XT39R4V00

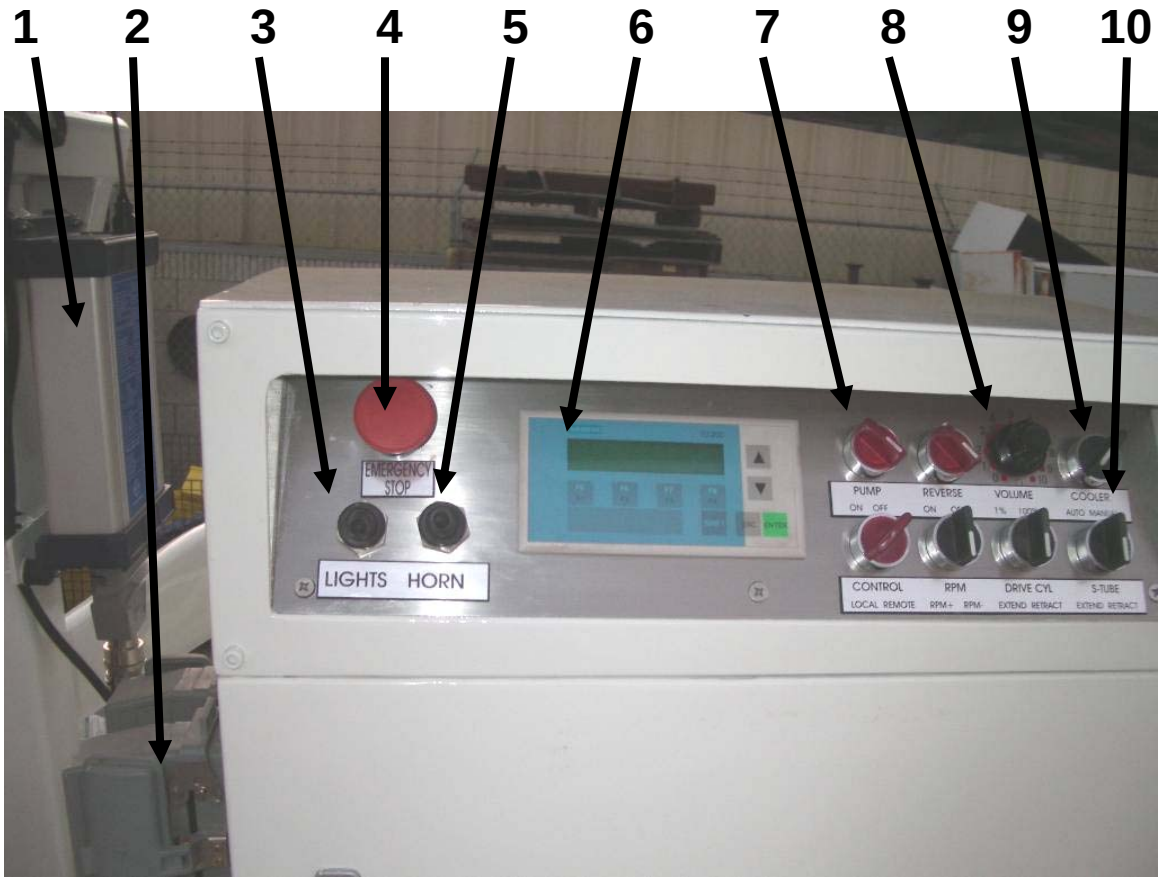
SPARE PARTS

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

The following is a spare parts list of recommended components to maintain in stock to support the concrete pump. If technical issues arise, please refer to the complete parts manual and contact the local dealer for support

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

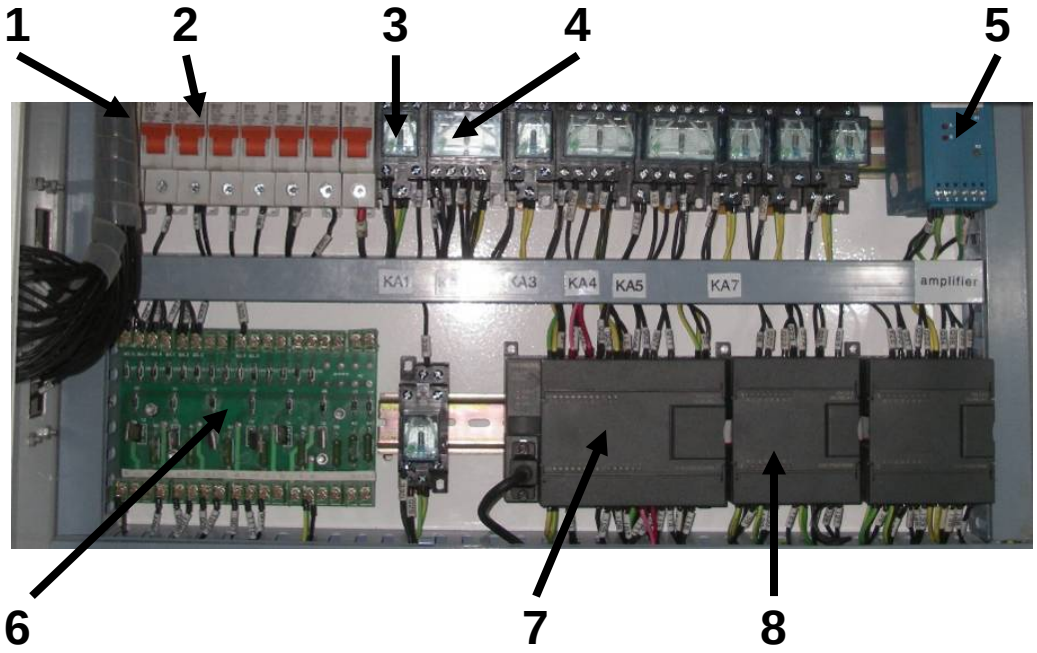
CONTROL SYSTEM



No.	Description	Part Number	Material	Parent	Weight	Quantity
8	potentiometer	2-2K				1
NA	sensor,proximity sensor	XS1-M18DA210				1
NA	coil,24vdc 1.25a	900021389.E-66				1

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

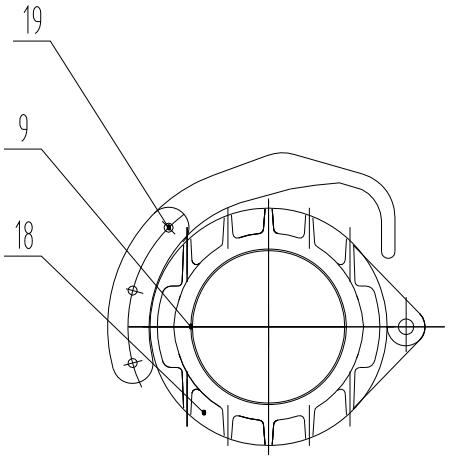
CONTROL BOX



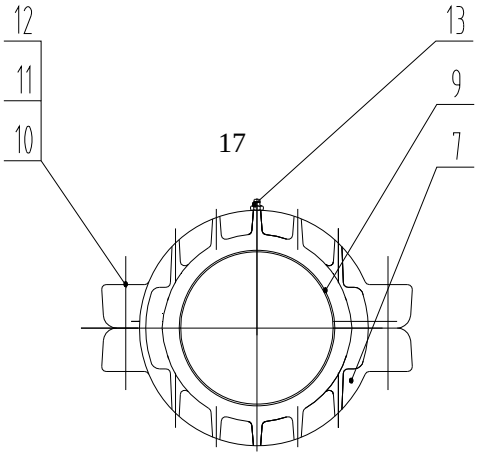
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	breaker,circuit breaker	BKNIP/16A		XBC39.7		1
2	breaker,circuit breaker	BKNIP/10A		XBC39.7		1
3	relay	LY2NJ24V		XBC39.7		1
4	relay	LY4NJ24V		XBC39.7		1

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

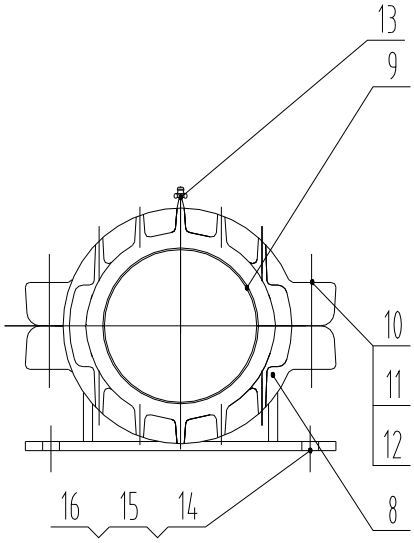
CLAMPS



A



B

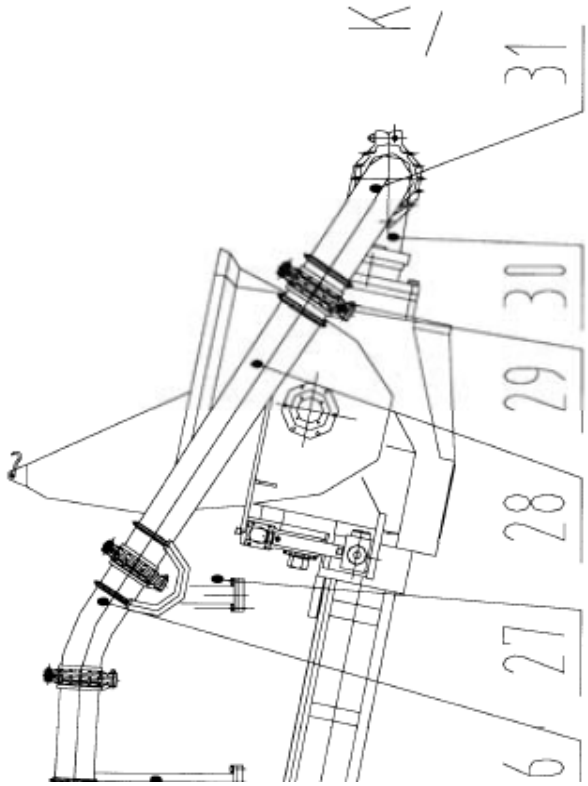


C

No.	Description	Part Number	Material	Parent	Weight	Quantity
9	gasket,clamp 125mm hp	XBC39.00-2509		XBC39.11		4
18	clamp,snap 125 mm lp	XBC39.00-2518		XBC39.11		2
19	pin Φ6	XBC39.00-2519		XBC39.11		4

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

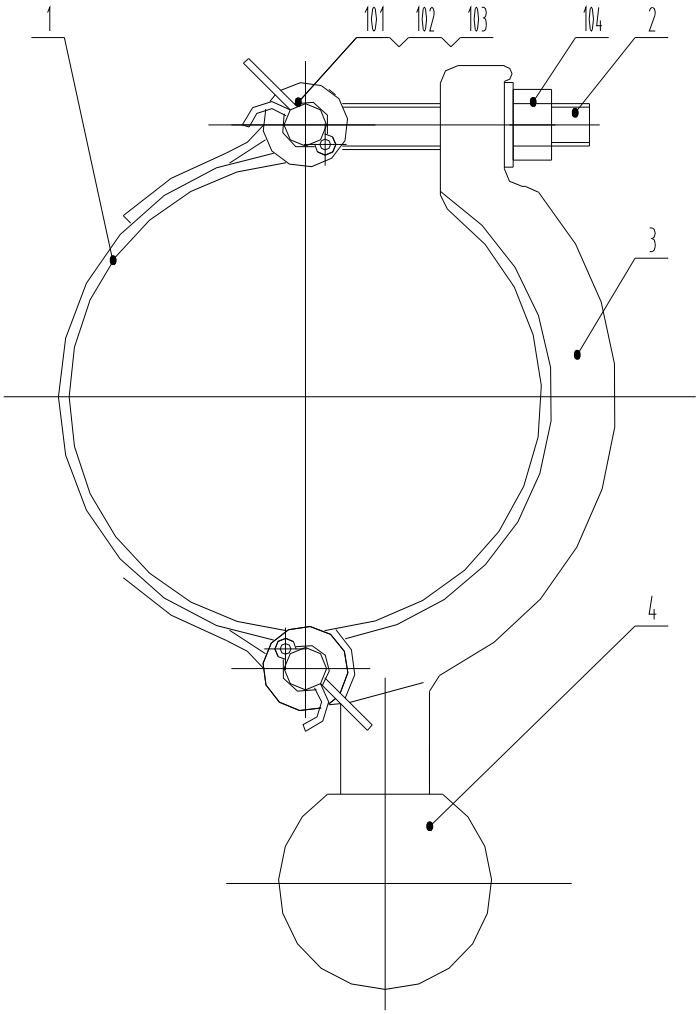
CLAMPS CONTINUED



No.	Description	Part Number	Material	Parent	Weight	Quantity
29	CLAMP,PIPE CLAMP W/GASKET HP 150MM	60S1816.14.1		BC37.3		2
NA	GASKET 150MM	XBC39.00-012				

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

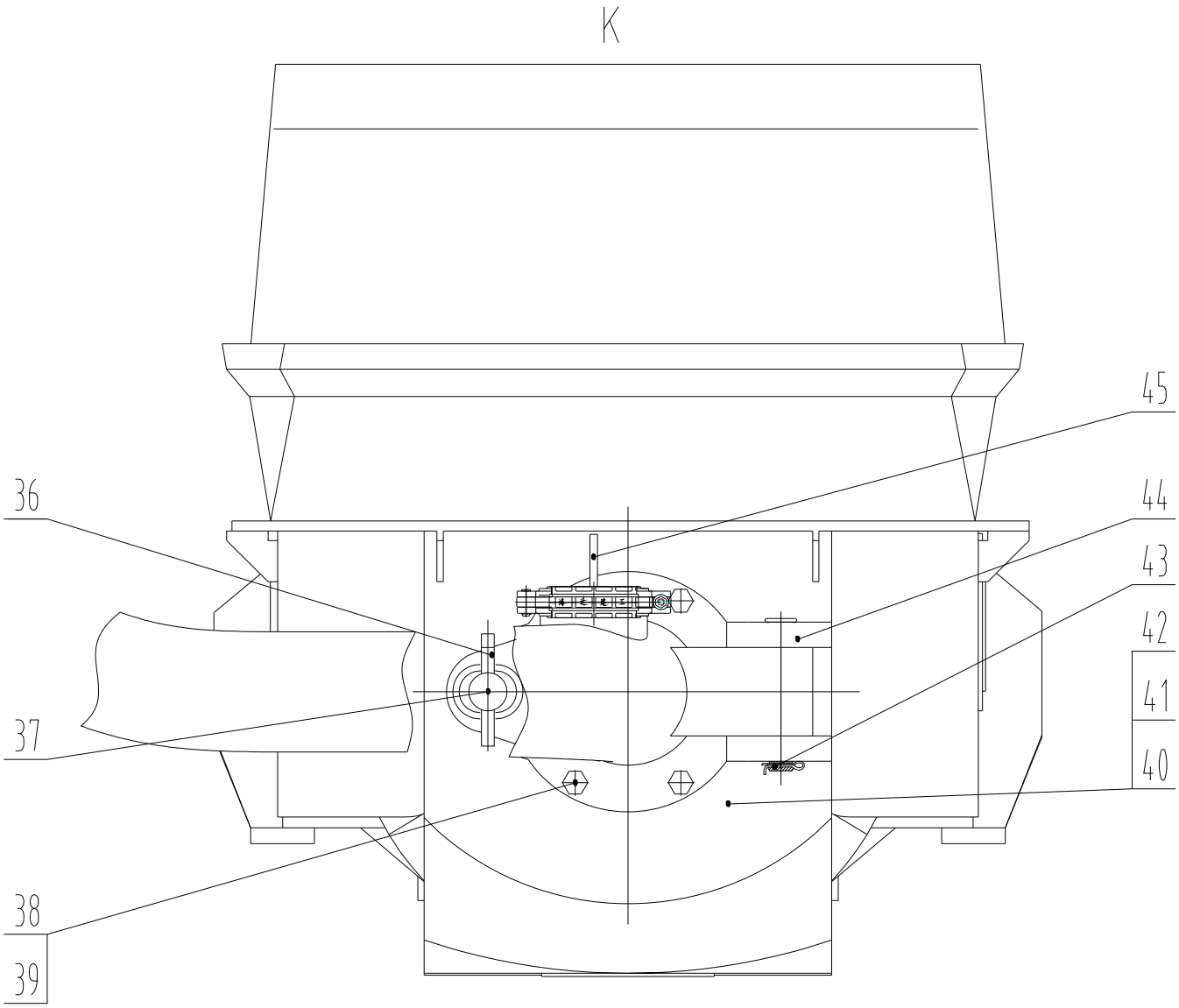
PIPE SUPPORT STRAPS



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	strap	ZBC37.11.1.1-1	Q235	XBC39.11.1		4
2	bolt	ZBC37.11.1.1-2	35	XBC39.11.1		2
101	pin,cylindrical pin 12x 50	C100000003	35	XBC39.11.1		4
102	pin,cotter pin 4 x 25	C100000005	Q195	XBC39.11.1		4

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

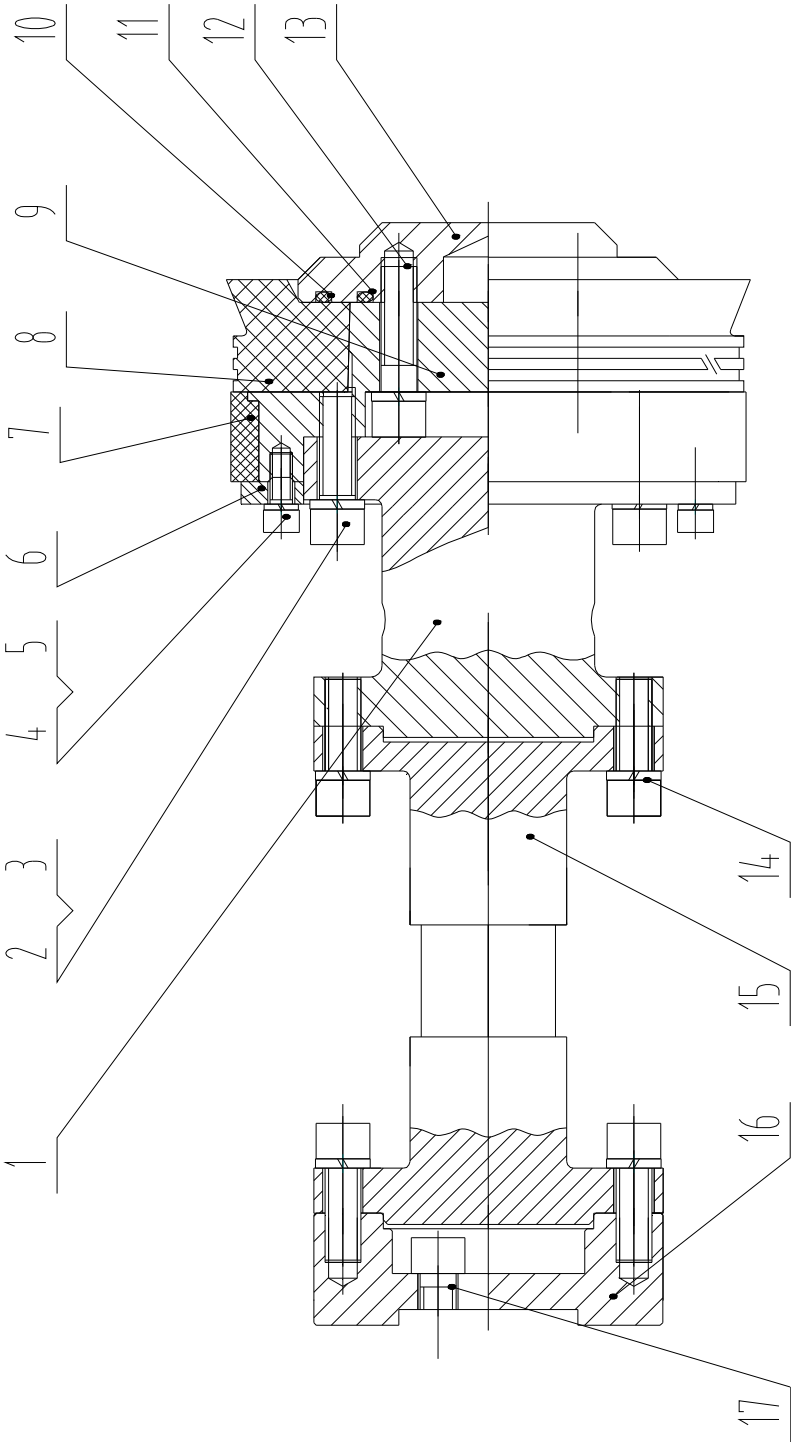
OUTLET O-RINGS



No.	Name	Code	Material	Parent	Weight	Quantity
41	O-ring Φ205×7	CO00000024		BC37.3		2
42	O-ring Φ258×7	CO00000026		BC37.3		2

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

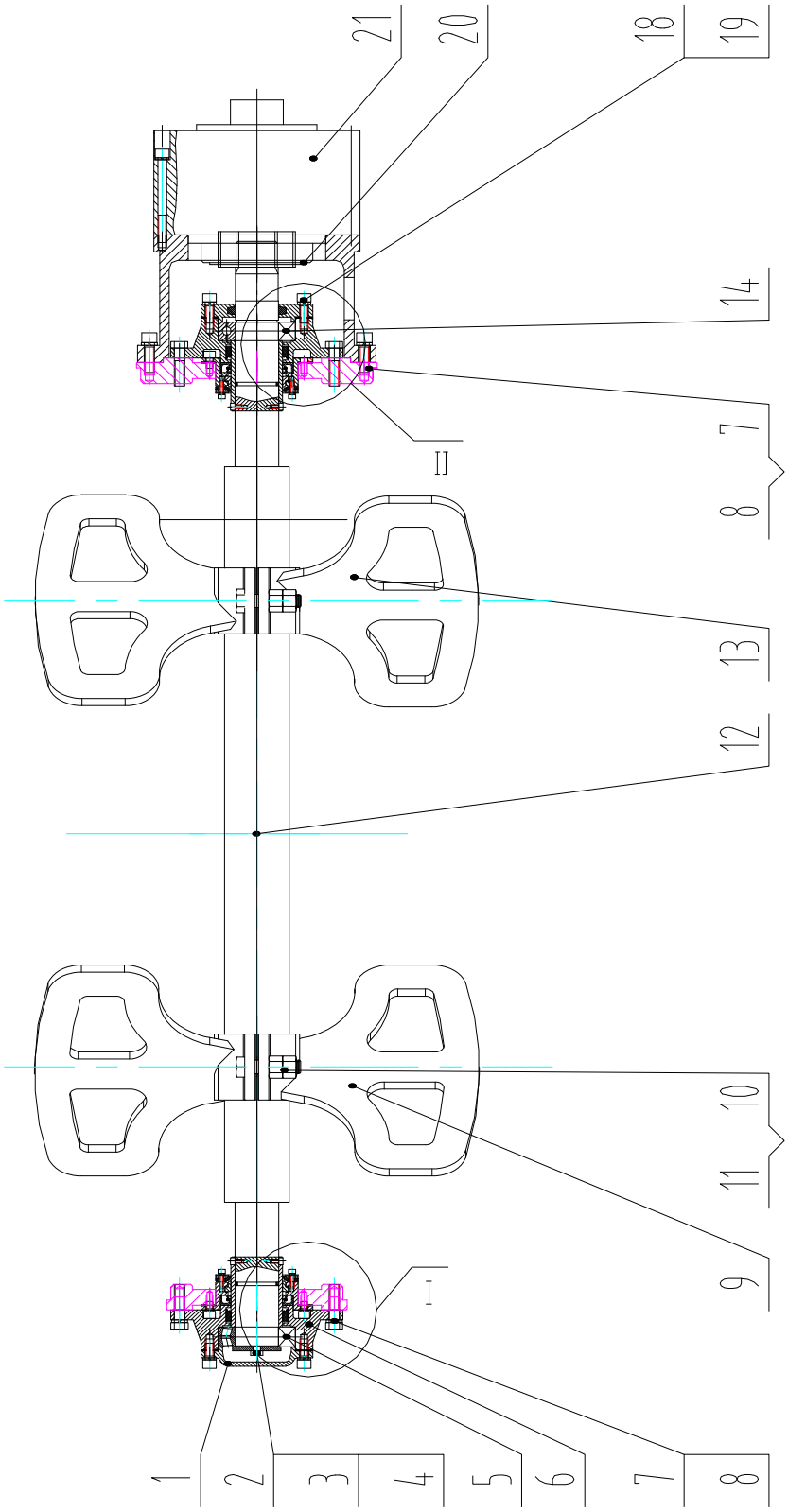
CONCRETE PISTON ASSEMBLY



No.	Name	Code	Material	Parent	Weight	Quantity
7	band,guide band	BC37.3.4-3		BC37.3.4		2
8	cup,piston concrete piston	BC37.3.4-4	Polyurethane	BC37.3.4		2
10	o-ring 140x5.3	CO00000020	Rubber	BC37.3.4		2
11	o-ring 103x5.3	CO00000019	Rubber	BC37.3.4		2

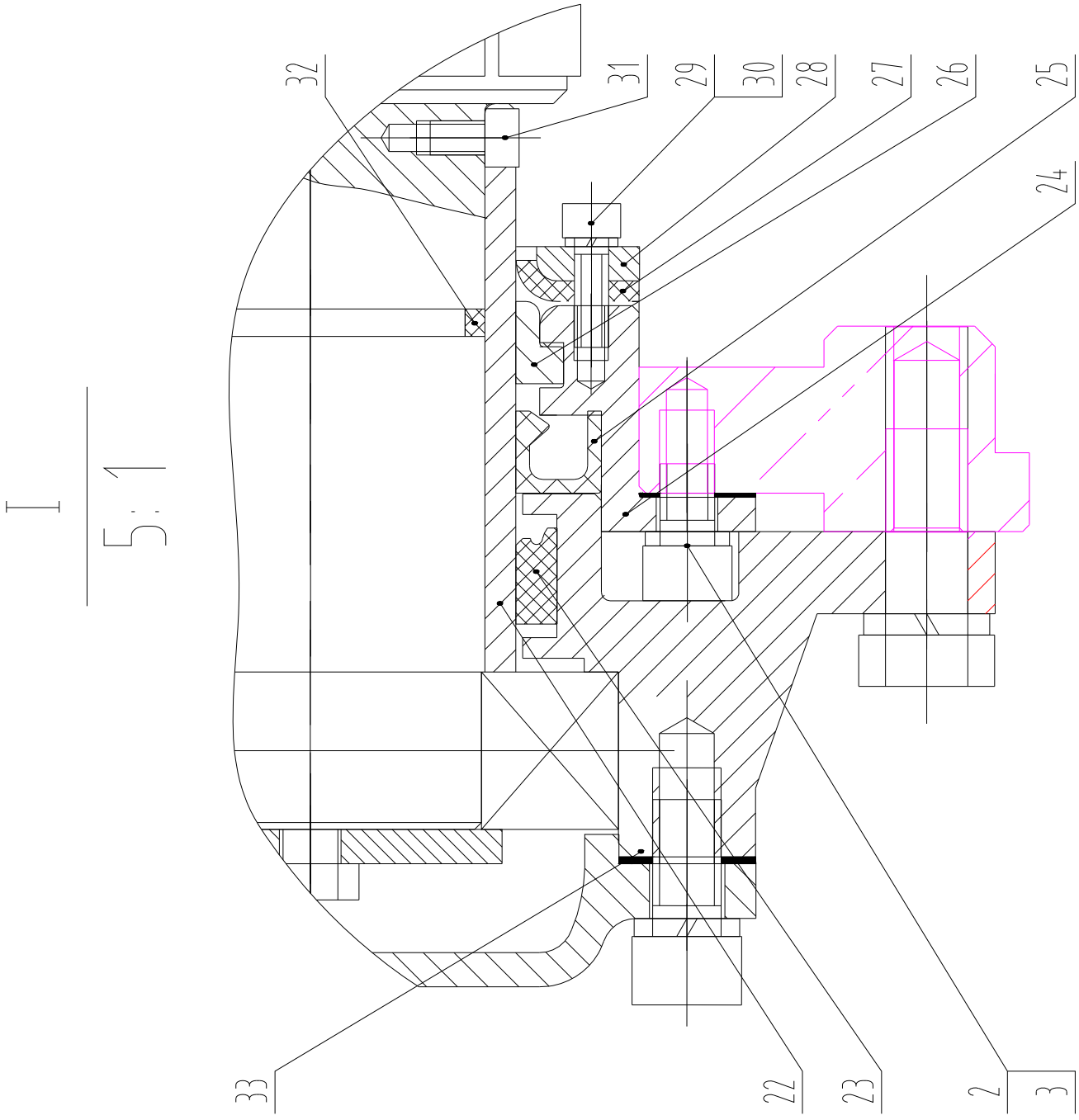
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

