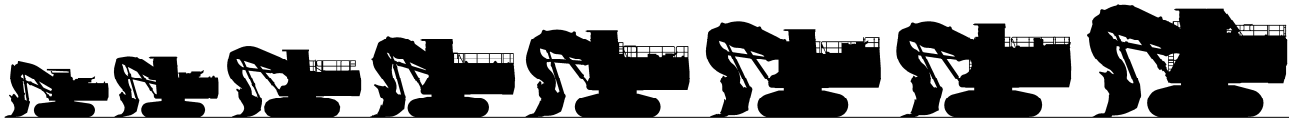
Operating Instructions

CE

Hydraulic Excavator

RH 120E No.

Bucyrus HEX GmbH



1 INTRODUCTION

	Operating instructions	Target group
Part 1	**INTRODUCTION FUNDAMENTAL SAFETY INSTRUCTIONS**	**Operating personnel + Inspection and servicing personnel + Repair personnel**
Part 2	**OPERATION**	**Operating personnel** The operating personnel must have know-how relevant to the operation and the application of this or comparable machines.
Part 3	**INSPECTION AND SERVICING**	**Inspection and servicing personnel** The inspection and servicing personnel must have know-how relevant to the inspection and servicing of this or comparable machines.
Part 4	**REPAIR WORK**	**Repair personnel** The repair personnel must have know-how and experience relevant to the repair of this or comparable machines.
Part 5	**ANNEX**	**Operating personnel + Inspection and servicing personnel + Repair personnel**
Part 6	**INDEX**	**Operating personnel + Inspection and servicing personnel + Repair personnel**

Gas, dust, steam and smoke

Always start and operate the engine in a well-vented area;

If in an enclosed area, vent the exhaust to the outside;

Do not modify or tamper with the exhaust system

California Proposition 65 WARNING

Diesel engine exhaust and some of its constituents are known in the state of California to cause cancer, birth defects, and other reproductive harm.

Operate fuel-operated heating systems only on adequately ventilated premises. Before starting the machine on enclosed premises, make sure that there is sufficient ventilation.

Observe the regulations in force at the respective site.

Carry out welding, flame-cutting and grinding work on the machine only if this has been expressly authorized, as there may be a risk of explosion and fire.

Before carrying out welding, flame-cutting and grinding operations, clean the machine and its surroundings from dust and other inflammable substances and make sure that the premises are adequately ventilated (risk of explosion).

Hydraulic equipment

Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.

Depressurize all system sections and pressure pipes (hydraulic system) to be removed in accordance with the specific instructions for the unit concerned before carrying out any repair work.

Hydraulic lines must be laid and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must comply with the technical requirements.

Noise

During operation, all sound baffles of the machine must be closed.

Always wear the prescribed ear protectors.

Oil, grease and other chemical substances

When handling oil, grease or other chemical substances, observe the product-related safety regulations (see safety specifications).

Be careful when handling hot consumables (risk of burning or scalding).

Ether

The machine can be equipped with pressure vessels for cold-starting fluid (ether) installed in the engine compartment. Ether is toxic and highly flammable; the vessels are under pressure. These pressure vessels can explode if exposed to high temperatures (above 49°C / 120°F) or in the event of damage. Protect the vessels against damage and high temperatures.

Do not store pressure vessels with cold-starting fluid (ether) on the excavator.

Do not eat, drink or smoke when replacing pressure vessels with cold-starting fluid (ether). Observe the instructions on the pressure vessels. Provide for sufficient ventilation (see also Part 3 "Inspection and servicing").

Do not open empty cold-starting fluid pressure vessels (ether). Have the vessels disposed of properly.

For further details please refer to the instructions and safety data-sheets of the manufacturer / supplier of pressure vessels with cold starting fluid (ether).

Transporting and recommissioning

The machine must be loaded and transported only in accordance with the operating instructions.

Use only appropriate means of transport and lifting gear of adequate capacity.

The recommisioning procedure must be strictly in accordance with the operating instructions.

Excavator layout

Fig. 2-1:

Undercarriage

1 - Track drive

2 – Idler

3 - Track roller

4 - support roller

5 - Crawler track

6 - Track tensioner

7 - Slewing ring

8 - Ladder

Superstructure

10 - Engine

11 - Radiator (engine cooling liquid)

11 - Reservoir (cooling liquid)

13 - Air-intake system

14 - Exhaust system

15 - Fuel tank

16 - Hydraulic oil reservoir

17 - Hydraulic oil cooler

18 - Engine oil reservoir (optional)

19 - Pump transfer gearbox

20 - Working pump

21 - Cooling oil pump

22 - Servo system pump

23 - Servo system pump

24 - Gearbox circulating pump

25 - Slewing pump

26 - Fan drive pump (cooler, hydraulic oil)

27 - Fan drive pump (radiator, engine cooling liquid)

28 - Air compressor drive (air conditioning system)

29 – Slewing gear

30 – Travel block and rotor

31 – Driver`cab

32 – Control stand with BCS

33 – Control cabinet

34 – Air conditioner (optional)

35 – Fire-extinguisher

36 – Control cabinet with battery main switch

37 - Batteries

38 - Service-station, (tanklift)

39 - Ladder

40 - Ladder

41 - Grease container for central lubrica ting system

42 - Tool cabinet (optional)

43 - Counterweight

44 - On-board crane (optional)

45 - Drive unit (onboard crane, optional)

Loading bucket

51 – Boom

52 - TriPower linkage

53 – Stick

54 - Bottom-dump bucket

55 - Boom cylinder

56 - Stick cylinder

57 - Tipping cylinder

58 - Bottom-dump cylinder

64 - Control valves

65 - Quick-action valve

Backhoe bucket

53 - Stick

55 - Boom cylinder

56 - Stick cylinder

59 - Monoblock boom

60 - Backhoe bucket

61 - Backhoe cylinder

62 - Toggle link

63 - Toggle lever

64 - Control valves

65 - Quick-action valve

Driver's seat

The driver's seat (Fig. 2-24:) can be adjusted in inclination, height and fore-and-aft position. The seat suspension can be adjusted to suit the driver's weight.

Never adjust the seat while driving. Concentrate on the road to avoid accidents.

