

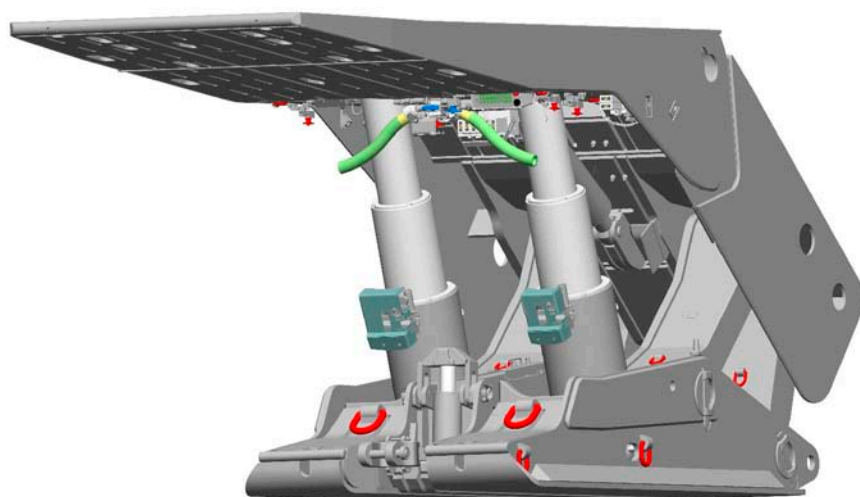


Operating Manual

DBT shield

1219/2692-2X4877-2058

Doc. Nr.: 7420 185 000 BA 00



DBT GmbH

Industriestrasse 1 Telefon: +49 (0) 23 06 / 709 - 0 e-mail: infodbt@dbt.de
D-44534 Luenen Telefax: +49 (0) 23 06 / 709 - 1421 Internet: www.dbt.de
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2 Your safety





If you raise the conveyor in the area of several shields, the shields to which lifting tackle is attached must not be located directly next to one another.

For raising the conveyor, use only:

- high-strength, undamaged chain slings,
- the points of attachment provided for the purpose.
Check that the lifting points are undamaged before attaching a load.
- lifting gear with adequate load-carrying capacity.

attaching loads

Use only permitted lifting points. Reset all shields to which you wish to attach loads. Make sure that the entire length of the canopy always fits closely against the entire length of the roof. Afterwards, check the setting pressure once again.

Maintenance

Make sure that all safety and safety equipment of the support units are complete and functional. If the safety and safety equipment are included in the DBT scope of delivery, refer to Chapter 6 for their location.

Be sure to observe the intervals specified for maintenance and inspection. See Chapter 5, section "Maintenance".

Check the shield at least once every shift for externally visible damage.

Inform the supervisory personnel and the face crew about maintenance and repair work. Provide them with information on the intended work and its probable duration.

Secure your working area over a wide range, in order to avoid endangering other persons.

Immediately replace damaged components affecting safety. Stop and lockout the respective shield immediately if component damage creates a hazard and immediate repair is not possible. If there is a safety hazard, secure this area and notify the entire face crew and responsible foreman without delay.

Use only spare parts which conform to the specified technical requirements. This is best ensured by using original DBT spare parts. Please refer to the spare parts catalogue provided for the equipment for the order numbers for the required spare parts.

Do not make modifications or carry out conversions which might impair the safety of the shield. DBT must be informed of all conversions and modifications to check whether they have any effect on the approval or whether it is necessary to apply for a revised approval.

Any modifications carried out without authorisation invalidate the DBT declaration of conformity and a new conformity test will be required.

During work on the relay bar assembly, isolate the working area for the mining equipment.



Caution!

To avoid overloading the stabilizing cylinder, you must make sure that the setting angle of the shield canopy doesn't exceed the maximum permissible value, e.g. when the canopy is set in a roof fall.

The setting pressure of pressure relief valves should not be changed! Only use pressure relief valves which have been factory-set to the required value and which have a corresponding color code.

Non-compliance endangers the operational safety of the hydraulic system and can cause serious and sometimes irreparable damage to components.

Always replace pressure relief valves with new valves having the same properties. Always compare with the hydraulic system's circuit diagram. Non-compliance endangers the operational safety of the hydraulic system and can cause serious and sometimes irreparable damage to components.

Exceeding the specified permissible angles can lead to damage to the props and cylinders and their fastening elements, as well as to the part hinges.



