, in addition to disconnecting the battery, also disconnect the electronic boxes.

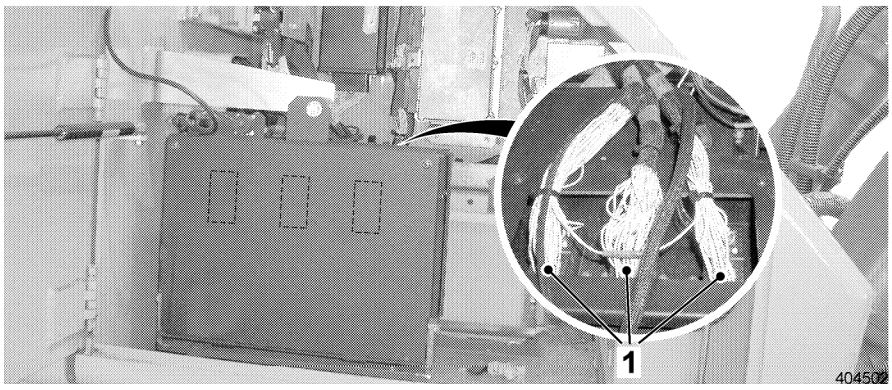
Electronic boxes

The electronic boxes are installed in the central electric housing.



Central electric housing

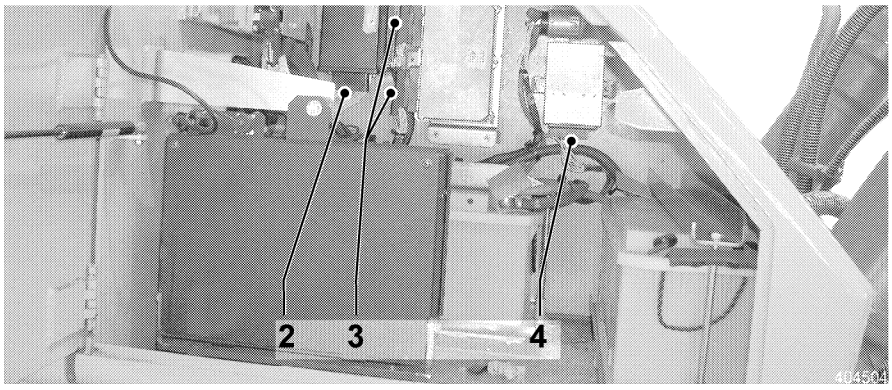
- Remove the screw 1 on top of the central electric housing.
- Fold the central electric housing forward.



Electronic box

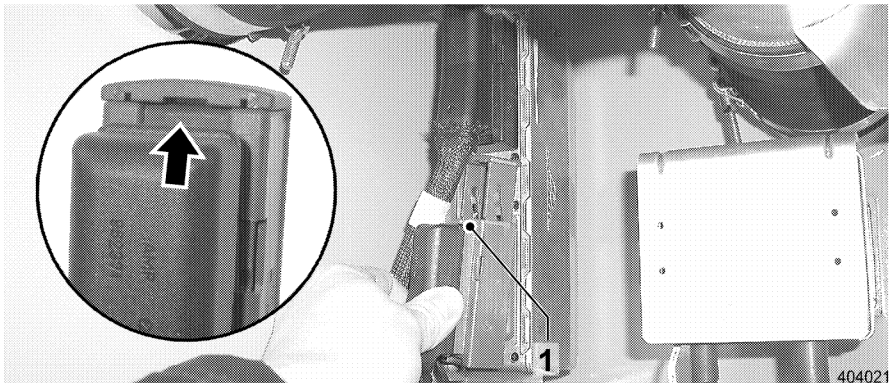
Unplug the electronic box

- Unplug the plugs 1 on the central electronic box.



Central electric box

- Unplug plugs 2, 3 and 4 on the remaining electronic boxes.



Unplug plugs

- With a screw driver in the recess, push the plug lock 1 up and unplug the plugs.

Caution

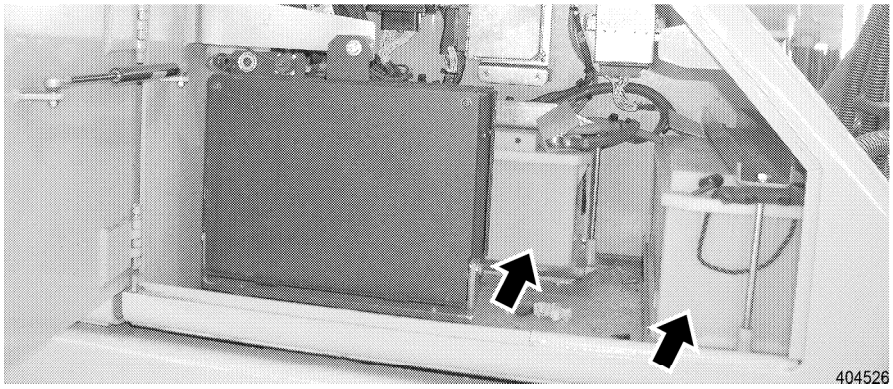
! When plugging the plugs back in, make sure they are correctly connected and locked.
– The plugs cannot be mixed up due to the plug coding.

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.

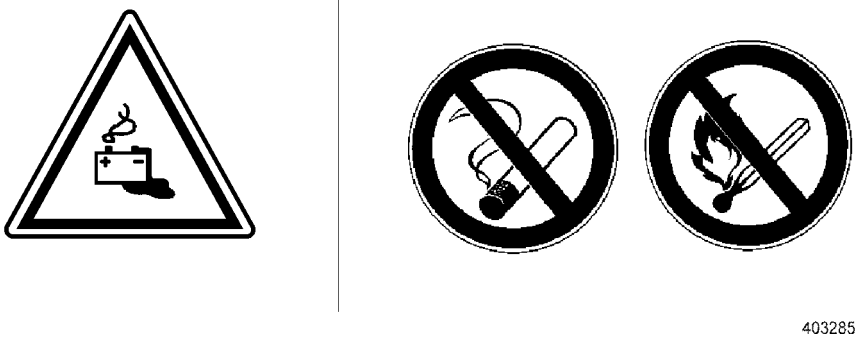
5.11.2 Batteries



Batteries

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 better access, the battery pan can be pulled out after removing the mounting screws.
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,



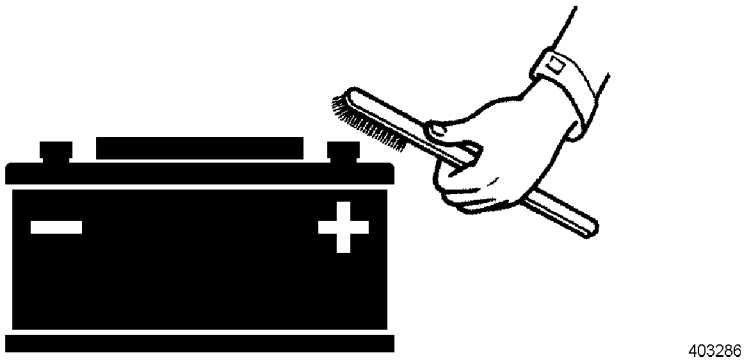
Explosive gases

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.



Special terminal brush

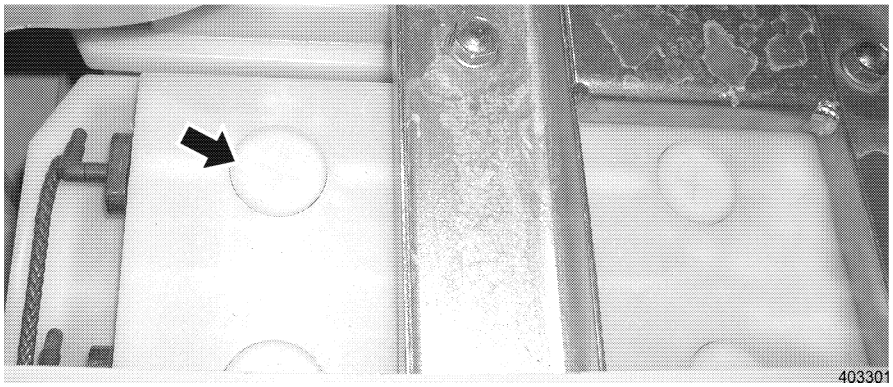
Caution

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.



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.

Halogen lights

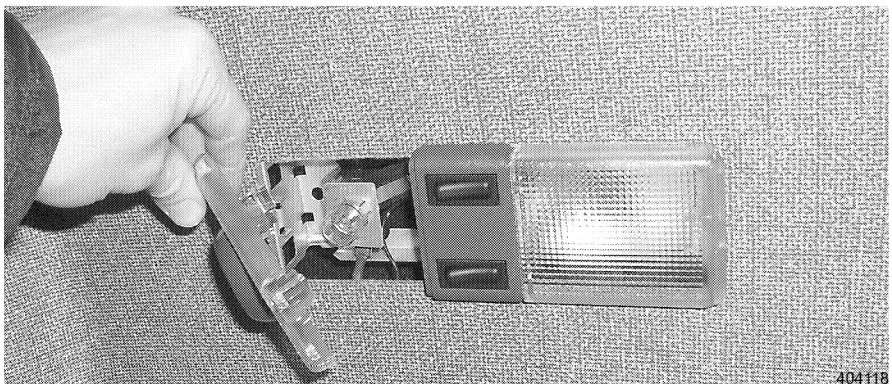
Change the halogen bulbs in the halogen lights

- Remove the screws on the frame of the lights.
- Remove the frame with the glass cover.

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

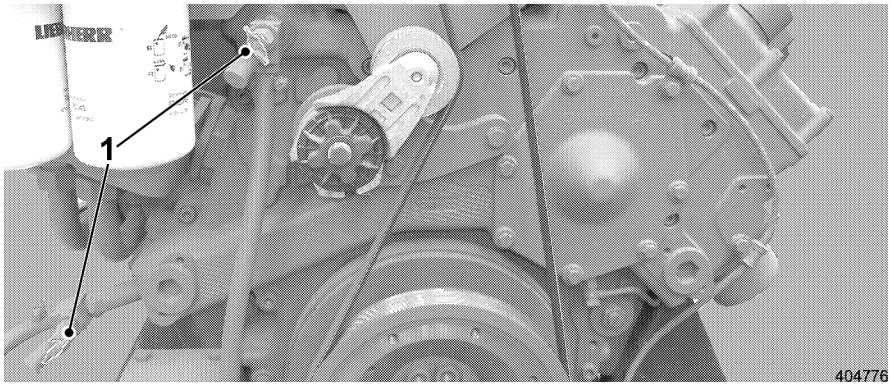
The following checks must be made regularly, but at least once a year before the start of the cold season.

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.

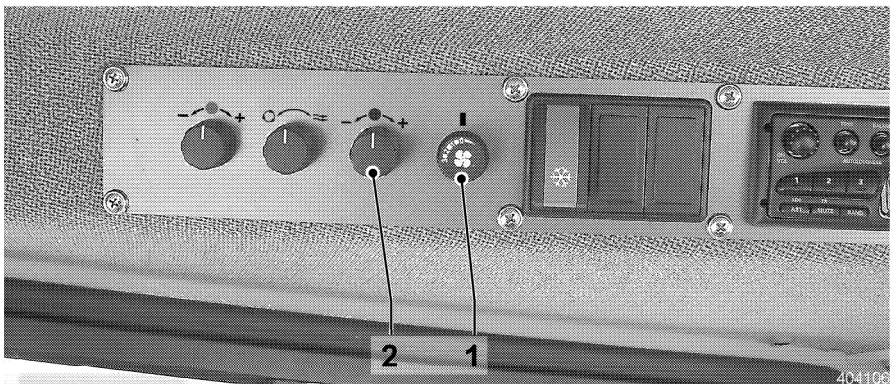


Shut off valves

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.