Before carrying out any seat adjustments:

– stop the machine

– set the control lever to "0"

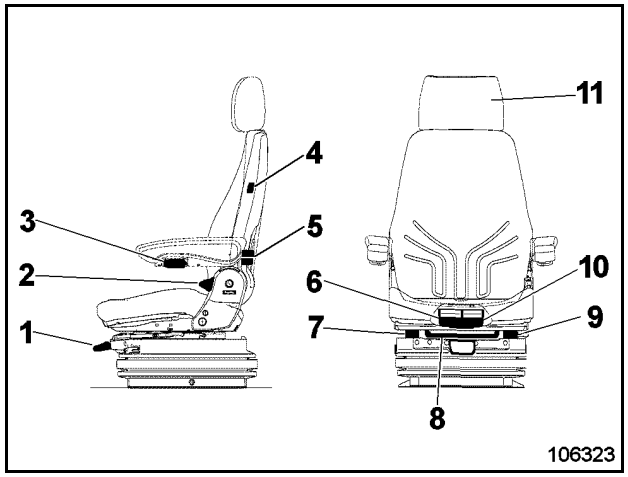


Fig. 2-24:

Pos.	Function
1	Height adjustment
2	Backrest adjustment
3	Armrest adjustment
4	Seat heating ON / OFF
5	Lumbar support, inflate / deflate the air chambers
6	Fore-and-aft position adjustment of the seat
7	Cushioning effect adjustment
8	Fore-and-aft position adjustment of the complete drivers seat
9	Longitudinal / horizontal cushioning adjustment
10	Inclination adjustment of the seat
11	Headrest height and inclination adjustment

Fig. 2-43

No.	Element	Function	Symbol
31	**Botton Emergency OFF**	Shuts off the whole electrical system	
32	**Key-switch**	Switches the electrical system on and off	
33	**Buzzer**	**Gives an acoustic warning signal if a fault is reported** ▪ Fault in engine system (engine 1 and/or 2; left and/or right) ▪ Coolant level (engine 1 and / or 2; left and / or right) too low ▪ Engine oil pressure (engine 1 and / or 2; left and / or right) too low ▪ Engine oil temperature (engine 1 and / or 2; left and / or right) too high ▪ Hydraulic oil level too low ▪ Distributor gearbox temperature (1 and / or 2; left and / or right) too high ▪ Slewing pump temperature (1 and / or 2; left and / or right too high ▪ Slewing gearbox temperature (1 and / or 2) too high ▪ Fault in lubricating system **Lower the equipment to the ground and shut off engin immediately if the buzzer (33) sounds and the BCS indicates a fault. The buzzer (33) continues to sound until the fault has been retified.**	

Fig. 2-48:

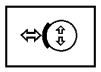
No.	Element		Function	Symbol
71	**Switch**	**Travel motors**	Preselection: CW: 1st gear stage forward / reverse travel CCW: 2nd gear stage (fast gear) Only parallel forward travel is possible. When the switch is in this position and another travel function (e.g. reverse travel) is switched on, there is an automatic change to 1st gear.	
72	**Switch**	**Undercarriage holding brake**	CCW: brake permanently applied The excavator can not be driven CW: Every time the excavator stops, the undercarriage brake is automatically applied after approx. 8 sec. The undercarriage brake is automatically released when the travel function is activated.  **Actuate switch only when the excavator is stationary. Do not use as service brake.**	
73	**Button**	**Reset**	Activate after a fault in the central lubricating system.	
74	**Switch**	**Electronic excavator control**	Switches on the electronic servo control.	Servo
75	**Switch**		Not connected	
76	**Cigarette lighter**			
77	**Switch**		Not connected	

Fig. 2-53:

No.	Element		Function	Symbol
131	**Pressure gauge**	**Engine oil pressure (engine 1 left)**	Indicates the oil pressure in the diesel engine lubricating system	
132	**Thermometer**	**Engine temperature (engine 1 left)**	Indicates the cooling-water temperature	
133	**Pressure gauge**	**Engine oil pressure (engine 2 right)**	Indicates the oil pressure in the diesel engine lubricating system	
134	**Thermometer**	**Engine temperature (engine 2 right)**	Indicates the cooling-water temperature	
135	**Warning lamp**	**Alternator (engine 1 left)**	Lits up when the batteries are not recharged	
136	**Warning lamp**	**Engine oil pressure (engine 1 left)**	Lits up when the engine oil pressure is too low	
137	**Warning lamp**	**IDLE-Auto (engine 1 left)**	Lights during the engine´s run-down phase of 5 minutes	
138	**Warning lamp**	**Engine temperature (engine 1 left)**	Lits up when the engine temperature is too high	
139	**Warning lamp**	**Cooling water level (engine 1 left)**	Lits up when the cooling-water level is too low	
140			free for optional	
141	**Warning lamp**	**Alternator (engine 2 right)**	Lits up when the batteries are not recharged	
142	**Warning lamp**	**Engine oil pressure (engine 2 right)**	Lits up when the engine oil pressure is too low	
143	**Warning lamp**	**IDLE-Auto (engine 2 right)**	Lights during the engine´s run-down phase of 5 minutes	
144	**Warning lamp**	**Engine temperature (engine 2 right)**	Lits up when the engine temperature is too high	
145	**Warning lamp**	**Cooling water level (engine 2 right)**	Lits up when the cooling-water level is too low	
146			free for optional	

Assemblies resp. reservoirs	Measuring device	Remarks
Fuel tank	BCS fuel indicator (2, Fig. 2-62:)	Stop filling when the fuel tanks are full (service station shuts off automatically by counter-pressure). Optional The fuel level is also indicated on the fuel level gauges (21, Fig. 2-63:) for the right fuel tank and (22) for the leftt fuel tank. When the battery main switches are in position OFF the immersed tube sensors in both tanks are then electrical activated by toggle switch (23). This is necessary to check the fuel level in both tanks after all.

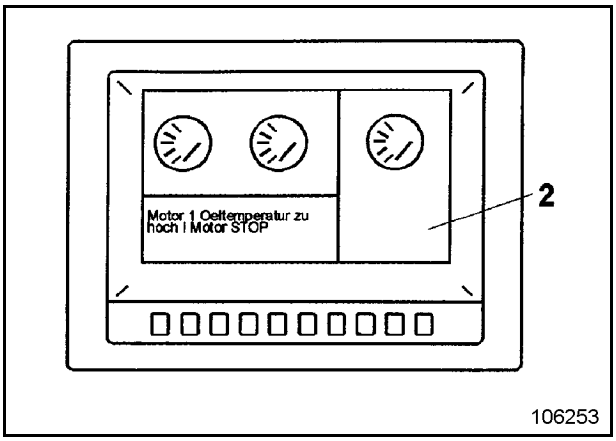


Fig. 2-62:

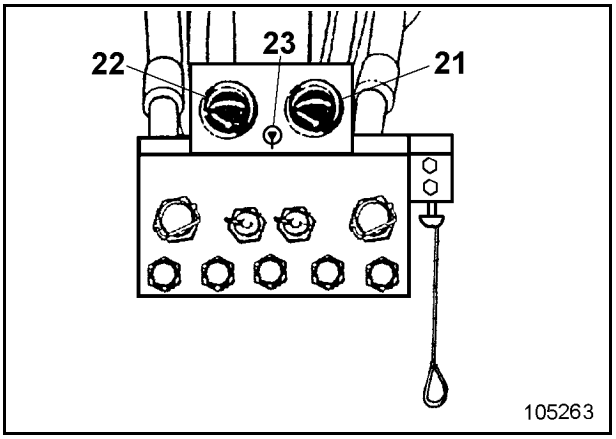


Fig. 2-63:

:

Back-up heating (option)

The back-up heating control elements are located in the satellite (182, Fig. 2-84:).