Notice!

Apply lubricant B6 EWN7068 to all connecting points and slide surfaces.

The lifting points in the canopy (see Fig. 63) are for fastening lifting tackle and may only be used when the shield is completely set. Pay attention to the load limits.

The force of the hydraulic support may not be used for lifting.

Apply lubricant B6 EWN 7068 to all connecting points and slide surfaces.

The technical data for the cylinders can be found in the "Technical Data, Hydraulic Cylinders" section for the support unit used.

Always fit new seals when replacing a pressure relief valve. Failure to comply with these instructions can lead to leaky plug connections and impair the operational safety of the hydraulics.

Please observe the separate Operating Manual for the PMC[®]-R control unit.

Use only hydraulic fluids for which you have a valid certificate issued by DBT GmbH. Otherwise, there is a danger that the hydraulic equipment can be seriously damaged and could result in the loss of warranty claims.



The shield is equipped on both sides with an additional device on the base.



Caution!
The additional device must be mounted during shield transport to ensure that the control elements are protected.

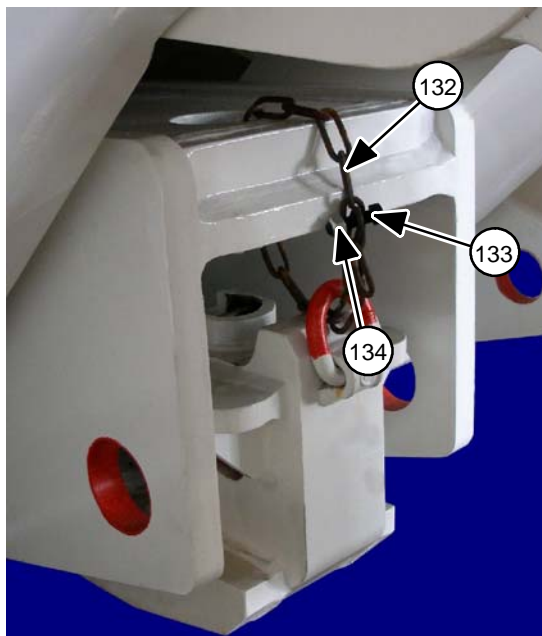
Fig. 9: Additional device



a additional device

Transport securing devices

Fig. 10: Relay bar assembly (gobside)



132 chain 6x42

133 hex. head screw M 12x45-8.8

134 hex. nut M 12-8



Make sure that the HP ball valves, item 23 (see Chapter 5, page 5.33 Fig. 46 and 47), are also open on the prop control valves.

The shield is now movable via the external control devices.

☞ move the shield to the desired position.

In order to relieve the pressure hose,

☞ short-circuit the HP ball valve, item 22, and activate the function "Advance conveyor" briefly until the pressure hose is relieved (support is not yet connected to the conveyor).



Warning!

Pressure may build up in the return line due to incorrect operation. This must be relieved via the pressure release valve (Item 30, see Fig. 17) by screwing in the vented cap screw. After relieving the pressure, this screw must be screwed all the way out again.

Make sure that all hose lines are depressurized before you release the connection lines on the distribution block.

☞ relieve the connections of the auxiliary supply.

☞ disconnect the connection lines of the auxiliary supply and seal the connections with the plugs.

☞ release the three connection lines P, R and W on the distributor block and connect them to the neighboring shield.



repair work Before you start work on the hydraulic system, you must always first make sure that the respective section of the system has been depressurized. Also, take appropriate measures to prevent the pressure from being reactivated by unauthorized personnel.

If the support units are to be detached from the conveyor, mining must either be completely stopped or it must be otherwise ensured that mining can be continued only outside of the safety zone required for safely carrying out repair work.

Parts which are under mechanical or hydraulic tension must be relieved before they can be released or dismantled. The tension can be relieved, for example, by aligning, lifting or lowering.

If in exceptional cases, the tension cannot be relieved completely, it must be reduced as far as possible and the respective part must be secured by suitable means, such as chains or locking elements, so that the tension can be safely absorbed as it is released. All work in this area may only be carried out from a safe position.