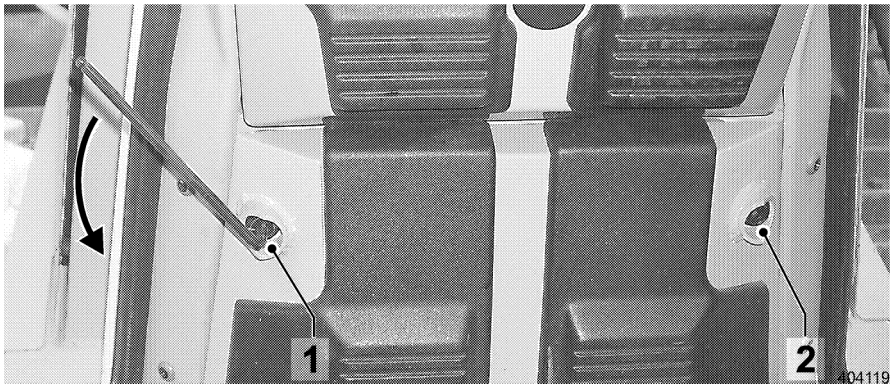
– Operate the heater to ensure that the coolant fluid contains sufficient antifreeze fluid. See "Check antifreeze and DCA-4 concentration in coolant".

5.12.2 Heater - fresh air filter

Make sure that the machine is in maintenance position.

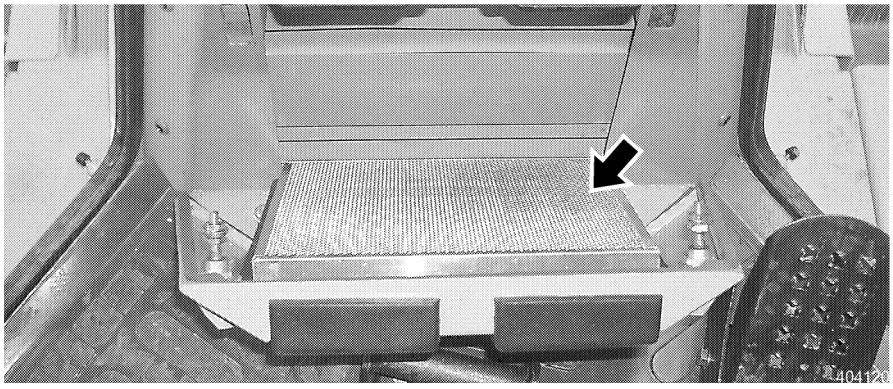
Clean / change the fresh air filter

Access to the fresh air filter for the cab is at the front in the operator's cab, below the compartment for the machine documentation.



Locks

- Use a socket wrench to open locks 1 and 2.



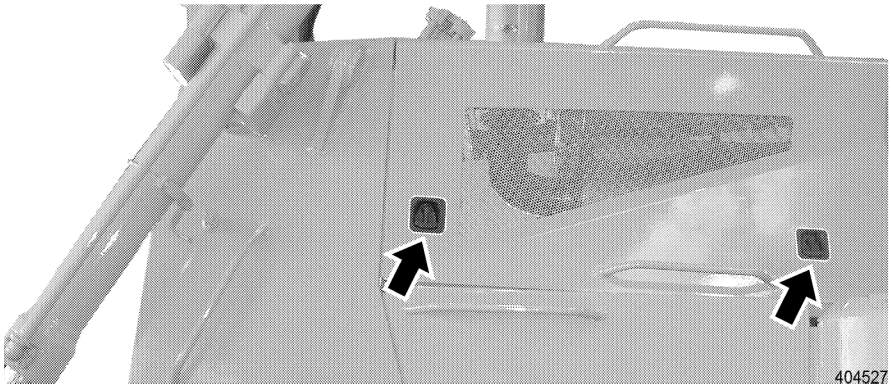
Location of cab fresh air filter

- Fold the cover back.

- Pull out the filter and remove.
- Clean the filter (blow out) or change, as necessary.
- Reinsert the cleaned or new filter.
- Fold the cover up and lock with the quick locks.

5.12.3 Air conditioning system

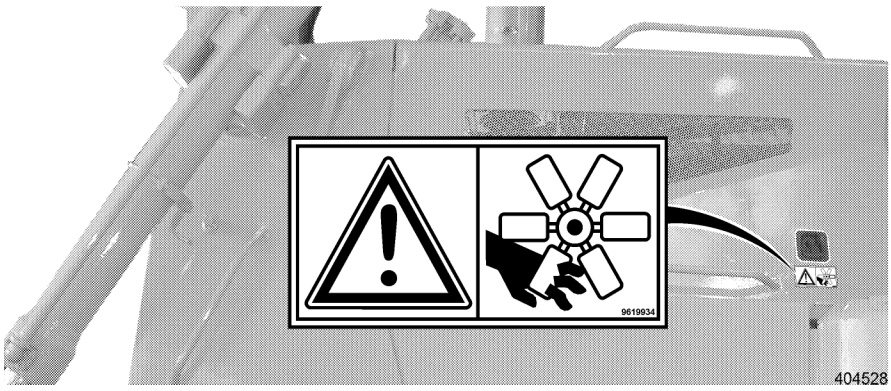
Proper function of the complete air conditioning system is only ensured if the maintenance tasks are carried out fully, properly and by especially trained personnel.
Only trained air conditioning mechanics may access and repair the coolant circuit.
The air conditioning system must be serviced once a 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 left engine compartment door.

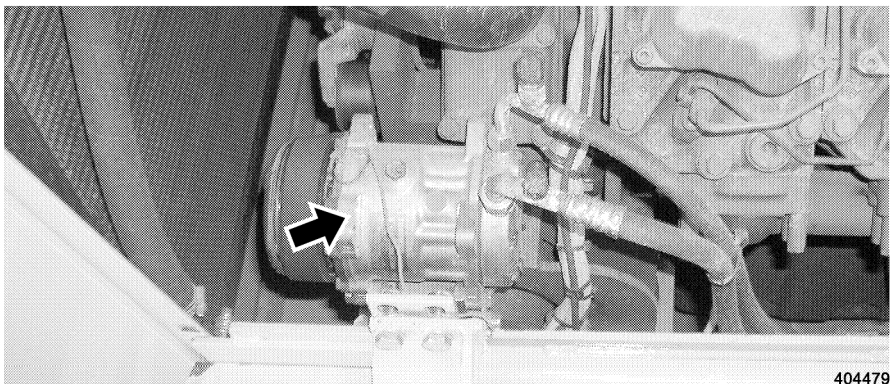


Open only if the engine is not running!

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.

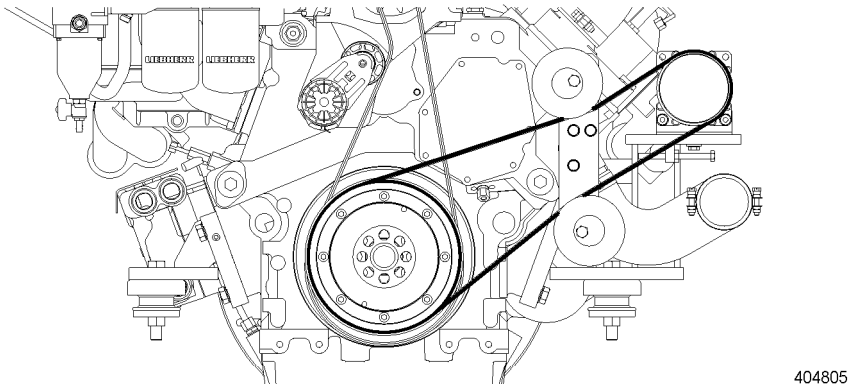


Compressor

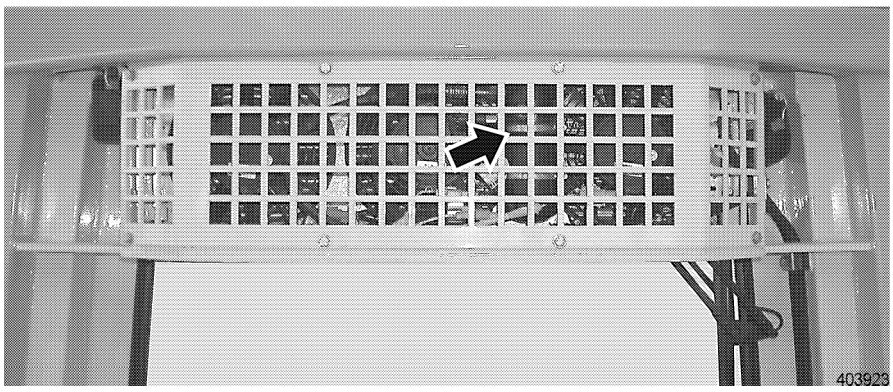
- Check the compressor carrier and supports for cracks and breaks, check the screws to ensure that they are all present and seated tightly.
- Check the compressor for leaks.
- Check the hose lines for leaks and chafing.

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.

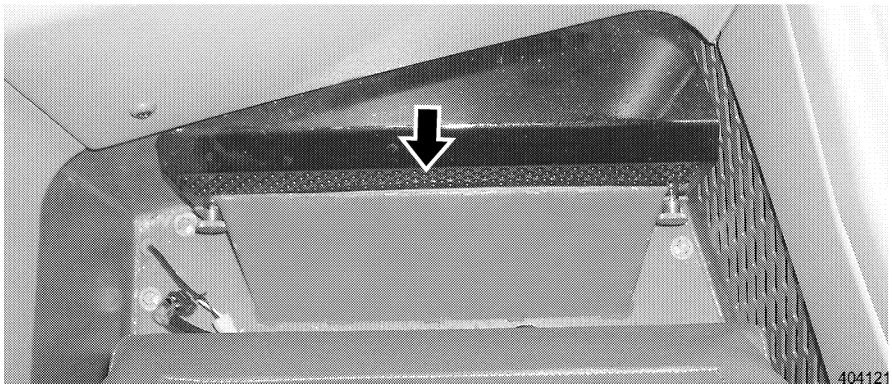
Caution

! Danger of falling!
To check, use a suitable ladder!

Indicator pearls

- Check the color of the indicator pearls.

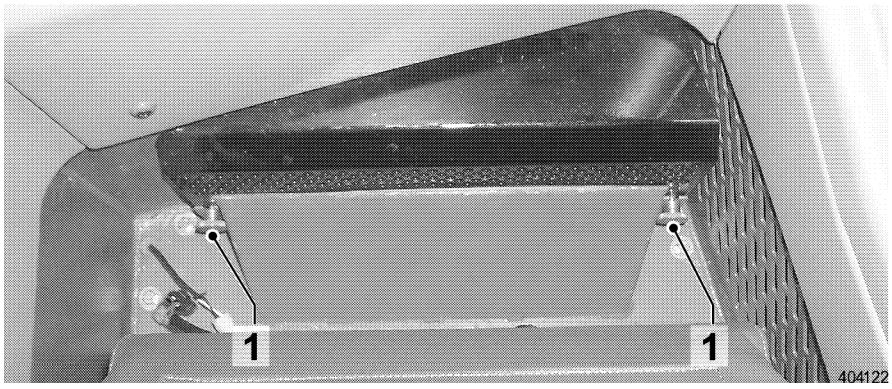
In the sight gauge are two indicator pearls.
A white floater ball and a blue moisture indicator.
When the Diesel engine is running, the refrigerant must flow through the sight gauge of the fluid reservoir (dryer) without air bubbles and lift the white floater ball.
After the engine is turned off, the fluid level must fall back into the reservoir. This ensures that the system is not overfilled.
If the blue ball (moisture indicator) in the sight gauge changes its color to red or pink, 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

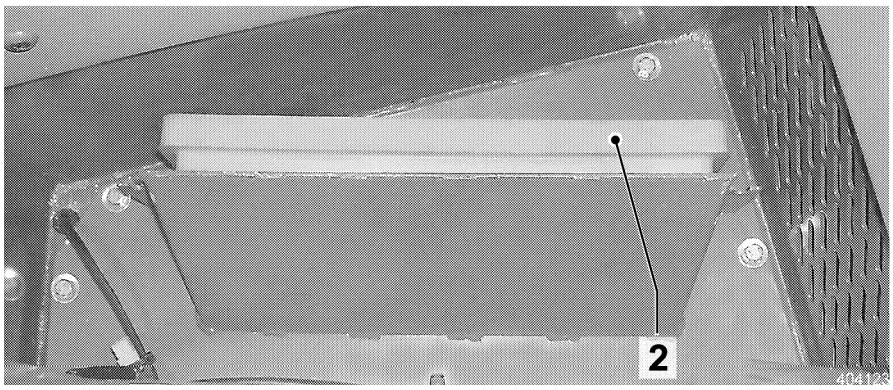
The air filter for the ventilation is located behind the operator's seat, on the floor of the operator's platform.
The air in the cab is filtered through the air filter during air circulation.



Change the air filter

Replace the air filter

- Move the operator's seat all the way forward.
- Loosen the knurled screws 1 on the upper side of the filter housing.