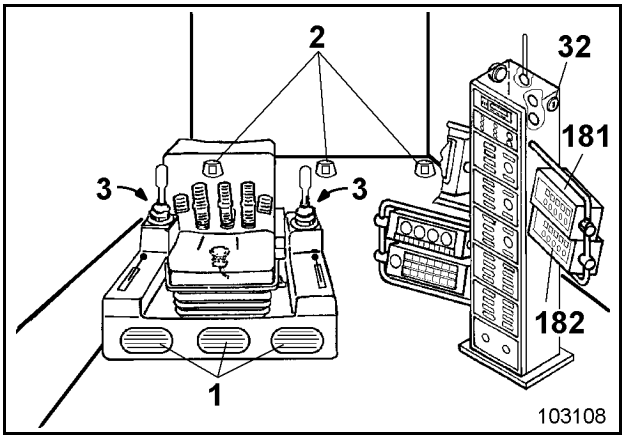


Fig. 2-84:

Do not switch on the back-up heating when the air conditioner is set to ”cooling”.

Control panel (Eberpächer)

(Fig. 2-85:)

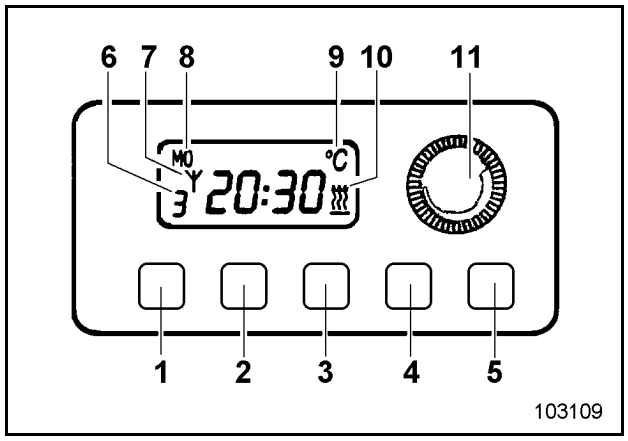


Fig. 2-85:

1	Pushbutton	set heating time
2	Pushbutton	heating time preselect
3	Pushbutton	heating on / off
4	Pushbutton	change set data
5	Pushbutton	Einstelldaten verändern
6	Symbol	change set data
7	Symbol	radio remote-control
8	Symbol	time and day of the week
9	Symbol	temperature
10	Symbol	operation
11	Selector	temperature

TRANSPORTING THE MACHINE

Transport - Safety instructions

The machine must be loaded and transported only after all safety regulations have been observed and complied with.

Entrust loading and transporting of the machine to a company experienced in the transport of heavy equipment.

The responsability for loading and transporting lies with the transport company or their representative.

Remove oil, grease, soil, mud, snow, ice and other materials from the excavator's crawler tracks and from ramps and loading platforms of the transport vehicle to minimize slipping.

Secure the transport vehicle against rolling away.

Use only tying equipment of sufficient strength (the weights and dimensions of the excavator are set out in the "Technical specifications").

Transport

The dimensions and the service weight of the fully assembled excavator do not allow the excavator to be transported in an undismantled state on a low-bed trailer over public roads.

Therefore, the following components and modules must be dismantled beforehand.

Weights and suspensions points are marked on the modules.

NOTES

INSPECTION AND SERVICING WORK, FIRE AND EXPLOSION HAZARD

Safety instructions

Prior to commencing work, obtain informationon the national and corporate rules for the prevention of accidents and avoiding fires.

Pay particular attention to hazards caused by combustible and easily flammable substances.

Obtain information on the safe handling of the fire extinguishers to be used.

Avoid smoking and open fire on, next to and below the excavator.

Even battery gases can ignite in open flames or fire.

Combustible and easily or highly inflammable substances or liquids increase the risk of fire and explosion. This is also valid for pressure vessels containing flammable substances as, for instance, spray oil or cold-starting fluid (ether). They are heat-sensitive and can explode even if exposed only to intensive sunlight.

These substance can also ignite themselves if they come close to hot units or objects as, for instance, a turbocharger.

Do not store these substances on the excavator. If combustible, easily or highly flammable substances or liquids were used during maintenance operations, they must be completely removed from the excavator at the end of the work.

Avoid parking the excavator in places where

- combustible substances such as coal dust or tar are present.
- open or smouldering fire may occur.

Remove the excavator from such an area where combustible or easily flammable liquids have spilled from the excavator onto the ground.

Flying sparks (caused by welding, flame cutting, grinding, electrical short-circuit) may cause fire on the ground that can spread to the excavator.

Place suitable fire guardings (fire barriers) if open fire or flying sparks cannot be avoided during repair work.

If necessary, also cover the ground with fire-protective blankets.

Apply special protection to cables, cable ducts as well as to hose and pipe lines.

Have all your welding, flame cutting and grinding work approved before starting work.

The engine compartment can be equipped with pressure vessels containing cold-starting fluid (ether). Ether is toxic and highly flammable; the vessels are under pressure. These pressure vessels can explode if exposed to high temperatures (above 49°C / 120°F) or in the event of damage. Protect the pressure vessels against damage before beginning to work in or close to the engine compartment.

Ensure sufficient ventilation.

Do not keep any fire extinguishers that are not suitable or have not been tested.

Do not extinguish flammable liquids with water. Use:

- dry-powder, carbon-dioxide or foam extinguishing compounds.

When getting into contact with burning substances, the fire-fighting water would abruptly evaporate and distribute the substance such as oil over a wide area. Water causes short-circuits in the electrical system thus possibly entailing new hazards.

Call the fire brigade.

Clean the excavator carefully after the maintenance, if oil, grease, fuel, detergents or cold-starting fluid have been spilt over the machine. If possible, use a steam-jet cleaner for cleaning.