AGITATOR ASSEMBLY



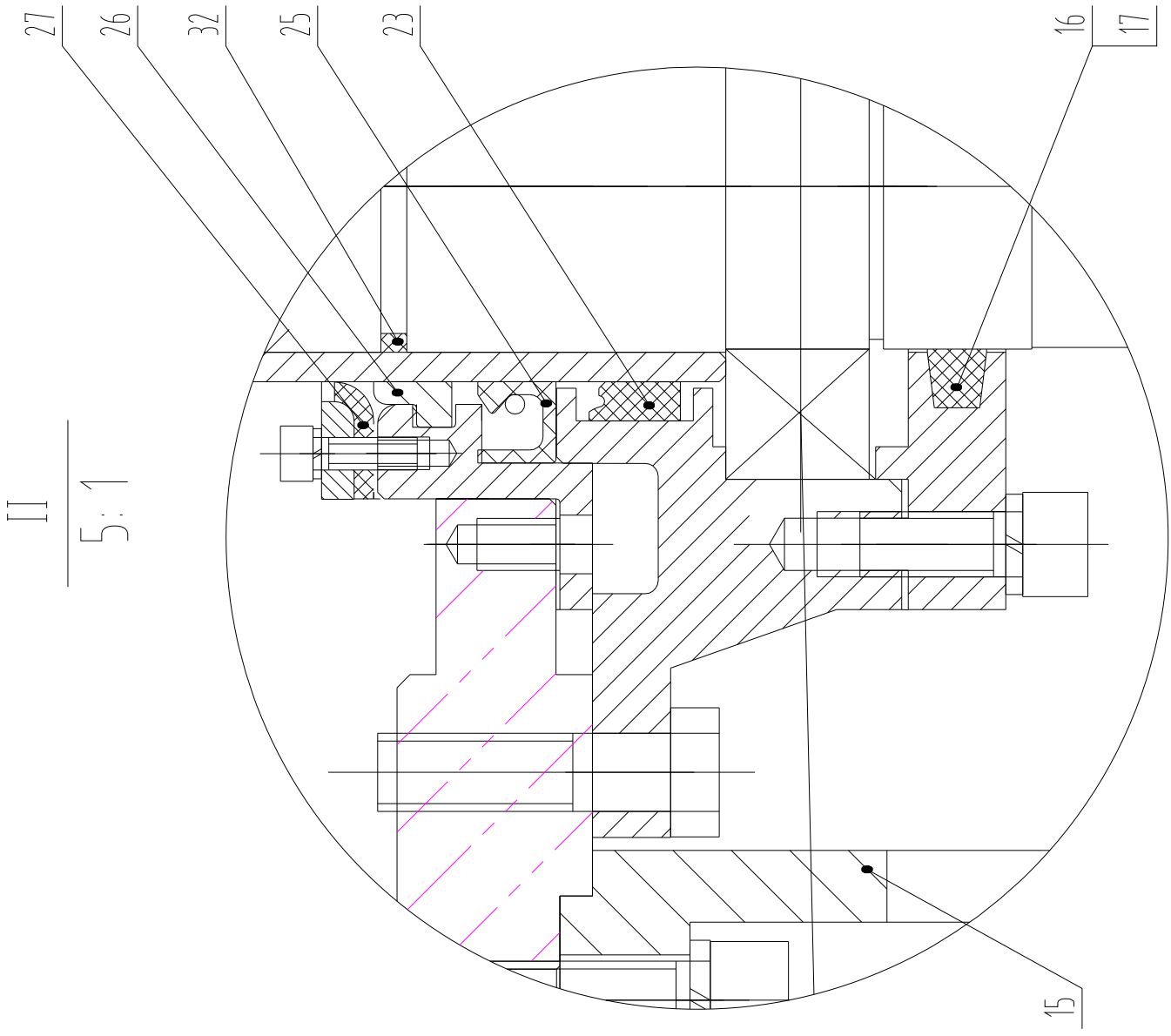
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

AGITATOR ASSEMBLY CONTINUED



13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

AGITATOR ASSEMBLY CONTINUED



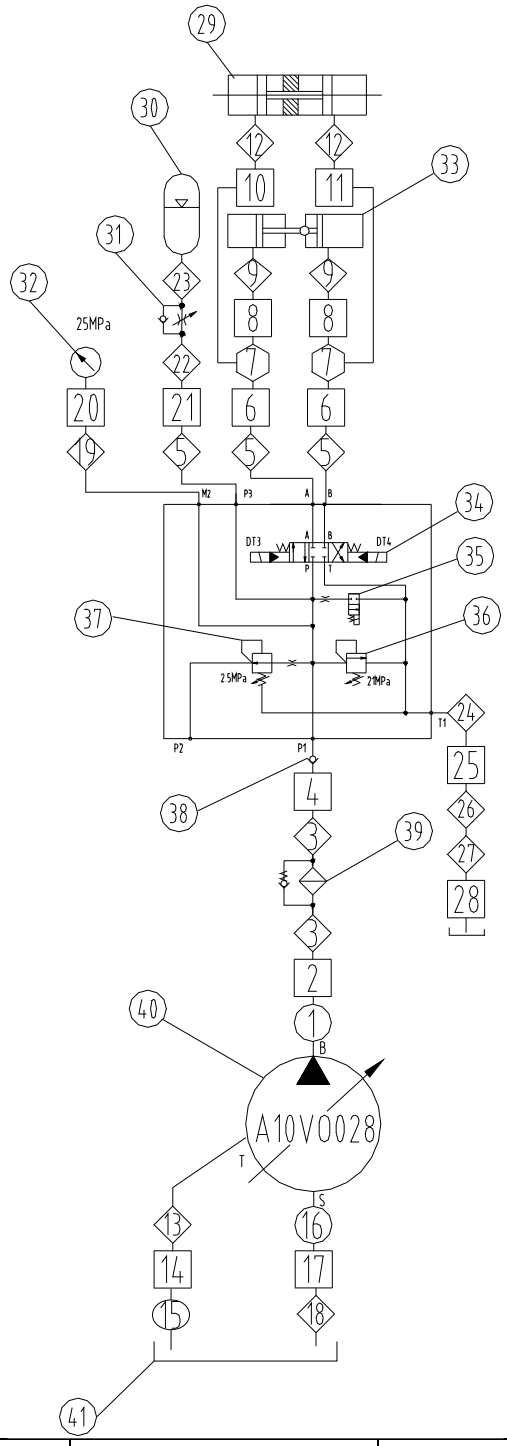
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

AGITATOR ASSEMBLY CONTINUED

Number	Description	Part Number	Material	Parent	Quantity
17	felt ring	60S1816.3.2-7			1
23	ring, bearing ring Yxd60×72×14	CO00000048			2
25	Lip seal	CO00000047	GB9877.1-88		2
26	seal ， Dustproof seal J60	CO00000049			2
27	Dustproof mat of rubber	60S1816.3.2-11			2
29	Washer 5	CW00000026	GB93-87		8
30	bolt M5×14	CB00000108	GB70-85		4
31	bolt M5×8	CB00000109	GB70-85		4
32	O-ringφ50×3.1	CO00000046	GB1235-76		2
33	sealing gasket	60S1816.3.2-13	0.5		2

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

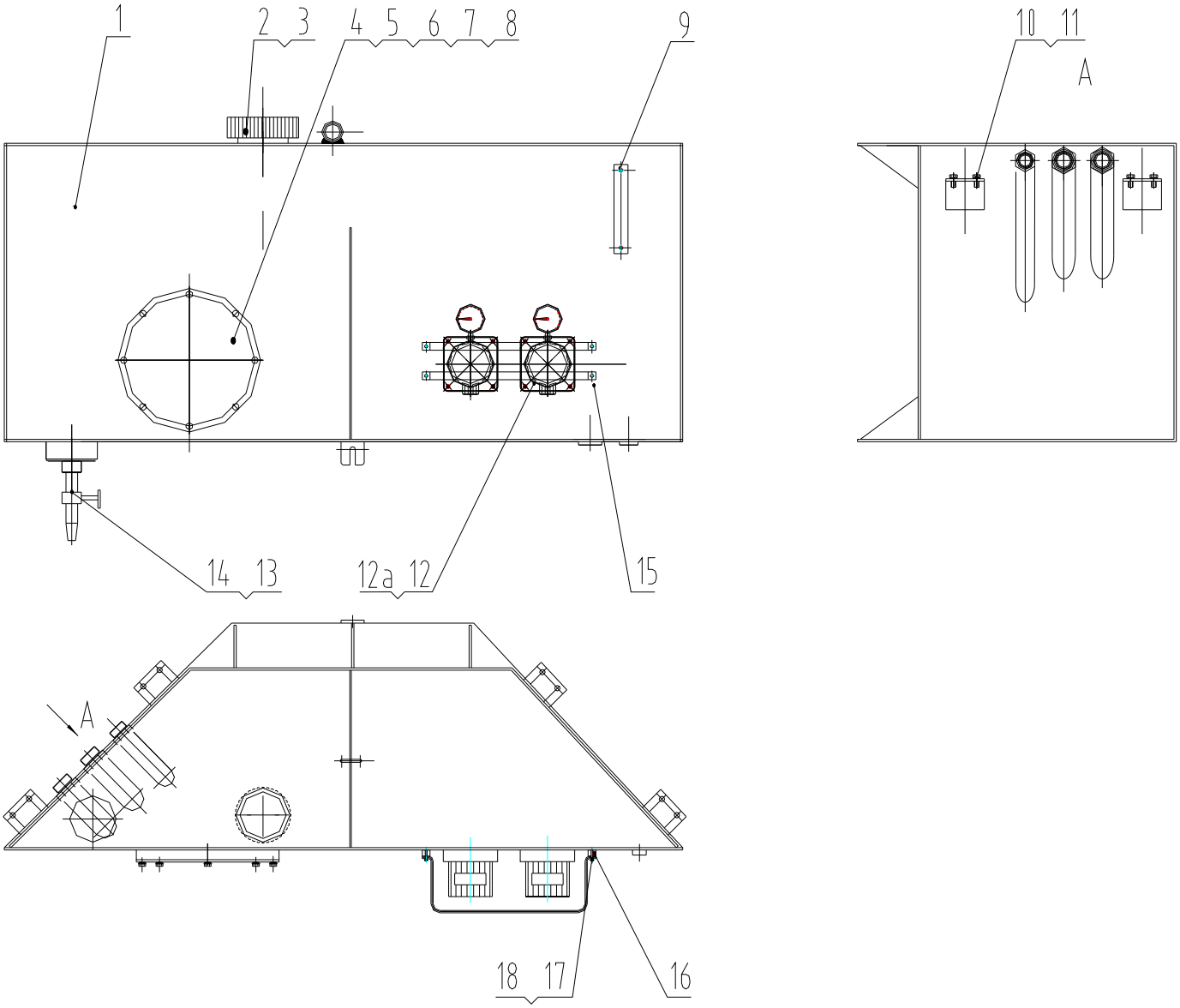
HYDRAULIC CHECK HOSES AND GAUGES



No.	Description	Part Number	Material	Parent	Weight	Quantity
42	hose,check pressure 5m	XBCY39.00-6142		XBC39.6.1		3
50	gauge,pressure 6 MPa	XBCY39.00-6150		XBC39.6.1		1
51	gauge,pressure 60 MPa	XBCY39.00-6151		XBC39.6.1		1
NA	gauge,pressure 25	XBCY39.00-6232		XBC39.6.3		1

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

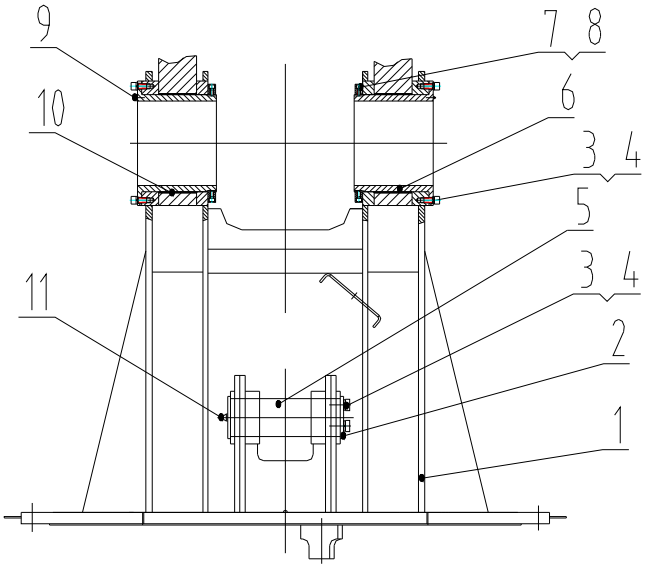
HYDRAULIC FILTERS

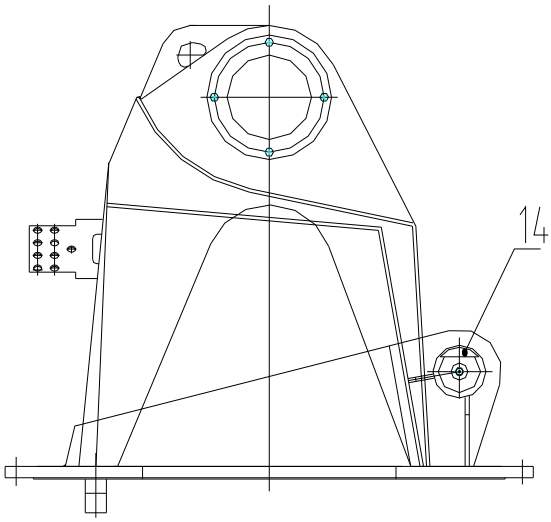


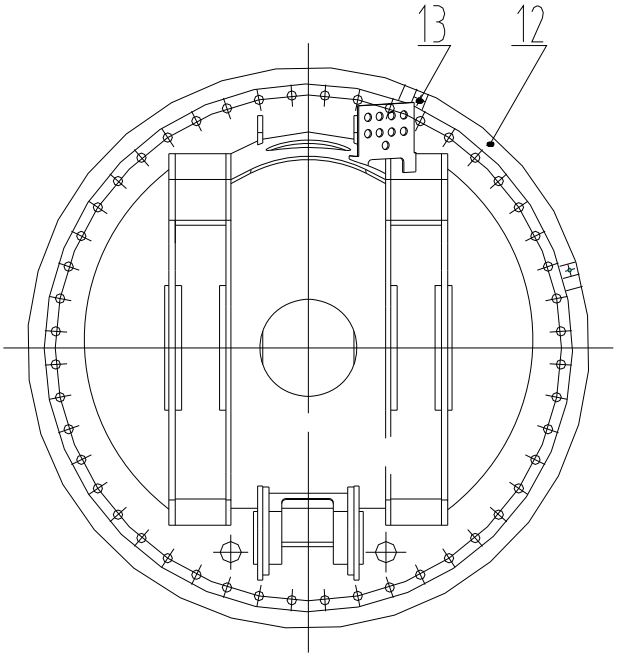
No.	Description	Part Number	Material	Parent	Weight	Quantity
12a	element,filer oil	P20933-01		XBC39.2.6		2

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

GREASE NIPPLES



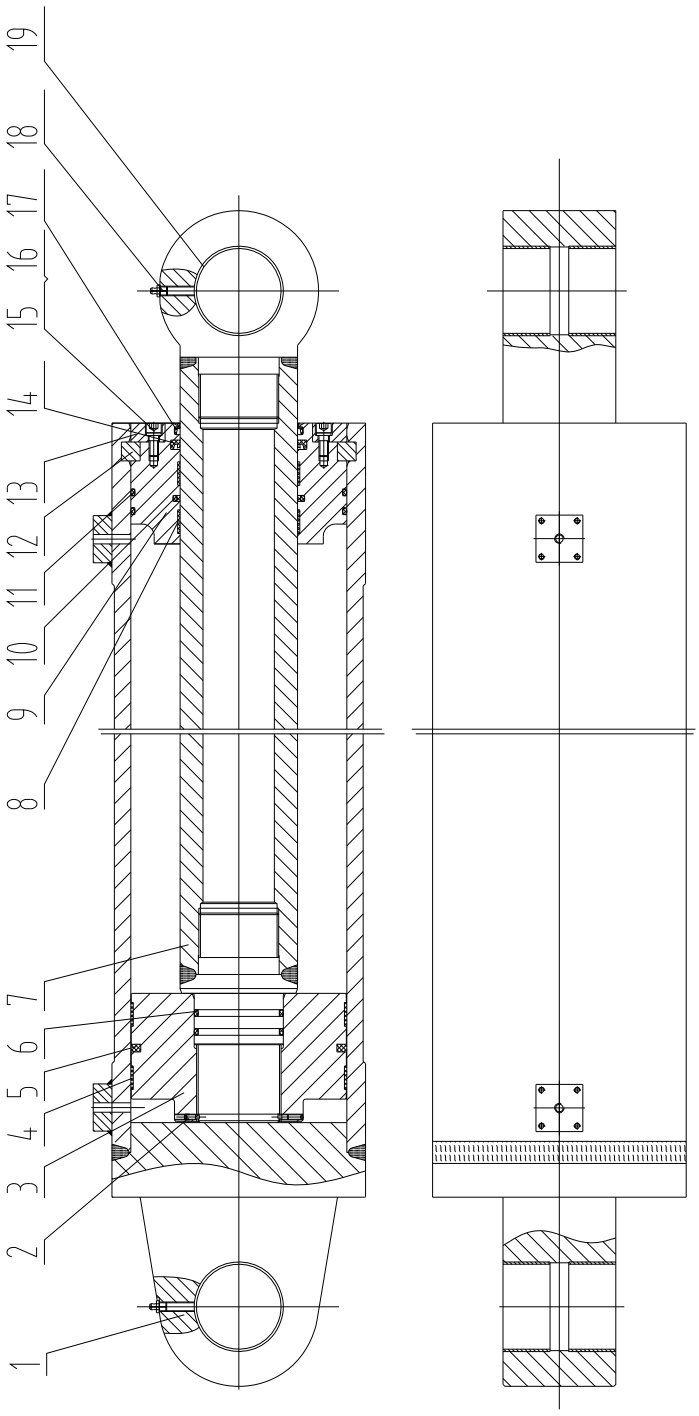




No.	Description	Part Number	Material	Parent	Weight	Quantity
9	Nipple,grease M6 x 1	CL00000002		XBC39.2.9		4
11	Nipple,grease M8 x 1	CL00000003		XBC39.2.9		4

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

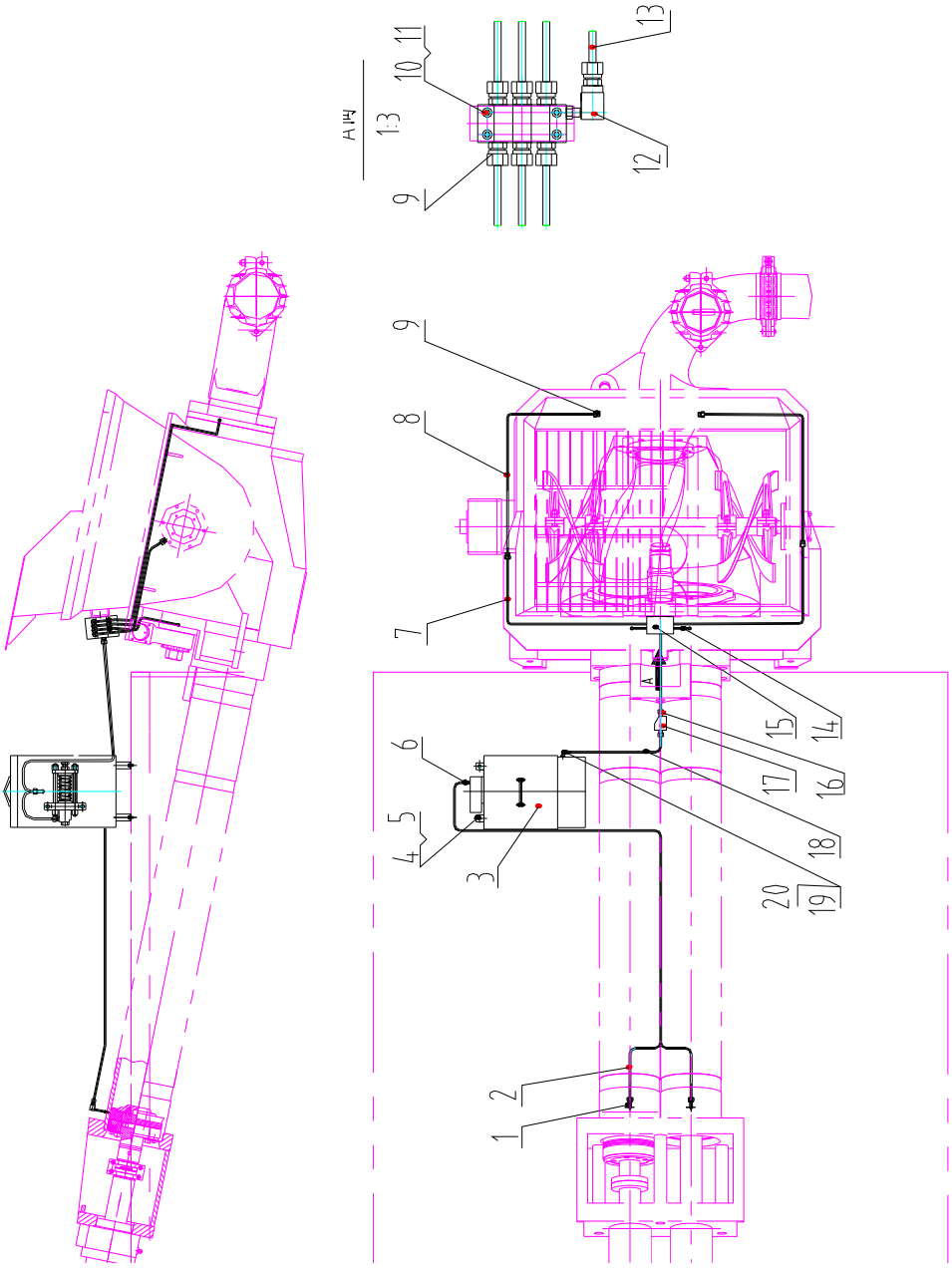
GREASE NIPPLES CONTINUED



No.	Description	Part Number	Material	Parent	Weight	Quantity
18	nipple M10	CL00000001		ZBC37.1.1.3s		4

13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

LUBRICATION SYSTEM



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	elbow,union Z1/8	22646T		XBC39.8		1
9	straight thread connector	22587-1T		XBC39.8		1
17	filter,oil and grease filter	28985-2		XBC39.8		1

XT39R4 OPERATION MANUAL

TABLE OF CONTENTS

INTRODUCTION

This operation manual introduces the technical characteristics, performance parameters, operating principle, safe operation, safe maintenance, safe inspection, safe repair, and other aspects of the truck mounted concrete boom pump.

Reading and understanding this operation manual will help maximize performance and reliability, and help minimize dangers, improper operation, and repair costs.

The truck mounted concrete boom pump is only to be used for the purpose of placing concrete.

The operation manual is applicable to a **STANDARD EQUIPPED TRUCK MOUNTED CONCRETE BOOM PUMP**. It is possible some truck mounted concrete boom pumps are supplied with various options and specialized equipment.

All product descriptions, illustrations and specifications found throughout this manual were in effect at the time the manual was released for printing. It should be noted ***REED*** **RESERVES THE RIGHT TO MAKE CHANGES IN DESIGN OR TO MAKE ADDITIONS TO OR IMPROVEMENTS IN THE PRODUCT WITHOUT IMPOSING ANY OBLIGATIONS UPON ITSELF TO INSTALL THEM ON PRODUCTS PREVIOUSLY MANUFACTURED.**

SAFETY

Everyone involved with the operation, maintenance, inspection, and repair of the truck mounted concrete boom pump **MUST READ** and **UNDERSTAND** this operation manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

- Use only qualified, experienced, and trained personel wearing protective equipment at all times.

- For safe use, maintainance, inspection, and repair of the truck mounted concrete boom pump, only operate, maintain, inspect, and repair in accordance with this operation manual and ACPA Safety Manual.

- Contact REED Technical Support and Service when assistance is required.

- Performance and safety features must never be altered, disconnected, or removed.

Safety Alert Symbols and Signal Word Explanations

The following safety alert symbols, signals, and explanations are adopted from the ACPA Safety Manual.

The triangle with the exclamation point inside is used to alert the operator to an important safety point, and is called a safety alert symbol. One of the following color coded signal words will appear after the safety alert symbol:

If the safety alert symbol is followed by the signal word **DANGER** with white letters in a red box, the safety alert symbol indicates a hazardous situation which, if not avoided, **WILL** lead to death or serious injury.

If the safety alert symbol is followed by the signal word **WARNING** with black letters in an orange box, the safety alert symbol indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.

If the safety alert symbol is followed by the signal word **CAUTION** with black letters in a yellow box, the safety alert symbol indicates a potentially hazardous situation which, if not avoided, **COULD** result in minor to moderate injury.

The signal word **CAUTION**, used in a yellow box, but without safety alert symbol means the safety symbol alert addresses a hazard which, if not avoided, **COULD** cause damage to equipment or property.

Safety Decals

Decals and placement of decals are standardized by the Concrete Pump Manufacturers Association (CPMA) for your protection. They are placed at appropriate areas on the truck mounted concrete boom pump to be constant warnings of dangers. Know and adhere to the information they provide. Contact REED Customer Service for complimentary replacements of safety decals.

Lockout/Tagout

The Lockout/Tagout procedure applies to all REED concrete pumping equipment.
Before performing any maintenance on a concrete pump;

- Unit must be OFF and the ignition key must be removed from the control panel or dash.
- Key must be securely stored in toolbox or with operator performing maintenance.
- Signage must be posted to indicate machine is currently under Lockout/Tagout.

Operator Qualifications

Everyone involved with the operation, maintenance, inspection, and repair of the truck mounted concrete boom pump **MUST READ** and **UNDERSTAND** this operation manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

- Individuals who cannot read and understand this operation manual, ACPA Safety Manual, signs, warnings, notices, and operating instructions, in the language in which it is printed, must not be allowed to operate the truck mounted concrete boom pump.
- Only qualified, experienced, and trained personnel may be allowed to operate the truck mounted concrete boom pump.
- Operation, maintenaince, inspections, and repair must only be made by qualified, experienced, and trained personnel.
- Obey all applicable local and government statutes and regulations applying to safe operation and driving of truck mounted concrete boom pumps.

PRODUCT DESCRIPTION

The operation of the truck mounted concrete boom pump encompasses the use of hydraulic and electrical systems. The truck mounted concrete boom pump is designed to safely pump wet concrete through a delivery system of pipes and hoses attached to a boom within its published ratings and specifications.

Stability of the truck mounted concrete boom pump during operation of the boom is provided by hydraulic outriggers. Controls for the outriggers are located on the passenger and driver sides of the truck mounted concrete boom pump.

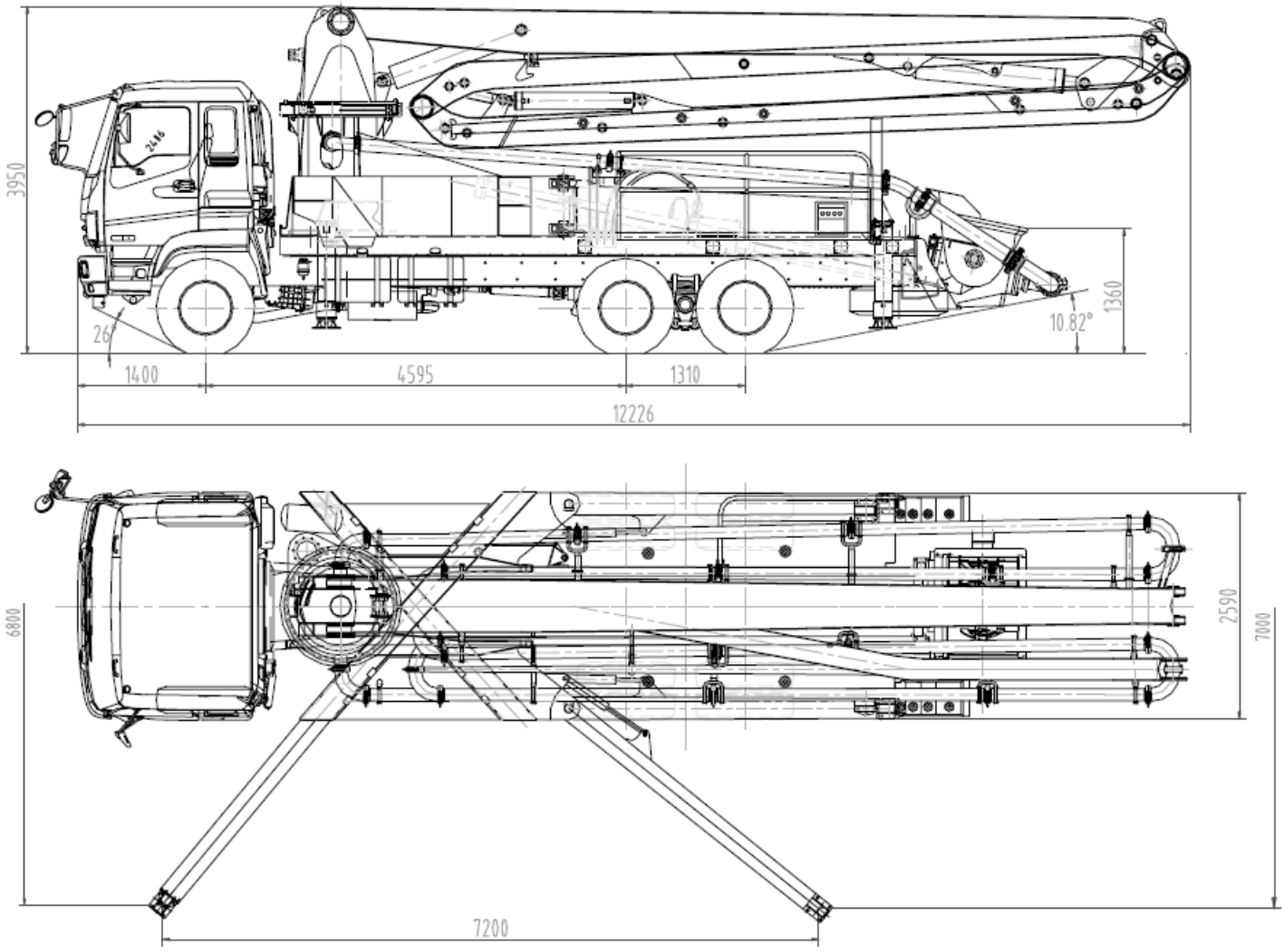
The boom is mounted on a pedestal structure directly behind the chassis cab and is equipped with a rotational mechanism incorporating a low friction rotational bearing. Each boom section can be operated independently through the pre-established design articulation parameters of each section. The boom function controls are located on or near the pedestal structure and the remote.

A steel pipe delivery line is installed from the hopper discharge outlet, along the deck, through the pedestal and attached along side of the boom sections. A heavy duty end hose is provided to facilitate concrete placement.

The pumping system employs an s-tube design valve system. This system incorporates material cylinders, powered by hydraulic cylinders that cycle alternately. With concrete material in the hopper and the pump operating, a material cylinder retracts material inside the cylinder. At full retraction of the cylinder, a signal is sent to the s-tube swing cylinders causing the s-tube to shift position to the fully loaded material cylinder. The piston of the loaded cylinder then pushes the material through the s-tube and into the delivery lines. The shifting from one cylinder to the other cylinder takes place providing a continuous flow of material through the delivery piping system. The pump can be operated at the control panel on the deck or can be operated from the remote control.

The power for operation of the boom and concrete pump is provided by the truck engine, which drives the hydraulic pumps through a power take-off (PTO) unit.