Air filter

- Remove the protective grill and remove the air filter 2.

When inserting the new filter, make sure to align the sealing profile to the rear.

- Add the cover and tighten the knurled screws.

5.13 Travel gear

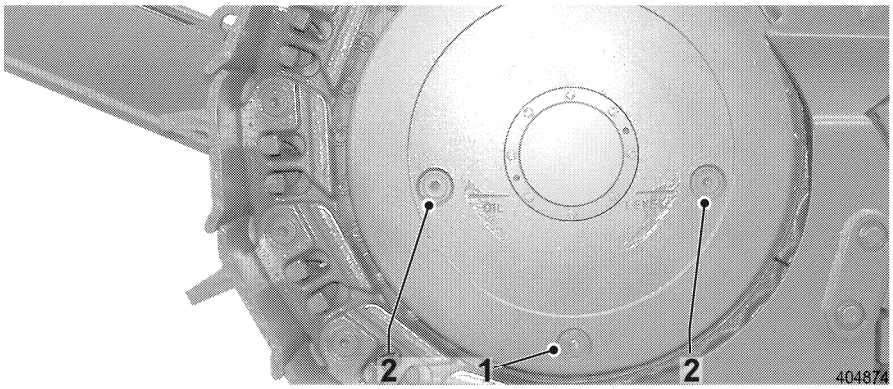
5.13.1 Check the condition of the travel gear

- 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.
- Turn out 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:

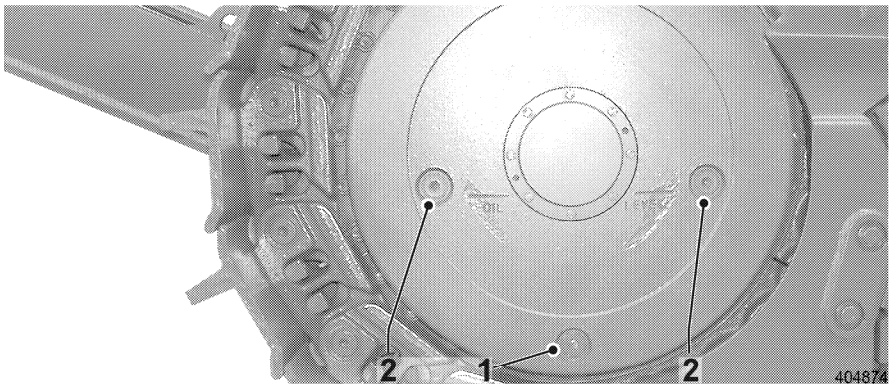
- Add oil via the oil filler port 2.

– 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

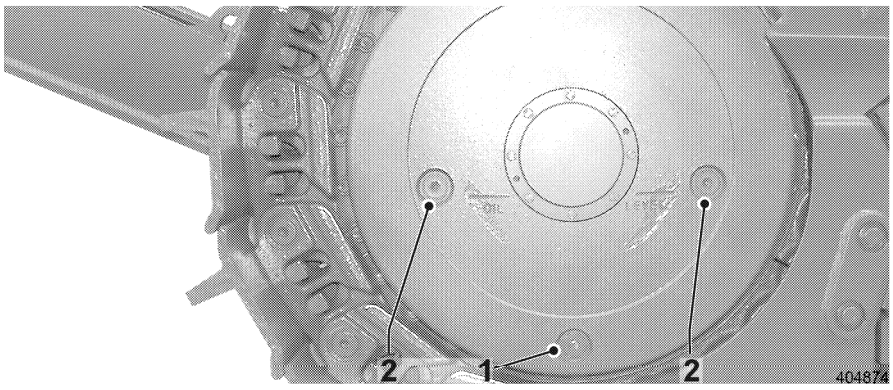
Make sure that:
– the machine is in maintenance position,
– the machine is parked in such a way that the oil drain plug is on the lowest gear point,
– a torque wrench is available,
– a suitable container is available.
– the correct oil specification and quantity according to the data in chapter "Lubricants 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!



Travel gear

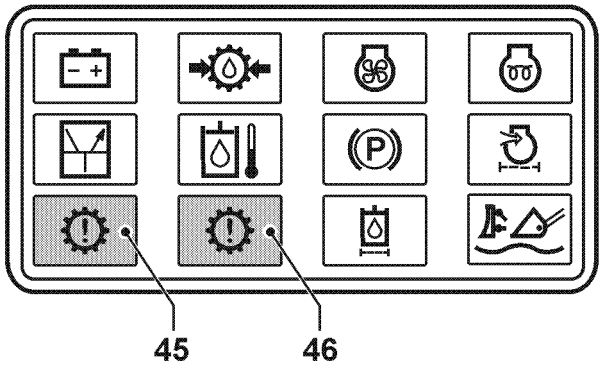
- Add oil to the gear via the oil filler plug 2 until the lower edge of the filler port.
- Clean the oil filler plug 2 and reinstall it.

– 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.



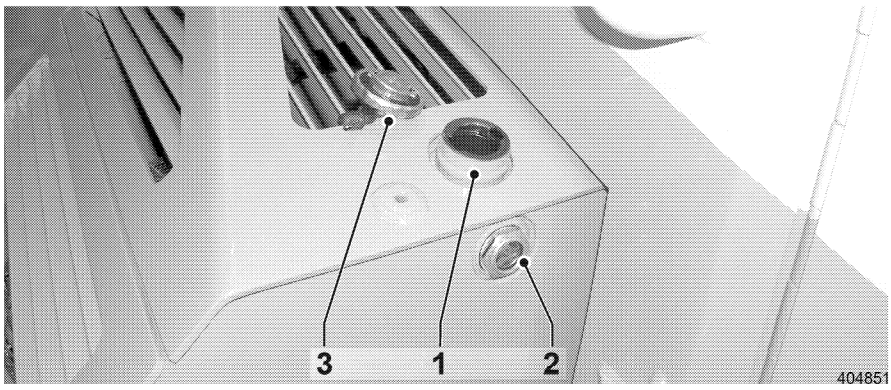
Indicator lights - travel gear – slip ring area

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.



Slip ring area - oil reservoir

The oil reservoir 1 is located on the right hand side in the oil cooler compartment.

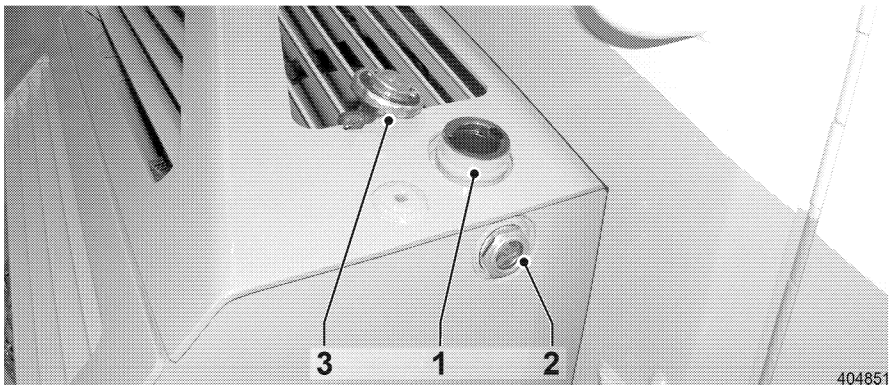
- Check the oil level on the sight gauge 2. The oil must be visible in the center of the sight gauge.

– If necessary, add oil according to the lubricants and service fluid specification.

Change the oil in the slip ring area

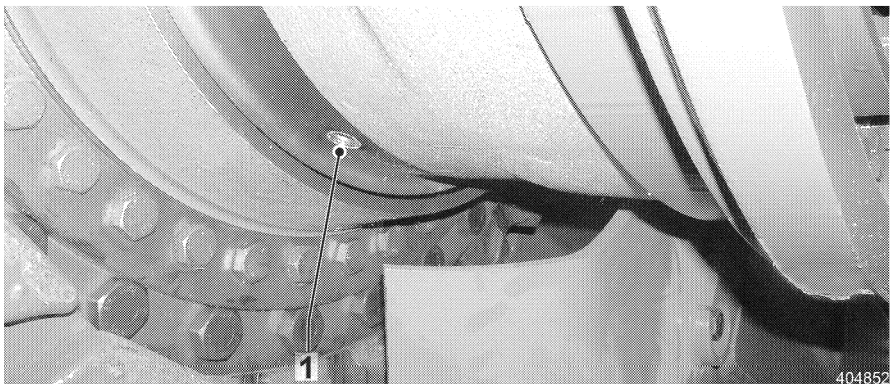
Make sure that:
– the machine is in maintenance position,
– two suitable containers are available,
– the correct oil specification and quantity according to the data in chapter "Lubricants and service fluids" is available.

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.

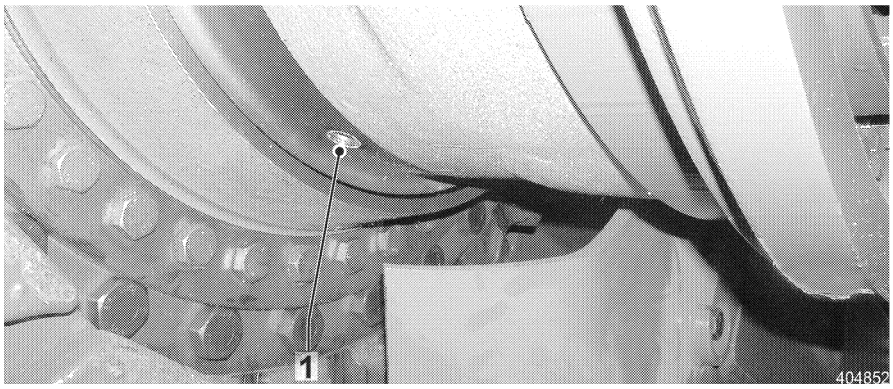


Drain plug – slip ring area

- 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.

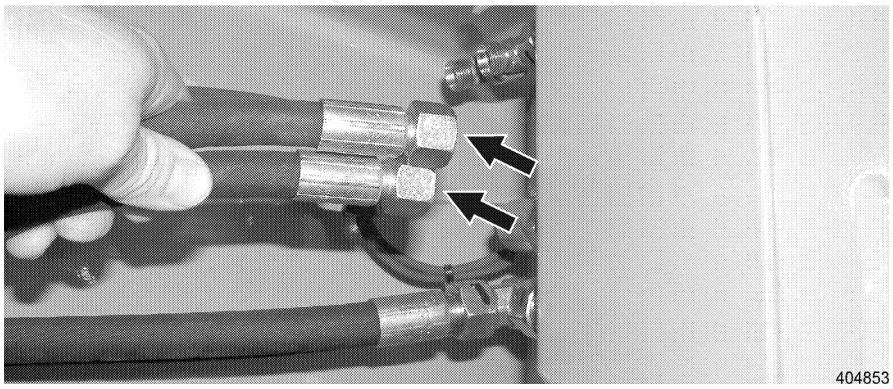
Flush the slip ring area

Before refilling, always flush the slip ring area adequately. Any possible debris will be removed from the slip ring area by the flushing procedure.



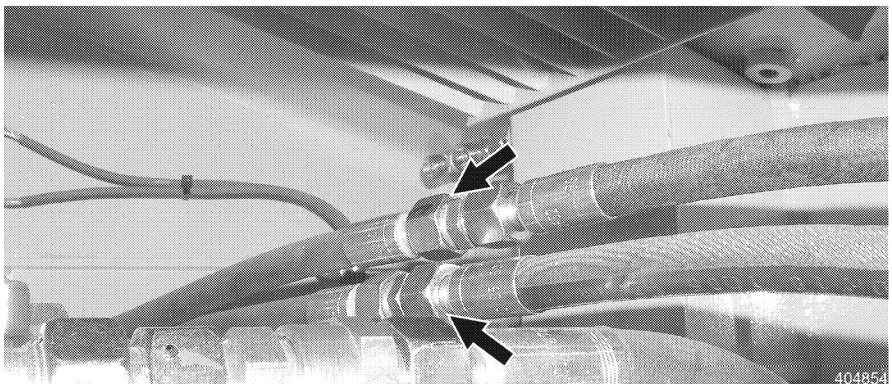
Drain plug – slip ring area

- Check if both containers are positioned under the drain plugs – slip ring area and if the drain plugs are open.