Plan A – E

Plan A – after every 250 OH
(at 250, 750, 1250 … OH)

Plan B – after every 500 OH
(at 500, 1500, 2500 … OH)

Plan C – after every 1000 OH
(at 1000, 2000, 3000, 4000 … OH)

Plan D – after every 5000 OH
(at 5000, 15000, 25000 … OH)

Plan E – after every 10000 OH
(at 10000, 20000, 30000, … OH)

Location	Servicing work	Menge / No.	Plan A	Plan B	Plan C	Plan D	Plan E
Servicing in acc. with W or T			●	●	●	●	●
Monitoring, warning and control elements							
- Joystick							
- Control spool	oil lightly	2 x 4 [5]			●	●	●
- Pedal							
- Control spool (machine with loading shovel)	oil lightly	3 x 2 [5]			●	●	●
- Control spool (machine with backhoe bucket)	oil lightly	2 x 2 [5]			●	●	●

[5] apply a thin layer of hydraulic oil

Lubricating chart – Grease (legend)

No.	Greasing point	Number	Lubricant properties	Grease every .... operating hours
1	Central lubricating system – grease container	1	**V** [17]	10
3	Ramp-type ladder (optional) - central greasing point	1	**V** [17]	1000
4	On-board crane			250
	- Bearing	4	**V** [17]	250
	- Joint (column / boom)	2		250
	- Cylinder bearing	5		250
	- Slewing ring	1	**Graphitspray**	250
5	Monitoring, warning and control elements			
	- Joystick	2 x 4 [18]	**II** [17]	1000
	- Pedal	3 x 2 [18]		1000

All other greasing points are supplied with grease by the central lubricating system.

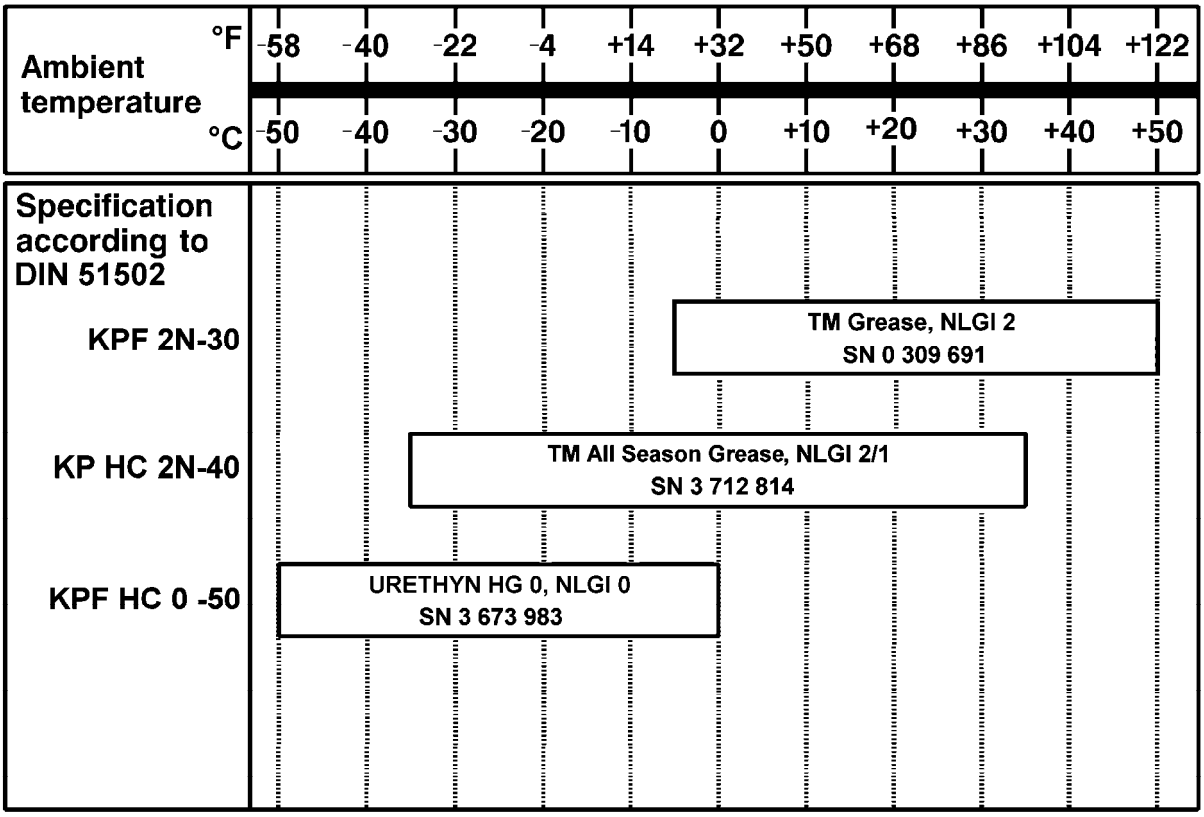
Filling quantities - Grease

Greasing point	Lubricant properties	Filling quant. kg	Filling quant. lb
Central lubricating system – grease container (depending on the container built in)		180-500	397-1102
Internal gearing – Roller-bearing slewing ring	**V** [17]	150	330.7
Idler (permanent grease filling)		2 x 4.4	2 x 10
Track rollers (permanent grease filling)	**Tribol** Bucyrus HEX part no. 2764564	14 x 14	14 x 31
Support rollers (permanent grease filling)		4 x 1.3	4 x 3

[17] see "LUBRICANTS" section.

[18] apply a thin layer of hydraulic oil

V. Greases for bearings and slewing rings



Minimum requirements:

Base oil: Mineral oil or synthetic oil mixable with mineral oil

Thickening agent: Lithium soap or other thickening agent mixable with lithium

Solid lubricant content (MoS_2 or graphite) : max. 3 %

NLGI – class : see above

Corrosion preventing characteristics EMCOR DIN 51802 : ≤ 1

Grease for low temperatures and for machines in low – temperature version — KP HC 2N-40

Grease for temperatures down to -50 °C — KPF HC 0 -50

8005081

Fig. 3-8:

Cold-starting fluid (ether) - Replacing the pressure vessel

Read and observe: "Inspection and servicing - Safety instructions"

Risk of injury

Cold-starting fluid is composed mainly of ether.

Ether is toxic when the mists and vapours are inhaled. Ether is harmful to the eyes, the skin, the respiratory system and the central nervous system. Prolonged inhalation of ether can be fatal.

In contact with the skin, ether can cause frostbites and irritations.

Ether is toxic and highly flammable; the vessels are under pressure.

These pressure vessels can explode if exposed to high temperatures (above 49°C/ / 120°F) or in the event of damage.

Before replacing an empty pressure vessel:

Read and observe the instructions on the pressure vessels.

For further details please refer to the instructions and safety data-sheets of the manufacturer / supplier of pressure vessels with cold starting fluid (ether).

Provide for sufficient ventilation of the surroundings.

Do not eat, drink or smoke when replacing an empty vessel.

Do not inhale the vapours of escaping cold-starting fluid (ether).

Avoid skin contact. Wear suitable protective gloves and goggles.

If the machine is used in low temperatures, the engine may be equipped with a cold-starting device.

The pressure vessel containing the cold-starting fluid (ether) can be installed in or near the engine compartment.