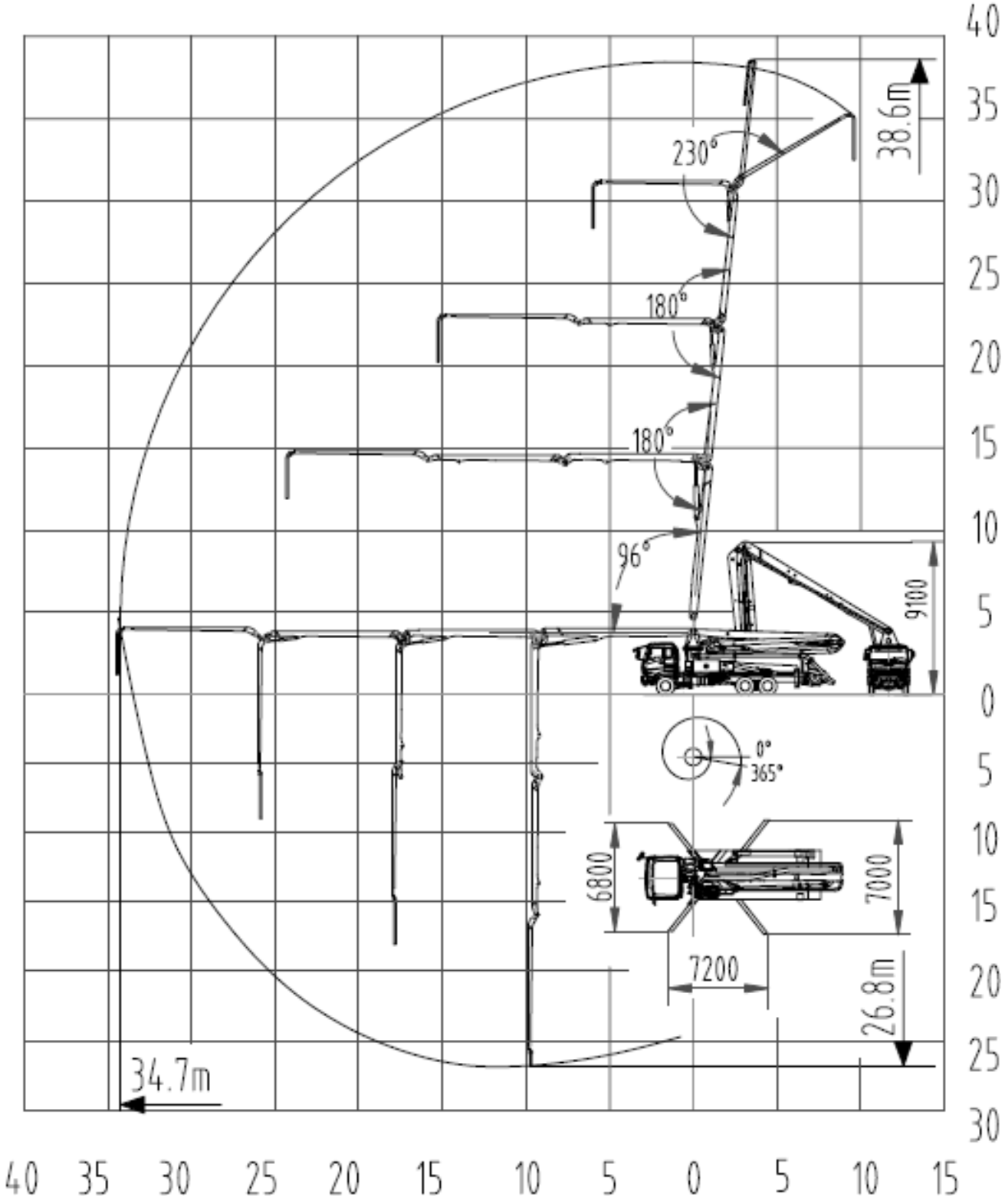
DIMENSIONS



TECHNICAL SPECIFICATIONS

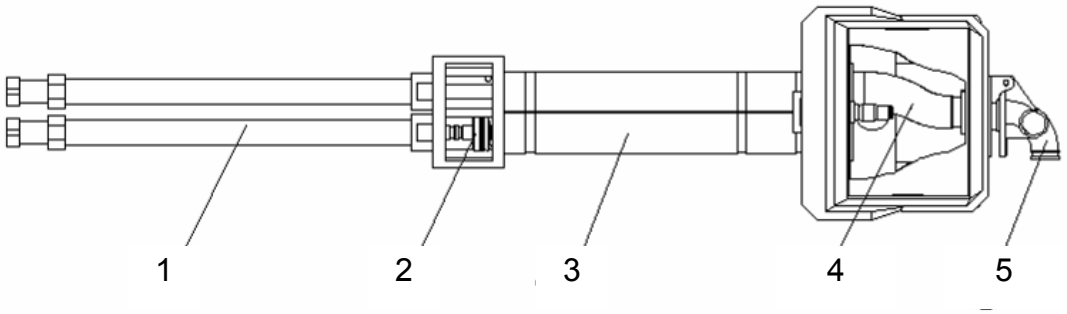
GENERAL SPECIFICATIONS	
Chassis Model	Mack MR688S
Wheelbase	5461 mm
Hydraulic System	Closed Loop
Water Tank Capacity	560 l
PUMP SPECIFICATIONS	
Output	125 m3/hr
Concrete Pressure	85 bar
Concrete Cylinder Diameter	230 mm
Stroke Length	2000 mm
Strokes per Minute	26
Hopper Capacity	600 l
Hydraulic Pressure	320 bar
Hydraulic Oil Capacity	380 l
BOOM SPECIFICATIONS	
Boom Sections	4
Fold Type	Roll and Fold
Section 1 Length	9.3 m
Section 2 Length	8.4 m
Section 3 Length	8.4 m
Section 4 Length	8.6 m
Delivery Pipe Diameter	125 mm
Hydraulic Pressure	320 bar
Hydraulic Oil Capacity	360 l

BOOM ARTICULATION DIAGRAM



PRODUCT OVERVIEW

Concrete Pumping System



1. Drive Cylinder 2. Concrete Piston 3. Concrete Cylinder 4. S-Tube 5. Hopper Elbow

The hydraulic oil flow created by the hydraulic pump, driven by the engine on the truck, pushes the drive cylinder pistons, inside the drive cylinders (1), alternately back and forth. Because the drive pistons and concrete pistons (2), inside the concrete cylinders (3), are linked together, the pistons move synchronously.

Forward Pumping

When the drive cylinder pistons retract, along with the concrete piston, concrete will be sucked from the hopper into the concrete cylinder. Then, when the drive piston, along with the concrete piston, is pushed towards the hopper, the concrete piston will pump concrete through the concrete cylinders into the s-tube (4), and out to the hopper elbow (5).

Next, the pump switches at the end of the stroke. Then the s-tube valve shifts to the other concrete cylinder which has sucked concrete and then starts the next cycle.

Reverse Pumping

Reverse pumping links the concrete piston in the sucking stroke and s-tube valve to suck concrete from the s-tube instead of the hopper. As a result, the concrete piston pumps concrete into the hopper.

Pumping is controlled using the control panel and the remote.

Outriggers

The truck mounted concrete boom pump is equipped with front and rear outriggers. The front set consists of a hydraulic telescopic beam that extends on a diagonal direction out toward the chassis cab. The beams are equipped with a hydraulic leveling jack. The rear set consists of a beam that hydraulically swings out away from the chassis to a diagonal position; also equipped with a leveling jack. Both sets are used to stabilize the unit before operation of the boom. Controls for the outriggers are located on the passenger and driver sides of the truck mounted concrete boom pump.

Boom

The boom consists of 4 sections and each sections movement is independently controlled with lever valves and the remote. A control is also provided for the rotation of the complete structure.

The booms sections are identified by numbers.

SECTION 1

Section 1 is the 1st boom section which has 1 end attached to the masthead and the other end attached to the 2nd boom section.

SECTION 2

Section 2 is the 2nd boom section which has 1 end attached to the 1st boom section and the other end attached to the 3rd boom section.

SECTION 3

Section 3 is the the 3rd boom section which has 1 end attached to the 2nd boom section and the other end attached to the 4th boom section.

SECTION 4

Section 4 is the last boom section and has 1 end attached to the 3rd boom section.

Control Panel

The control panel located on the deck features switches to control Emergency Shutdown, Forward Pumping, Reverse Pumping, Pumping Output, Engine RPM, Hydraulic Oil Cooling Fan, Local/Remote Control, Lights, S-Tube Shift, Drive Cylinder Extension, and Horn. A text display is also on on the conrol panel to gauge engine RPM.

Transmitter and Receiver

The truck mounted concrete boom pump is equipped with a wireless remote control system which consists of a transmitter and a receiver. The transmitter is to be carried by the operator for convenient operation of the equipment, controlling pumping and the boom.

PUMPING AND DRIVING MODES

Pump Mode Precautions

Refer to the ACPA Safety Manual and the Setup section of this operation manual for setup area safety precautions not limited to the following guidelines:

- Ensure the machine can be safely setup and safely operated in the chosen location.

- The operator must have a clear view over the entire working area. Ensure the area is clear of any obstructions (such as electrical wires, trees, and personnel) that may compromise safety.

- Examine the entire area of the proposed setup to ensure stability. The machine must be positioned on level ground. Keep a sufficient distance away from slopes, pits, trenches, and excavations as governed by the ACPA safety manual.

Engaging Pump Mode

To Engage Pump Mode

1) Depress clutch

2) Flip 24V Converter Switch on

3) Push System Switch on

4) Push PUMP Switch on

5) Shift into desired gear

6) Release clutch

Drive Mode Precautions

Refer to the ACPA Safety Manual for driving safety precautions not limited to the following guidelines:

- Concrete must be cleaned out of the delivery system.
- Boom must be completely folded and resting on the boom rest before operating outriggers.
- Jack cylinders and outriggers must be completely retracted with safetly locks engaged before driving.
- Outrigger pads and other miscellaneous equipment must be stored and secure.
- Obey all traffic laws when driving the truck mounted concrete boom pump.

Engaging Drive Mode

To Engage Drive Mode:

1) Depress clutch

2) Push DRIVE Switch on

3) Push System Switch off

4) Flip 24V Converter Switch off

5) Shift into desired gear

6) Release clutch

SETUP AREA

Refer to the ACPA Safety Manual for setup area safety precautions not limited to the following guidelines:

- Ensure the machine can be safely setup and safely operated.
- The operator must have a clear view over the entire working area.
- Ensure the area is clear of any obstructions (such as electrical wires, trees, and personnel) that may compromise safety.
- Examine the entire area of the proposed setup to ensure stability. The machine should be positioned on level ground.
- Keep a sufficient distance away from slopes, pits, trenches, and excavations.

OUTRIGGERS

The outriggers are driven by hydraulic cylinders that extend to support and stabilize the truck mounted concrete boom pump boom operations. The truck mounted concrete boom pump is equipped with front and rear outriggers. The front set consists of hydraulic telescopic beams that extend on a diagonal direction out toward the chassis cab. The rear set consists of an outrigger beam that hydraulically swings out away from the chassis to a diagonal position. The outriggers are equipped with a hydraulic leveling jack.

Outrigger Precautions

Refer to the ACPA Safety Manual for outrigger safety precautions not limited to the following guidelines:

- Clear the area while extending or retracting outriggers, personnel may be injured or killed within this area.
- Surface of the supporting ground must be horizontally level solid ground and have load bearing capacity in accordance with ACPA guidelines.
- Fully extend all outriggers and rest jacks on outrigger pads.
- The maximum inclination angle of the machine is 3°.
- Only unfold the boom after properly placing the outriggers and only retract outriggers when the boom is secure on the boom rest.
- Do not drive with boom unfolded or outriggers extended.
- Engage outrigger safety locks devices and secure boom before traveling.

Outrigger Operation

On each side of the truck mounted concrete boom pump, there is 1 group of 4 section operation valves for the outriggers, which control extracting or retracting, swinging out or swinging in, and up or down operation for outriggers and outrigger jack cylinders.

CAUTION

- Before starting outrigger operations, the outrigger safety locks must be unlocked.

Facing the left side of the valve group, you can see the following parts in the order from the left to right:

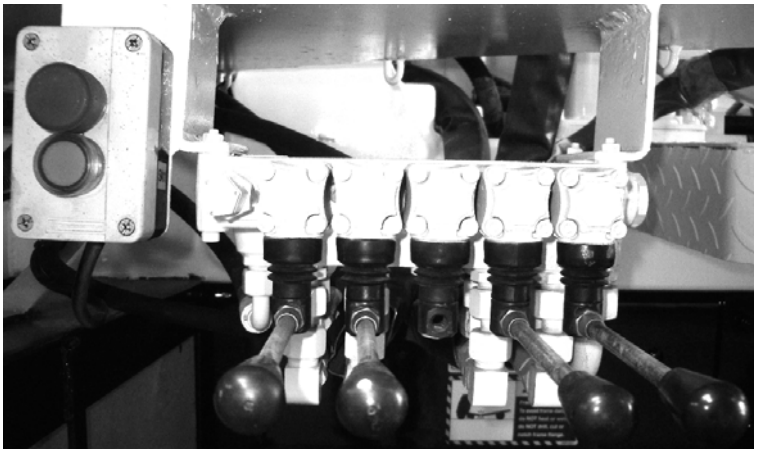
1) Safety interlock/control button must be pushed while an outrigger control is actuated. If the button is released, even if outrigger control lever is actuated, outrigger operations will cease to function

2) Lever for jack cylinder operation of front outrigger

3) Lever for extraction or retraction of front outrigger

4) Lever for swingout operation of rear outrigger

5) Lever for jack cylinder operation of rear outrigger



Movement direction of the outrigger and jacks is determined by upward or downward movement of the lever. Fully extend outriggers and use jack cylinders to stabilize machine within 3° of horizontal.

- Fully extend outrigger footprint to ensure stability and ensure the machine is horizontally level (bubble levels should not exceed 3°) before operating boom to prevent tipping.

- Securely fold boom onto boom rest before retracting outriggers. Ensure the outriggers have been locked in the fully folded and retracted position before driving.

BOOM

The boom is mounted on a pedestal structure directly behind the chassis cab and is equipped with a rotational mechanism incorporating a low friction rotational bearing. Each boom section can be operated independently through the pre-established design articulation parameters of each section. The boom function controls are located on or near the pedestal structure and the remote.

Boom Precautions

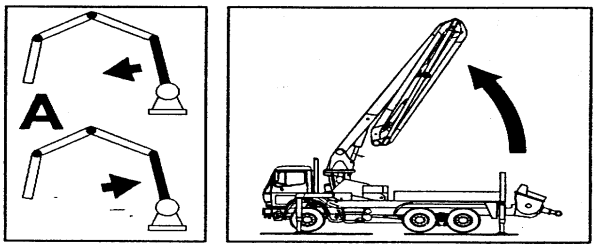
Refer to the ACPA Safety Manual for boom safety precautions not limited to the following guidelines:

- Boom must not come within 17 feet of powerlines.
- Outriggers must be fully extended, leveling unit within 3°, before boom is unfolded.
- Do not operate outriggers until boom is completely folded and secure on the boom rest.
- Do not drive with boom unfolded.
- Only operate boom when the entire boom is within clear sight.
- Boom must not be used as a crane.
- Extra pipe or hose must not impose an additional load on the boom.

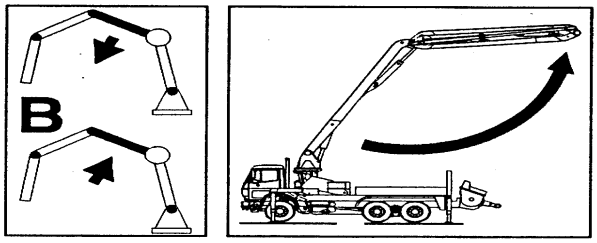
Boom Operation

The boom consists of 4 sections:

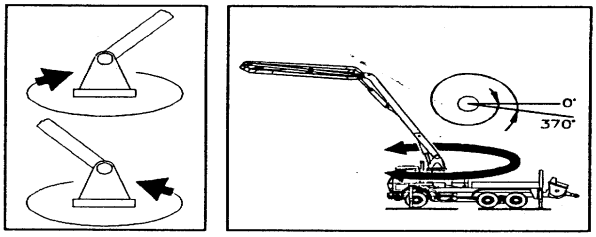
SECTION 1 - The first boom section attached to the masthead
SECTION 2 - The second boom section attached to the first section
SECTION 3 - The third boom section attached to the second boom section
SECTION 4 - The last section of the 4 section boom



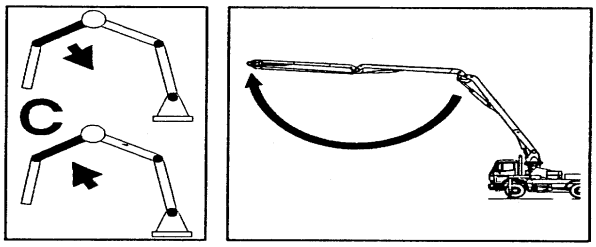
1) Actuate control lever "**A**" to unlock safety hook and that the entire structure is raised to at least 70°.



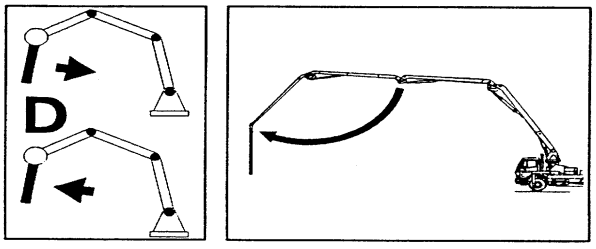
2) Actuate control lever "**B**" to raise boom "**B**" opening to at least 120°.



3) Actuate the **ROTATION** control rotating the rotation bearing until the boom is over front of cab.



4) Open boom section "**C**" with appropriate control to approximately 180°.



5)
Open boom section "**D**" to desired position

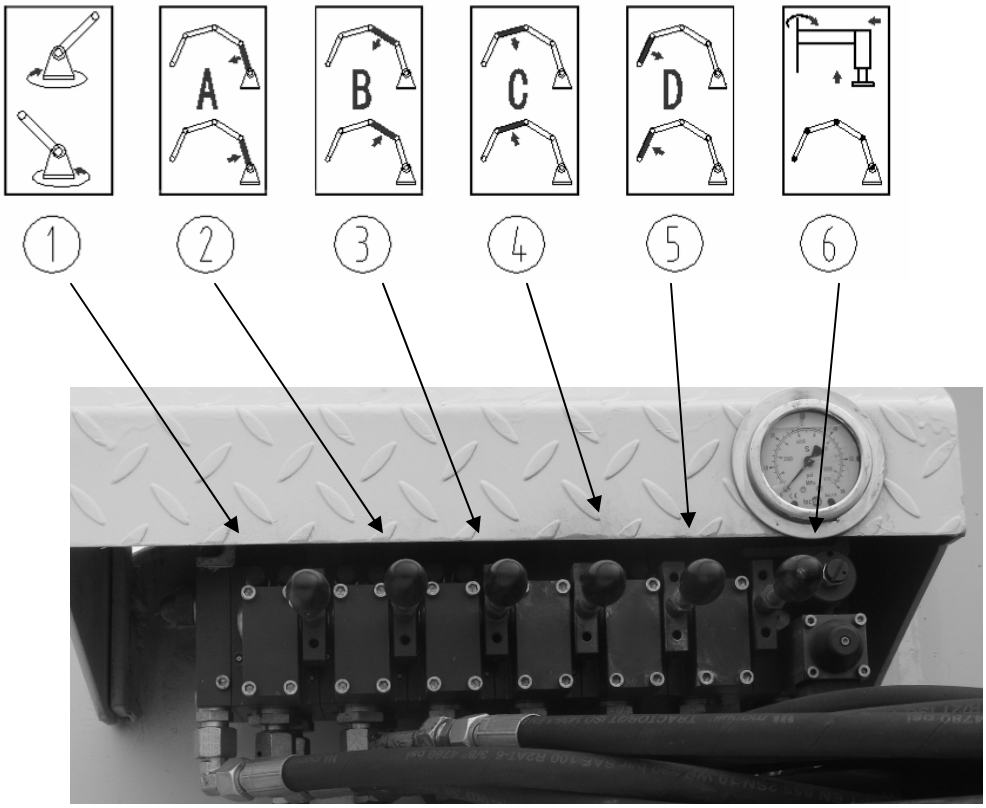
Manual Boom Control Operation

The boom control valves are located on the pedestal near the masthead. The control valves are 3 position hydraulic directional type valves, which can be manually or remote operated.

CAUTION

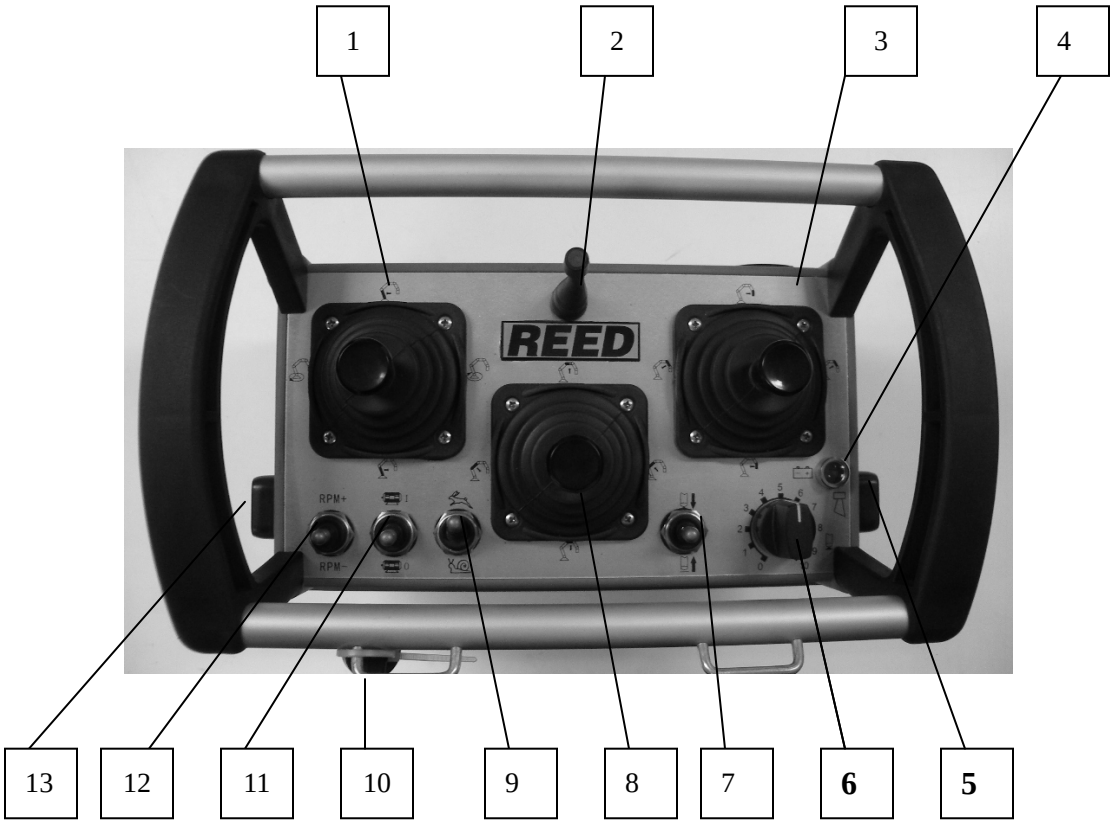
The boom control valve is a proportional valve; the speed of the boom sections is proportional to the trigger angle of the actuating lever. Because of this load sensitivity, the actuating levers should be gradually actuated for gradual acceleration and hence smooth operation. Correspondingly, when stopping boom movement, the actuating lever should be returned gradually to center for smooth operation.

1. Boom Rotation
2. Upward/Downward of Segment 1
3. Upward/Downward of Segment 2
4. Upward/Downward of Segment 3
5. Upward/Downward Turning of Segment 4
6. Boom and Outrigger



Remote Boom Control Operation

The truck mounted concrete pump is equipped with a remote control system which consists of a transmitter and a receiver. The receiver is installed near the control box of the truck mounted concrete pump. The transmitter is to be carried by the operator for convenient operation.



1. Boom Rotation, Section 1 Folding/Unfolding Lever
2. Antenna
3. Section 4 Folding/Unfolding Lever
4. Battery Low Voltage Indicator
5. Horn Button
6. Pumping Volume
7. Positive/Reverse Pump
8. Section 2 & 3 Folding/Unfolding Lever
9. Boom Fast/Slow
10. Remote On Key
11. Engine Start/Stop
12. Engine RPM
13. Emergence Shutdown Switch

Remote Control Activation

1) Turn the LOCAL/REMOTE switch on the control panel to the REMOTE position.

2) Turn on the transmitter (the status light of the transmitter will flash green when entering normal working status).

3) Press the HORN button and the system will reset enabling remote control.

Precautions of the operation are identical to manual operation. Special attention should be paid to the gradual transition of the lever from starting and stopping the boom sections movement.

The transmitor will automatically shut off when controls are being affected by RF interference; then the boom movement stops and repressing the start button is required to reset the system and enable the transmittor to reenter its working status.

Speed of boom movement can be selected by controlling the FAST/SLOW switch on the fully proportional remote control.

When an EMERGENCY STOP button is pressed, electrical and hydraulic functions will be stopped. Address conditions for EMERGENCY STOP, press the HORN switch to reset and enable system.

After cancellation of the emergency shutdown, the toggle lever switch of PUMP START/STOP on the remote must be pushed to the off position (0); the remote can only be started again by pressing the horn button to restart the system.

Severe RF disturbance from radio stations, TV stations and other electromagnetic signals require the use of a teather for remote control. Connect the supplied teather to the transmitter and receiver.

Closing and Securing Boom

After cleaning the boom, fold the boom in the REVERSE sequence from the boom unfolding.

- Take precaution to secure the boom using straps before driving.

CONTROL PANEL

Concrete pumping operations are controlled utilizing the system control box. See description of each function below:

CONTROL Switch
LOCAL position for local control mode using control box controls
REMOTE position for remote control mode using radio remote

RPM Switch
RPM+ to raise engine RPM
RPM- to lower engine RPM

DRIVE CYLINDER Switch
EXTEND position to extend concrete piston position through concrete cylinder
RETRACT position to retract concrete piston position through concrete cylinder

S-TUBE Switch
EXTEND position to extend shift cylinder to swing and change s-tube position
RETRACT position to retract shift cylinder to swing and change s-tube position

PUMP Switch
ON position to turn forward pumping on
OFF position to turn forward pumping off

REVERSE Pump Switch
ON position to turn reverse pumping on
OFF position to turn reverse pumping on

VOLUME Switch
0 - 100% variable output

COOLER Switch
AUTO position will flush hydraulic oil through the cooler at 55º C
MANUAL position will flush hydraulic oil through the cooler until switch shifted back to center neutral or AUTO posision

HORN Switch
Toggle HORN switch to power horn and reset system settings

LIGHTS Switch
Toggle LIGHTS switch on to turn on system lights

EMERGENCY STOP

Pressing EMERGENCY STOP switches stop all pump and boom functions as well as releasing accumulator pressure. To reenable operations after addressing issues, release activated EMERGENCY STOP switches and reset system by activating the HORN switch.

PUMPING

Everyone involved with the operation, maintenance, inspection, and repair of the machine **MUST READ** and **UNDERSTAND** this manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

Contact REED Technical Support and Service when assistance is required.

Pumping Precautions

Refer to the ACPA Safety Manual for pump safety precautions not limited to the following guidelines:

- Never put your hands or any other body part into any area of the machine, including, but not limited to hopper, s-tube, and waterbox.

- Concrete is pumped at extremely high pressures, do not open blocked delivery line or place body in way of endhose discharge.

- Press Emergency Stop button whenever safety or performance is compromised. After pressing any Emergency Stop button, the machine funcitions will turn off. After addressing emergency situation, the machine system must be reset by activating the Horn Switch.

- Replace, do not repair damaged pipes and hose.

- Keep hopper grate closed.

- Keep sufficient material in the hopper to prevent the induction of air into the concrete cylinders. When compressed air within the delivery line is abruptly released, the concrete being pumped is discharged in an explosive manner.

- Never bend the end hose during pumping. A bend is an obstruction of the material flow allowing pressure to build up in the system creating a dangerous condition.

- Reversing pumping direction may, or may not, relieve concrete pressure in the system.

- Do not allow the end hose to be guided or maneuvered by hand.

- Move the concrete within the concrete pump delivery system during pumping stoppage to avoid segregation (or separation) and solidification.

- Clean out the delivery system and concrete pump if pumping operations are suspended for too long.

- Concrete output is influenced and related to the quality and consistency of the concrete mix. Mix consistency is a decisive factor when it comes to the filling rate of the material cylinders.

Priming the Pump

Prime the delivery line ahead of the actual concrete mix to lessen the possibility of packing when the line is filled with concrete.

1) Mix prime packs as directed by the prime pack manufacturer (typically 2 packs for new pipe, 1 pack thereafter).

2) Cycle machine 2-3 times to verify pump is ready for operation.

3) Pour prime pack mixture into prime port on swing out elbow and then reseal prime port.

4) Fill hopper with concrete and begin pumping at low to medium volume.

Pumping Operation

Before filling hopper with concrete, check for safe work conditions and safe operation of functions, follow priming procedures and activate the AGITATOR SWITCH for agitator operation.

After hopper is filled with concrete:

1) Turn Pump Switch On.

2) Initially pump at low to medium volume at preset minimum RPM, use the VOLUME CONTROL switch and engine RPM to gradually increase pumping output.

3) Using the remote transmittor, control boom to pump concrete to desired location.

Cleaning Precautions

Everyone involved with the operation, maintenance, inspection, and repair of the machine **MUST READ** and **UNDERSTAND** this manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

Contact REED Technical Support and Service when assistance is required.

Refer to the ACPA Safety Manual for cleaning safety precautions not limited to the following guidelines:

- Never put your hands or any other body part into any area of the machine, including, but not limited to hopper, s-tube, and waterbox.

- Keep hopper grate closed during cleaning.

- Do not operate the water hose when there is no water in the water tank.

Cleaning the System

Effective clean-up removes concrete in the hopper, s-tube, concrete cylinders and delivery system.

1) Upon completion of pumping, reverse pump concrete back into the hopper.

2) After all possible concrete is reversed pumped into the hopper; remove end hose from tip section of the boom.

3) Insert water soaked cleanout spongeball into the tip section opening.

4) Position the boom at a 15º angle, relative to horizontal.

5) Pump in reverse to suck the spongeball through the delivery pipe.

6) After the sponge ball is sucked through the delivery pipe, open the hopper swingout elbow to remove the sponge.