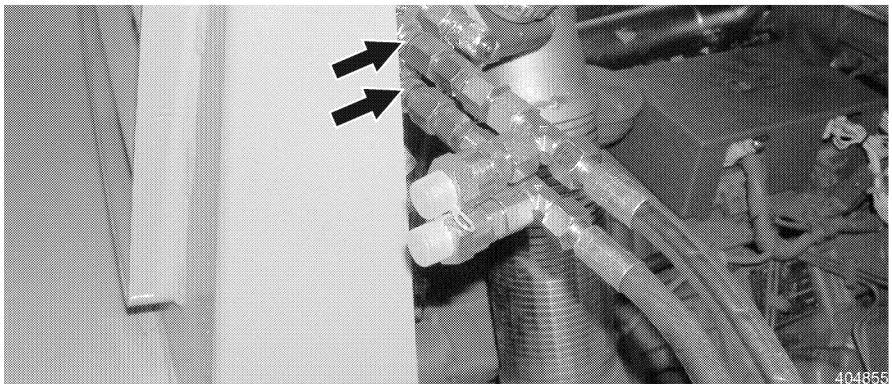
Remove the bleeder lines

- On the oil reservoir in the oil cooler compartment, unscrew both bleeder lines from the screw fittings.



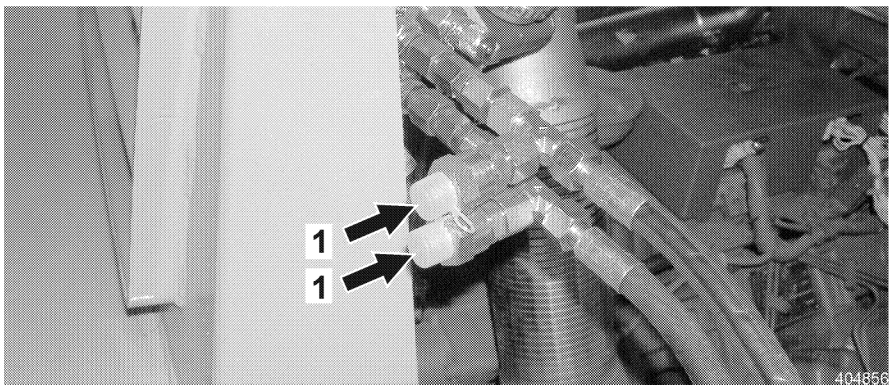
Connect the flushing lines

- Screw the flushing lines (part of the tool box) onto the bleeder lines.
- Open the right engine compartment door.



Connect the flushing lines

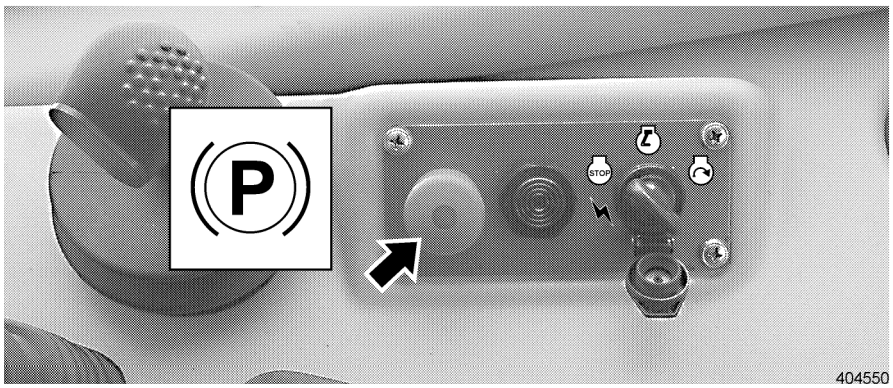
- Remove the caps on connections ML1 and MR1 and connect the flushing lines on connections ML1 or MR1.



Pressure relief valve – flushing lines

The flushing lines are equipped with a pressure relief valve 1. If the discharge of the slip ring area is plugged up, the pressure relief valve actuated from an excess pressure of 1 bar.

- In this case, clean the drain bore and continue the flushing procedure.



Emergency off button

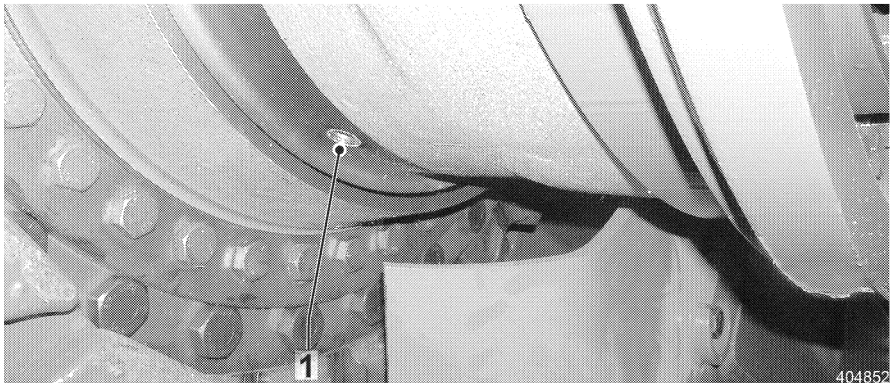
- Press the emergency off button in the instrument panel.

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.



Drain plugs – slip ring area

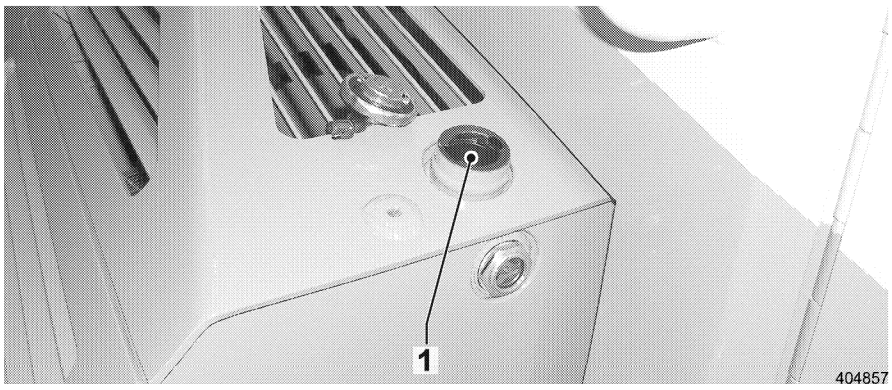
- Reinstall the drain plugs 1 on the left and right hand side and tighten (40 Nm).

Add oil to the slip ring area

Drain the oil first as described previously and flush the slip ring area.

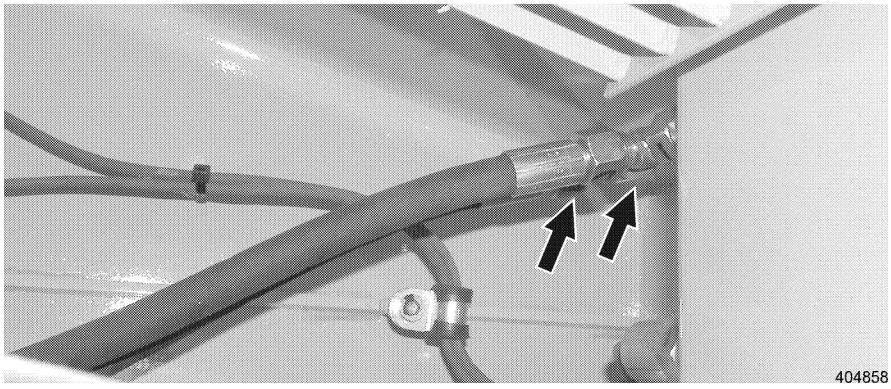
– Reinstall the drain plugs on the left and right hand side and tighten (40 Nm).
- Start the Diesel engine in low idle. See chapter "Control, operation".

– The slip ring area is filled with oil via the bleeder line.



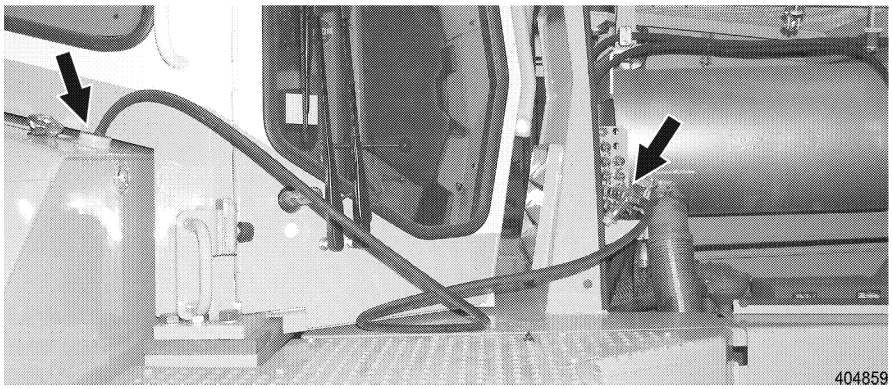
Slip ring area - oil reservoir

- 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.



Install the bleeder lines

- Remove the flushing lines from the bleeder lines and reinstall the bleeder lines properly.



Fill the oil reservoir

- Unscrew one flushing line from connection M1, hold the second flushing line over the filler port in the reservoir.
- Start the Diesel engine again at low idle and let it run until the reservoir is filled to the lower edge of the filler port = overfilling.
- Turn the Diesel engine off.

– Remove the remaining flushing line, close off connections M1 with caps.

- Check the oil level in the hydraulic tank and add oil, if necessary.

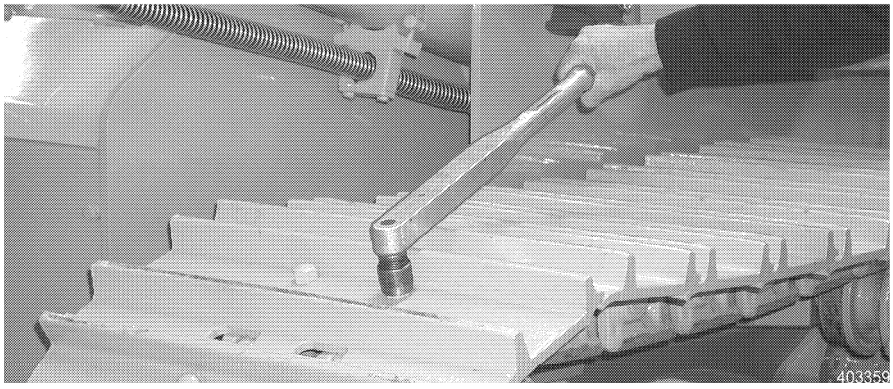
- Operate the machine for a short time and recheck the oil level.

5.14 Track components

5.14.1 Check the screws on nuts on the track components for tight seating

Make sure that:
– the machine is in maintenance position,
– a torque wrench is available.

- Visually inspect the mounting screws on the track pads and sprocket segments to ensure they are tight.



Tightening torque

- Check the tightening torques.

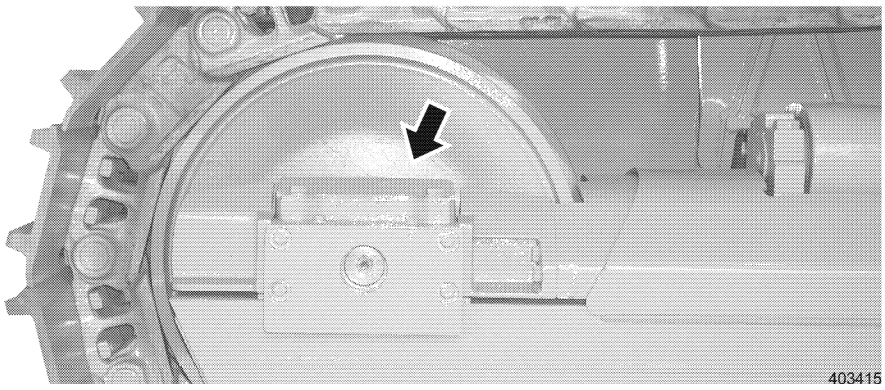
Tightening torques for track pads and sprocket segment bolts:
– 5/8" UNF: 180 Nm + 120°
– 3/4" UNF: 270 Nm + 120°
– 7/8" UNF: 400 Nm + 120°

5.14.2 Check the seal on the carrier rollers, track rollers and idlers

- Check visually.

5.14.3 Idler guide

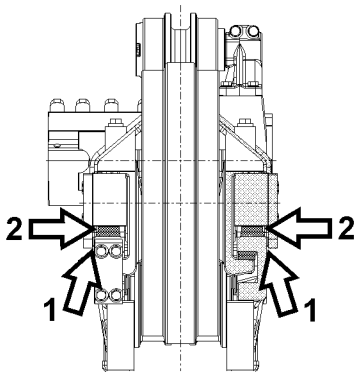
Make sure that:
– the machine is in maintenance position.