Safety equipment increases security and may only be removed if it is required for carrying out work. The safety equipment should be reinstalled immediately following completion of the work.

water spraying system The water spraying system serves to actively fight against the dust. Usually several nozzles are attached to the shield support, through which water can be sprayed as needed. The water spraying system is activated only temporarily depending on the operating state of the system, for example when pushing the shield and when the mining equipment passes the support. The water spraying valves are controlled by the program of the electronic shield control or directly by means of the hydraulic shield control system.

conveyor steering device On an inclined face, the conveyor must be anchored neighboring to the support, if necessary. This way you can prevent the conveyor from shifting to the side with respect to the support. This allows you to reduce the risk that the relay bar assembly will get stuck in the base frame.

The intended working pressure must always be applied to the hydraulic conveyor steering device. This is the only way to guarantee that there will be sufficient bracing between the support and conveyor.

When advancing the shields, you must always comply with the specified sequence of steps. Otherwise, the conveyor steering device can become damaged and unfit for use.

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Operation of the shield hydraulics



Warning!

During normal operation, the support may only be moved by means of the control unit of the electrohydraulic neighboring control device. Always observe the instructions in the control device's separate Operating Manual.

Location of hydraulic components on the support

The following Table indicates the hydraulic components for the support.

Tab. 6: Hydraulic components

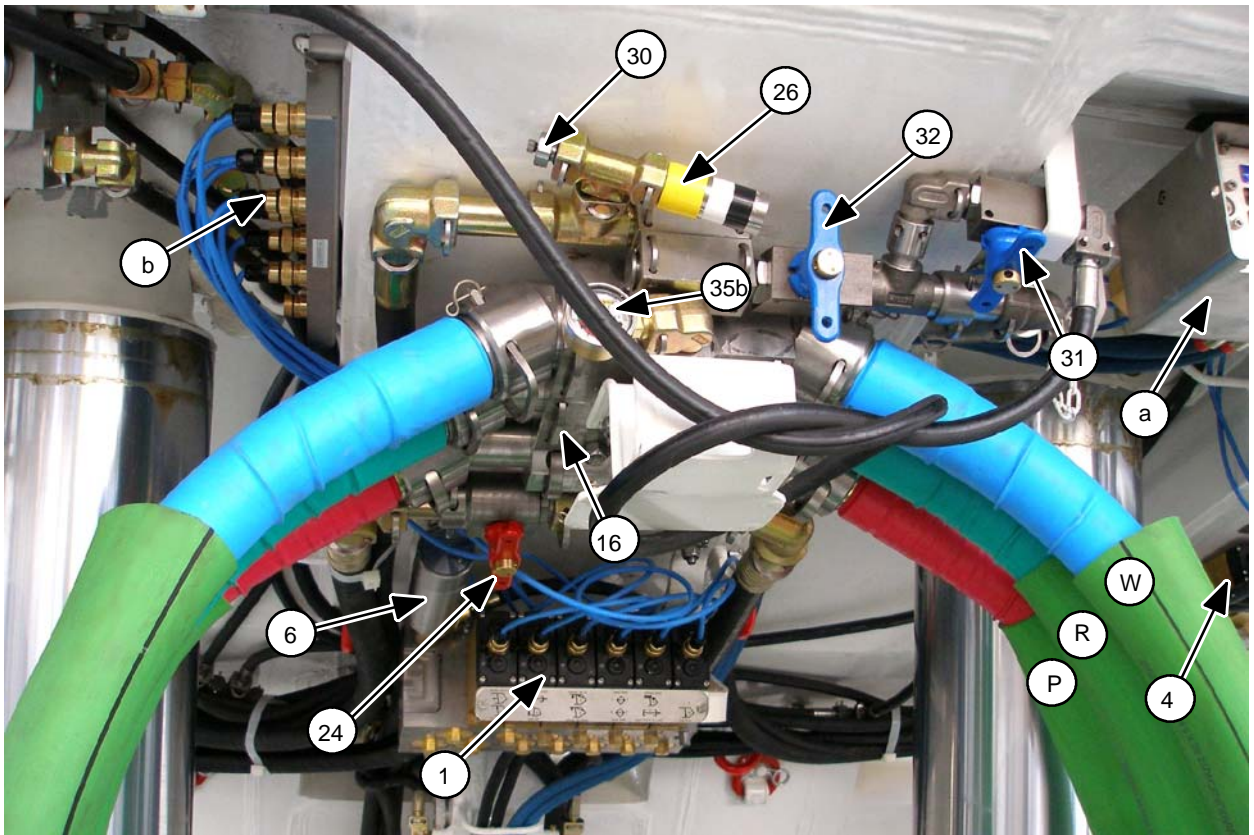
Item	Pcs.	Designation	Configuration	Remarks
01	1	Electrohydraulic control unit, 12 functions	Behind the props underneath the canopy	On a support
02	1	Prop CV, NG 20 compact	On the left prop, faceside	Without compensating valve