7) Open the clean out door of the hopper in the designated area to empty hopper of concrete.

8) Turn on the water pump and use the water hose to wash the end hose, hopper swingout elbow, s-tube, concrete cylinder, agitators, grate, and hopper.

9) Finally, wash and clean the entire machine.

10) In extremely cold temperatures, the water tank and water pump should be thoroughly e to prevent freezing.

MAINTENANCE

This section introduces safe maintenance of the truck mounted concrete pump. In order to achieve normal and safe operation of the truck mounted concrete pump all inspection, maintenance, and repair work must be performed. Safe inspection, maintenance, and repair will minimize maintenance costs and health hazards and maximize performance.

Maintenance Precautions

Everyone involved with the operation, maintenance, inspection, and repair of the truck mounted concrete boom pump **MUST READ** and **UNDERSTAND** this operation manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

Contact REED Technical Support and Service when assistance is required.

- Maintenance must be performed by trained, experienced, and certified personnel in the appropriate fields.

- The following maintenance guide is a general guide to aid trained, experienced, and certified personnel.

- Trained, experienced, and certified personnel must wear appropriate protective equipment.

- Ensure unit is shutoff and utilize lockout/tagout safety products before performing maintenance.

Recommended Daily Inspections

1) Chassis

Check

- Engine oil level
- Fuel tank level
- Tire condition and pressure
- Fuel, oil, and other leaks
- Chassis lighting, brakes, and signals

2) Sub-Frame and Decking

Check

- Subframe for weld cracks, missing bolts, deformation
- Structural integrity of decking, steps, walkways
- Tool boxes and miscellaneous features are secure

3) Drive Components

Check

- Power take-off mounting secure and oil level
- No interference of drive lines
- All hydraulic pumps in good condition
- Cables, wires, hoses, and tubing secure
- Hydraulic leaks
- Lubrication points

4) Outriggers

Check

- For missing parts such as rollers, pins, bolts, and nuts
- Hydraulic cylinders are secure
- Foot pads secure
- Condition of hydraulic hoses and tubing
- Switches undamaged, emergency stop switch-push/pulls
- Level sight gauge in good condition
- Lubrication points

5) Boom Pedestal and Rotation Assembly

Check

- Pedestal and rotation assembly for structural damage and/or cracked welds

Rotation gear mounting bolts are secure
Drive pinion and gear teeth in good condition
Reduction unit securely mounted
Rotation limit stops in good condition
Delivery piping, clamps secure
Hydraulic hoses, tubing secure, properly clamped no leaks
Oil levels full
Lubrication points

6) Boom

Check

For structural damage and cracked welds
Bushings, pins, and retainers secure
Hydraulic cylinders are in good condition and securely mounted
Hydraulic hoses, tubing secure, properly clamped with no leaks
Delivery line not damaged, no dents, secured properly to boom
All clamps secure, retaining pin in place
Lubrication points

7) End Hose

Check

For damage, condition, free of cuts internal and external
Mounted securely to boom, support brackets intact
Locking levers, lever springs in place, in good condition
Hose clamps secure, retaining chain in good condition, shackles and pins tight

8) Boom Control Valve

Check

Hydraulic control valve bank securely mounted
Each control lever moves freely, returns when released
Protective rubber boots in good condition
Control identification decal in good condition
Hydraulic tubing, hoses and electrical wiring secure and clamped
No hydraulic leaks

9) Concrete Pump

Check

For structural damage, cracked welds, and attachment to sub-frame

Hydraulic drive cylinders in good condition, secure, no leakage
Material cylinders secure
Water box structurally sound, clean, cover in place, drain functional
Proximity switches
S-tube shift mechanism structurally sound, all pins and retainers in place
Hydraulic shift cylinders in good condition
Bearing housing, seals etc. in good condition
Hydraulic hoses secure no leaks
Clamps of delivery pipes are loose or damaged
Lubrication points

10) Hopper Assembly

Check

For structural damage, dents, cracked welds
S-tube secure, in good condition
Condition of wear plate, wear ring, seals
Connection of S-tube to outlet seals, bearing
Hopper grating is structurally sound, opens and closes
Vibrator securely mounted, wiring connections secure
Hopper drain is functional
Transfer delivery line undamaged, secured all clamps tight with pin retainers
Outlet elbow secure, clamp tight

11) Agitator

Check

Agitator paddles and shaft for damage, cracked welds
Drive motor secure, bearings, seals housing in good condition
Control valve securely mounted, levers move freely
Hydraulic hoses and tubing secure, clamped

12) Lube System

Check

Lube pump securely mounted, gaskets, lid in place
Lube line connections tight, clamped
Ample grease in reservoir

13) Control Panel

Check

Switches in good condition, stay in position or momentary return to center
Instruments and gauges in good condition, lights operate
Control identification in good condition

14) Remote Controls

Check

Switches in good condition, stay in position or momentary return to center
Boom control levers move freely, return to center, protective rubber boots in good condition
Cord in good condition, not damaged or cut and securely connected

15) Hydraulic System

Check

Filler caps in place
Level sight gauges in good condition
Hydraulic filter condition gauges
Hydraulic oil cooler securely mounted, fan motor in good condition
Hydraulic fluid levels to proper levels
Hoses and tubing's secure, no leaks, minimal wear

16) Electrical System

Check

Electrical connections are well secured and free of rust
Wire insulators free of aging or peeling

17) Water System

Check

Filler caps in place
Level sight gauges
Water level full
Hoses and tubing minimum wear

Suggested General Inspection Schedule

	Inspection	Inspection Interval (Daily/ Per Hour)						Also Inspect
		Daily	250	500	1000	1500	2000	
General	Lubrication Points	●						Weekly
	Visual And Functional Check Of All Safety Equipment	●						
	Tighten Nuts and Bolts							As Required
	Certified Boom Inspection			●				Annually
	Wire, Hose, and Tube Conditions	●						
Hydraulic System	Oil Level	●						
	Discharge Condensed Water	●						
	Hoses and Tubes	●						
	Replace All Hydraulic Oil And Analyze				●			
	Clean Hydrualic Cylinders				●			
Drive Cylinder	Seals Of Hydraulic Cylinders							Monthly
Hydraulic Oil Filter	Replace Filter Element							As Required
Water Tank	Water Level	●						
Gearbox	Replace All Oil In Gear Box			●				
	Rotating Speed Reducer			●				

	Inspection	Inspection Interval (Daily/ Per Hour)						Also Inspect
S-Tube	Wear	●						
	Check And Adjust Enclosed Gasket	●						
	S-Tube Bolt			●				
Delivery Pipe	Clamps	●						
	Wall Thickness	●						
	Gaskets			●				
Concrete Piston	Connector		●					
	Concrete Cylinder And Concrete Piston Wear	●						
Delivery System	Wear	●						
Lubrication System	Oil Level	●						

LUBRICATION

The truck mounted concrete pump is equipped with several critical areas that require lubrication.

- Rapid wear and component breakdown will result if the unit is operated with inadequate lubrication.

- Follow the recommended interval and if need be increase the interval when above normal usage takes place.

Boom and Outrigger Area Lubrication

Boom and outrigger lubrication points involve all the articulated joints on the boom, the swivels and rotating joints of the concrete delivery piping and the pivot points of the swing out outriggers.

- Before making the connection of the lube pump to grease fitting be sure to clean the grease fittings to prevent contaminates from entering the lube point.

- Wipe off any excess lubricant after greasing.

Recommended interval: every 60 hours of operation under normal usage, more frequent as required.

Concrete Pump Area Lubrication

Some of these areas critical lube points are connected to the central lubrication distribution block and fed by the automatic lube pump. The main lube pump and reservoir is located at rear of unit near hopper. This system will automatically feed the central distribution block at the preset interval.

- The reservoir must be checked and lubricant replenished if necessary on a daily basis.

- For areas not connected to the auto lube system, use a manual lube pump and pump a sufficient number of strokes to ensure thorough lubrication of each point.

- Visually check each point and wipe off any excess lubricant.

Rotation Bearing Lubrication

Greasing serves to reduce the ball friction and maintains the bearing seal as well as offering protection against the entry of contaminates. Inject the grease until it is made to exit from the gasket.

For lubrication of gear teeth on bearing and pinion, smear or brush recommended oil on all areas of teeth.

Bearing lubricant: **GENERAL PURPOSE GREASE, SHELL ALVANIA ELPFH2 OR EQUAL**
Gear teeth lubricant: **SHELL MALLEUS FLUID "C" OR EQUAL**
Recommended interval: **EVERY 100 HOURS OF OPERATION**

Gear Reduction Unit Lubrication

This unit is located on the outside of the turret pedestal and requires attention on a daily basis. An oil level plug is located on side of reduction unit. The breather and fill extends from reduction unit opposite oil level plug and is readily accessible. Remove the cap to add oil if necessary.

Lubricant: **SHELL OMALA OIL 150**
Interval: **CHECK DAILY FILL AS REQUIRED (TOTAL CAPACITY OF OIL = 5.6 LITERS)**

Power Take-Off (PTO) Lubrication

The PTO unit contains two (2) areas requiring lubrication attention. One area is the main gear box and the other is the pump shaft cavity.

The oil level plug for the main section is located on side of the casing. Remove plug to check level. When required add oil through breather fill fitting.

The oil level plug for the pump shaft cavity is located on side of flange ring. Remove plug to check level. When required add oil through cavity breather fill unit.

Recommended lubricants are mineral oil meeting CLP DIN 51517-3 and synthetic oils meeting CLP PG DIN 51517-3 and CLP HC DIN 51517-3. Check level every 100 hours of operation

HYDRAULIC SYSTEM MAINTENANCE

The concrete boom pump is equipped with 2 hydraulic systems. One system is used to meet the hydraulic requirements for concrete pump operation and the other hydraulic system is used for the boom and outrigger operations. Contamination is the most common cause for hydraulic system failure. Extreme care must be exercised to prevent contaminants from entering the system. Always cap or plug open ports and hydraulic lines.

The concrete boom pump utilizes in its hydraulic system a fluid manufactured by the SHELL OIL CO. and is designated as TELLUS #46. It is to be used in ambient temperatures of 39-90° F (4-32° C). The normal fluid temperature will range from 100-167° F (38-75° C).

- Use only shell tellus 46 or equal hydraulic fluid and never mix with other type fluids. Always use a CLEAN fluid. Using impure or other type of fluids not specified will contaminate the hydraulic system and can lead to eventual system malfunction or damage and possibly deteriorate the hydraulic seals.

- Fluid Level - It is important that the fluid level of the boom and pump hydraulic systems be checked constantly. Maintain fluid to proper level at all times.

- Return Filters - For the concrete pump these are 10 micron filters with disposable elements. Change element when filter condition gauges indicates to do so. For the boom system the element is a 25 micron type.

- Pressure Filters - These filters are 10 micron filters with disposable element. Change when condition indicator depicts to do so. The boom filter is also a 10 micron filter with condition indicator.

- Hydraulic Tank - Change oil in tank every 1500 hours of operation or yearly whichever comes first.

Adding Hydraulic Fluid

CAUTION

- Exercise extreme care when adding fluid to the hydraulic tank, preventing contamination.

1) To prevent any dirt or water from entering the hydraulic tank, thoroughly clean area around filler opening.

2) Fill appropriate reservoir with clean hydraulic fluid using clean pump filters and fine wire mesh, 200 mesh or finer.

3) Replace filler cap immediately after filling tank to proper level.

CAUTION

- Do not use a cloth for straining fluid as lint is harmful to the hydraulic system.

Filter Servicing

Hydrualic filters in the system provide continuous hydraulic fluid filtration to prevent contamination which will cause rapid wear, component breakdown, and eventual failure.

The filter assemblies on the pump circuit are equipped with condition indicators. These need to be checked periodically and the element changed when so indicated.

CAUTION

- The filter for the boom hydraulics is a pressure filter. It is not equipped with a condition indicator thus a log needs to be kept and element changed every 250 hours of operation.

1) Shut off machine and use Lockout/Tagout. On pump circuit allow accumulator system to depressurize.

2) Place a drain pan underneath the filter housing to catch any fluid drainage.

3) Clean area around filter housing.

4) On the return filters carefully unscrew filter element, remove and discard properly.

5) For the high pressure filters loosen bolt on bottom of filter housing until free then remove element.

6) If element has a gasket lightly smear a small amount of oil on the element gasket.

7) Replace the element in the filter and secure filter housing.

8) Start up machine and observe for any leakage.

- Don not wash and reuse filter elements, use new filters to prevent contamination.

Cleaning the Hydraulic Tank

The boom hydraulic tank is located inside the boom pedestal. The tank is equipped with a filler breather cap located on top of the tank as well as return filter assembly and a high pressure filter.

The pump hydraulic tank is located on the right side between the front and rear outriggers. The tank is equipped with a filler cap located on top of the tank and access covers on both the outer side and top side of the tank. On the side of the tank, there are 2 suction filters for pre-filtering of the fluid before it enters the system.

- The hydraulic tanks should be drained and cleaned after 1500 hours of operation or yearly whichever comes first. This will assist in keeping the systems clean and in proper condition. The following is suggested and generally will apply to both hydraulic tanks.

1) Shut off machine and use Lockout/Tagout. On pump circuit allow accumulator system to depressurize.

2) Place a suitably sized drain container under the hydraulic tank drain.

3) Open drain valve to drain tank.

4) Remove the access cover(s) on the hydraulic tank being careful not to damage the gaskets.

5) Remove filters.

6) After tank has drained, flush the inside of the hydraulic tank with clean solvent and wipe clean with lint free cloths, do not use paper towels, removing any particles from tank.

7) Close the tank drain valve.

8) Reinstall the filter housings after replacing filters.

9) Reinstall access covers with gaskets.

10) Clean the filler breather with solvent and air blow dry.

11) Refill the hydraulic tank with new clean hydraulic fluid.

12) Start machine and check for leaks.

Bolt Torque Chart

Tightening-moment is determined by bolt diameter, bolt material, and loading area of bolt head. Refer to the following charts for general torque values. When replacing bolts, new bolts of identical dimensions and grades must be used.

Bolt Size	Pitch 0.2d (mm)	Grade 4.6		Grade 5.6		Grade 6.8	
		Force N	Torque T (Nm)	Force N	Torque T (Nm)	Force N	Torque T (Nm)
M8	1.6	5800	9	7140	11	11200	
M10	2	9310	18	11300	22	17800	36
M12	2.4	13500	32	16500	39	25900	62
M16	3.2	25200	80	30800	98	48300	154
M20	4	39400	158	48000	192	75600	302
M24	4.8	56800	272	69100	332	108000	518
M30	6	90300	542	109000	654	172000	1032
M36	7.2	131000	943	160000	1152	151000	1807

Bolt Size	Pitch 0.2d (mm)	Grade 8.8		Grade 10.9		Grade 12.9	
		Force N	Torque T (Nm)	Force N	Torque T (Nm)	Force N	Torque T (Nm)
M8	1.6	14800	23	21200	34	24800	39
M10	2	23500	47	33600	67	39400	78
M12	2.4	35400	85	49000	118	57200	137
M16	3.2	66100	211	91000	291	106000	339
M20	4	102000	408	142000	568	166000	664
M24	4.8	148000	710	205000	984	239000	1174
M30	6	235000	1410	326000	1956	380000	2280
M36	7.2	343000	2470	474000	3412	554000	3988

Hose Torque Chart

When tightening hoses and tubes, refer to the following table:

Hose Size		Md (Nm)	Hose Size		Md (Nm)
6	L	20	18	L	120
8	L	40	20	S	250
12	L	55	25	S	400
15	L	70	30	S	500
16	S	130	38	S	800

TROUBLESHOOTING AND REPAIRS

Everyone involved with the operation, maintenance, inspection, and repair of the machine **MUST READ** and **UNDERSTAND** this manual and the accompanying American Concrete Pumping Association (ACPA) Safety Manual.

Troubleshooting and repairs must be performed by trained, experienced, and certified personnel in the appropriate fields. The following troubleshooting guide is a general guide to aid trained, experienced, and certified personnel identify and repair potential issues only.

Contact REED Technical Support and Service when assistance is required.

Pumping System Troubleshooting

Piston of Drive Cylinder Does Not Move

1) Connection wire to pumping start button loose or disconnected; check and replace if necessary.
2) Auxiliary relay burnt; check and replace if necessary.
3) Solenoid directional control valve failure; typically coil failure; check and replace if necessary.
4) Improper adjustment of pumping volume switch; check and adjust if necessary.
5) Insufficient hydraulic oil inside hydrualic cylinder; check and adjust if necessary.
6) Filter element severely blocked; check and replace if necessary.

Piston of Drive Cylinder Does Not Change Direction

1) Gap between proximity switch and induction shield too large; adjust the gap to within 2~3mm if necessary.
2) Bottom surface of proximity switch become insulated due to grease or the other contaminants; clean bottom surface of the proximity switch if necessary.
3) Wrong placement of two proximity switches; check and adjust if necessary.
4) Failure of proximity switches; check and replace if necessary.
5) Coil of solenoid directional control valve failure; check and replace if necessary.

6) Auxiliary relay burnt; check and replace if necessary.

Piston of Drive Cylinder Slow
1) Drive cylinder check valve damaged; check and replace if necessary.
2) Improper adjustment of pumping volume switch; check and adjust if necessary.
3) Insufficient control pressure. Adjust main pump charge pressure to 3MPa and flushing valve to 2.5Mpa if necessary.
4) Blockage of filter element or insufficient oil pressure; check and replace if necessary.
5) Incorrect RPM; check and adjust if necessary.
6) Failure of directional control valve; spool cannot move to the required position; check and replace if necessary.

Concrete Output of Poor Condition: Irregular or Insufficient Concrete Output
1) Severe wear of concrete piston; check and replace if necessary.
2) Gap between wear plate and wear ring too large; check and adjust if necessary.
3) Poor quality of supplied concrete; demand quality concrete.
4) S-tube partially blocked; check and clear if necessary.

Pumping Does Not Stop
1) KAI contact point of auxiliary relay burnt and damaged; check and replace if necessary.
2) Failure of shutdown switch; check and replace if necessary.

S-Tube Does Not Swing
1) S-tube blocked with object; check and clear if necessary.
2) Failure of pilot relief valve occurred and caused insufficient reversing pressure; check and replace if necessary.
3) Failure of accumulator pump causes insufficient pressure; check and replace if necessary.
4) Poor quality of aggregate or long shutdown time; demand quality concrete and/or cycle during downtime to prevent blockage.

S-Tube Weak Swing
1) Insufficient pressure inside accumulator or bladder. Recharge gas into the bladder and make nitrogen pressure larger than 10.5MPa or replace it with a new accumulator bladder and recharge it to 10.5MPa if necessary.
2) Load releasing switch not fully closed; check and replace if necessary.
3) Oil leakage in swing cylinder; check and replace if necessary.
4) Spool of pilot relief valve severely worn and damaged which causes reversing pressure be lower than 15MPa; check and replace if necessary.
5) Coil failure of directional control valve or spring breaking of valve spool: abrasion of spool of the directional control valve occurs and internal leakage appears; check and replace if necessary.

S-Tube Has Insufficient Swing
1) Copper alloy bearing of swing oil cylinder has distortion or non-uniform thickness; check and replace if necessary.
2) See S-Tube Weak Swing section

Concrete Leakage of S-Tube
1) Sleeve of the s-tube has distortion or the bearing is severely worn and has a large gap; check and replace if necessary.

Lubrication System
1) Lube distributor fully clogged; check and clear if necessary.
2) Failure of check valve of the lubricating pump; check and replace if necessary.
3) Failure of relief valve of lubricating system; check and replace if necessary.

4) High viscosity lube cannot pass filtration screen; check and replace if necessary.
5) Lube line is fully blocked; typically the lubricating point at the s-tube outlet; check and clear if necessary.

Agitation System
1) Poor aggregate; agitation resistance too large; check concrete and demand quality concrete.
2) Adjustment pressure of agitation relief valve insufficient; adjust the pressure to 12MPa if necessary.
3) Agitation blade damaged; check and replace if necessary.
4) Gear pump of agitation system damaged; check and replace if necessary.
5) Operation lever of reversing valve is broken; check and replace if necessary.
6) Agitation shaft or shaft liner damaged; check and replace if necessary.

Proximity Switches
1) Bottom surface has accumulated oil and waste, which has caused ineffective induction; check and replace if necessary.
2) Gap too large and causing ineffective induction; check and adjust to 2-3mm if necessary.
3) Water temperature in the water box too high causing irregular swing of s-tube; check and add cool water if necessary.
4) Fully damaged; check and replace if necessary.

Accumulator
1) Accumulator charge leakage; check bladder pressure with appropriate accumulator charge kit and replace if necessary.

Cooler
1) Temperature activating switch damaged; check and replace if necessary.
2) Cooler solenoid valve damaged; check and replace if necessary.

Oil Overheating
1) High pumping volume of low quality concrete; lower output volume of concrete until quality concrete is delivered.
2) Blockage causing overheating; check for and clear blockage if necessary.
3) See section regarding Cooler.

Boom System Troubleshooting

Boom Inoperable
1) Insufficient pressure in boom hydraulic system; check maximum pressure and adjust if necessary. If desired maximum pressure cannot be achieved, check hydraulic pump and replace if necessary.
2) Control valve damaged. Check electrical signals to coils and manually actuate control valve to identify issue and replace if necessary.

Boom Vibration
1) Insufficient lubrication; check and lubricate lubrication points if necessary.
2) Boom pins and other articulating parts damaged; check and replace if necessary.
3) Rotational thrust bearing and rotating gears too large; check and replace if necessary.
4) Bolts of rotational thrust bearing are loose; fasten and/or replace bolts if necessary.

Boom Rotation Too Slow or Not Rotating
1) Valve blocked; check and clear if necessary.

2) Boom pump not horizontal; check and adjust if necessary.

Boom Abnormal Operation
1) Control valve blocks dirty or damaged; check and clean or replace if necessary.
2) Oil leakage in hydraulic cylinder; replace seals if necessary.

Cannot Lubricate Pins
1) Lubricating units blocked or damaged; check and replace if necessary.
2) Blockage in lubricating groove; check and clear if necessary.

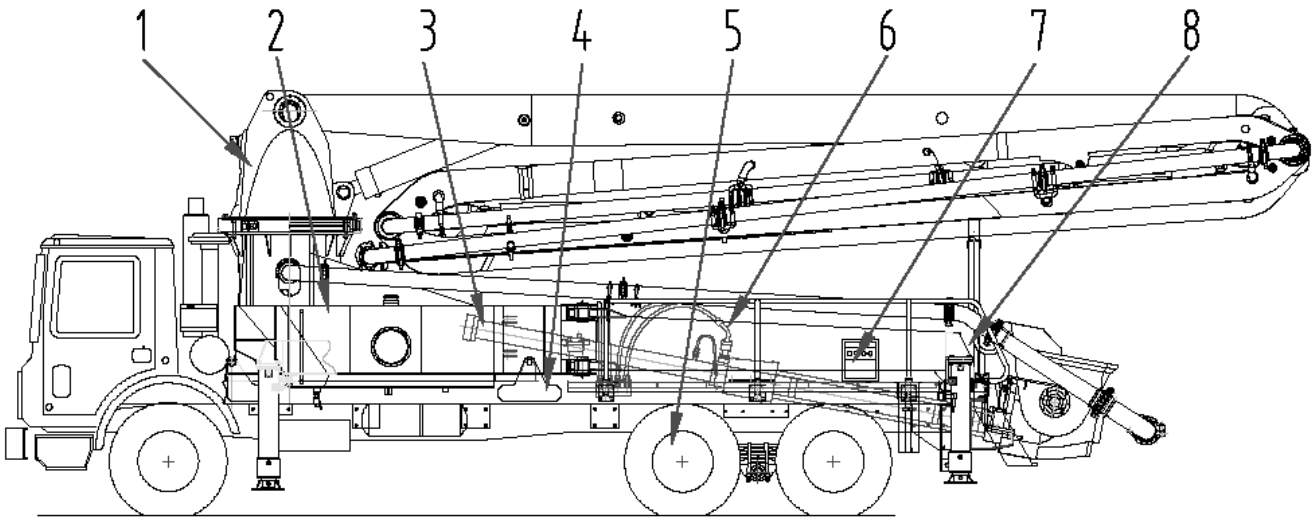
XT39R4V00

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 1 MACHINE OVERVIEW

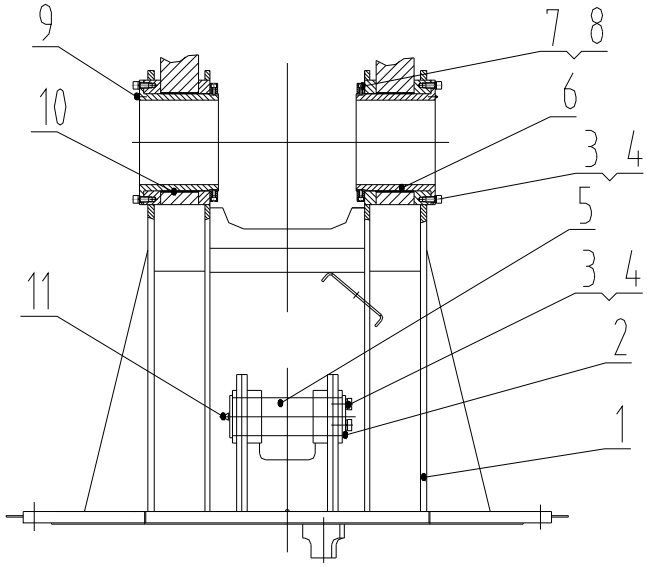


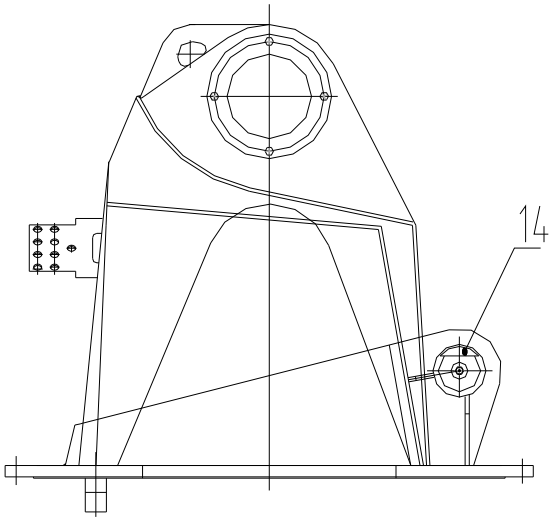
No.	Description	Group Number	Material	Parent	Weight	Quantity
1	boom	XBC39.1		XT39R4V00		1
2	pedestal	XBC39.2		XT39R4V00		1
3	pumping system	XBC39.3		XT39R4V00		1
4	subframe	XBC39.4		XT39R4V00		1
5	chassis	XBC39.5		XT39R4V00		1
6	hydraulic system	XBC39.6		XT39R4V00		1
7	electrical system	XBC39.7		XT39R4V00		1
8	lubrication system	XBC39.8		XT39R4V00		1

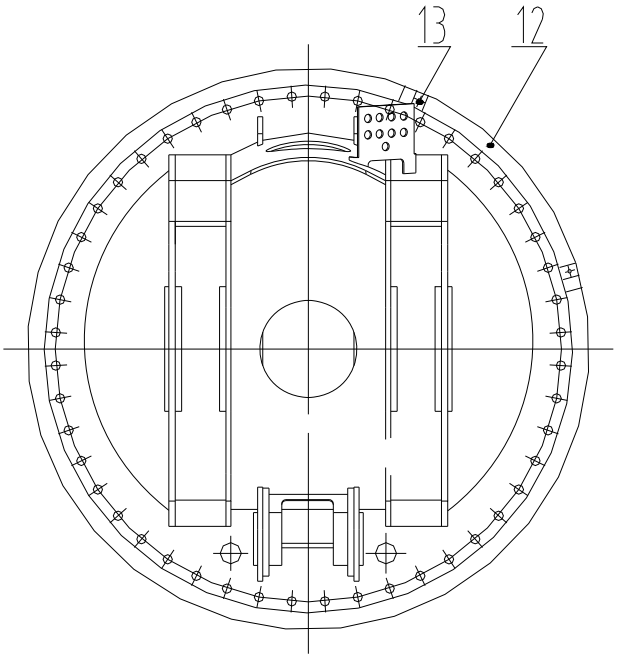
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 2 BOOM