Idler guides

Check / adjust the idler guides

The normal play between the track roller frame and side guides is 1 - 2 mm, the height clearance of the rubber springs is approx. 3 mm.
The clearance is increased due to wear of the wear bars, guide rails and plates.
When the maximum permissible value is reached, the corresponding play must be readjusted or the worn guide sections must be replaced.



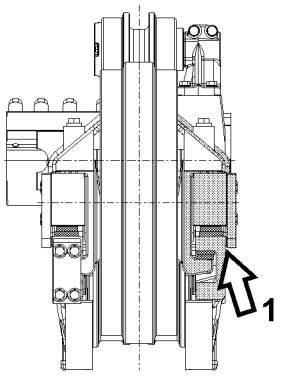
Side clearance – height clearance

New / repair dimension
- Side clearance 1 = min. 1 -2 mm
- Height clearance 2 = min. 3 mm

Maximum permissible play
- Side clearance 1 = 5 mm
- Height clearance 2 = 6 mm

Check / adjust side clearance

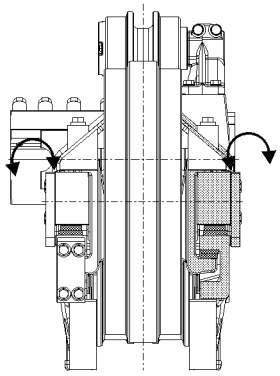
- Move the inner guide plate until it touches the roller frame.
- By steering to turn (80% joystick deflection), see "Control", "Operation".



404562

Check the side clearance

- Measure the existing clearance between the track roller frame and the outer guide plate.

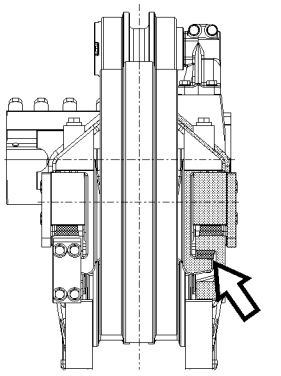


404563

Correct the side clearance

- If the maximum permissible value is exceeded, remove the shims on the inside and / or the outside.

– The difference between the number of shims on the inside and on the outside may never be more than 1 shim.
– If no shims are left, then replace the guide plates.

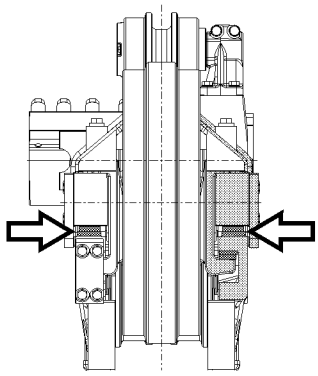


404564

Raise the idler

Check / adjust the height clearance

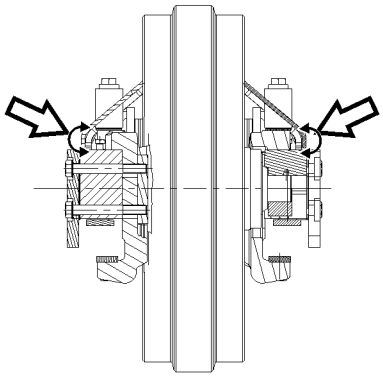
- Raise the idler by driving on a piece of wood (height of the wood = max. 200 mm) until the claws touch the guide rails.



404565

Check the height clearance

- Measure the height clearance between the wear strips and the bearing bock.



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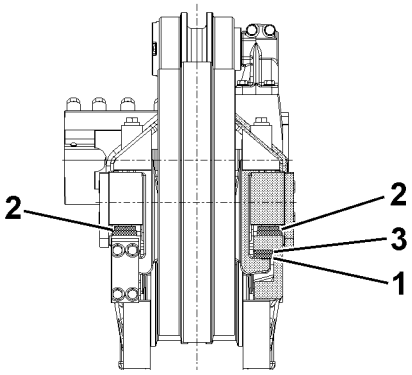
Adjust the height clearance

- If the permissible value is exceeded, remove the shims under the screws and add them between the claws and the bearings.

– The same number of shims must always be added on the inside and the outside.



404567

Wear parts - Idler guide

- Check the wear parts on claws and track roller frame and if the permissible value is exceeded, replace the worn strips 1 and 2 in pairs.
- When replacing the wear strips, check the welded on guide rails 3 and replace them also if they are worn significantly.

5.14.4 Chain tension

Danger

The chain tensioner may only be replaced or repaired by authorized expert personnel.

! The chain tension spring is still pretensioned, even though the chain tension is relieved!

Due to wear of track components, it is necessary to check the chain tension regularly and to adjust the chain tension, if necessary.
Since material deposits on rocky terrain are less than on muddy ground, the adjustment of the chains must be made to reflect the job application.
Do not remove any material, which has built up on the tracks during working hours before checking the chain tension.

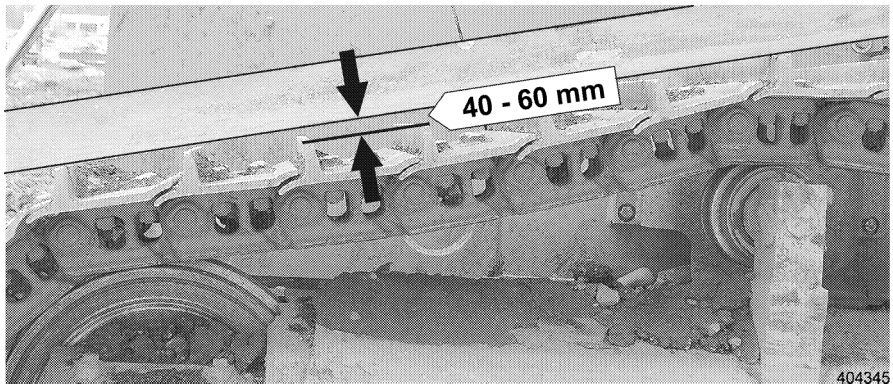
! The conditions must be identical to the working conditions!

Caution

! Excessively tensioned chains increase dirt build up and wear.
Significant dirt build up and tooth wear can cause the track chains to skip.
Frequent skipping of the chains can in turn cause damage to the drive train.

– Clean the tracks regularly and check tooth backlash wear.
– If the tooth backlash wear has progressed to the tooth points, then the tooth segments should be replaced.

Make sure that:
– the machine is in maintenance position,
– a measuring stick is available.

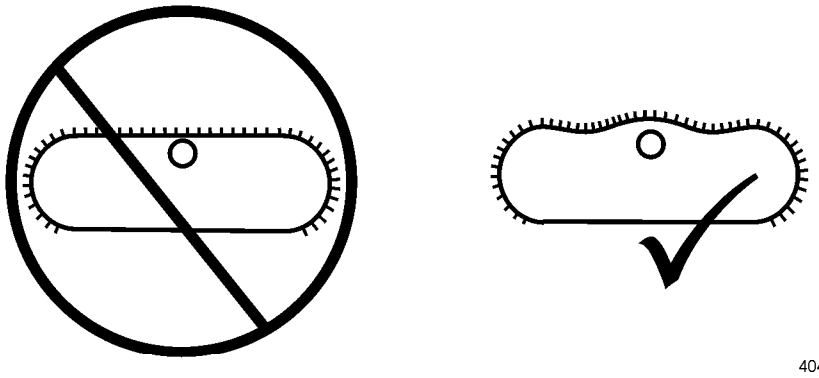


Check the chain tension

Check the chain tension

- Relieve the chains by driving the machine back and forth.
- Place the measuring stick in the area between the idler and the carrier roller.
- Measure the distance between the lower edge of the measuring stick and the chain bar.

– The chain is tensioned correctly for the job application if the slack between the carrier roller and the idler or the sprocket is 40 - 60 mm.



404344

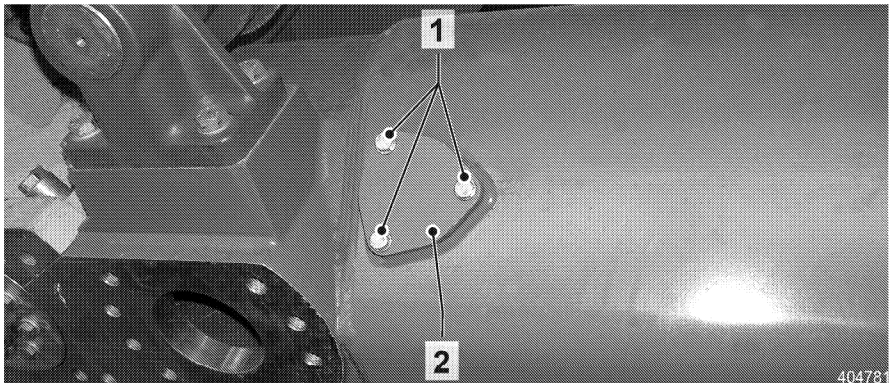
Chain tension

! An incorrectly tensioned chain can lead to significant chain wear.
– Always adjust the chain tension under working conditions to the given slack.

- Adjust the chain tension, if necessary.

Tension the chain

Make sure that:
– the machine is in maintenance position,
– the manual grease gun for the grease fitting of the chain tension cylinder is available.



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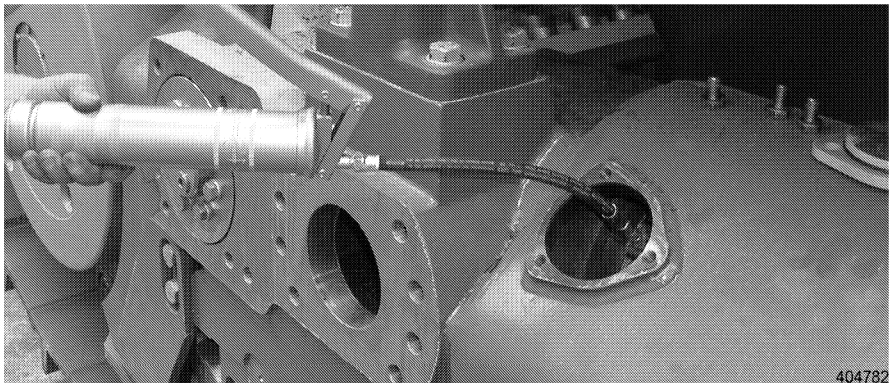
Cover – track roller frame

- Clean the areas next to the cover on the track roller frame.
- Remove hex head screws 1 on the cover and remove cover 2.



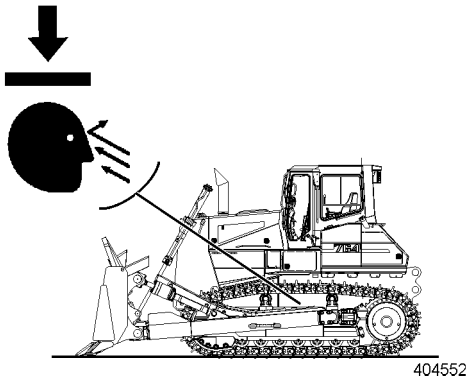
404782

Manual grease gun

- Connect the manual grease gun to the grease fitting of the tension cylinder.

- Pump grease into the cylinder until the required dimension (40 -60 mm) is reached.
- Attach the cover with the hex head screws.

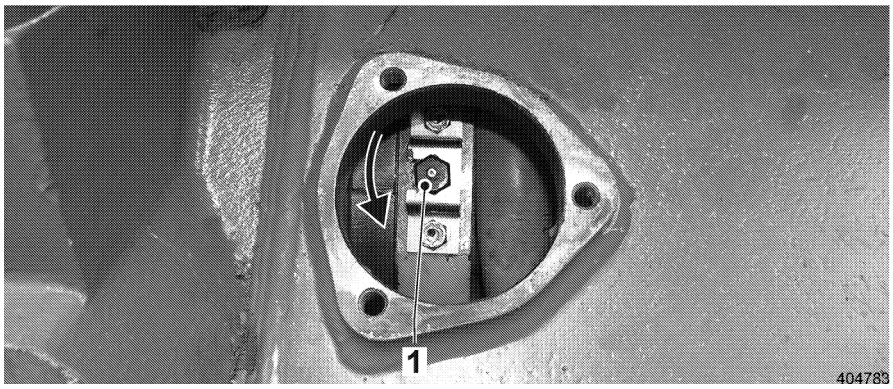
Relieve chain tension



Danger of injury!