03	1	Prop CV, NG 20 compact	On the right-hand prop, faceside	With compensating valve
04	1	Water valve unit	On the left underneath the canopy	
05	1	CV DN 13, hydraulically piloted	Underneath the canopy behind the right-hand prop next to the PRV (17a)	For shifting rams (Z2)
06	1	Accumulator cartridge	On the electrohydraulic control unit (1)	
07	2	PRV, 460 bar	On prop respectively, faceside	In the piston space
08	1	CV, NW 25	On the supply block (16)	In the return line
09	1	CV, NW 20	On the left underneath the canopy	In the water feed behind the water filter (34)
10	1	CV, DN 10	On the left underneath the canopy	In the line for backflushing the water spraying system
11	1	Twin CV, NG 4	On the stabilizing cylinder (Z3)	For stabilizing cylinders (Z3)
13	1	Hose lines		Subassembly
14	1	Water spraying system accessories		Subassembly
15	1	Brackets and accessories		Subassembly
16	1	Supply block	Centered under the canopy in front of the two props	On a bracket
17	2	PRV, 380 bar	a) On the CV, hydr. piloted (5) b) Under the canopy next to the HP ball valve (21b)	a) for shifting rams (Z2) b) for baselift cylinders (Z4)
18	2	PRV	On the stabilizing cylinder	For piston space side and annular space side
20	1	Dual filter, can be backflushed automatically	In front of the right prop under the canopy	
21	2	HP ball valve, DN 10 red handle	a) On the right prop on the compensating valve for the stabilizing cylinder b) Next to PRV (17b) to the left under the canopy	a) for stabilizing cylinders (Z3) b) for lifting cylinders (Z4)
22	2	HP ball valve, DN 12 red handle	Next to the dual filter (20) and underneath the canopy next to the PRV (17b)	For auxiliary supply, on the left and on the right
23	2	HP ball valve, DN 20 red handle	On prop respectively, faceside	In the pressure supply line to the prop
24	1	HP ball valve, DN 25 red handle	On the supply block (16)	In the pressure supply line to the shield
26	1	PRV, 80 bar	Before the supply block (16)	In the return line
29	2	Pressure gauge port	On prop respectively, faceside	
30	1	Plug DN 10 with pressure relief	On the supply block (16)	
31	1	HP ball valve DN 10, blue handle	Next to the supply block (16) underneath the canopy	In the spray line