2.1 MASTHEAD ASSEMBLY XBC39.2.9







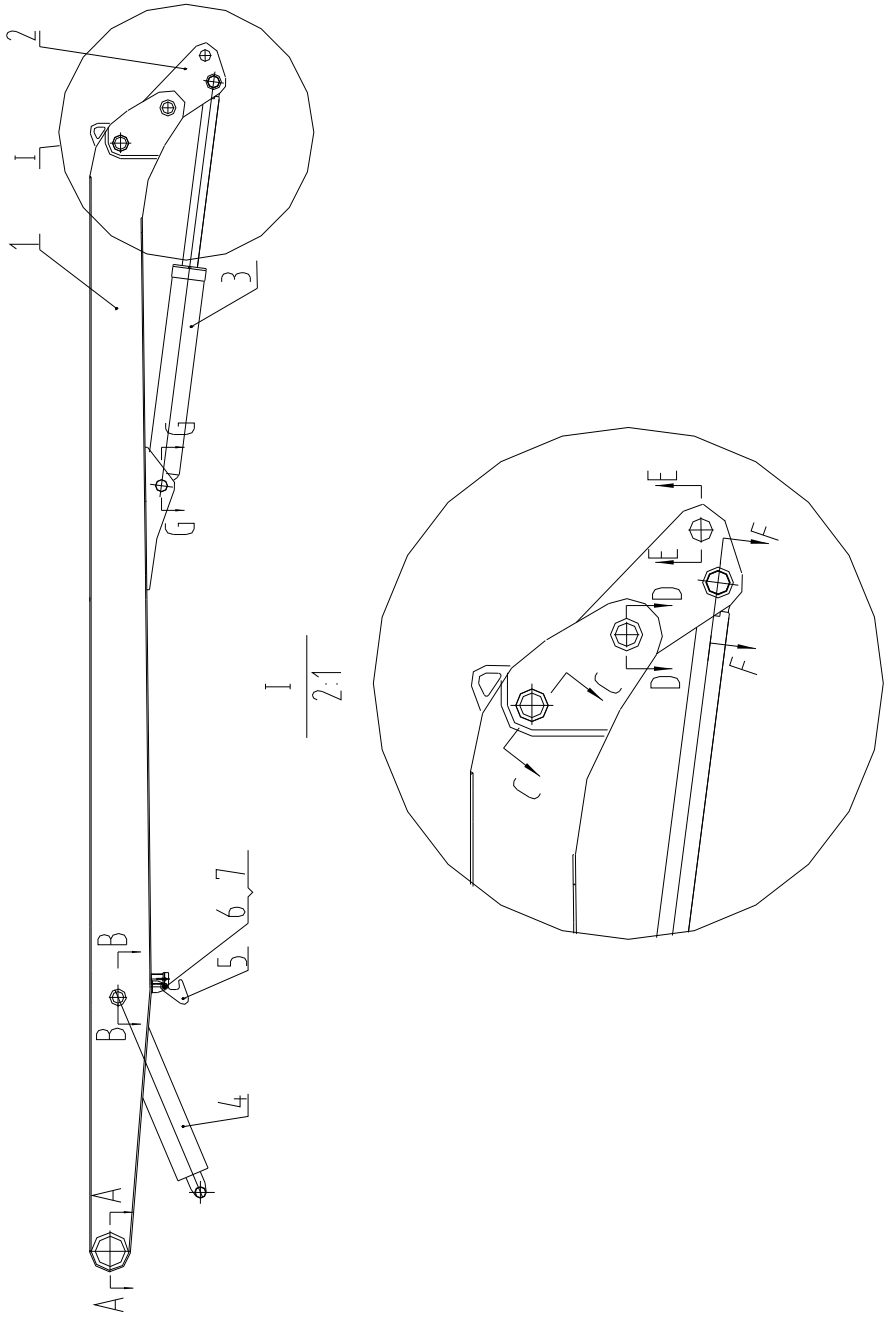
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	masthead weldment	XBC39.2.9.1		XBC39.2.9		1
2	plate,guide plate	ZBC37.2.1-1		XBC39.2.9		1
3	bolt M12X25	CB00000014		XBC39.2.9		15
4	washer 12	CW00000003		XBC39.2.9		15
5	pin	ZBC37.2.1-2		XBC39.2.9		1
6	pin,hollow pin	ZBC37.2.1-3		XBC39.2.9		2
7	bolt M8 x 25	CB00000052		XBC39.2.9		4
8	nut M230	ZBC37.2.1-4		XBC39.2.9		2
9	Nipple,grease M6 x 1	CL00000002		XBC39.2.9		2
10	bearing	ZBC37.2.1-5		XBC39.2.9		2
11	Nipple,grease M8 x 1	CL00000003		XBC39.2.9		1
12	cover,protection	ZBC37.2.1-6		XBC39.2.9		1
13	bolt M5 x 8	CB00000039		XBC39.2.9		2
14	plate	ZBC37.2.1-7		XBC39.2.9		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

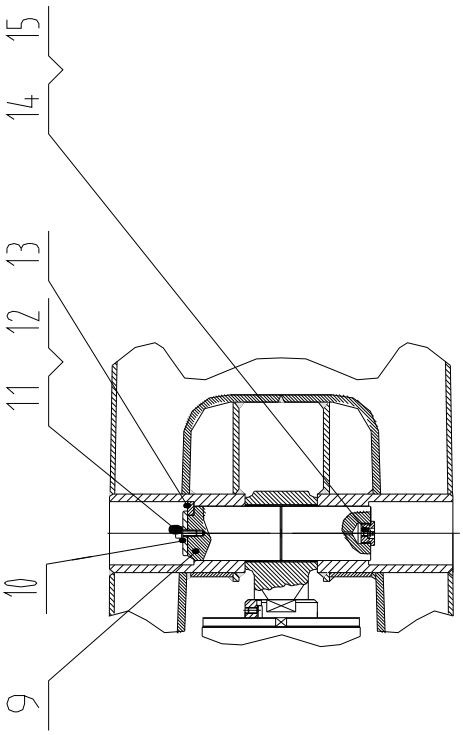
2.2 BOOM SECTION 1 XBC39.1.1

2.2.1 SECTION 1 XBC39.1.1.1

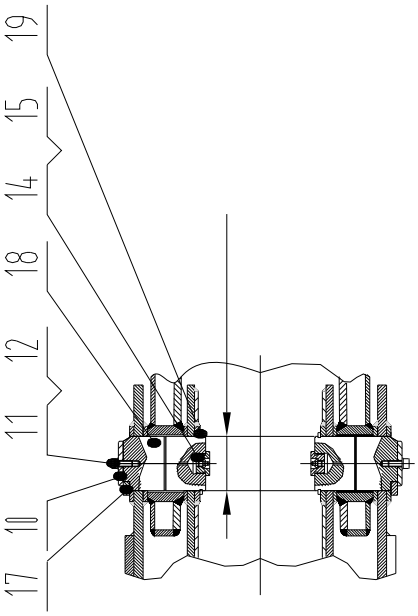


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

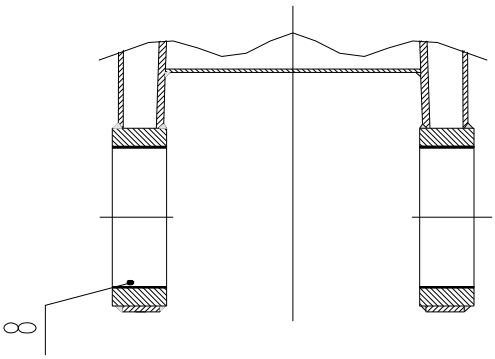
B-B



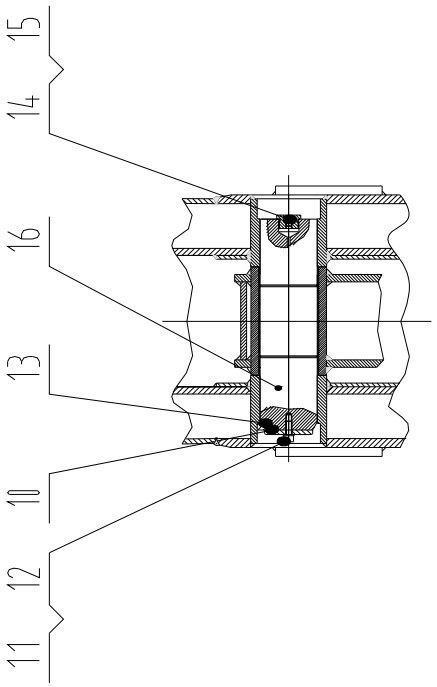
D-D



A-A

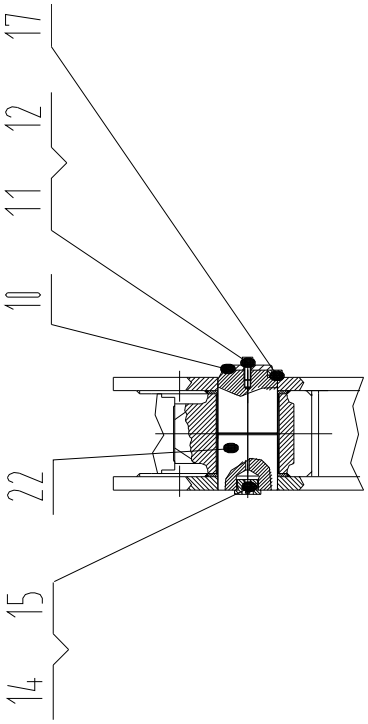


C-C

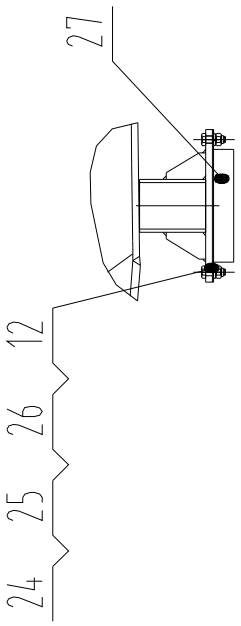


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

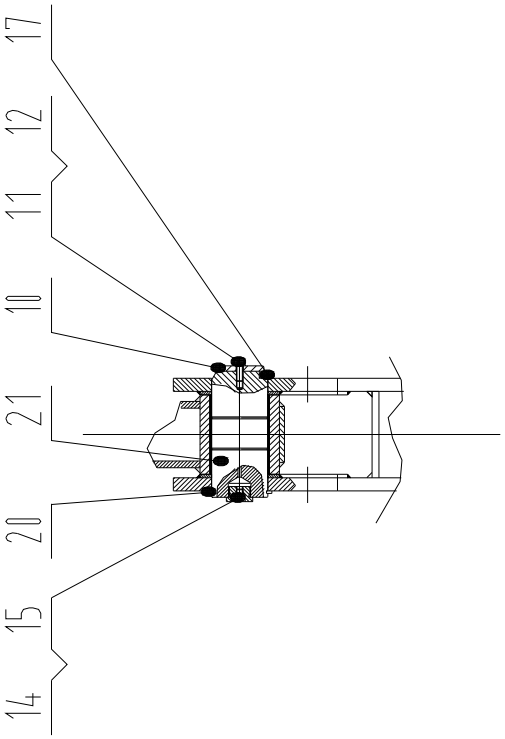
F-F



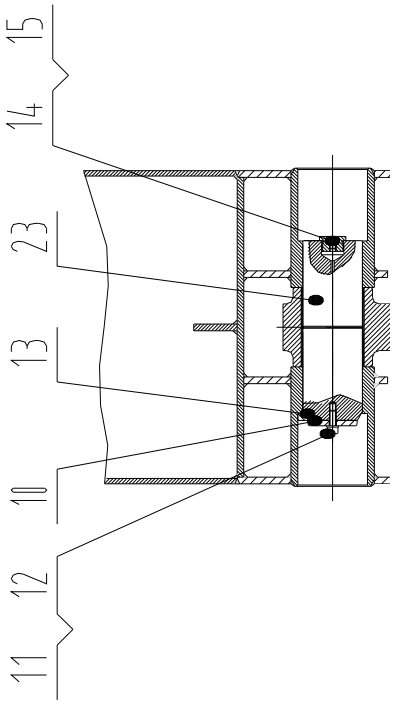
H-H



E-E



G-G

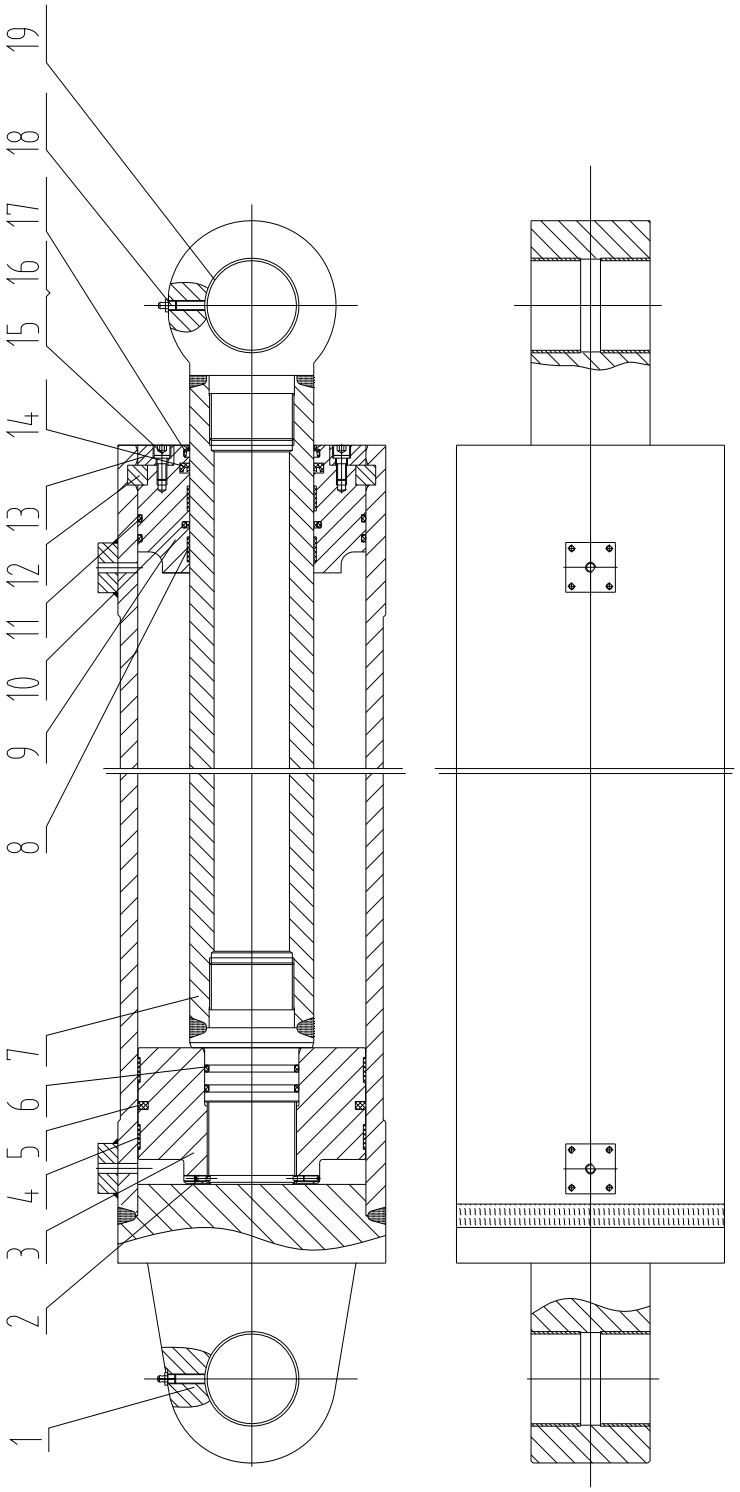


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	section 1	XBC39.1.1.1		XBC39.1.1		1
2	link,lever link	ZBC37.1.1.2		XBC39.1.1		1
3	cylinder 1 section 1	ZBC37.1.1.3		XBC39.1.1		1
4	cylinder 2 section 1	ZBC39.1.11		XBC39.1.1		1
5	hook	ZBC37.1.1-1		XBC39.1.1		1
6	pin 30 × 60	ZBC37.1.1-2		XBC39.1.1		1
7	pin,cotter pin 6.3 × 55	C100000007		XBC39.1.1		1
8	boss,pin boss	ZBC37.1.1.5		XBC39.1.1		1
9	bushingΦ235×Φ230×90	ZBC37.1.1-3		XBC39.1.1		2
10	pin Φ90 × 304	ZBC37.1.1-4		XBC39.1.1		1
11	ring,snap ring	ZBC37.1.1-5		XBC39.1.1		7
12	bolt M10 × 25	CB00000005		XBC39.1.1		7
13	washer 10	CW00000001		XBC39.1.1		13
14	plate 1	ZBC37.1.1-6		XBC39.1.1		3
15	plug,screw plug	ZBC37.1.1-7		XBC39.1.1		7
16	nipple,grease M10	CL00000001		XBC39.1.1		7
17	pin Φ95 × 350	ZBC37.1.1-8		XBC39.1.1		1
18	plate 2	ZBC37.1.1-9		XBC39.1.1		4
19	pin Φ90 × 137	ZBC37.1.1-10		XBC39.1.1		2
20	ring,snap ring shaft 90	CD00000006		XBC39.1.1		2
21	ring,snap ring shaft 85	CD00000005		XBC39.1.1		1
22	pin Φ85 × 190	ZBC37.1.1-11		XBC39.1.1		1
23	pin Φ90 × 180	ZBC37.1.1-12		XBC39.1.1		1
24	pin Φ90 × 271	ZBC37.1.1-13		XBC39.1.1		1
25	bolt M10 × 30	CB00000007		XBC39.1.1		2
26	washer 10	CW00000002		XBC39.1.1		2
27	nut M10	CN00000001		XBC39.1.1		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.2.1-1 CYLINDER 1 OF SECTION 1 ZBC37.1.1.3

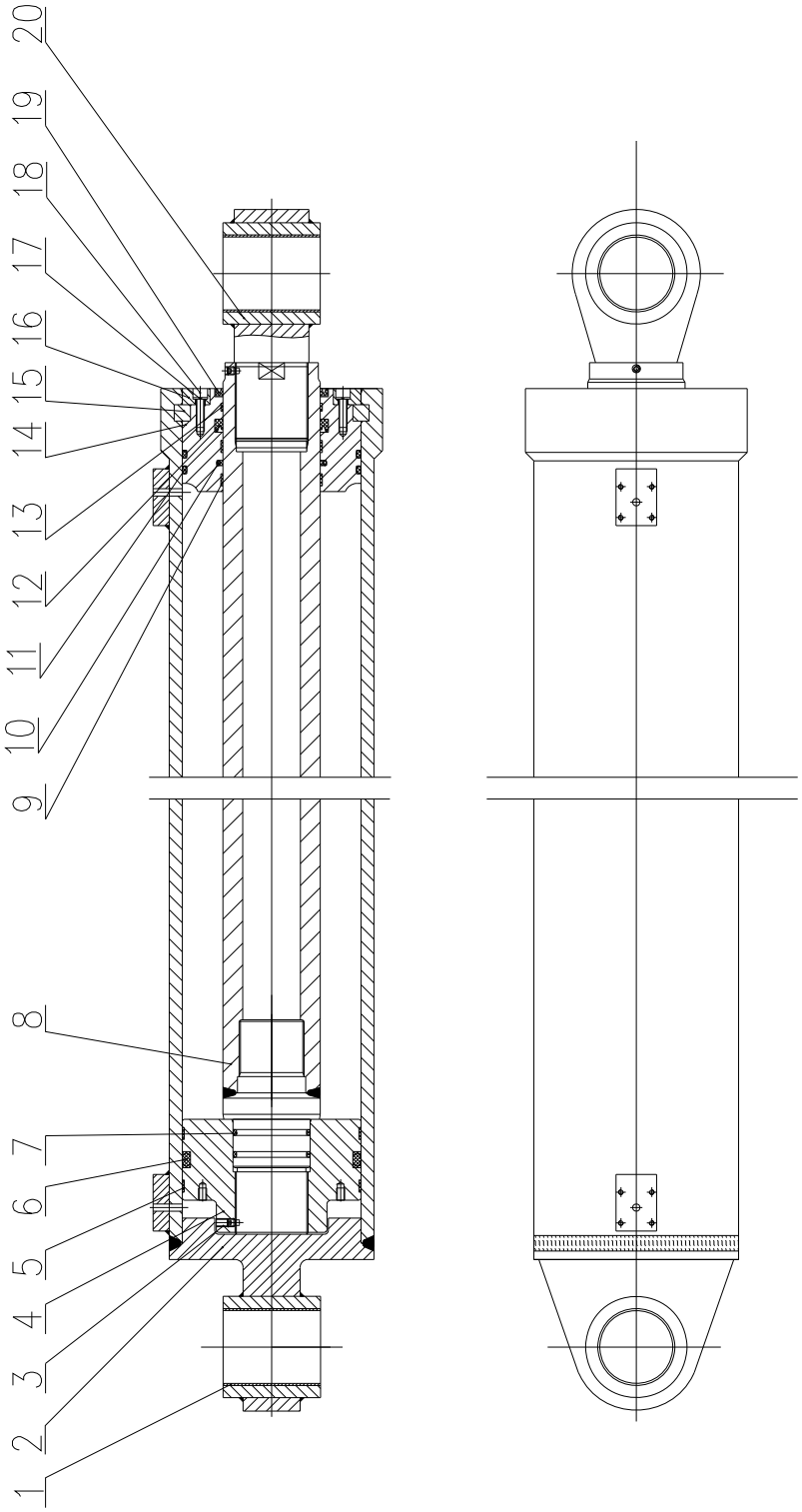


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	cylinder body	XBC3900211101	weldment	ZBC37.1.1.3		1
2	bolt M6 x 16	CB00000042		ZBC37.1.1.3s		2
3	piston	XBC3900211103		ZBC37.1.1.3		1
4	ring,guide ring 230 × 225 ×25	XBC3900211104		ZBC37.1.1.3s		2
5	seal,bearing seal 230 x 210 x 16	XBC3900211105		ZBC37.1.1.3s		1
6	O-ring 85.09 × 5.33	XBC3900211106		ZBC37.1.1.3s		2
7	rod,piston rod	XBC3900211107		ZBC37.1.1.3		1
8	ring,guide ring 130×125×25	XBC3900211108		ZBC37.1.1.3s		2
9	carrier,seal carrier	XBC3900211109		ZBC37.1.1.3		1
10	seal,bearing seal 125 x 140.1 x 6.3	XBC3900211110		ZBC37.1.1.3s		1
11	O-ring 221.62 x 5.33	XBC3900211111		ZBC37.1.1.3s		1
12	ring,key ring	XBC3900211112		ZBC37.1.1.3s		1
13	ring,snap ring	XBC3900211113		ZBC37.1.1.3s		1
14	seal,bearing seal 125 x 145 x 16	XBC3900211114		ZBC37.1.1.3s		1
15	bolt M10 × 25	CB00000004		ZBC37.1.1.3s		6
16	washer 10	CW00000001		ZBC37.1.1.3s		6
17	seal,ring 125 x 133.8	XBC3900211117		ZBC37.1.1.3s		1
18	nipple M10	CL00000001		ZBC37.1.1.3s		2
19	bearing 90 x 95 x 120	XBC3900211119		ZBC37.1.1.3s		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.2.1-2 CYLINDER 2 OF SECTION 1 ZBC39.1.11



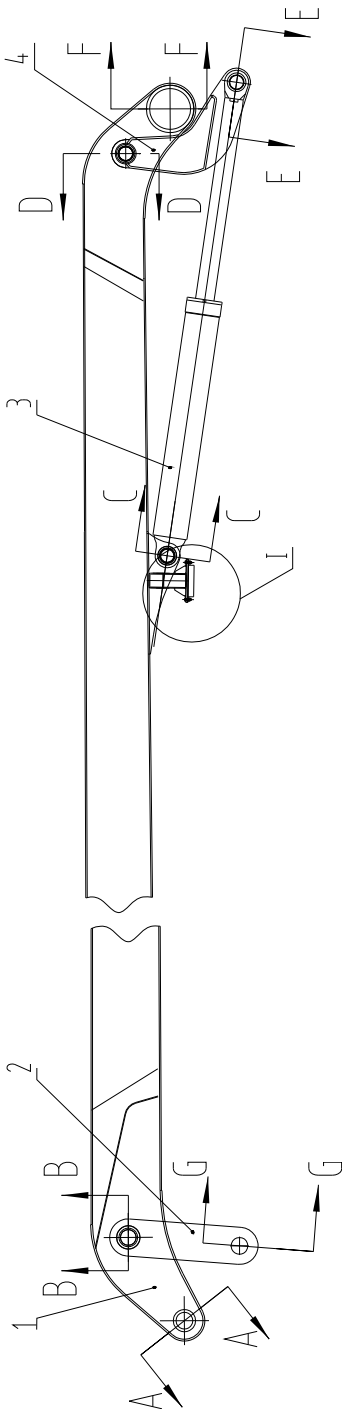
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bearing 90 × 95 × 120	XBC3900211201		ZBC39.1.11s		2
2	cylinder body	XBC3900211202		ZBC39.1.11		1
3	bolt M10 × 15	CB00000001		ZBC39.1.11s		2
4	piston	XBC3900211204		ZBC39.1.11		1
5	ring,guide ring 220 × 215 × 15	XBC3900211205		ZBC39.1.11s		2
6	seal,piston seal 220 × 200 × 16	XBC3900211206		ZBC39.1.11s		1
7	O-ring 85 × 5.3	CO00000014		ZBC39.1.11s		2
8	rod,piston rod assembly	XBC3900211208		ZBC39.1.11		1
9	ring,guide ring 120 × 125 × 15	XBC3900211209		ZBC39.1.11s		2
10	seal,bearing seal120 × 6.3	XBC3900211210		ZBC39.1.11s		1
11	O-ring 206 × 7	CO00000013		ZBC39.1.11s		2
12	seal,bearing seal120 × 140 × 14.5	XBC3900211212		ZBC39.1.11s		1
13	ring,supporting ring 120 × 125 × 9.7	XBC3900211213		ZBC39.1.11s		1
14	carrier,seal carrier	XBC3900211214		ZBC39.1.11		1
15	ring,key ring	XBC3900211215		ZBC39.1.11s		1
16	ring,snap ring	XBC3900211216		ZBC39.1.11s		1
17	washer 10	CW00000001		ZBC39.1.11s		6
18	bolt M10 × 25	CB00000004		ZBC39.1.11s		6
19	seal, ring 120 × 140 × 10	XBC3900211219		ZBC39.1.11s		1
20	clevis,rod end clevis	XBC3900211220		ZBC39.1.11		1

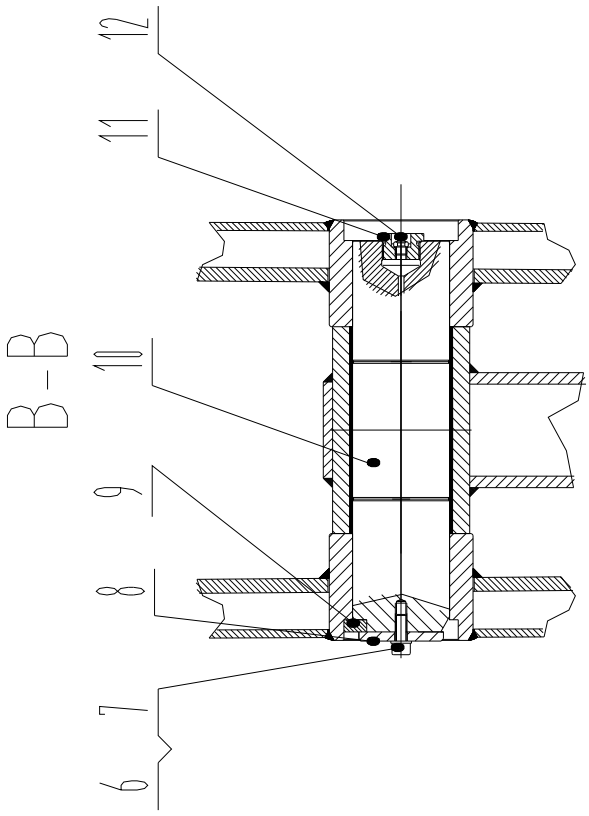
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