Danger

Danger of injury!
! Danger of injury due to sudden chain sag and squirting grease.
– When relieving chain tension, keep your head away from the track roller frame.

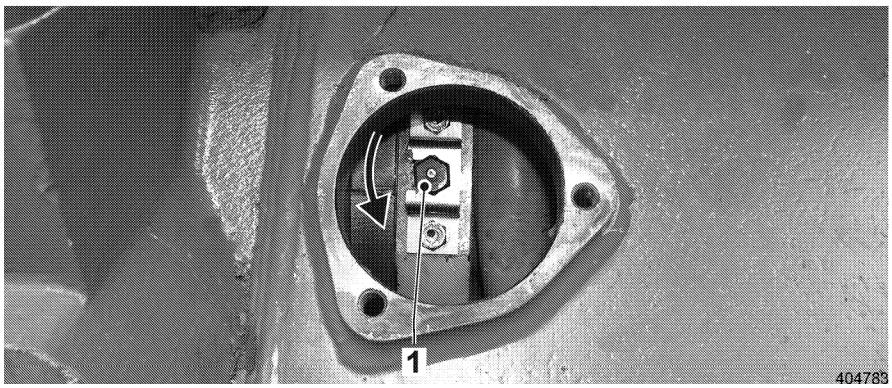


Grease fitting

- Carefully back out the grease fitting 1 by a few turns until the grease emerges from the groove of the fitting.
- Tighten the grease fitting 1 as soon as the desired chain tension is reached.
- After the adjustment procedure, move the machine back and forth and recheck chain tension.

5.14.5 Changing the chain

Make sure that:
– a torque wrench is available,
– the required tools for changing the chain are available.



Grease fitting - relieve chain tension

Removing a sealed chain

- Relieve chain tension. See section "Chain tension".

– Back out the grease fitting 1 by a few turns.

- Slowly move the machine with the idler against a wooden block until the idler is pushed back completely.
- Park the machine on level and solid 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 on the countersunk bore.

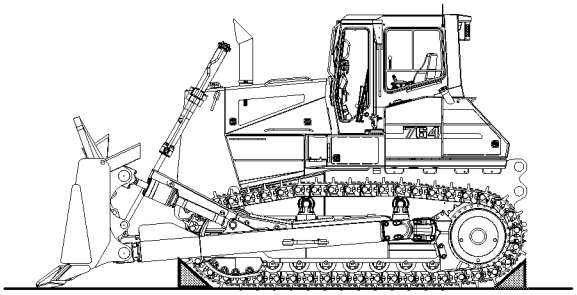
Caution

! Knocking the master link 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.

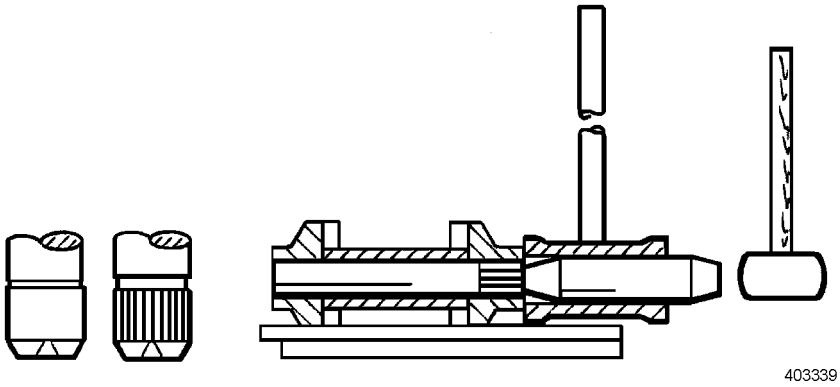
If possible,install or remove the master link pin with a hydraulic press.

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!



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.

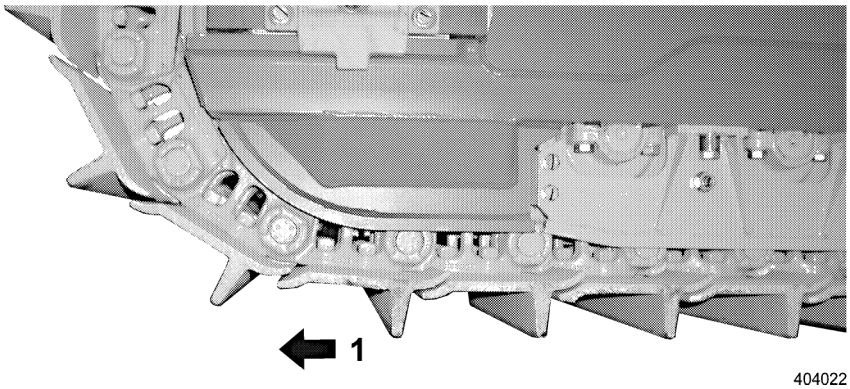


Press out the chain link pins

- Press out the master link pin with a pin press or with a suitable tool.

– When knocking out the master link pins, support the chain link on the other side.

- Raise the attachment.
- Carefully drive the machine forward on the chain until is completely rests on the ground.
- Drive the machine backward on the placed down chain.



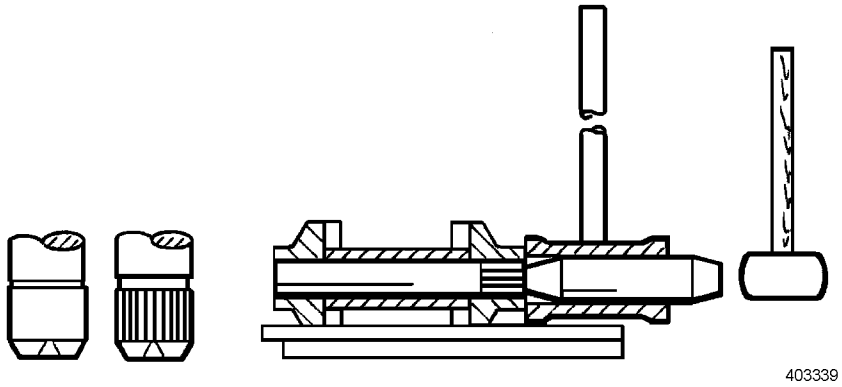
Travel direction forward

Installing a sealed chain

- Place the new chain in the correct direction on the ground and connect it to the old chain with the master link pin.

– Pay attention to the travel direction of the chain and the track pads 1 = travel direction forward.

- Align the chains to the track frame and carefully move the machine until the end of the new chain.
- Release the new chain from the old chain and attach with a wire on the sprocket wheel.
- Carefully move the machine forward until the chain is on the sprocket on top.
- Remove the wire from the chain and bring the chain over the carrier rollers and the idler by continuing to move forward. Stop the machine when there are still approx. 2 track pads in front of the idler.

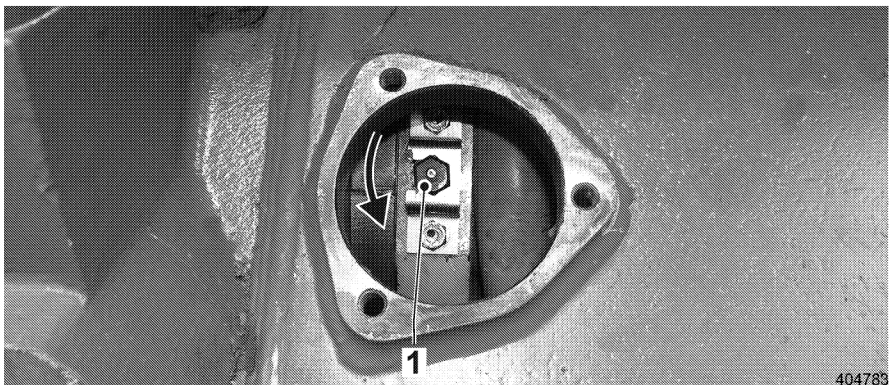


Press in the chain link pins

- Lift the last track pads, insert the spacers which were removed when the chain was removed and press or knock in the master link pin from the outside to the inside.
- Tension the chain. See section "Adjust chain tension".

Removing a chain with a split master link

- Park the machine on level ground.

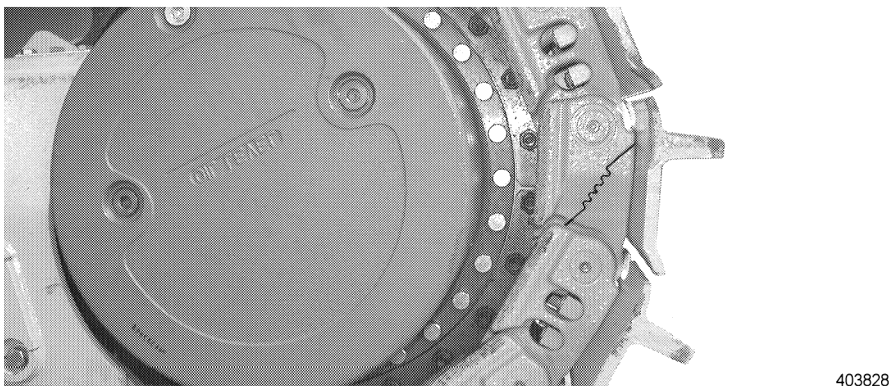


Grease fitting - relieve chain tension

- Relieve chain tension. See section "Adjust chain tension".

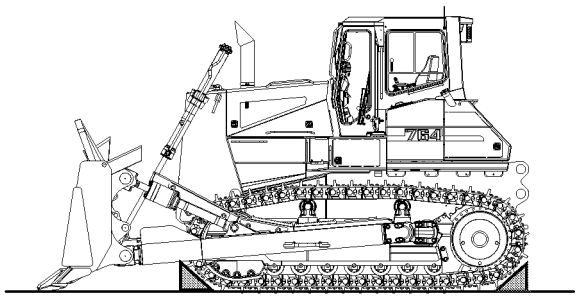
– Back out the grease fitting 1 by a few turns.

- Slowly move the machine with the idler against a wooden block until the idler is pushed back completely.



Master link

- Move the machine and park it in such a ways that the master link and the center of the sprocket are at the same level.



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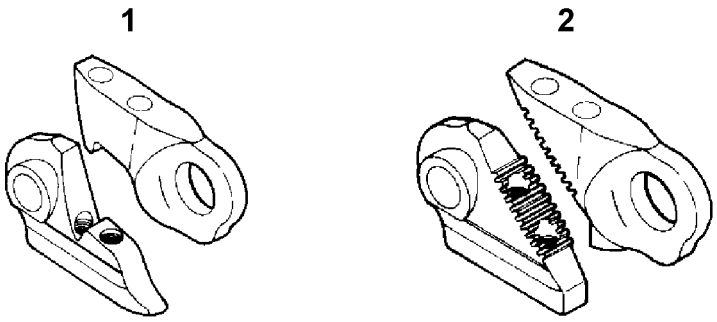
Place wooden blocks

- Secure the chain in front of the idler and behind the sprocket with a wooden block to prevent it from rolling off.
- Spray the end of the master link with penetrating oil and hit the master link lightly with a hammer to help the oil to penetrate into the tooth gap.

Various chains with split master links are used in Liebherr machines.



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Master link types

- Remove the track pad bolts, remove the track pad and release and split the master link by hitting it lightly with a hammer.

– If necessary, treat the master link again with penetrating oil.

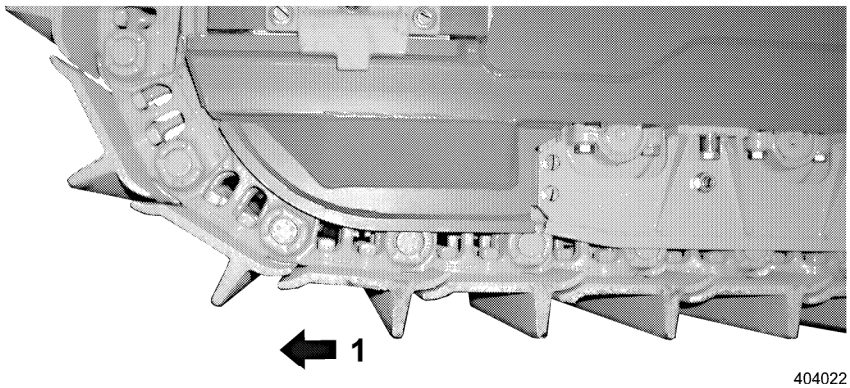
- Place the chain on the ground by carefully driving forward.