The vessel is screwed onto an electro-mechanical metering valve. At temperatures below 0°C (32°F), this valve is activated automatically by the engine electronics and injects a precisely metered amount of cold-starting fluid into the air intake duct of the engine.

Replacing the pressure vessel:

- ➲ Remove the clamp around the pressure vessel.
- ➲ Unscrew the pressure vessel carefully from the metering valve.
- ➲ Remove the used seal from the metering valve.
- ➲ Insert a new seal into the valve (supplied with the new pressure vessel).
- ➲ Screw the new pressure vessel onto the metering valve and tighten by hand.
- ➲ Fasten the clamp round the pressure vessel.

Even apparently empty pressure vessels can contain rests of ether and therefore explode if they are damaged or heated up above 49°C / 120°F. They must therefore be handled in the same way as full pressure vessels.

- ▪ Do not keep them on the machine.
- ▪ Do not damage or open the vessels.
- ▪ Do not expose the vessels to great heat or direct sunlight.
- ▪ Do not dispose of in fire.
- ▪ Keep the vessels in a place unaccessible to unauthorized persons.
- ▪ Dispose of the vessels properly.

Venting the fuel system

The fuel tanks are vented with breather valves (3, Fig. 3-45:).

Clean breather valves regularly.

➲ Remove breather valve, flush with paraffin oil and blow clean with compressed air.

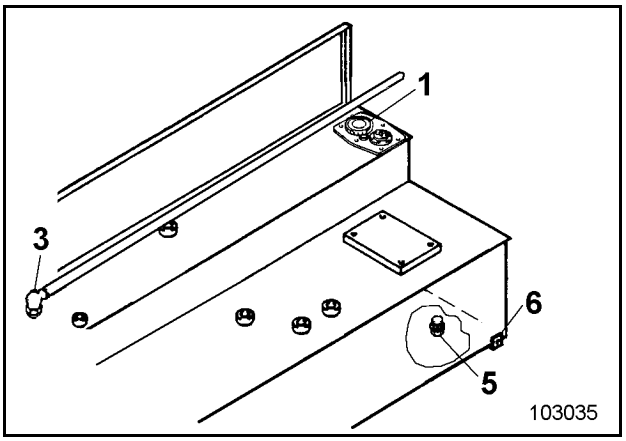


Fig. 3-45:

Cleaning the fuel tanks

Explosion hazard.

Read and observe the "Inspection and servicing.
Safety instructions" chapter.

Do not use white spirit, paraffin oil or other solvents.
For flushing and cleaning use diesel fuel.
Avoid skin contact.
Skin contact with diesel fuel may cause skin injury.
Wear firm working clothing.
Wear protective gloves or use a barrier ccream.

Fuel must be prevented from penetrating into the soil. Keep fuel for re-use or discard without polluting the environment.

➲ Use up as much fuel as possible.

➲ Check how much fuel remains in the tank and place a collecting recipient of sufficient size under the drain plugs of the tanks.

➲ Loosen drain plug (6) at fuel the tank and drain off fuel.

➲ Flush tank with diesel fuel.

➲ Screw automatic drain plug backs (6) in place.

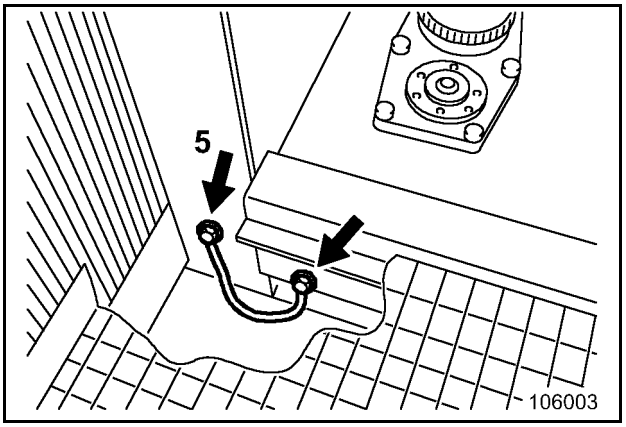


Fig. 3-62:

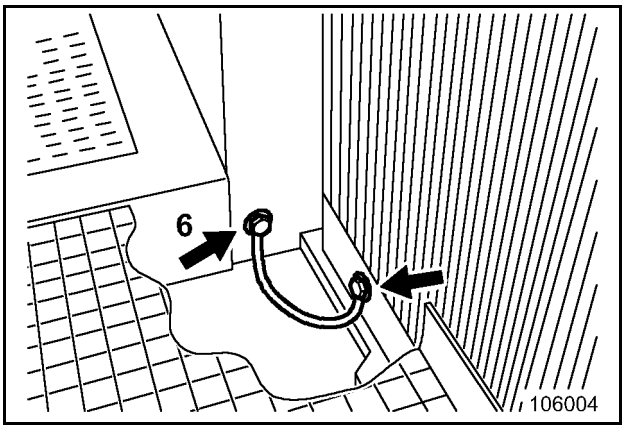


Fig. 3-63:

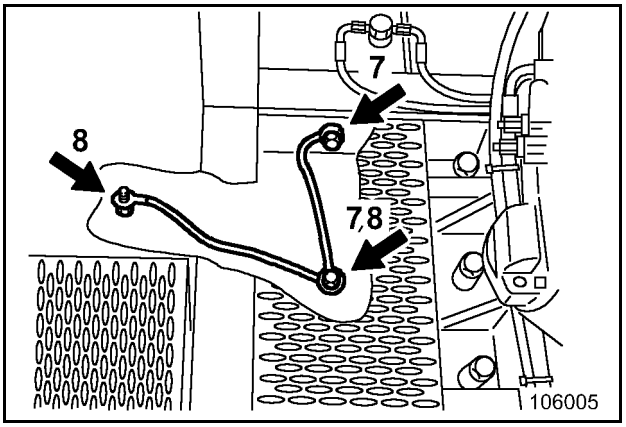


Fig. 3-64:

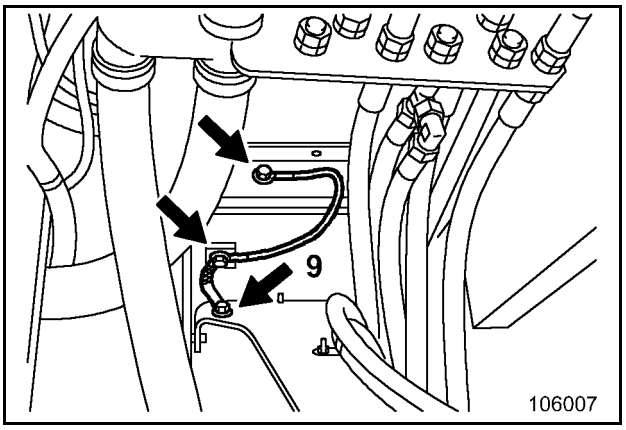


Fig. 3-65:

Bypass valves (filter housing - cooling system)

Read and observe the "Inspection and servicing - Safety instructions" chapter.