CV = check valve, PRV = pressure relief valve, HP = high pressure



Supply block

Fig. 33: View of the supply block from the front

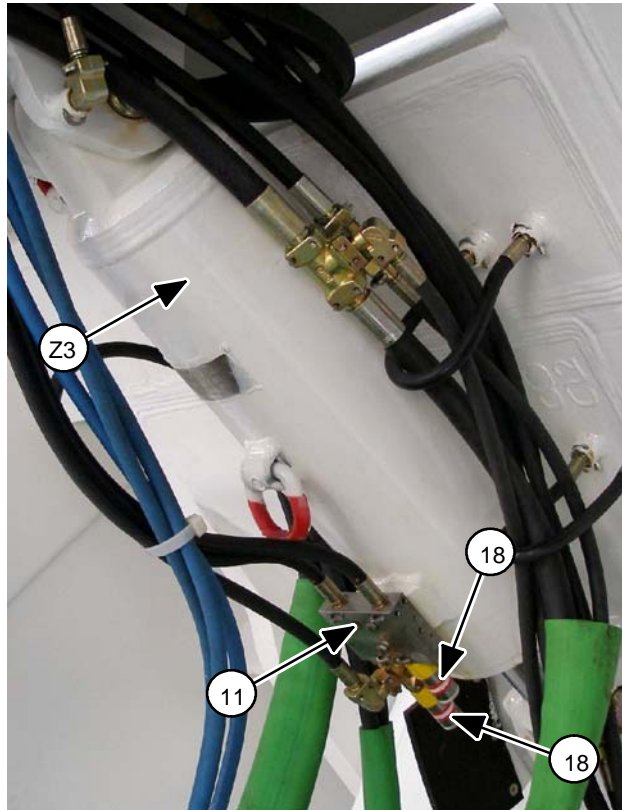


- | | |
|---|---|
| 1 electrohydr. control unit | 32 HP ball valve DN 20, blue, for water spraying system |
| 4 water valve unit | 35b pressure gauge |
| 6 accumulator cartridge | P pressure line, DN 40SS |
| 16 supply block | R return line, DN 50 |
| 24 HP ball valve DN 25, in the pressure supply line to the shield | W water line, DN 50 |
| 26 PRV, 80 bar | a PMC®-R control device |
| 30 plug DN 10 with pressure relief | b solenoid driver module |
| 31 HP ball valve DN 10, blue, for spray line | |



Stabilizing cylinder

Fig. 50: View of the stabilizing cylinder

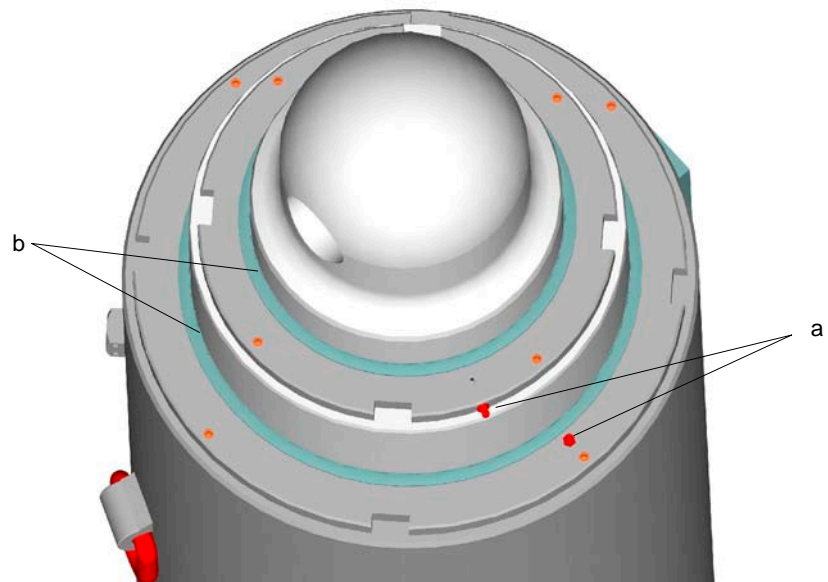


- 11 dual check valve
- 18 PRV, for piston space side and annular space side

Z3 stabilizing cylinder

**hydraulic prop**

- ☞ Lubricate the dirt strippers of both telescope stages via the lubricating nipples. Use the lubricating grease A2 in accordance with EWN 7068. See Chapter 6, section “Lubricating greases and pastes”.

Fig. 56: Lubricating nipples on the hydraulic props

a lubricating nipples on the guide bushing

b grease escaping at dirt stripper

Weekly maintenance**control system**

- ☞ check each control system for correct functioning.
- ☞ replace defective control systems or individual components immediately.
- ☞ clean the control systems, especially the operating panel.

**Notice!**

It is important that the control system symbols are easily legible. This prevents the risk of operational errors and any resulting accidents.

Carry out every six months

- ☞ apply a corrosion inhibitor to the piston rods of the hydraulic cylinders. More detailed information is contained in this chapter in the section “Special measures”.

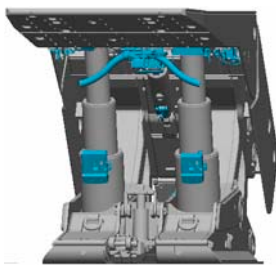
Assessment of damage according to schedule

We recommend keeping a record of any damage found. The records should be evaluated regularly, for example every month, and summarized in a damage report. This will enable you to detect frequently occurring damage and take preventative action. This will heighten system availability and lower operating costs accordingly.