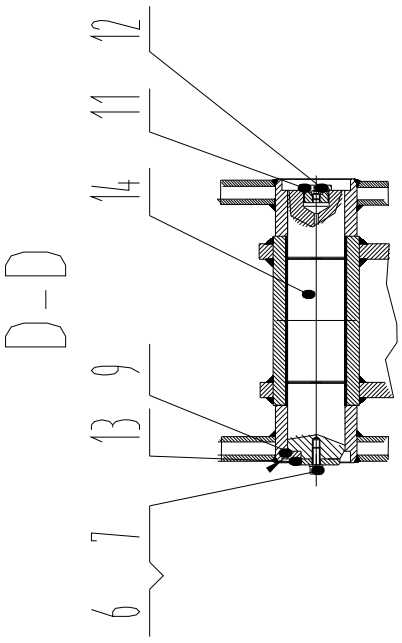
2.3 BOOM SECTION 2 XBC39.1.2

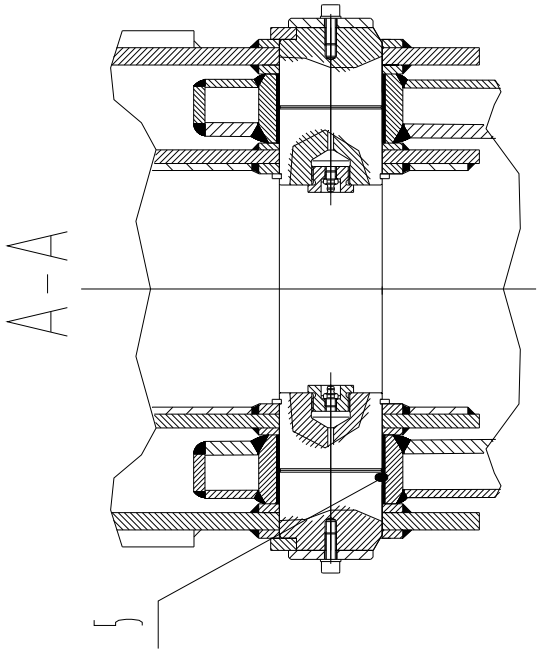
2.3.1 SECTION 2 XBC39.1.2.1

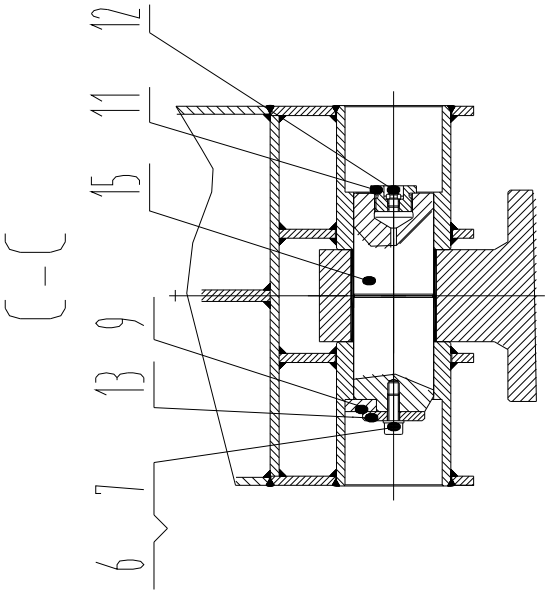


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

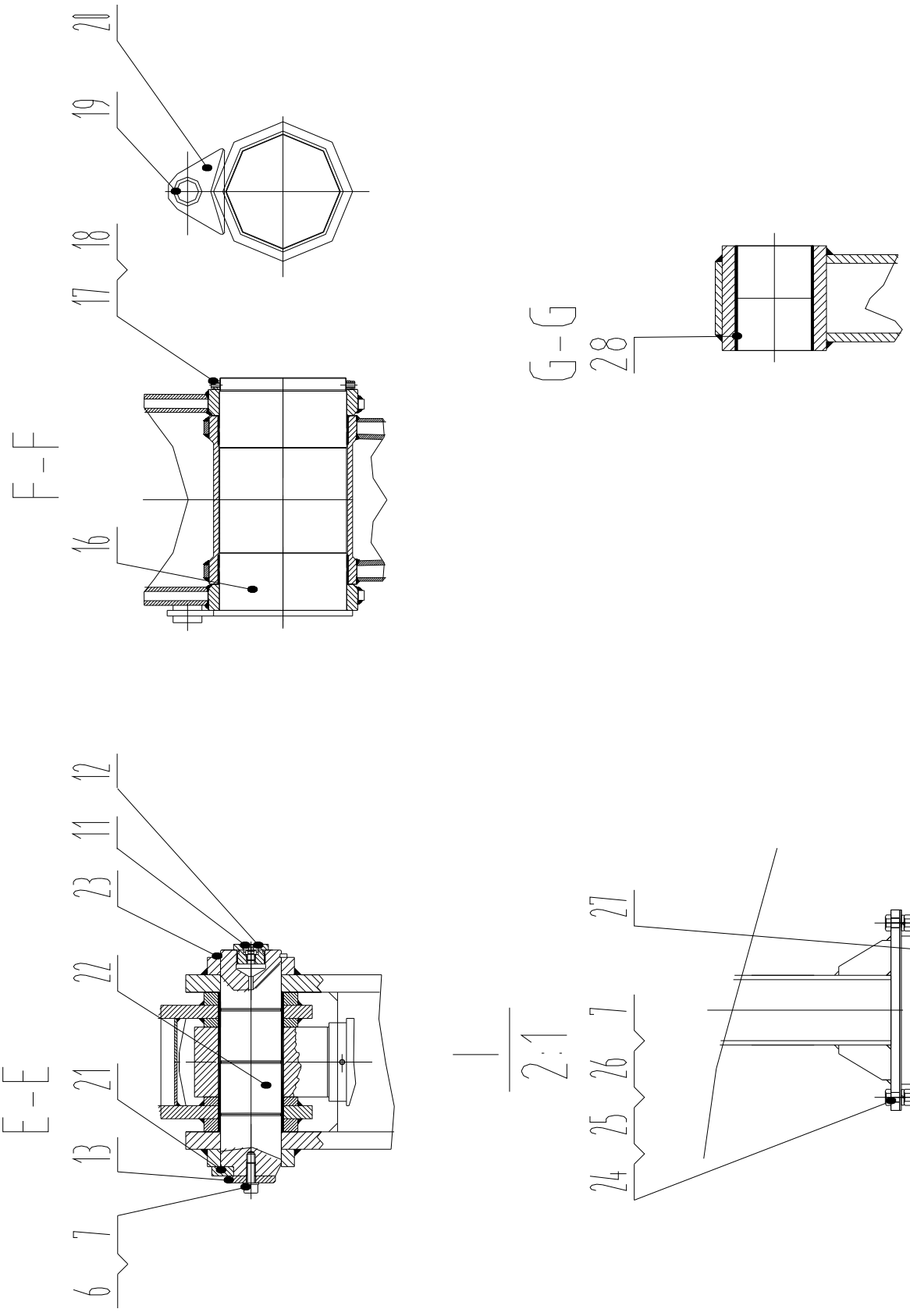








REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

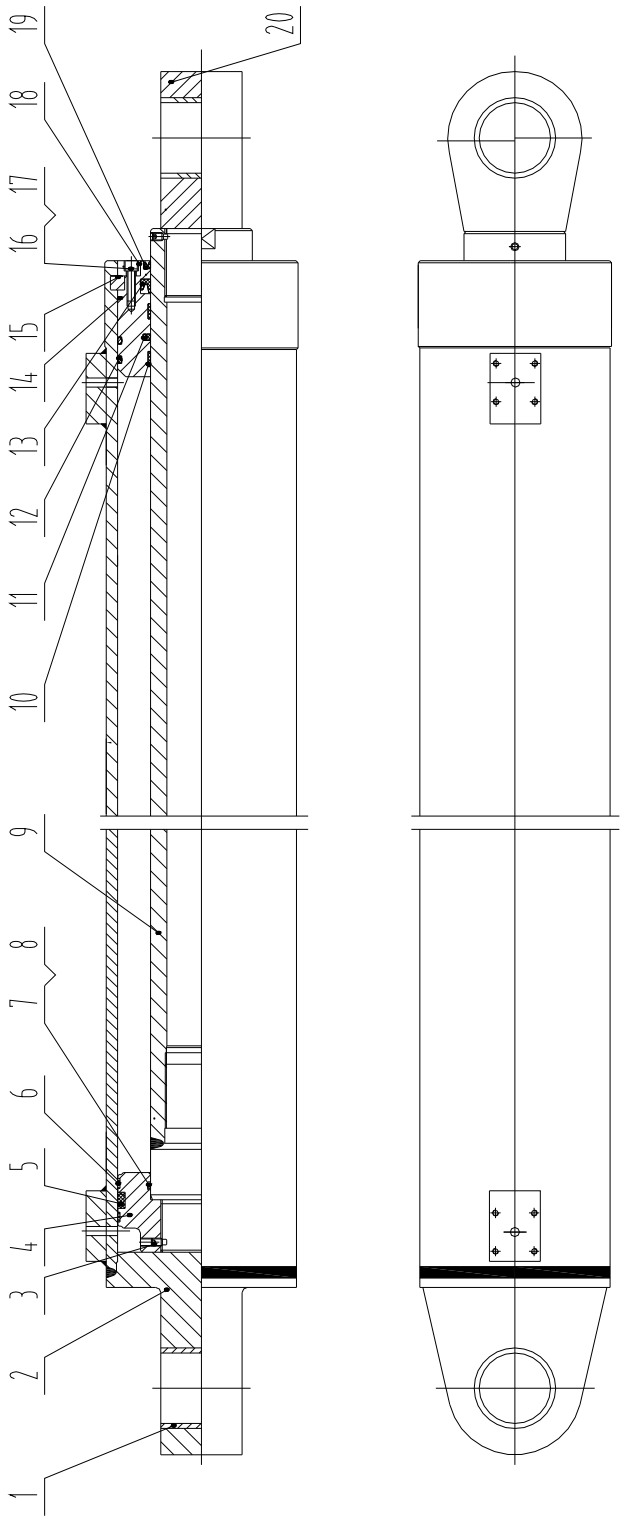


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	section 2	XBC39.1.2.1		XBC39.1.2		1
2	link,pressure link	ZBC37.1.2.2		XBC39.1.2		1
3	cylinder of section 2	ZBC37.1.2.3		XBC39.1.2		1
4	link,lever link	ZBC37.1.2.4		XBC39.1.2		1
5	bushing φ95 x φ90 x 60	ZBC37.1.2-1		XBC39.1.2		2
6	bolt M10 × 25	CB00000005		XBC39.1.2		4
7	washer 10	CW00000001		XBC39.1.2		10
8	ring,snap ring	ZBC37.1.1-5		XBC39.1.2		1
9	plate 1	ZBC37.1.1-6		XBC39.1.2		3
10	pin φ85 x 340	ZBC37.1.2-2		XBC39.1.2		1
11	plug,screw plug	ZBC37.1.1-7		XBC39.1.2		4
12	nipple M10 × 1	CL00000001		XBC39.1.2		4
13	ring,snap ring	ZBC37.1.2-3		XBC39.1.2		3
14	pin φ75 × 350	ZBC37.1.2-4		XBC39.1.2		1
15	pin φ70 × 190	ZBC37.1.2-5		XBC39.1.2		1
16	bushing	ZBC37.1.2-6		XBC39.1.2		1
17	nut M218 × 3	ZBC37.1.2-7		XBC39.1.2		1
18	bolt M6 × 8	CB00000041		XBC39.1.2		2
19	pipe	ZBC37.1.2-8		XBC39.1.2		1
20	plate,position plate	ZBC37.1.2-9		XBC39.1.2		1
21	plate 2	ZBC37.1.1-9		XBC39.1.2		1
22	pin φ70 × 259	ZBC37.1.2-10		XBC39.1.2		1
23	ring,snap ring for shaft 70	CD00000010		XBC39.1.2		1
24	bolt M10 × 30	CB00000007		XBC39.1.2		2
25	washer 10	CW00000002		XBC39.1.2		2
26	nut M10	CN00000001		XBC39.1.2		2
27	block,bumper block	ZBC38.1.1.7		XBC39.1.2		1
28	bushing φ85 × φ90 × 60	ZBC37.1.2-11		XBC39.1.2		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.3.1-1 CYLINDER OF SECTION 2 ZBC37.1.2.3



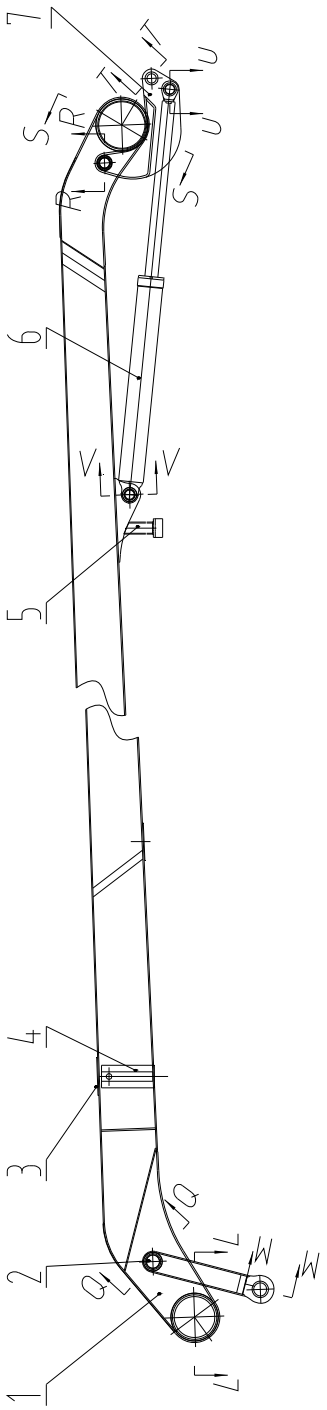
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bearing 70 × 75 × 80	XBC3900221101		ZBC37.1.2.3s		2
2	cylinder body	XBC3900221102		ZBC37.1.2.3		1
3	bolt M8 × 15	CB00000044		ZBC37.1.2.3s		2
4	piston	XBC3900221104		ZBC37.1.2.3		1
5	seal,piston seal 165 × 142 × 15.5	XBC3900221105		ZBC37.1.2.3s		1
6	ring,guide ring 165 x 160 x 9.7	XBC3900221106		ZBC37.1.2.3s		2
7	O-ring 98.02 x 3.53	CO00000007		ZBC37.1.2.3s		1
8	ring,snap ring	XBC3900221108		ZBC37.1.2.3s		2
9	rod,piston rod assembly	XBC3900221109		ZBC37.1.2.3		1
10	ring,guide ring 100 × 105 × 15	XBC3900221110		ZBC37.1.2.3s		2
11	seal,bearing seal 100 × 6.3	XBC3900221111		ZBC37.1.2.3s		1
12	O-ring 155 x 5.3	CO00000012		ZBC37.1.2.3s		2
13	seal,bearing seal100 × 120 × 14.5	XBC3900221113		ZBC37.1.2.3s		1
14	carrier,seal carrier	XBC3900221114		ZBC37.1.2.3		1
15	ring,key ring	XBC3900221119		ZBC37.1.2.3s		1
16	bolt M8 x 20	CB00000050		ZBC37.1.2.3s		6
17	washer8	CW00000017		ZBC37.1.2.3s		6
18	ring,snap ring	XBC3900221116		ZBC37.1.2.3s		1
19	seal,ring 100 × 114 × 8	XBC3900221117		ZBC37.1.2.3s		1
20	clevis,rod end clevis	XBC3900221118		ZBC37.1.2.3		1

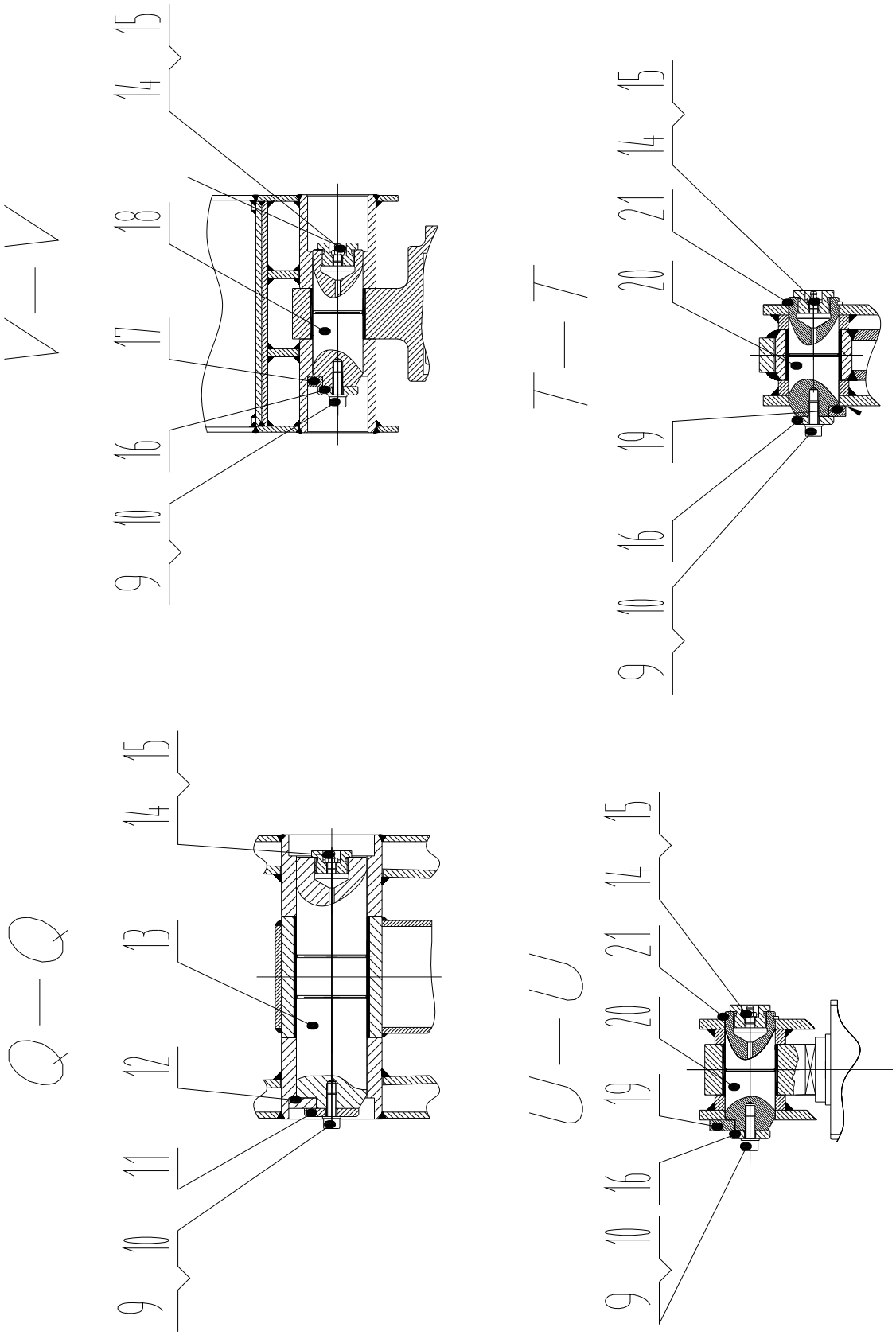
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.4 BOOM SECTION 3 XBC39.1.3

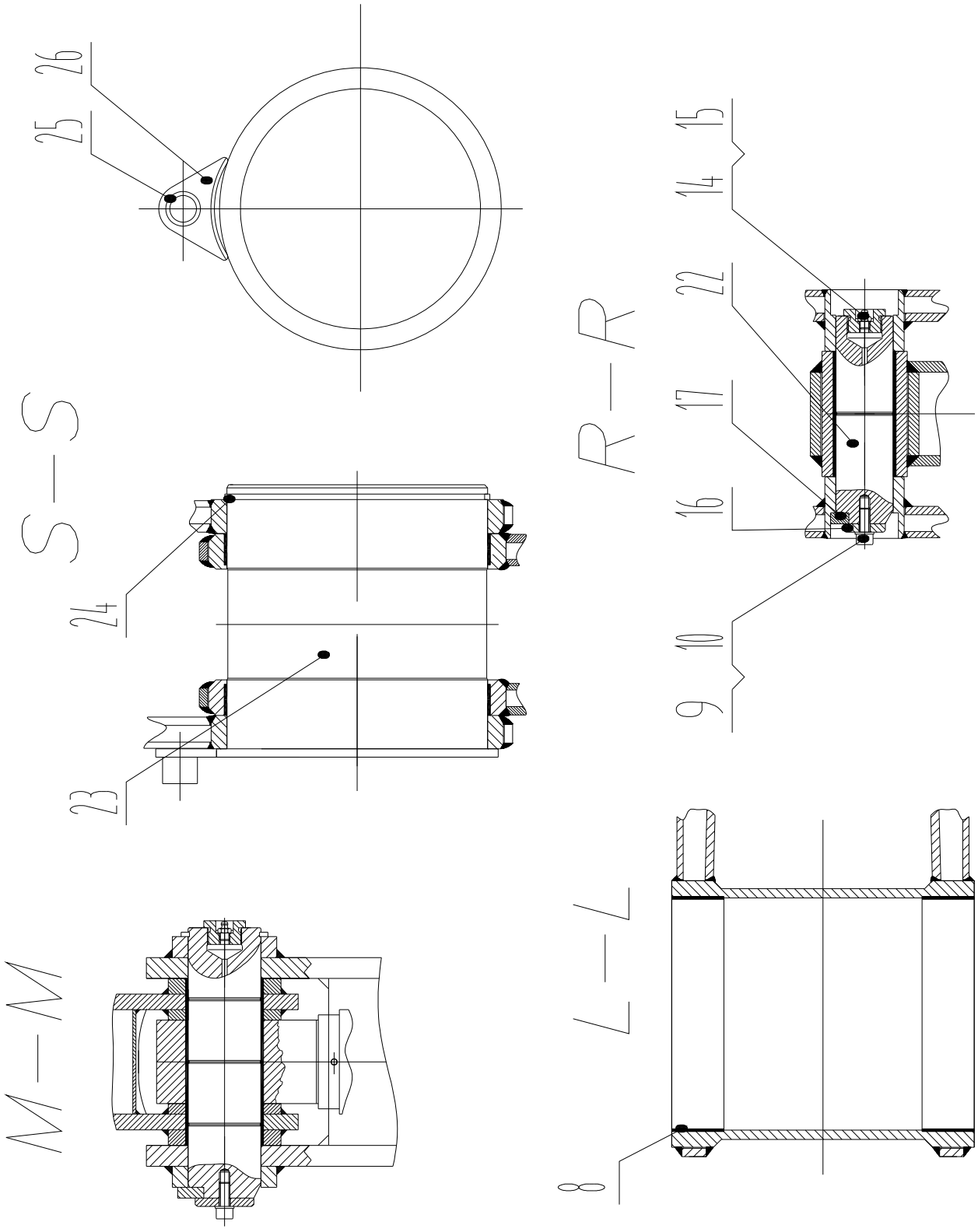
2.4.1 SECTION 3 XBC39.1.3.1



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

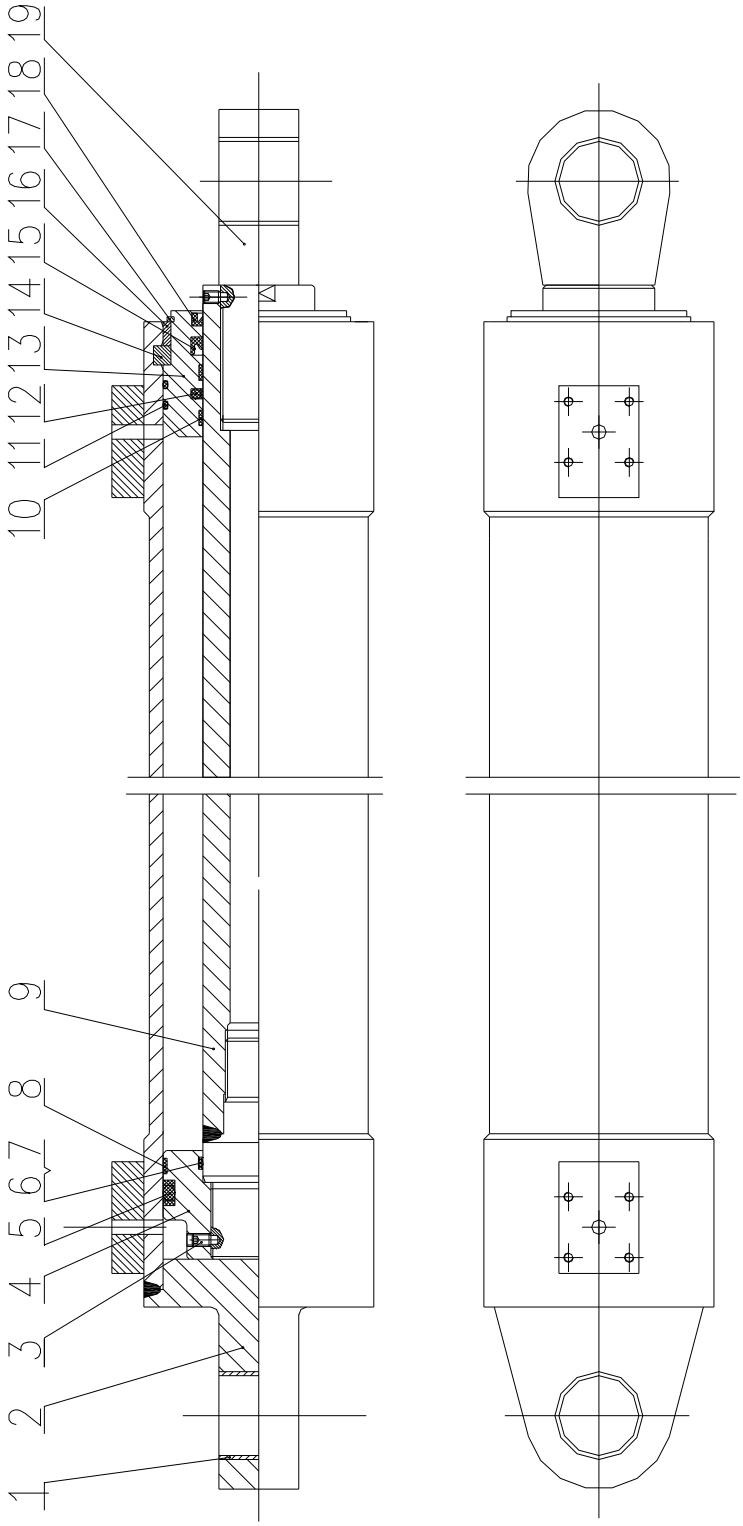


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	section 3	XBC39.1.3.1		XBC39.1.3		1
2	link,pressure link	ZBC37.1.3.2		XBC39.1.3		1
3	plate 5 × 200 × 280	ZBC37.1.3-1		XBC39.1.3		2
4	base,hook base	XBC39.1.3.3		XBC39.1.3		1
5	block,bumper block	XBC39.1.3.4		XBC39.1.3		1
6	cylinder section 3	ZBC37.1.3.5		XBC39.1.3		1
7	link,lever link	ZBC37.1.3.6		XBC39.1.3		1
8	bushing Φ225 × Φ220 × 50	ZBC37.1.3-2		XBC39.1.3		2
9	bolt M10 × 25	CB00000005		XBC39.1.3		5
10	washer 10	CW00000001		XBC39.1.3		5
11	ring,snap ring	ZBC37.1.2-3		XBC39.1.3		1
12	plate 1	ZBC37.1.1-6		XBC39.1.3		1
13	pin Φ70 × 249	ZBC37.1.3-3		XBC39.1.3		1
14	plug,screw plug	ZBC37.1.1-7		XBC39.1.3		5
15	nipple M10 × 1	CL00000001		XBC39.1.3		5
16	ring,snap ring	ZBC37.1.3-4		XBC39.1.3		3
17	plate	ZBC37.1.3-5		XBC39.1.3		2
18	pin Φ50 × 136	ZBC37.1.3-6		XBC39.1.3		2
19	plate 2	ZBC37.1.1-9		XBC39.1.3		2
20	pin Φ50 × 118	ZBC37.1.3-7		XBC39.1.3		2
21	ring,snap ring for shaft 50	CD00000009		XBC39.1.3		2
22	pin ΦC55 × 199	ZBC37.1.3-8		XBC39.1.3		1
23	pin,hollow	ZBC37.1.3-9		XBC39.1.3		1
24	ring,snap ring for shaft 250	ZBC37.1.3-10		XBC39.1.3		1
25	plate	ZBC37.1.2-8		XBC39.1.3		1
26	plate,position plate	ZBC37.1.2-9		XBC39.1.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.4.1-1 CYLINDER OF SECTION 3 ZBC37.1.3.5



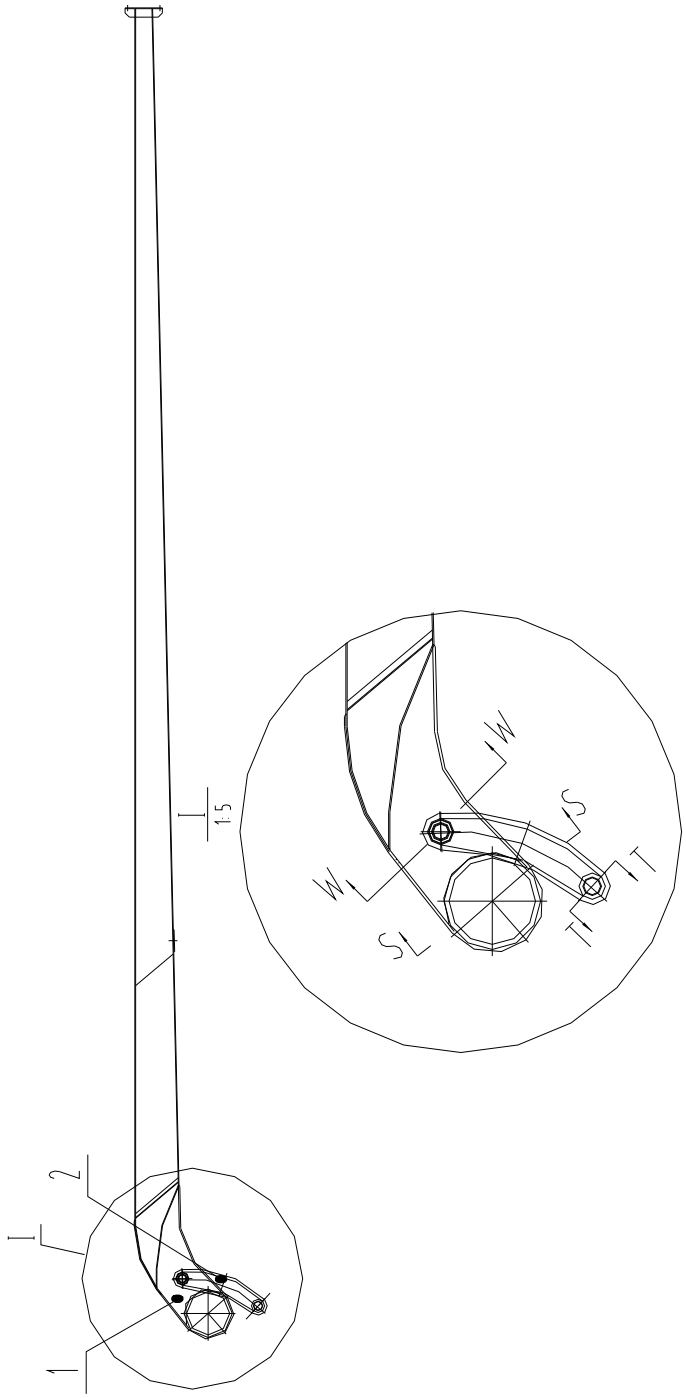
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bearing	XBC3900231101		ZBC37.1.3.5s		2
2	cylinder body	XBC3900231102		ZBC37.1.3.5		1
3	bolt M8 × 15	CB00000044		ZBC37.1.3.5s		2
4	piston	XBC3900231104		ZBC37.1.3.5		1
5	seal,bearing seal 120 × 105 × 16	XBC3900231105		ZBC37.1.3.5s		1
6	O-ring 71 × 3.55	CO00000006		ZBC37.1.3.5s		1
7	ring,snap ring 75.66 × 70 × 1.5	CD00000012		ZBC37.1.3.5s		2
8	ring,guide ring 120 x 105 x 9.7	XBC3900231108		ZBC37.1.3.5s		2
9	rod,piston rod assembly	XBC3900231109		ZBC37.1.3.5		1
10	ring,guide ring 70 x 75 x 9.7	XBC3900231110		ZBC37.1.3.5s		2
11	O-ring 112 x 3.55	CO00000011		ZBC37.1.3.5s		2
12	seal,combination seal 70 x 6.3 x85.1	XBC3900231112		ZBC37.1.3.5s		1
13	carrier,seal	XBC3900231113		ZBC37.1.3.5		1
14	ring,key ring	XBC3900231114		ZBC37.1.3.5s		1
15	seal,bearing seal 70 x 85 x 11.4	XBC3900231115		ZBC37.1.3.5s		1
16	ring,spacer ring	XBC3900231116		ZBC37.1.3.5s		1
17	ring,snap ring 110	CD00000013		ZBC37.1.3.5s		1
18	seal,ring 70 x 84 x 8	XBC3900231118		ZBC37.1.3.5s		1
19	clevis,rod end clevis	XBC3900231119		ZBC37.1.3.5		1