Shut off the engines.

Risk of scalding caused by hot hydraulic oil.

The hydraulic oil reservoir itself may also be hot.

Avoid skin contact.

Skin contact with hydraulic oil may cause skin injury.

Wear protective gloves and firm working clothing.

Collect escaping hydraulic oil and discard without polluting the environment.

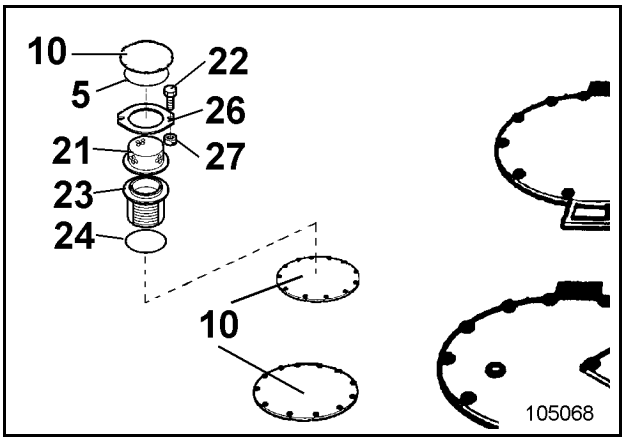


Fig. 3-85:

Cleaning the screens

Clean/replace the bypass valves (Fig. 3-85:) together with the bypass valves in the hydraulic oil reservoir.

- ➲ Detach cover (10) together with sealing ring (5).
- ➲ Unscrew screws (22) and withdraw bypass valve.
- ➲ Take off screen (23) together with sealing ring (24) and clean in white spirit or paraffin oil; replace, if required.
- ➲ Re-assemble the bypass valve.
- ➲ Insert bypass valve and fasten with screws (22).
- ➲ Refit cover (10) with a new sealing ring (5).

Replacing the bypass valves and sealing rings

Replace the bypass valves and sealing rings together with the bypass valves in the hydraulic oil reservoir.

- ➲ Remove the bypass valve as described under "Cleaning the screens".
- ➲ Re-assemble the bypass valve with a new screen (23) and a new sealing ring (24).
- ➲ Insert bypass valve with new sealing ring (24) and fasten with screws (22).
- ➲ Refit cover (10) with a new sealing ring (5).

Electronic excavator control

Joystick

Apply a thin layer of hydraulic oil regularly on the control spools of the joysticks (arrows, Fig. 3-102:) to prevent jamming of the joysticks.

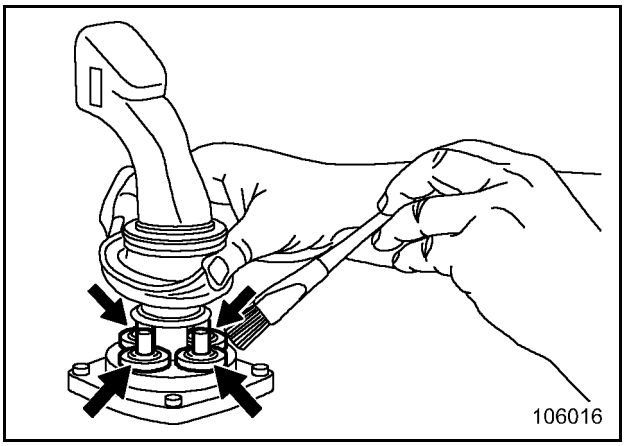


Fig. 3-102:

Make sure the hydraulic oil does not flow down along the control spools into the electronic control circuits where it might cause damage.

Pedal

Apply a thin layer of hydraulic oil regularly on the control spools of the pedals (arrows, Fig. 3-103:) to prevent jamming of the control spools.

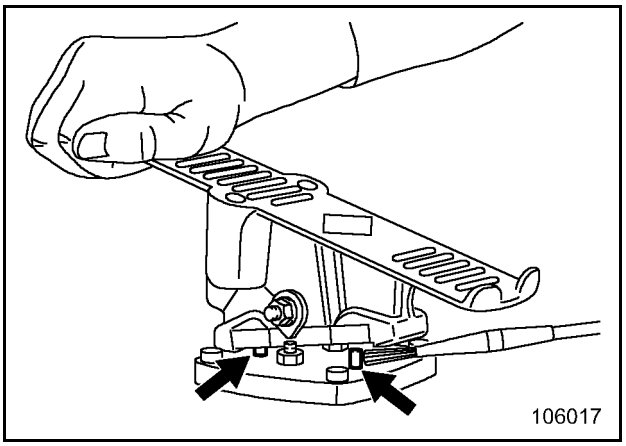


Fig. 3-103:

Make sure the hydraulic oil does not flow down along the control spools into the electronic control circuits where it might cause damage.

Brake chamber, draining off oil

- Prepare a collecting recipient for used oil.
  Choose the required capacity in accordance with the "Refilling quantities - Oil" table.
- Unscrew caps (7, Fig. 3-123:) from expansion reservoirs (6). Oil will escaping faster then.
- Unscrew plug at the upper edge of the gearbox housing (arrow, Fig. 3-122:).
  Oil escapes.
- Screw plug (arrow, Fig. 3-122:) back in place.

Brake chamber, filling in new oil / topping up

- Fill in new gearbox oil into expansion reservoirs (6, Fig. 3-123:).
  The expansion tanks must be filled with oil up to abt. 1/3.
  The oil level is visible from outside (light/dark area).
- Screw caps (7) back in place.

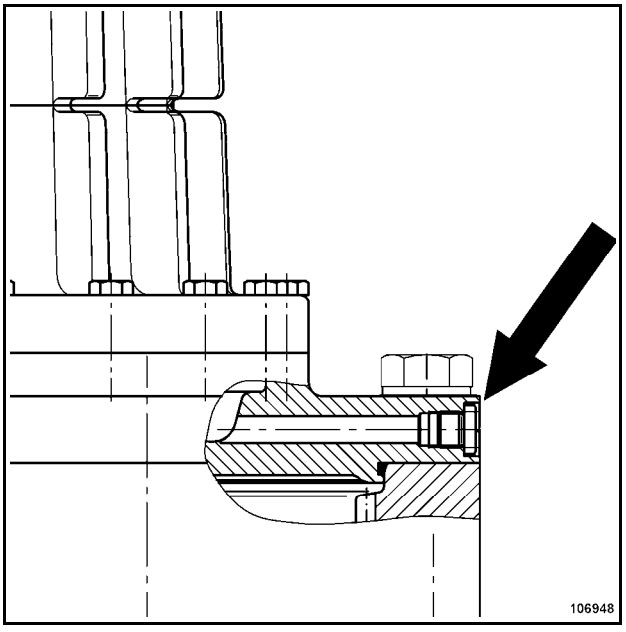


Fig. 3-122:

Gearbox venting

The gearbox is vented through the caps of the expansion reservoirs (7, Fig. 3-123:).