Tab. 11: DBT shield 7420 185 000 00 01, subassemblies used

Item	Designation	ID No.	Approximate weight in kg	Remarks
0001	Base/base skid	7420 185 300 00 01	9620	Shifting ram 8241 198 000 00 00 Lifting cylinder 8241 197 000 00 00 Relay bar assembly 7420 185 330 00 01
0011	Canopy	7420 185 400 00 01	7770	
0031	Caving shield	7420 185 800 00 01	4880	
0041	Hydraulic prop	8250 143 000 00 00	1305	
0051	Stabilizing cylinder	8241 193 000 00 00	163	
0061	Shield control system - 12 functions -	8112 263 000 00 00		Electrohydr. control unit 8154 120 000 00 00 Lines 8112 263 010 00 00 Water spraying system 8112 263 020 00 00 Brackets 8112 263 030 00 00
0071	Caving flap	7420 185 890 00 00	55.6	



normal and exceptional operation

Hydraulic system

The following section provides an overview of the parts of the shield hydraulics. You can find additional information in the spare parts catalogue of the shield support.

During normal operation, the shield functions may only be operated via the PMC[®]-R control unit.

The pilot solenoid valves of the electrohydraulic control unit are equipped with buttons, which allow the shield functions to be operated manually. A symbol plate shows the function/button allocation.



Warning!

During normal operation, the buttons on the pilot solenoid valves of the electrohydraulic control unit should not be used to activate functions. Failure to observe this warning can result in unexpected and hazardous situations, for example if interlocking functions are deactivated as a result.

The buttons on the pilot solenoid valves should only be used in exceptional cases, for example for repair and maintenance work. In such cases it is imperative to observe the applicable special safety regulations of the mine.

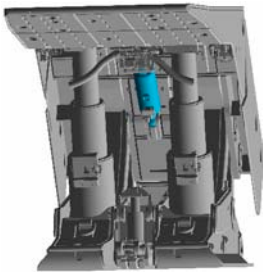
Shield hydraulics

The following Table indicates the hydraulic components for the support.

Tab. 12: Hydraulic components

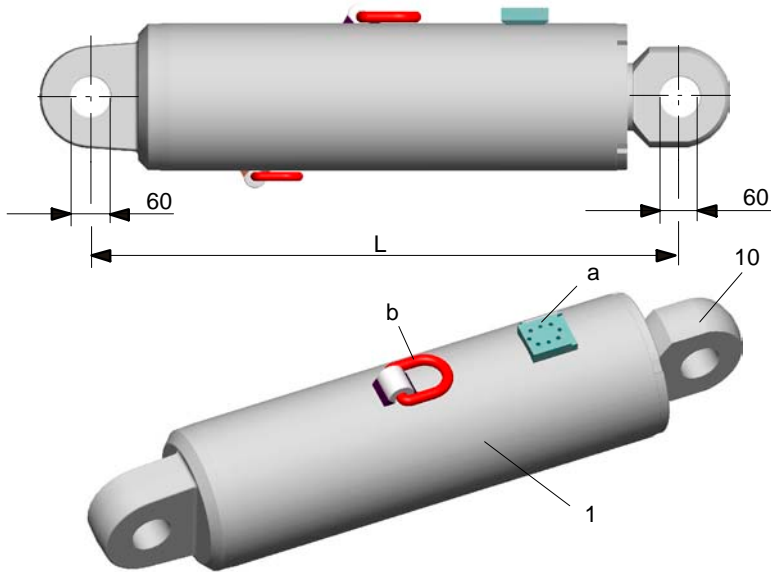
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04	1	Water valve unit	On the left underneath the canopy	
05	1	CV DN 13, hydraulically piloted	underneath the canopy behind the right-hand prop next to the PRV (17a)	For shifting rams (Z2)
06	1	Accumulator cartridge	On the electrohydraulic control unit (1)	
07	2	PRV, 460 bar	On prop respectively, faceside	In the piston space
08	1	CV, NW 25	On the supply block (16)	In the return line
09	1	CV, NW 20	On the left underneath the canopy	In the water feed behind the water filter (34)
10	1	CV, DN 10	On the left underneath the canopy	In the line for backflushing the water spraying system
11	1	Twin CV, NG 4	On the stabilizing cylinder (Z3)	For stabilizing cylinders (Z3)
13	1	Hose lines		Subassembly
14	1	Water spraying system accessories		Subassembly
15	1	Brackets and accessories		Subassembly
16	1	Supply block	Centered under the canopy in front of the two props	On a bracket
17	2	PRV, 380 bar	a) On the CV, hydr. piloted (5) b) Under the canopy next to the HP ball valve (21b)	a) for shifting rams (Z2) b) for baselift cylinders (Z4)