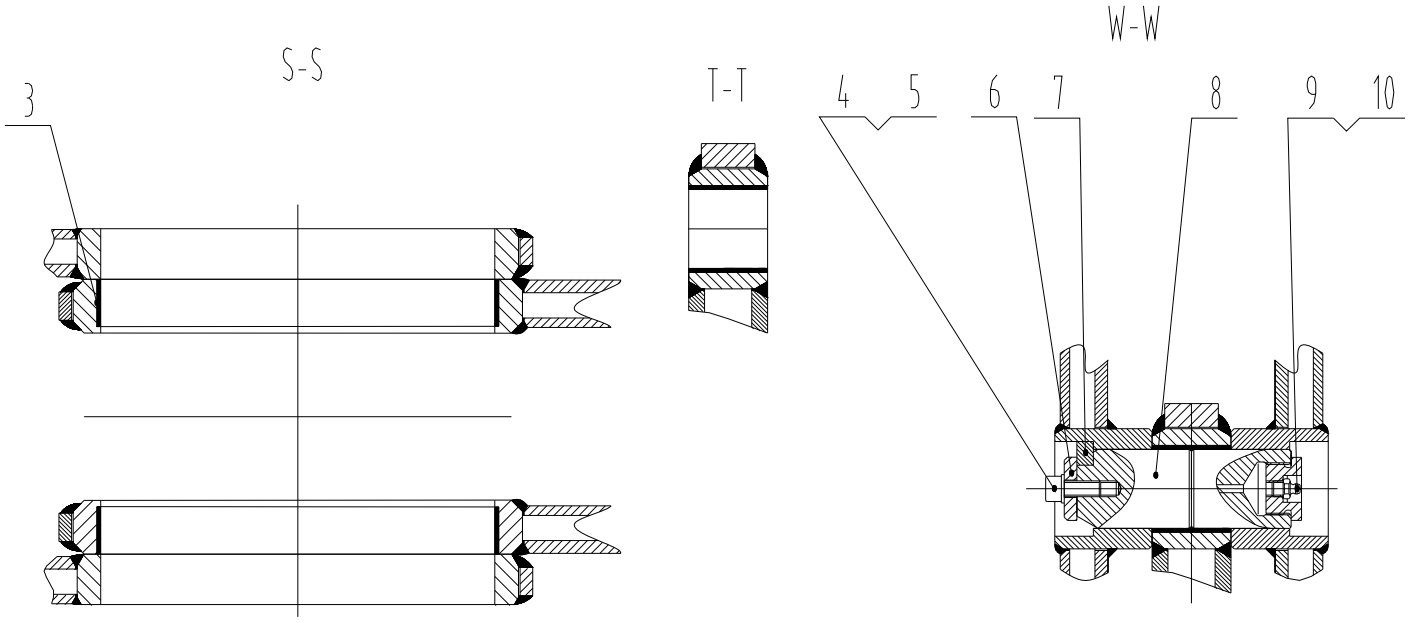
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.5 BOOM SECTION 4 ZBC39.1.4

2.5.1 SECTION 4 ZBC39.1.4.1



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

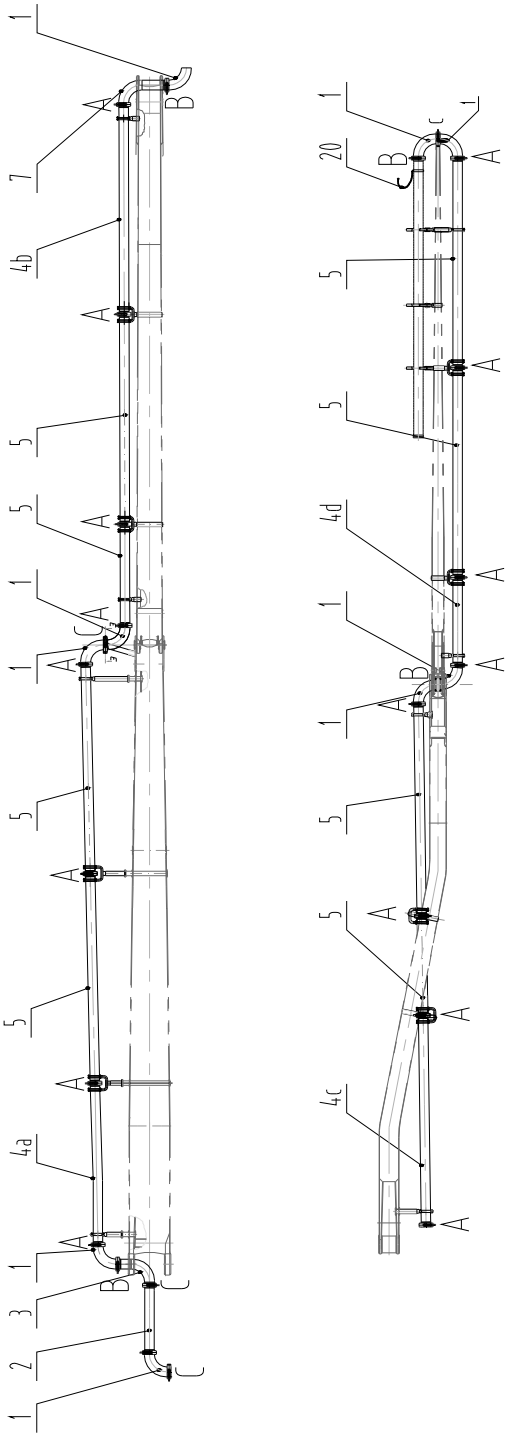


No.	Description	Part Number	Material	Parent	Weight	Quantity
1	section 4	ZBC39.1.4.1		ZBC39.1.4		1
2	link,pressure link	ZBC37.1.4.2		ZBC39.1.4.1		1
3	bushing Φ250×255×30	ZBC37.1.4-1		ZBC39.1.4.1		2
4	bolt M10 × 25	CB00000005		ZBC39.1.4.1		1
5	washer 10	CW00000001		ZBC39.1.4.1		1
6	ring,snap ring	ZBC37.1.3-4		ZBC39.1.4.1		1
7	plate	ZBC37.1.3-5		ZBC39.1.4.1		1
8	pin Φ50 × 136	ZBC37.1.4-2		ZBC39.1.4.1		1
9	plug,screw plug	ZBC37.1.1-7		ZBC39.1.4.1		1
10	nipple M10 × 1	CL00000001		ZBC39.1.4.1		1

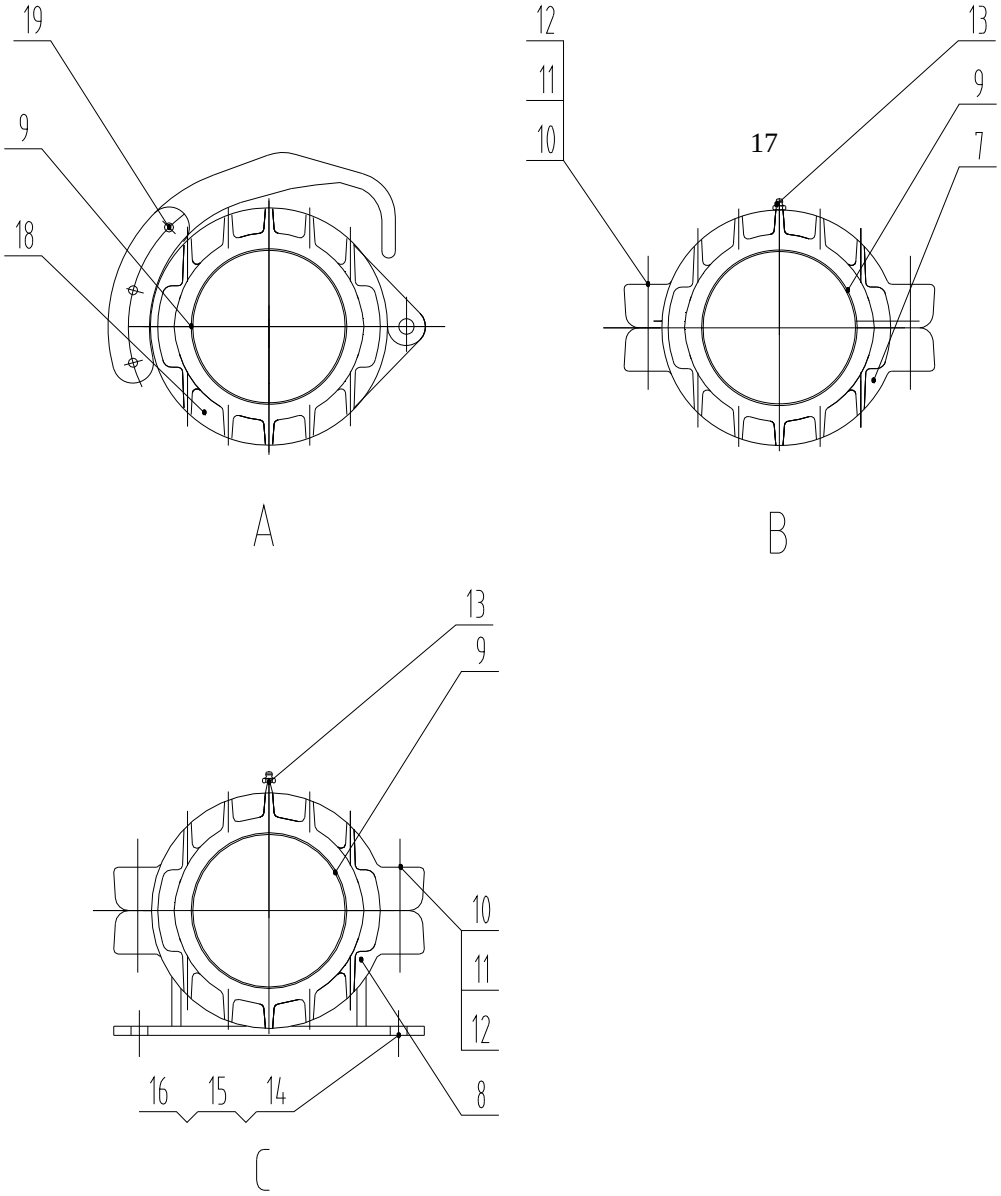
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.6 DELIVERY PIPE

2.6.1 BOOM DELIVERY PIPE XBC39.11



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

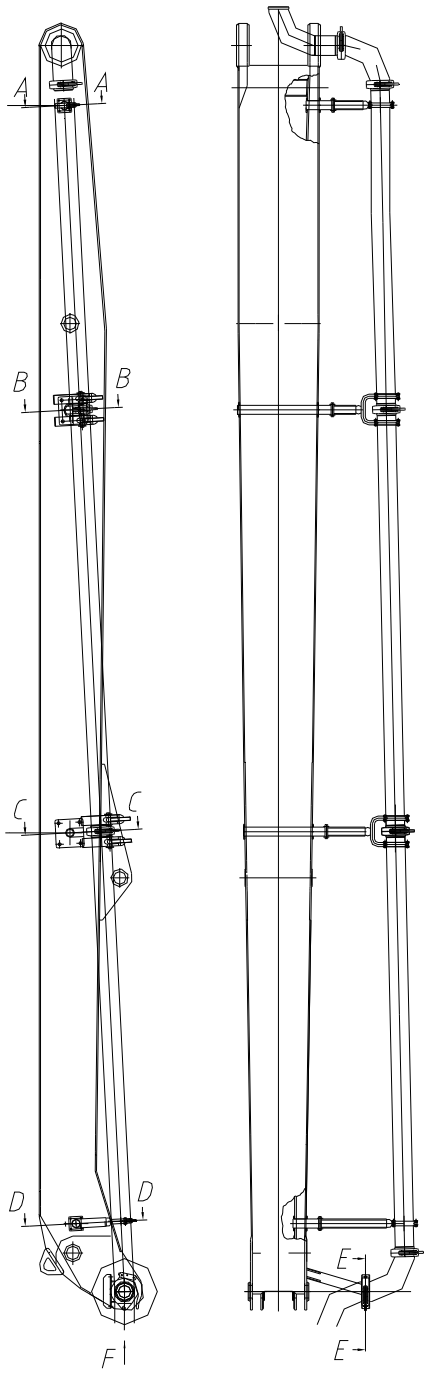


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

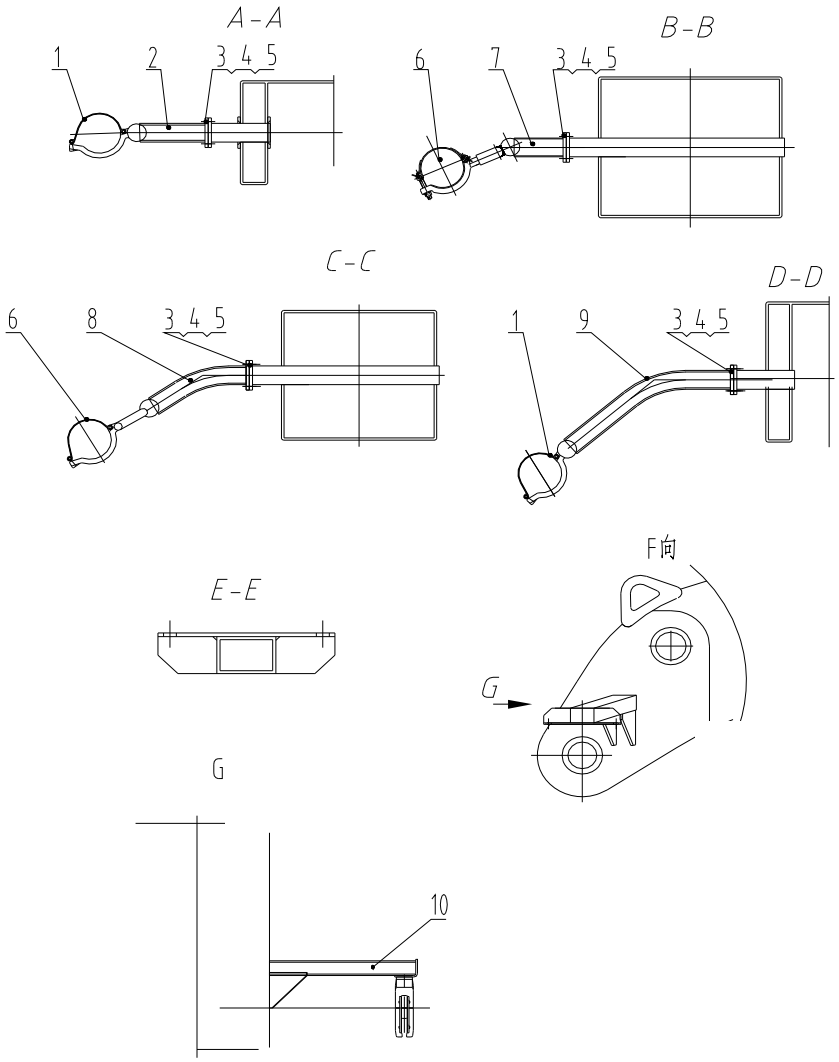
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	elbow,125mmx90,br275 lp	ZBC37.10.1		XBC39.11		9
2	pipe,makeup 125x1015mm lp	XBC39.00-2502		XBC39.11		1
3	elbow, extended 125mmx90,br190 lp	XBC39.00-2503		XBC39.11		1
4a	pipe,makeup 125x2754mm lp	XBC39.00-254a		XBC39.11		1
4b	pipe,makeup 125x1832mm lp	XBC39.00-254b		XBC39.11		1
4c	pipe,makeup 125x1803mm lp	XBC39.00-254c		XBC39.11		1
4d	pipe,makeup 125x2045mm lp	XBC39.00-254d		XBC39.11		1
5	pipe,straight 125x3000mm lp	XBC39.00-2505		XBC39.11		8
7	elbow,extended 345mm,125mmx90, br275	XBC39.00-2507		XBC39.11		1
8	clamp,base,2bolt 125mm lp	XBC39.00-2508		XBC39.11		5
9	gasket,clamp 125mm hp	XBC39.00-2509		XBC39.11		25
10	bolt M12 × 50	CB00000017		XBC39.11		16
11	washer 12	CW00000003		XBC39.11		16
12	nut 12	CN00000003		XBC39.11		16
13	nipple,grease M10 × 1	CL00000001		XBC39.11		8
14	bolt M16 × 55	CB00000024		XBC39.11		14
15	washer 16	CW00000006		XBC39.11		14
16	nut M16	CN00000005		XBC39.11		14
17	clamp,pipe 2 bolt 125mm lp	XBC39.00-2517		XBC39.11		1
18	clamp,snap 125 mm lp	XBC39.00-2518		XBC39.11		19
19	pin Φ6	XBC39.00-2519		XBC39.11		19
20	chain,hose chain	XBC39.00-2520		XBC39.11		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

SUPPORT OF SECTION 1 DELIVERY PIPE XBC39.11.1

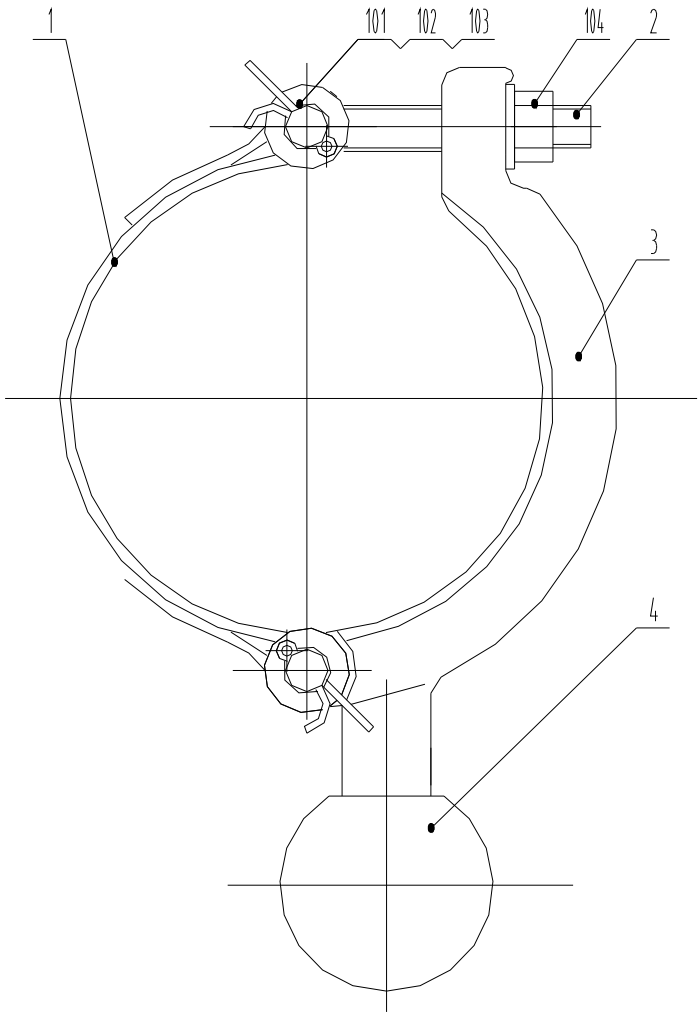


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



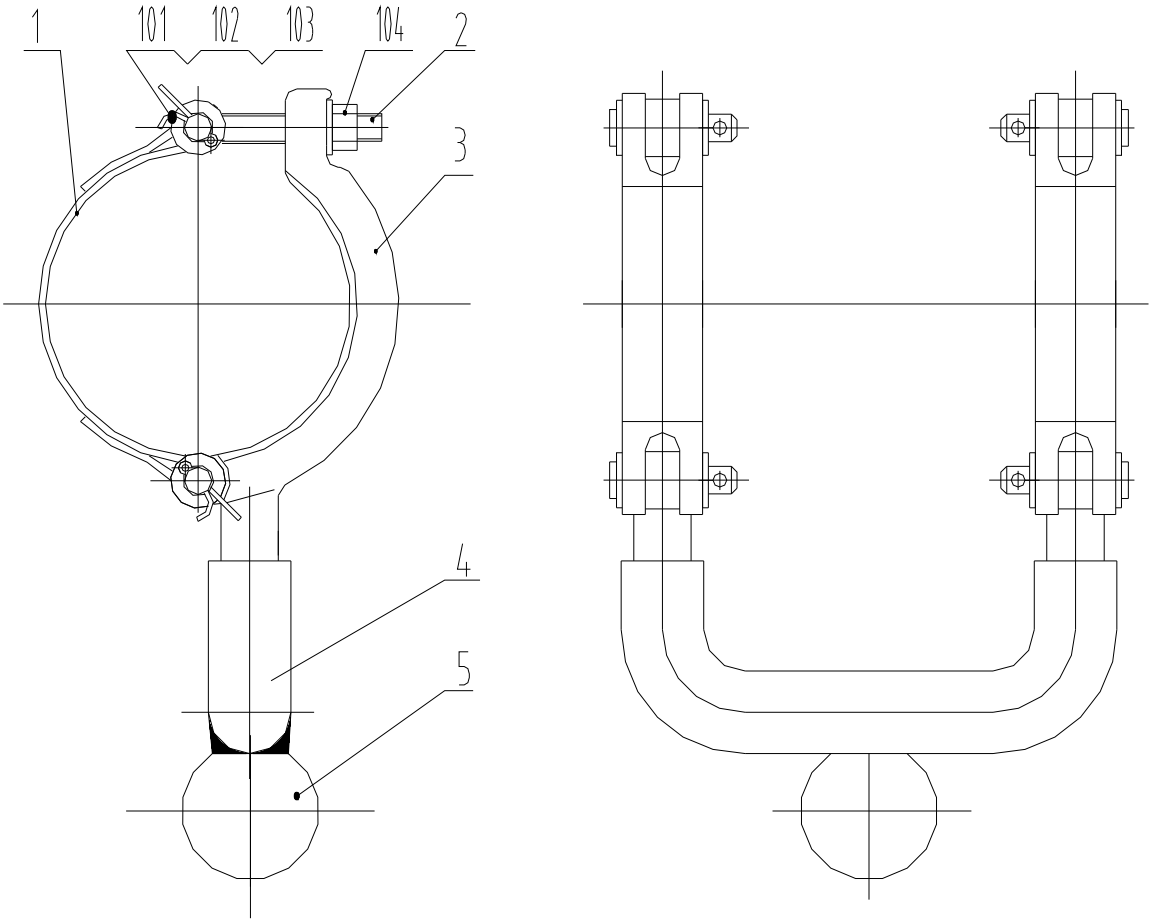
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	support,single	ZBC37.11.1.1	component	XBC39.11.1		2
2	base,support base 1	XBC39.11.1.2	weldment	XBC39.11.1		1
3	bolt M12*60	CB00000018	8.8	XBC39.11.1		18
4	nut M12	CN00000002	5	XBC39.11.1		18
5	washer 12	CW00000003	65Mn	XBC39.11.1		18
6	support,double	ZBC37.11.1.3	component	XBC39.11.1		2
7	support base 2	XBC39.11.1.4	weldment	XBC39.11.1		1
8	support base 3	XBC39.11.1.5	weldment	XBC39.11.1		1
9	support base 4	XBC39.11.1.6	weldment	XBC39.11.1		1
10	support base 5	XBC39.11.1.7	weldment	XBC39.11.1		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	strap	ZBC37.11.1.1-1	Q235	XBC39.11.1		1
2	bolt	ZBC37.11.1.1-2	35	XBC39.11.1		1
3	support,pipe	ZBC37.11.1.1-3	ZG230-450	XBC39.11.1		1
4	ball,steel ball Φ60	ZBC37.11.1.1-4	Q235	XBC39.11.1		1
101	pin,cylindrical pin 12x 50	C100000003	35	XBC39.11.1		2
102	pin,cotter pin 4 x 25	C100000005	Q195	XBC39.11.1		2
103	washer 12	CW00000004	100HV	XBC39.11.1		5
104	nut 12	CN00000003	5	XBC39.11.1		1

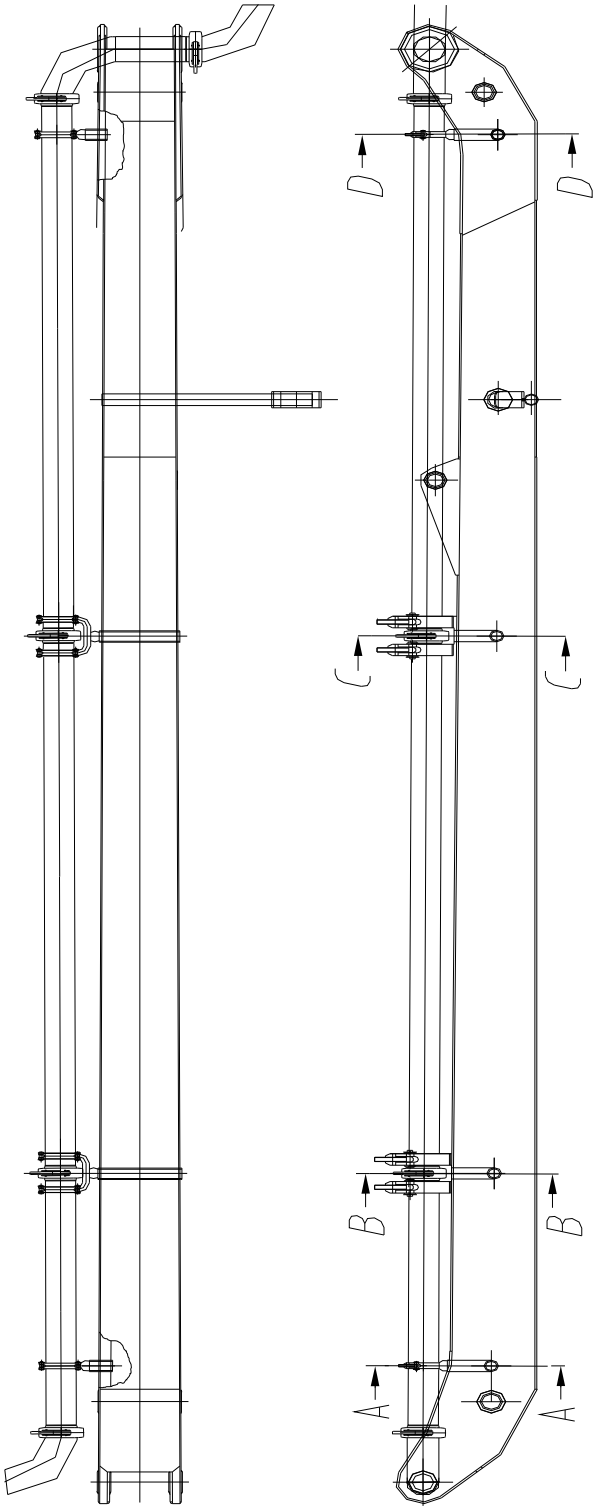
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



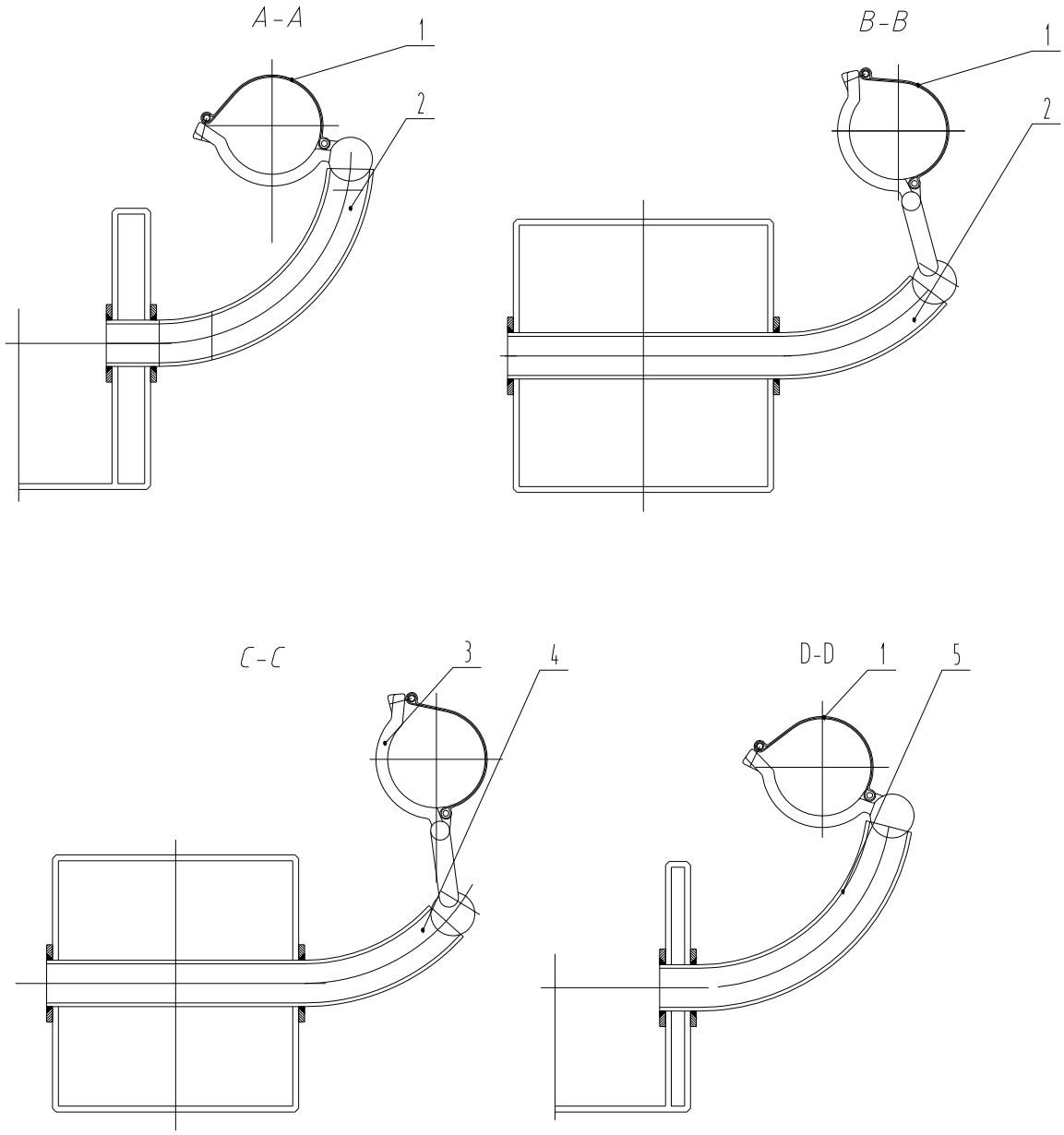
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	strap	ZBC37.11.1.1-1	Q235	XBC39.11.1		2
2	bolt	ZBC37.11.1.1-2	35	XBC39.11.1		2
3	support,pipe	ZBC37.11.1.1-3	ZG35	XBC39.11.1		1
4	pipe,steel pipe	ZBC37.11.1.3-1	20	XBC39.11.1		1
5	ball,steel ball Φ60	ZBC37.11.1.1-4	Q235	XBC39.11.1		1
101	pin,cylindrical pin 12 × 50	C100000003	35	XBC39.11.1		4
102	pin,cotter pin 4 × 25	C100000005	Q195	XBC39.11.1		4
103	washer 12	CW00000004	100HV	XBC39.11.1		10
104	nut 12	CN00000003	5	XBC39.11.1		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