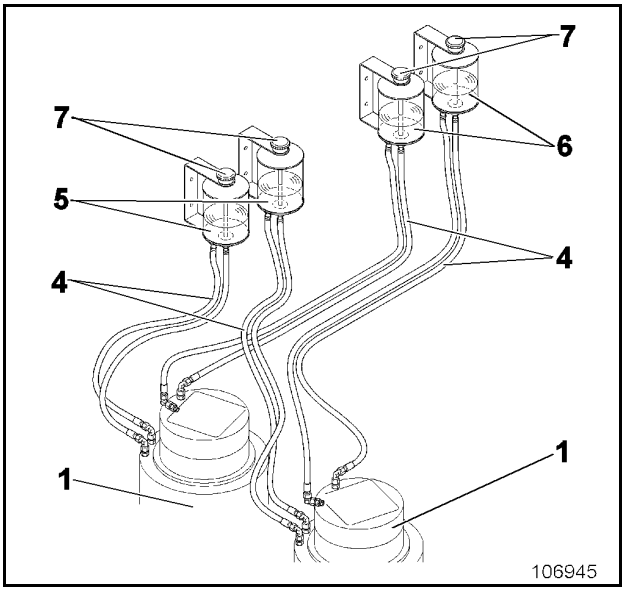


Fig. 3-123:

CENTRAL LUBRICATING

Design

The excavator is equipped with an automatic central lubricating system which provides grease regularly to all greasing points except those mentioned in the "Lubricating chart - Grease".

The central lubricating system is activated when the electrical system is switched on with the key-switch and the engines are running. All greasing points connected to the system are greased at regular intervals.

The automatic greasing is interrupted when the engines are stopped with the idle timers.

The central lubricating system is controlled electro-hydraulically by the programmable SPC contoller.

The SPC is located in a switch box underneath the cab.

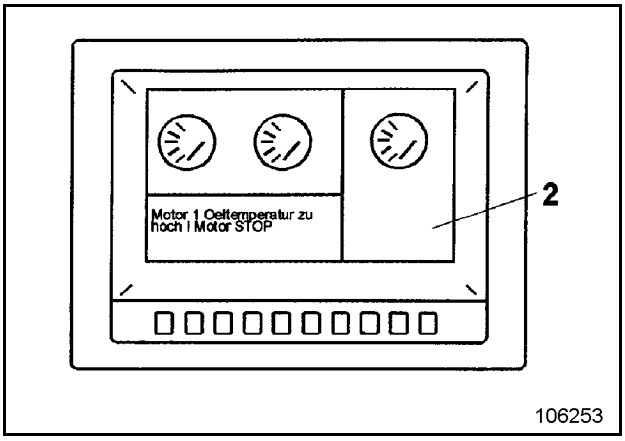


Fig. 3-139:

If a fault occurs, BCS gives a warning on the screen (2, Fig. 3-139:). Actuate the "Reset" button (73, Fig. 3-140:) to eleminate the fault. Is this is not possible, call in servicing personal.

For further information on the function and setting refer to the TECHNICAL HANDBOOK – SPC (storage-programmable control).

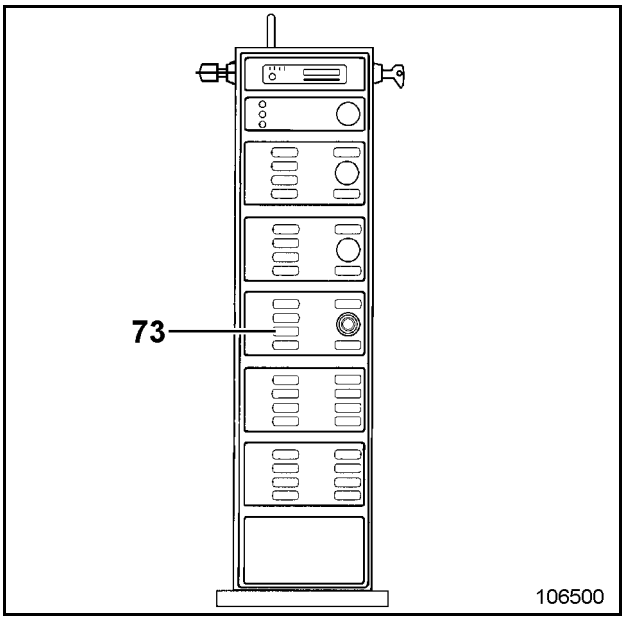


Fig. 3-140:

Pressure-accumulator inspection regulations

The following regulations are applicable only in Germany. Please observe the relevant regulations in force in your own country.

Extract from the German regulations

The accumulator vessel must not be subjected to welding, soldering or any other mechanical work. Work on systems containing accumulators (repairs, connection of pressure gauges or similar work) may be carried out only when the fluid pressure has been relieved.

Extract from the German acceptance regulations

Hydraulic accumulators are pressure vessels and are therefore subject to the "Druckbehälterverordnung (DruckbehV)" [Pressure Vessel Regulations]. Their installation, equipment and operation are governed by the "Technische Regeln Druckbehälter (TRB)" [Technical Rules for Pressure Vessels]. The pressure vessels of hydraulic accumulators are classified by the admissible operating pressure p in bars, the capacity l in liters and the product of pressure and capacity p x l. Depending on the class to which the accumulator belongs, the following inspections are mandatory:

Checking the gas charging pressure in the pressure accumulator

After commissioning (new installation or repair), the gas charging pressure in the pressure vessel must be checked at least once during the first week. If no pressure loss is detected, the second pressure test must be performed after ca. 3 months. If no pressure loss is detected in this test either, the testing interval can be fixed at once pressure test **each year**.

Group	**Inspections prior to commissioning**		**Regular inspections**
	at the factory	**at the place of use**	
III $p \geq 1$ bar and $p \cdot x\ l \geq 200$ bars $p \cdot x\ l \leq 1000$ bars	Preliminary inspection by an expert Prototype and pressure test certified by the manufacturer (type approval) or the expert	Acceptance inspection by an expert	Inspection schedule to be drawn up by end user, based on experience with type of operation and operating fluids.

REPAIR WORK - SAFETY INSTRUCTIONS

Operating instructions

Never carry out repair work without having read and understood the operating instructions.

Pay special attention to: "Fundamental Safety Instructions", "Inspection and servicing - safety instructions" and all warnings and safety instructions attached to the machine.

The descriptions of job sequences provide only experienced personnel with the necessary instructions.

The operating manual must be kept with the machine at all times.