CV = check valve, PRV = pressure relief valve, HP = high pressure



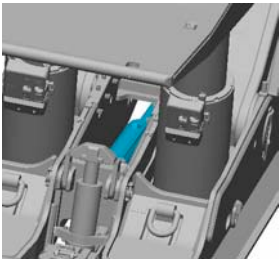
Stabilizing cylinder

Fig. 73: Hydraulic cylinder ZE-180/100-450,



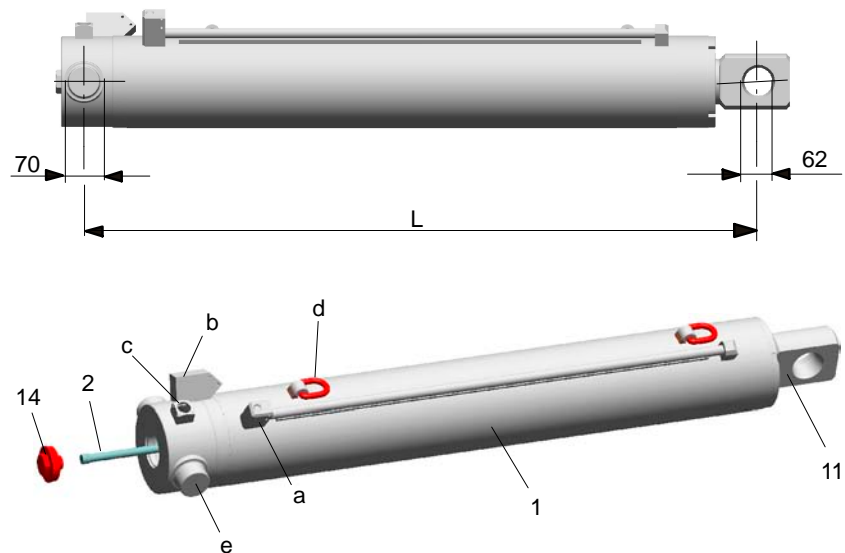
- 1 cylinder tube
- 10 piston rod
- a valve connection plate
- b load ring 3000 kg
- L retracted 870 - extended 1320
- Stroke: 450

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Shifting ram

Fig. 74: Shifting ram model ZE-150/90-1130



- 1 cylinder tube
- 2 reed rod
- 11 piston rod
- 14 screw fitting
- a annular space connection
- b piston space connection
- c reed rod adaptor
- d load ring 1000 kg
- e bearing pin
- L retracted 1469 extended 2599
- Stroke: 1130



Hydraulic fluid maintenance

The consistent good quality of the hydraulic fluid is essential for the operational reliability of hydraulic systems. Therefore, maintenance of the hydraulic fluid must not be neglected but should be performed with special care. The most important properties of the hydraulic fluid should ideally be monitored automatically and recorded in order to be able to directly counter any harmful effects. These properties include: temperature, foaming, pH-value, concentrate ratio and microbial load.

The operator of the equipment has to prepare a hydraulic fluid maintenance concept for any individual application. The maintenance concept should be prepared in close co-operation with the manufacturer of the concentrate and has to be applied consistently.

If it is not possible to monitor the hydraulic fluid continuously, the properties listed in the following should be checked at least once every week:

- pH value
 - target value: 7.5 to 9.5
- concentrate ratio
 - target value: see certificate
- microbial load
 - target value: $\leq 10^5$ col/ml.

In addition, the electrical conductivity, foaming and the operating temperature of the hydraulic fluid should be monitored regularly.

The permissible maximum temperature of the hydraulic fluid is 55°C. During normal operation, however, an operating temperature of 45°C should not be exceeded. A higher operating temperature will reduce the stability of the emulsion and shorten the life of the sealing material.

Quality of the process water

The quality of the water used for the preparation of the hydraulic fluid has an enormous influence on the properties of the hydraulic fluid. Accordingly, the requirements for monitoring the water quality are very high.

The following Table (Tab. 20) lists limits for the essential properties and components of the water.

If the limits shown are maintained, it can be assumed that the water is basically suitable.

If one or several of the limits mentioned are not met this should be taken into consideration when selecting a concentrate. Additional water treatment may also be required.

The customer shall in any case, however, provide a sample of the original water to permit performing the tests required for the issue of the certificate.

Changes in the composition of the water will also lead to the loss of the certificate, even if they are within the limit values mentioned.

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