Installing a chain with a split master link

Chains with master links can be easily installed on the sprockets or idlers.

- Drive the machine backward on the placed down chain.
- Clean the new chain to remove any 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.

– The bolts must be able to be installed by hand.



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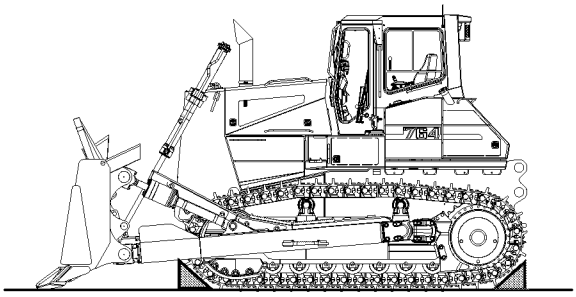
Travel direction forward

Make sure that the chain is correctly placed with the track pads on the correct side (1= travel direction forward).

- 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 to the end of the new chain.
- Release the new chain from the old chain and attach with a wire on the sprocket wheel.
- Carefully move the machine forward until the chain is on top of the sprocket.
- Remove the wire from the chain and bring the chain over the carrier rollers and the sprocket by continuing to drive forward. Drive and stop the machine when the master link and the center of the sprocket are at the same level.



404551

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.
- Connect the links.

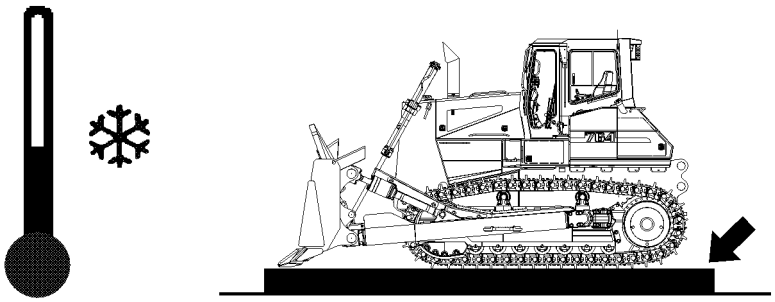
– Do NOT hit the mating surfaces with a hammer.

Place the track pad, insert the bolts and tighten with the required torque.
5/8" UNF: 180 Nm + 120°
3/4" UNF: 270 Nm + 120°
7/8" UNF: 400 Nm + 120°

- Tension the chain. See section "Chain tension".

5.14.6 Clean the tracks

Make sure that:
– the machine is in maintenance position.
DO NOT OPERATE the machine if large rocks, wood or metal pieces, wire or cable are stuck in the tracks.
Dried or frozen mud, as well as rocks or other debris in the track components can cause extensive damage to the machine, if the machine is put into operation or if an attempt is made to free the machine with engine power.



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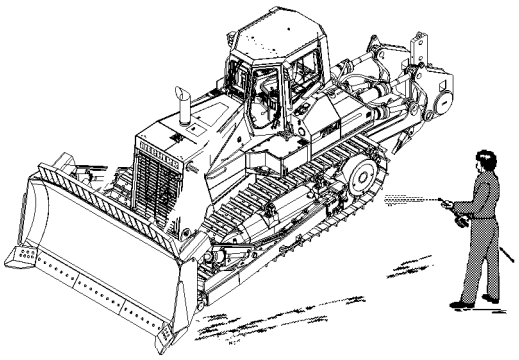
Parking at freezing temperatures

If temperatures are below freezing, always park the machine on wooden boards to prevent the chains from freezing to the ground.
A machine which is frozen to the ground can be freed by carefully heating up the track pads.
Never attempt to free a machine, which is frozen to the ground with force, this can cause significant damage.

- Check the travel gear and clean or repair it, if necessary.



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Wet cleaning

Anytime the machine is cleaned with steam, all lube points on the machine must be greased again!

- Clean the machine with steam.
- Grease all lube points on the machine again.

5.14.7 Check track wear

The tracks are maintenance free, except for the wear of some parts.

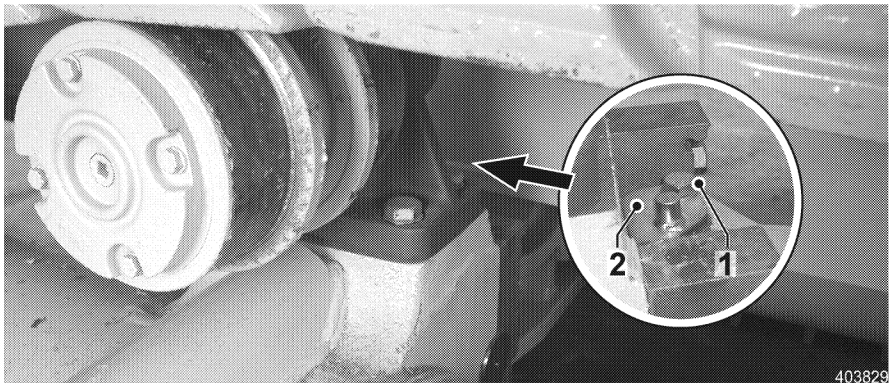
Track wear increases due to improper operation or if tolerances are not observed.
Visual inspections or wear checks must be made to recognize wear in time and to be able to overhaul and continue to use these parts.
Make sure that:
– the machine is in maintenance position.

Check track component wear

- Check chains, chain guides, track pads and sprockets for wear.

5.14.8 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.

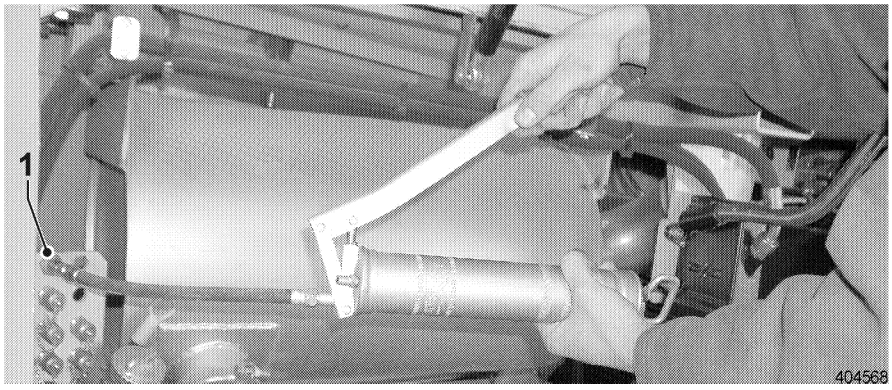


Grease point - Oscillating axle bearing

- 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.

5.14.9 Lubricate the center equalizer bar bearing

The center equalizer bar bearing is equipped with a grease fitting and must be lubricated according to the data in the maintenance and inspection schedule.



Lube point – equalizer bar bearing

- Open the right engine compartment door.
- Grease lube point 1 with the manual grease gun.

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.

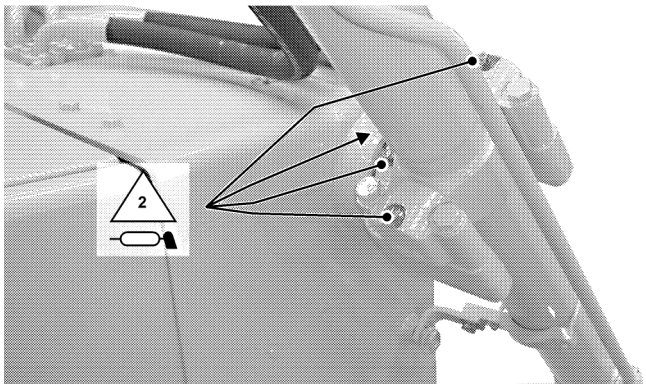
Check for wear

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.



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Lift cylinder bearing

- Lubricate the bearing points with the manual grease gun.

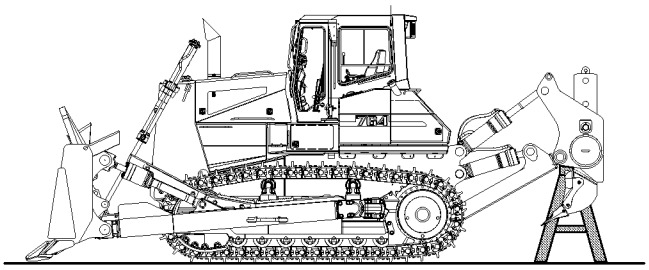
5.15.3 Change the ripper teeth

Danger

! Never work under the raised, unsupported attachment.
Lower the attachment to the ground or support it properly from below.

Caution

! When knocking out the safety element, there is a danger of injury due to material splitting off the pin.
– Always wear safety glasses and protective clothing.
– There may be no persons within the danger zone of the machine.



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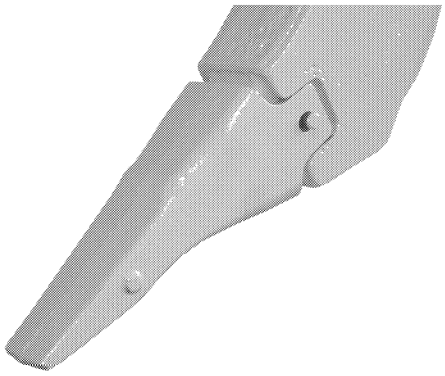
Support the ripper from below

- Properly support the ripper from below



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Ripper - tooth

- Knock out the retaining pin with a hammer and punch.
- Remove the tooth.
- Clean the tooth retainer and the retaining pin.
- Install a new tooth tip.

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.

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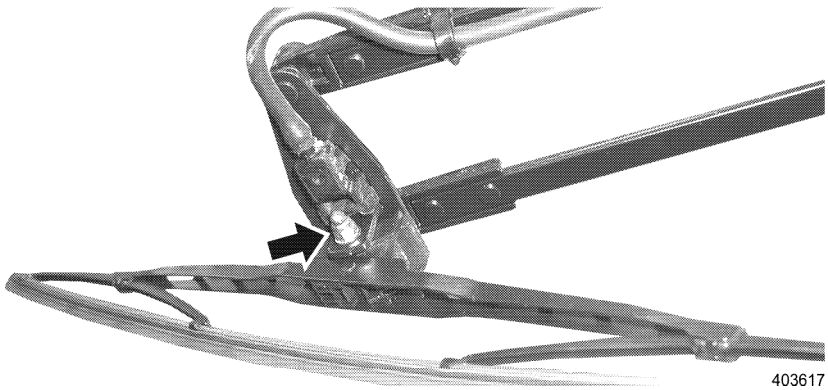
Visual inspection

- 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



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Windshield wiper

Change the windshield wiper blade

- Fold the wiper arm up.

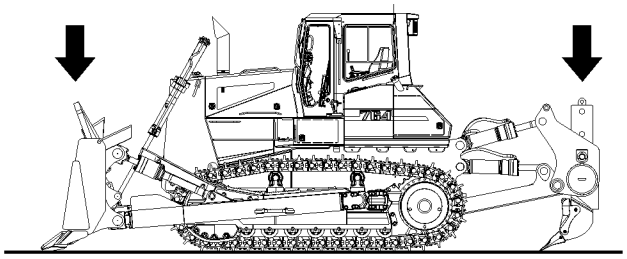
- Remove the nut of the mounting screw.
- Remove the spring ring and washer and pull out the mounting screw.
- Remove the wiper blade and change it.

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 Preservation of piston rods

For the preservation, we recommend LIEBHERR anti corrosion grease CTK. See "Lubricants and service fluids".



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Maintenance position for piston rod preservation

- The machine must be operated at least once every 14 days according to the operating instructions.

– The Diesel engine and the hydraulic system must reach operating temperature. All travel and working hydraulic functions must be actuated. The piston rods must be extended and retracted several times over their full length. Check the oil level, lube points and the electrical system.

- Park the machine in such a way that all piston rods are retracted in the cylinders as far as possible.
- Cover exposed piston rods thickly with acid free anticorrosion grease.

When moving a preserved machine for loading or transport purposes, the protection on the piston rods of the cylinders is removed by the scraper rings.
If the machine is being transported:

- Recheck the preservation of the piston rods after loading.

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.