Repair personnel

Repair personnel must have know-how and experience relevant to repairing this or comparable machines.

In the absence of such know-how, meticulous training must be given by experienced repair personnel, e.g. from Bucyrus HEX.

Working in greater heights

Always wear safety harnesses when working at greater heights.

Wear an approved safety harness; it must be equipped with fall arresters and safety cables.

Prestressed units

Never open defective prestressed units but replace them as an entirety.

In exceptional cases, open only when the system and the operating sequence are precisely known and any special tools required are available.

The operating manual contains no information on this point.

Dismantling components

Never do dismantling while the machine is at operating temperature.

Oils, greases, or coolants may have a high temperature and result in burning or scalding.

Leave time for the machine to cool down.

Before starting work, depressurize piping and hoses, cylinders, radiator, hydraulic tank and other systems or units.

Replace defective components in good time to prevent major damage.

Clean the defective component carefully before dismantling it.

Mark the dismantled parts in the correct sequence to faciliate re-assembly.

When dismantling the component, close off exposed hose and piping connections, exposed drill holes and housings carefully to prevent any dirt from penetrating.

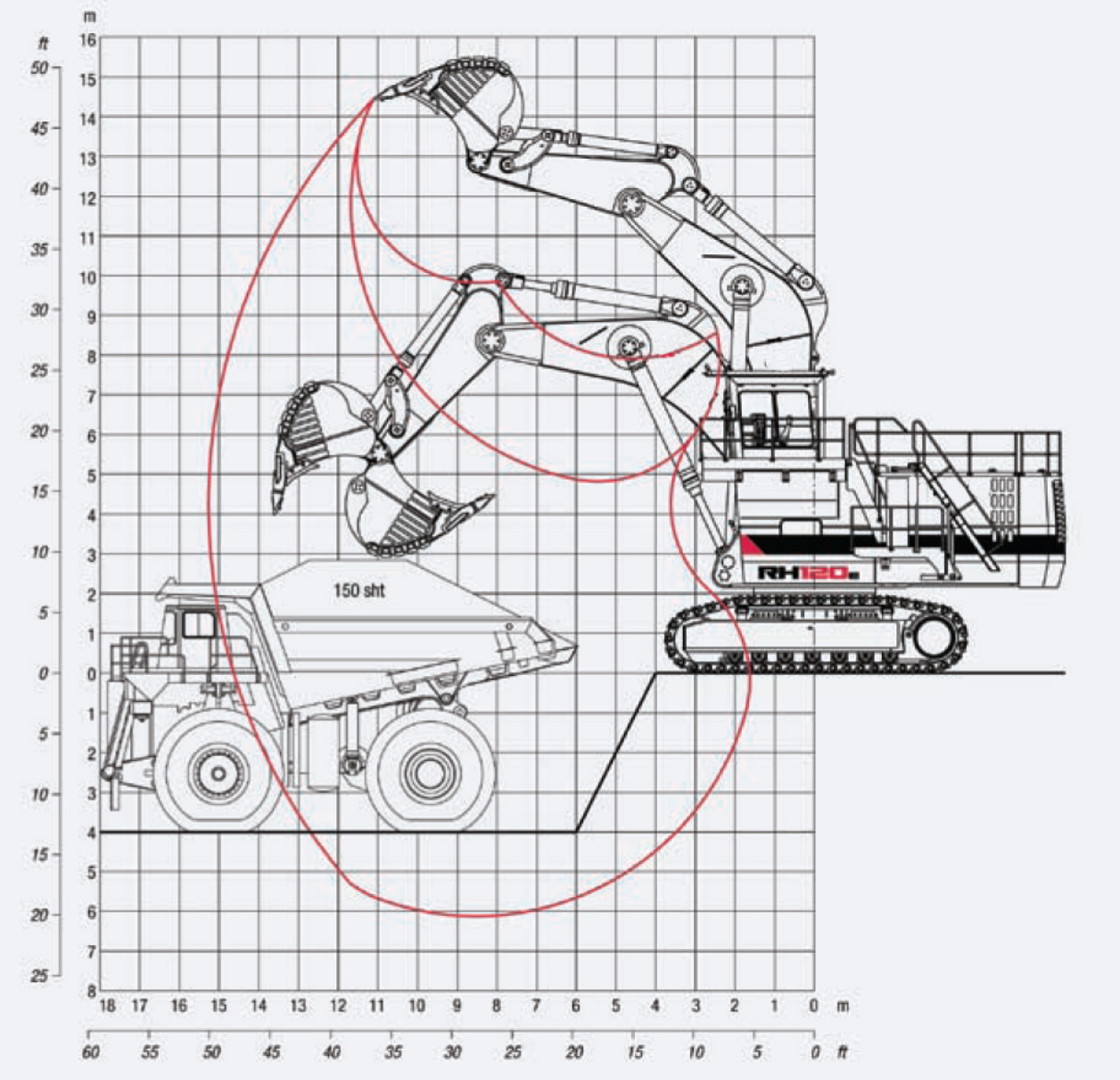
NOTES

HYDRAULIC CIRCUIT DIAGRAM

Further information can be found in the „Technical Handbook“ chapter 8.

Backhoe Attachment (BH)

Working Diagram - Boom 8.5 m (27'11") - Stick 4.0 m (13'9")



Working Range

Max. digging depth	6.1 m	20'0"
Max. digging reach	15.1 m	49'6"
Max. digging height	14.1 m	46'3"

Digging Forces

Max. crowd force	880 kN	197,760 lb
Max. breakout force	870 kN	195,520 lb

Backhoes

Type	Iron ore bucket	Heavy rock bucket	Standard rock bucket
Tooth system	ESCO V 81	ESCO V 81	ESCO V 81
Capacity SAE 1:1	12.0 m^3 (15.7 yd^3)	15.0 m^3 (19.6 yd^3)	17.0 m^3 (22.2 yd^3)
Capacity CECE 2:1	10.9 m^3 (14.3 yd^3)	13.6 m^3 (17.8 yd^3)	15.3 m^3 (20.0 yd^3)
Capacity struck	9.6 m^3 (12.6 yd^3)	12.3 m^3 (16.1 yd^3)	13.5 m^3 (17.7 yd^3)
Total width	3,450 mm (12'2")	3,700 mm (12'2")	4,080 mm (13'5")
Inner width	3,000 mm (9'10")	3,310 mm (10'10")	3,690 mm (12'1")
No. of teeth	5	5	6
Weight incl. universal wear kit	16,400 kg (36,160 lb)	16,900 kg (37,260 lb)	18,000 kg (39,680 lb)
Max. material density (loose)	2.5 t/m^3 (4,210 lb/yd^3)	2.0 t/m^3 (3,030 lb/yd^3)	1.8 t/m^3 (3,030 lb/yd^3)