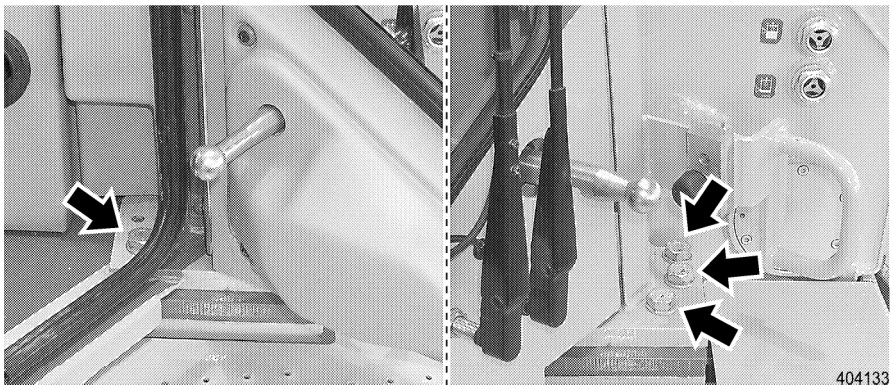
Danger

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.

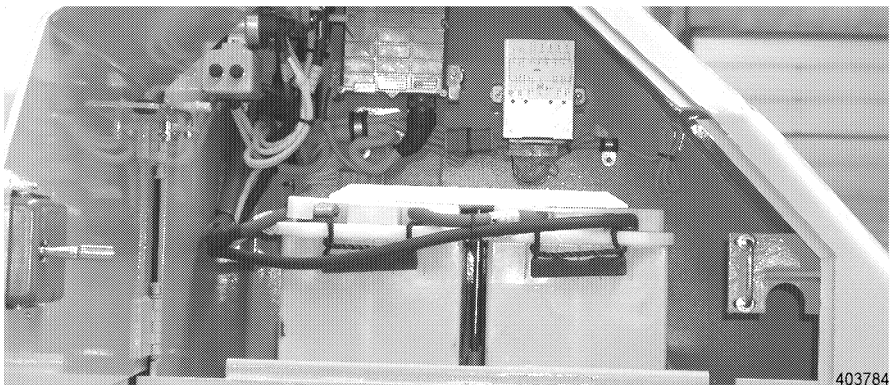
5.17.1 To raise the cab

Make sure that:
– the machine is in maintenance position,
– the extension pipe to control the hand pump is available.



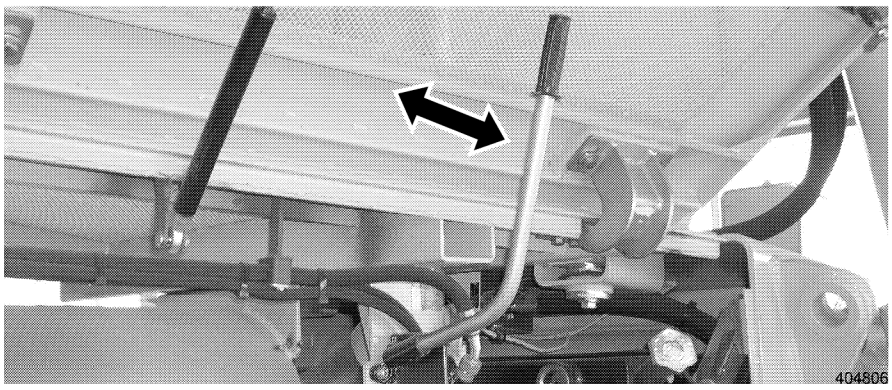
Mounting screws - cab

- Remove 4 hex head screws per side from the cab.
- Close both cab doors.
- Open the battery compartment door.



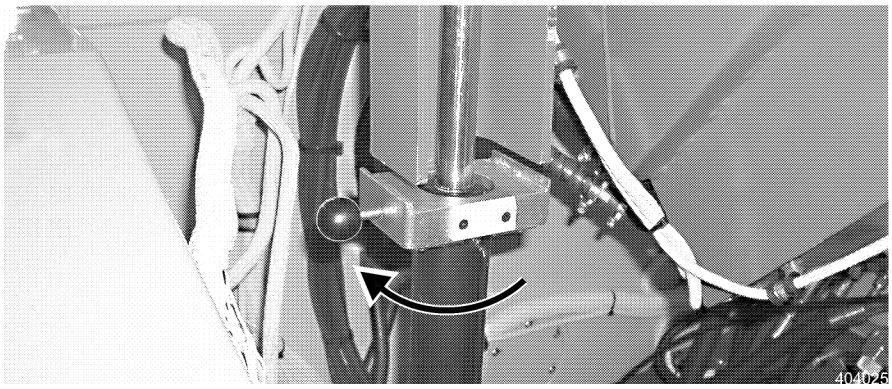
Hand pump "up"

- Set the lever on the hand pump to "up" .



Actuate the hand pump

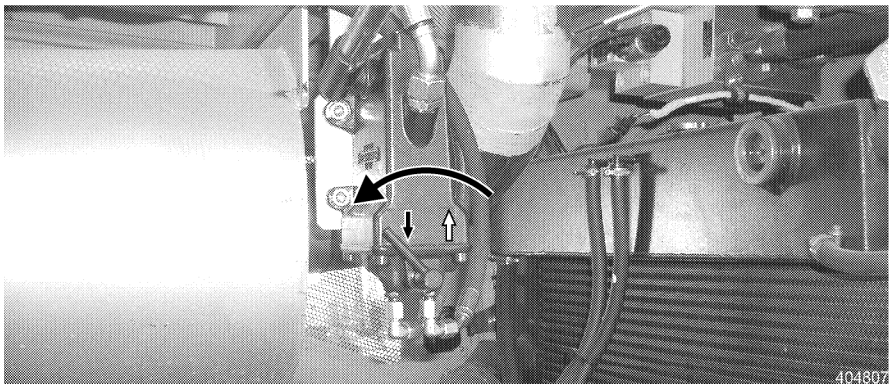
- Insert the extension pipe into the hand pump.
- Actuate the hydraulic hand pump until the piston has reached the end position (intermediate positions are prohibited!).



Turn the support plate by 90°

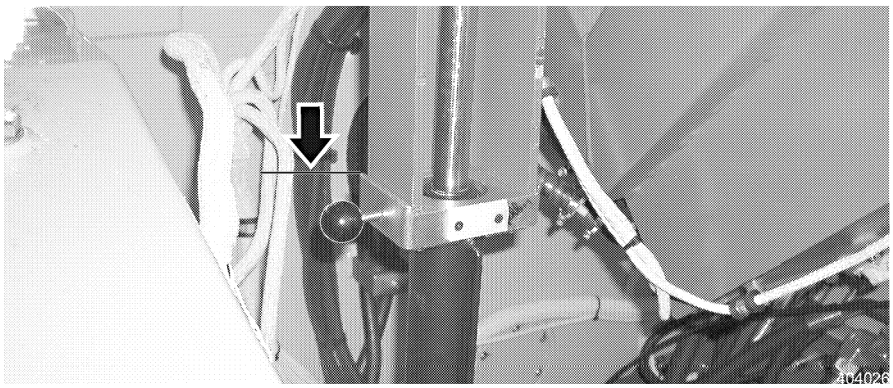
- Turn the mechanical support plate on the hydraulic cylinder in clockwise direction by 90°.

– The handle of the support plate is then horizontal to the travel direction of the machine.



Hand pump "down"

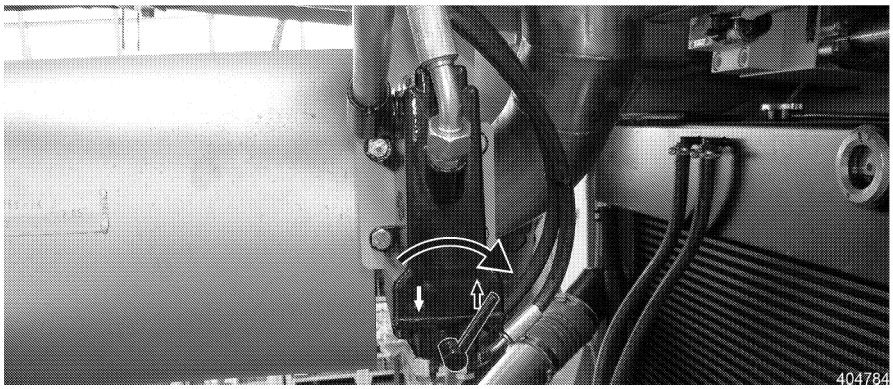
- Then set the lever on the hand pump to "down".



Safety bar

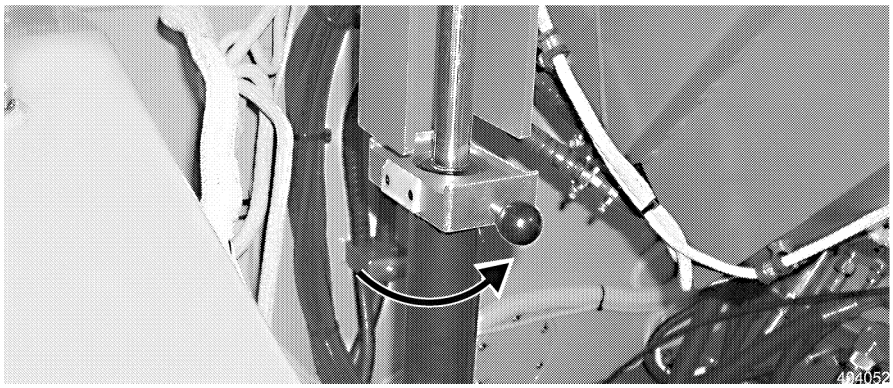
- Lower the cab by actuating the hand pump, until it is locked by the mechanical safety bar on the support plate.

5.17.2 Lower the cab



Hand pump "Up"

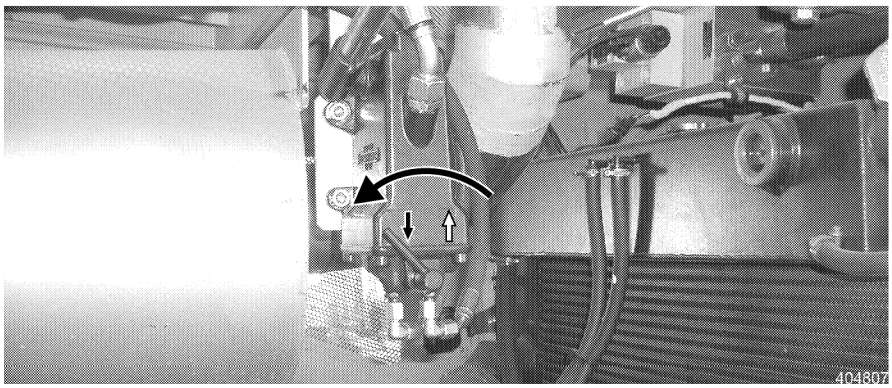
- Set the lever on the hand pump to "Up".
- Raise the cab by actuating the hydraulic hand pump.



Turn the support plate by 90°

- Release the safety support with a slight thumb pressure and turn the support plate on the handle in counterclockwise direction by 90°, to the front.

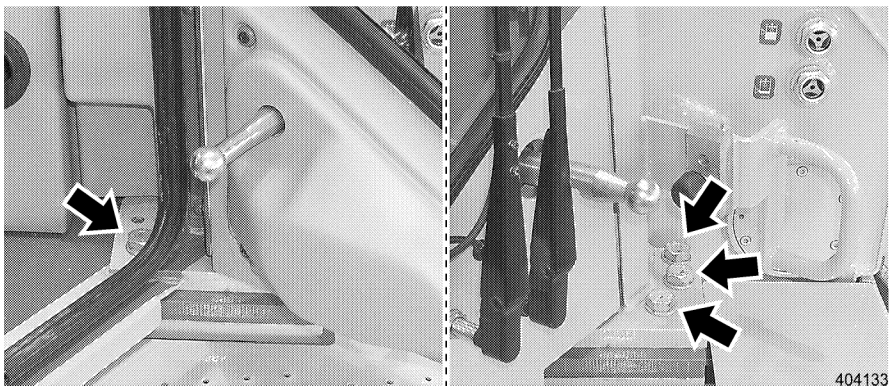
– The handle on the support plate is then positioned in travel direction on the front.



Hand pump "Down"

- Then set the lever to "Down". The cab is lowered by actuating the hydraulic hand pump.

! As soon as the cab is placed on the cab bearings, the hand pump must be actuated until the pressure relief valve in the cylinder is actuated (whistling sound). This ensures that the hydraulic cylinder for the cab tilt device is completely retracted and relieved.



Mounting screws - cab

Danger

In any case, it is strictly prohibited to start the Diesel engine before the cab is lowered and reattached.

- Attach the cab with 4 hex head screws per side.

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