SUPPORT OF SECTION 2 DELIVERY PIPE XBC39.11.2



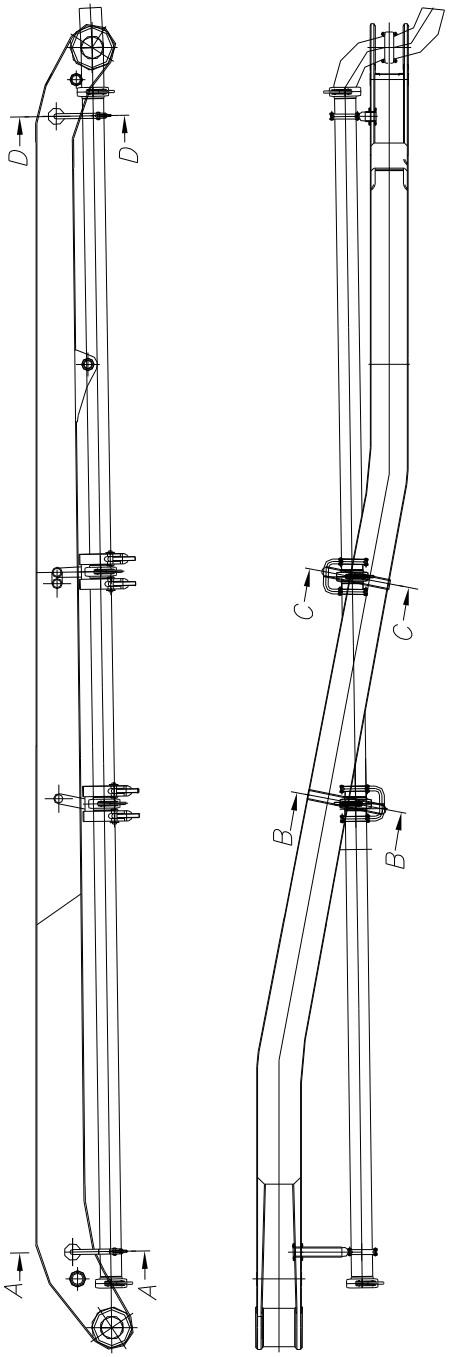
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



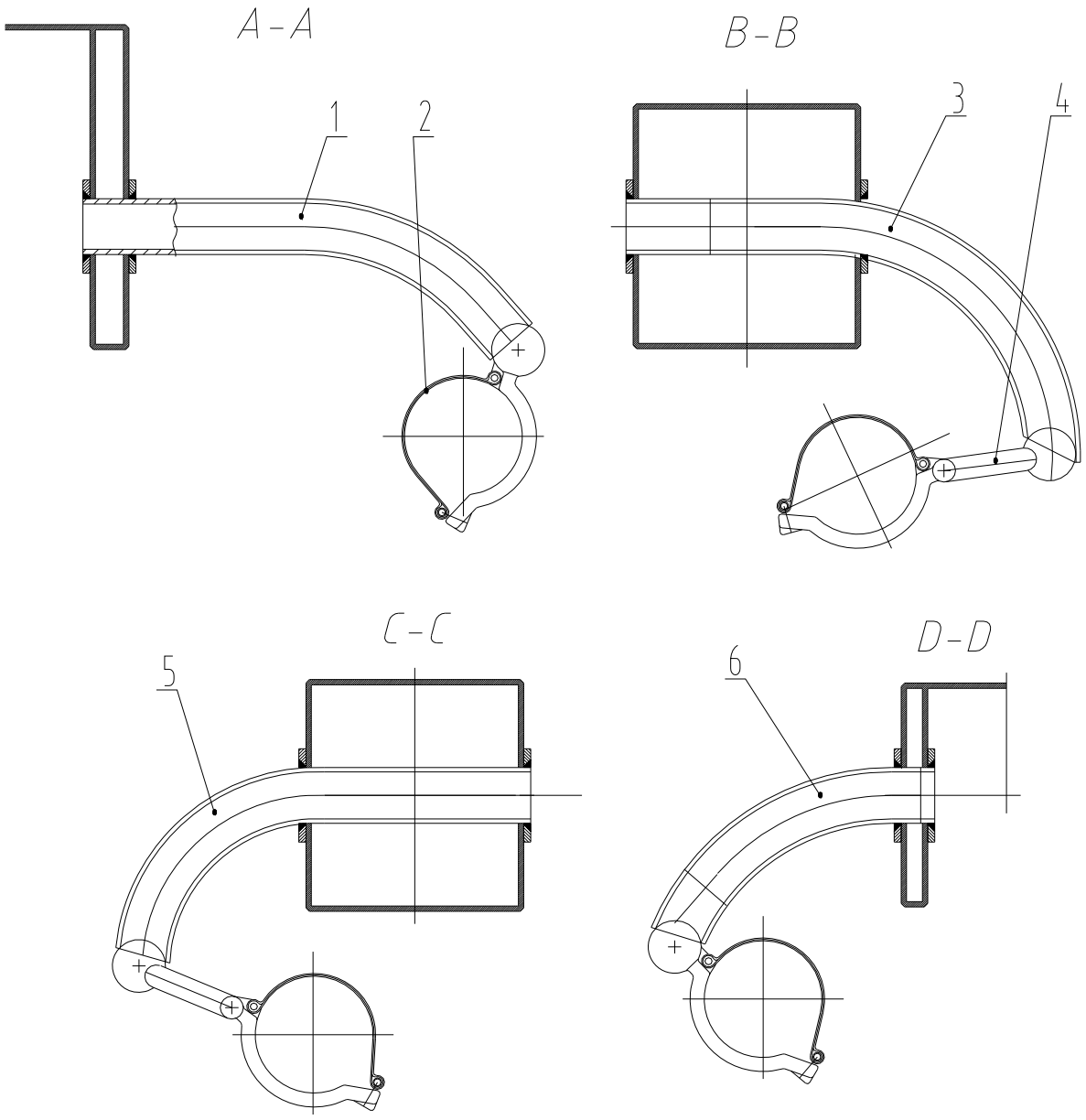
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	support,single	ZBC37.11.1.1	component	XBC39.11.2		2
2	support base 1	XBC39.11.2-1	Q345-A	XBC39.11.2		1
3	support,double	ZBC37.11.1.3	component	XBC39.11.2		2
4	support base 2	XBC39.11.2-2	Q345-A	XBC39.11.2		2
5	support base 3	XBC39.11.2-3	Q345-A	XBC39.11.2		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

SUPPORT OF SECTION 3 DELIVERY PIPE XBC39.11.3



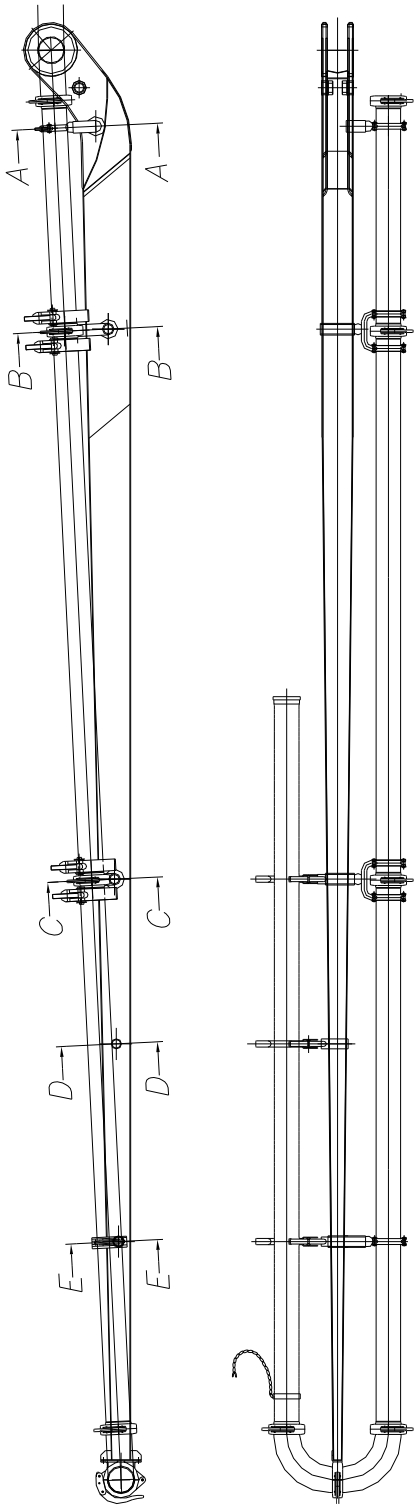
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



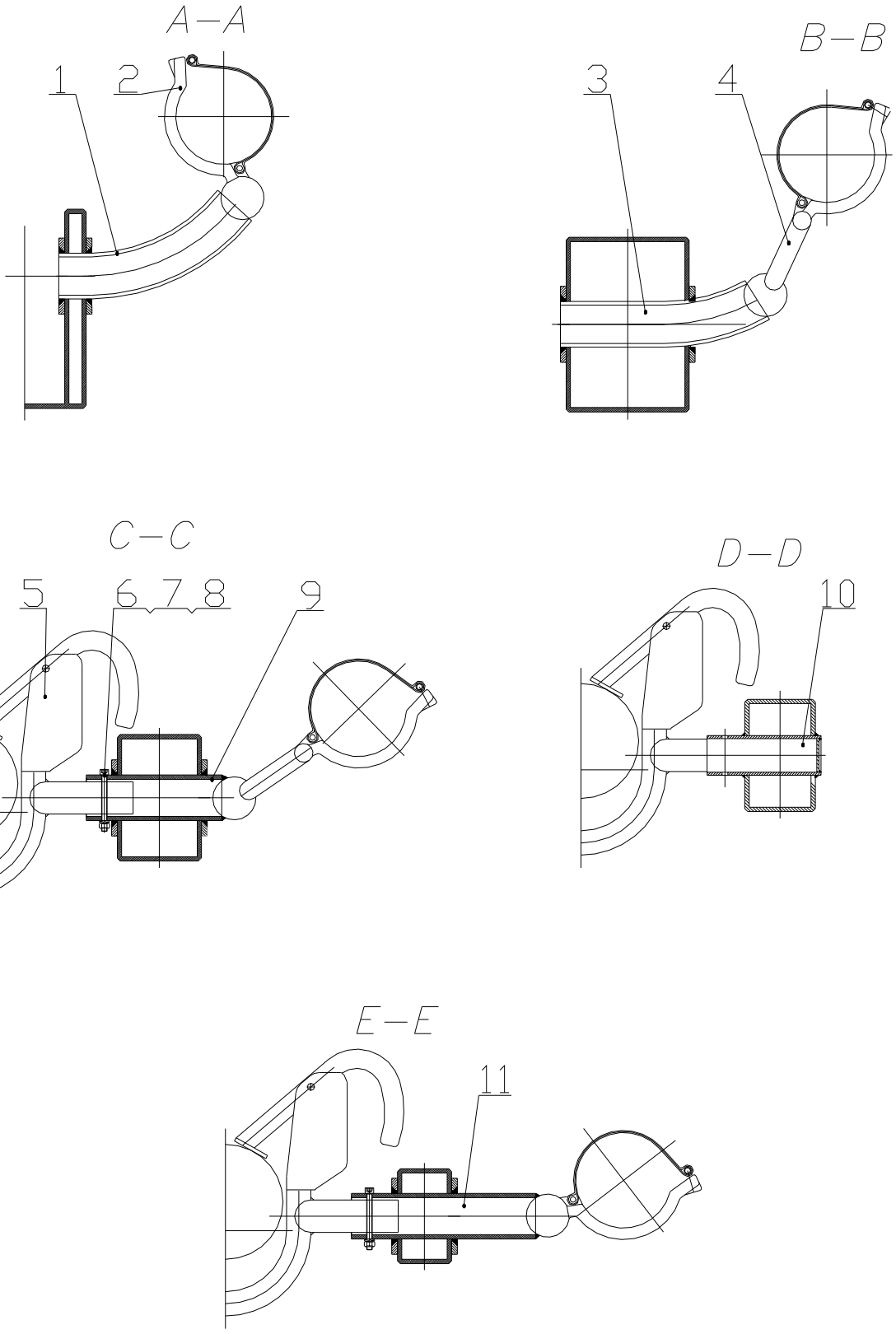
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	support base 1	XBC39.11.3-1	Q345-A	XBC39.11.3		1
2	support,single	ZBC37.11.1.1	component	XBC39.11.3		2
3	support base 2	XBC39.11.3-2	Q345-A	XBC39.11.3		1
4	support,double	ZBC37.11.1.3	component	XBC39.11.3		2
5	support base 3	XBC39.11.3-3	Q345-A	XBC39.11.3		1
6	support base 4	XBC39.11.3-4	Q345-A	XBC39.11.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

SUPPORT OF SECTION 4 DELIVERY PIPE XBC39.11.4



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

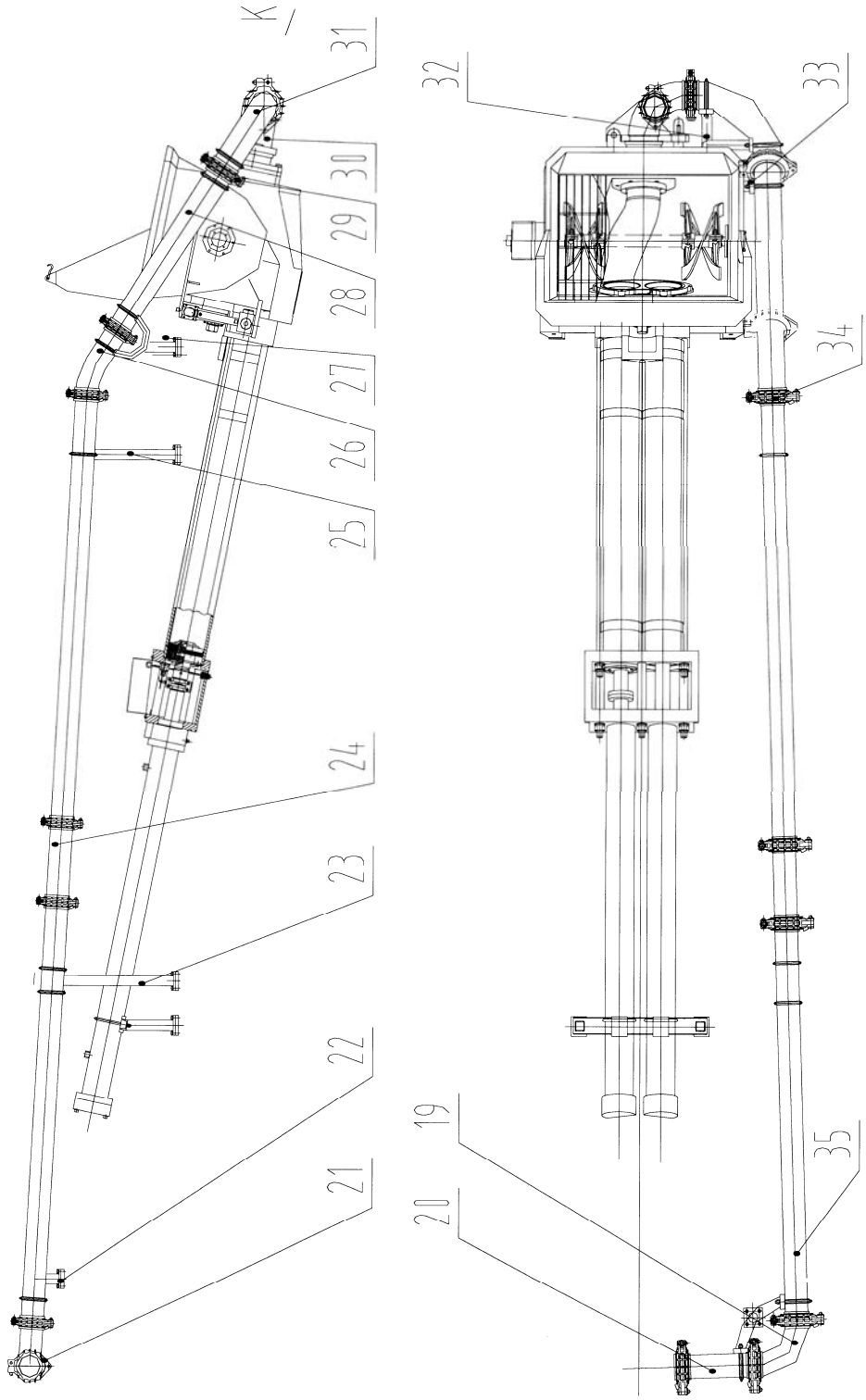


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

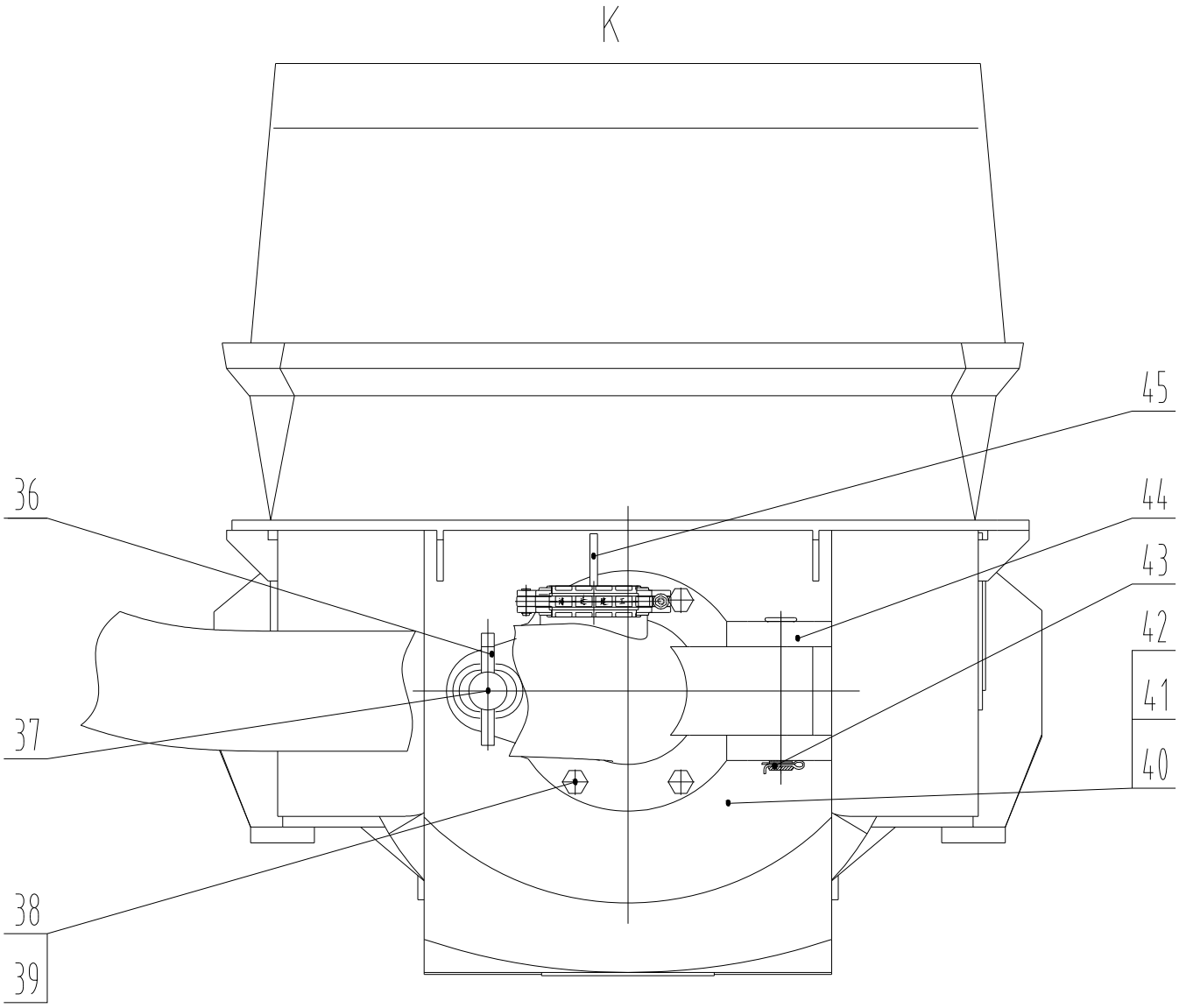
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	support base 1	XBC39.11.4-1	Q345-A	XBC39.11.4		1
2	support,single	ZBC37.11.1.1	component	XBC39.11.4		1
3	support base 2	XBC39.11.4-2	Q345	XBC39.11.4		1
4	support,double	ZBC37.11.1.3	component	XBC39.11.4		2
5	support,hose support	ZBC37.11.4.1	component	XBC39.11.4		3
6	bolt M8 x 75	CB00000053	8.8	XBC39.11.4		3
7	nut M8	CN00000008	6	XBC39.11.4		3
8	washer 8	CW00000017	65Mn	XBC39.11.4		1
9	support base 3	XBC39.11.4-3	Q345-A	XBC39.11.4		1
10	support base 4	XBC39.11.4.2	weldment	XBC39.11.4		1
11	support base 5	XBC39.11.4-4	Q345	XBC39.11.4		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

2.6.2 DECK DELIVERY PIPE BC37.3



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

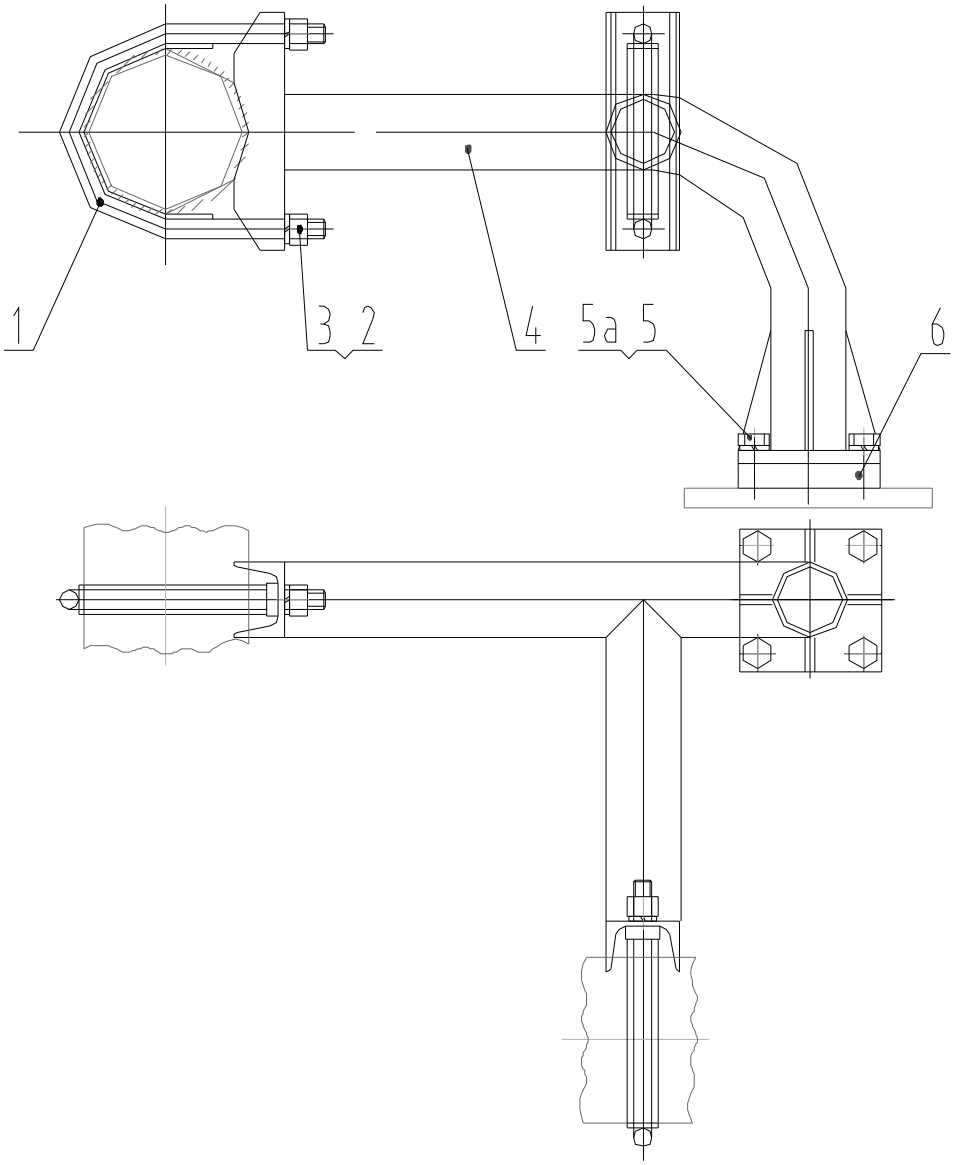


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Name	Code	Material	Parent	Weight	Quantity
19	elbow 125mmx90	BC37.3.6		BC37.3		1
20	pipe,makeup125×460mm	BC37.3.7		BC37.3		1
21	clamp,pipe 125mm (Φ148)	BC37.3.8		BC37.3		2
22	support 1	BC37.3.9		BC37.3		1
23	support 2	BC37.3.10		BC37.3		1
24	pipe,makeup 125x3661mm	BC37.3.11		BC37.3		1
25	support 3	BC37.3.12		BC37.3		1
26	elbow 125mmx30	BC37.3.13		BC37.3		1
27	support 4	BC37.3.14		BC37.3		1
28	reducer 150-125mm	BC37.3.15		BC37.3		1
29	clamp,pipe 150mm	60S1816.14.1		BC37.3		3
30	elbow,hinged elbow	BC37.3.16		BC37.3		1
31	elbow,150mmx90	BC37.3.17		BC37.3		1
32	support 5	BC37.3.18		BC37.3		1
33	support 6	BC37.3.19		BC37.3		1
34	clamp,125mm hp (157mm)	60S1816.14.13		BC37.3		4
35	pipe,makeup 125x2127mm	BC37.3.20		BC37.3		1
36	wedge	BC37.3-6		BC37.3		1
37	pin,slotted	BC37.3-7		BC37.3		1
38	bolt M24×125	CB00000035		BC37.3		6
39	washer 24	CW00000013		BC37.3		6
40	outlet,concrete outlet	BC37.3.21		BC37.3		1
41	O-ring Φ205×7	CO00000024		BC37.3		1
42	O-ring Φ258×7	CO00000026		BC37.3		1
43	pin,cotter pinΦ5×56	C100000010		BC37.3		1
44	pin Φ35×210	BC37.3-8		BC37.3		1
45	cover,cleanout port cover	BC37.3.22		BC37.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

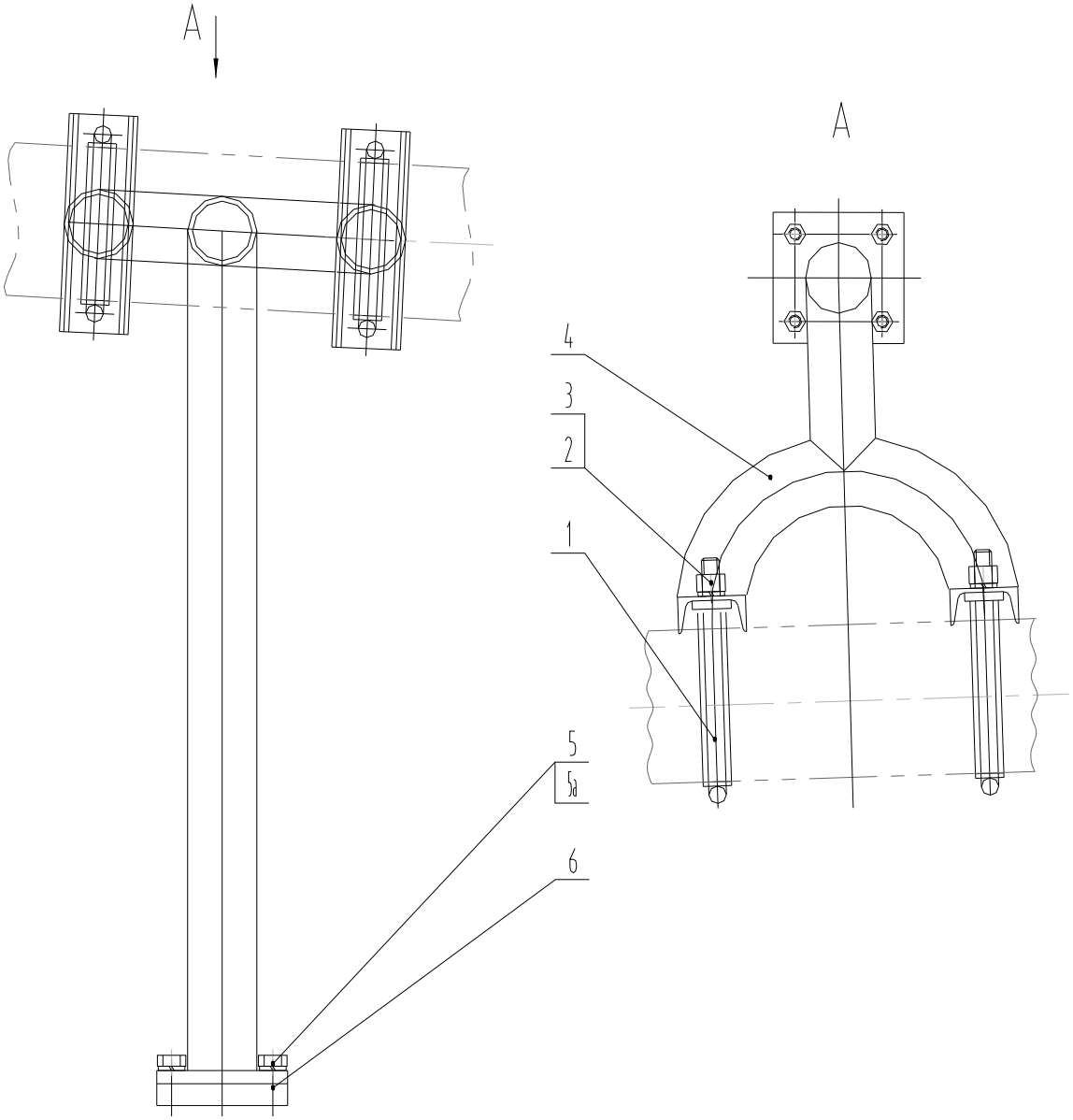
SUPPORT 1 OF DECK DELIVERY PIPE



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	U bolt	BC37.3.9.1		BC37.3		2
2	washer 14	CW00000005		BC37.3		8
3	nut M14	CN00000004		BC37.3		4
4	support rod	BC37.3.9.2		BC37.3		1
5	bolt M16×30	CB00000019		BC37.3		4
5a	washer 16	CW00000006		BC37.3		4
6	plate,base plate	BC37.3.9-1		BC37.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

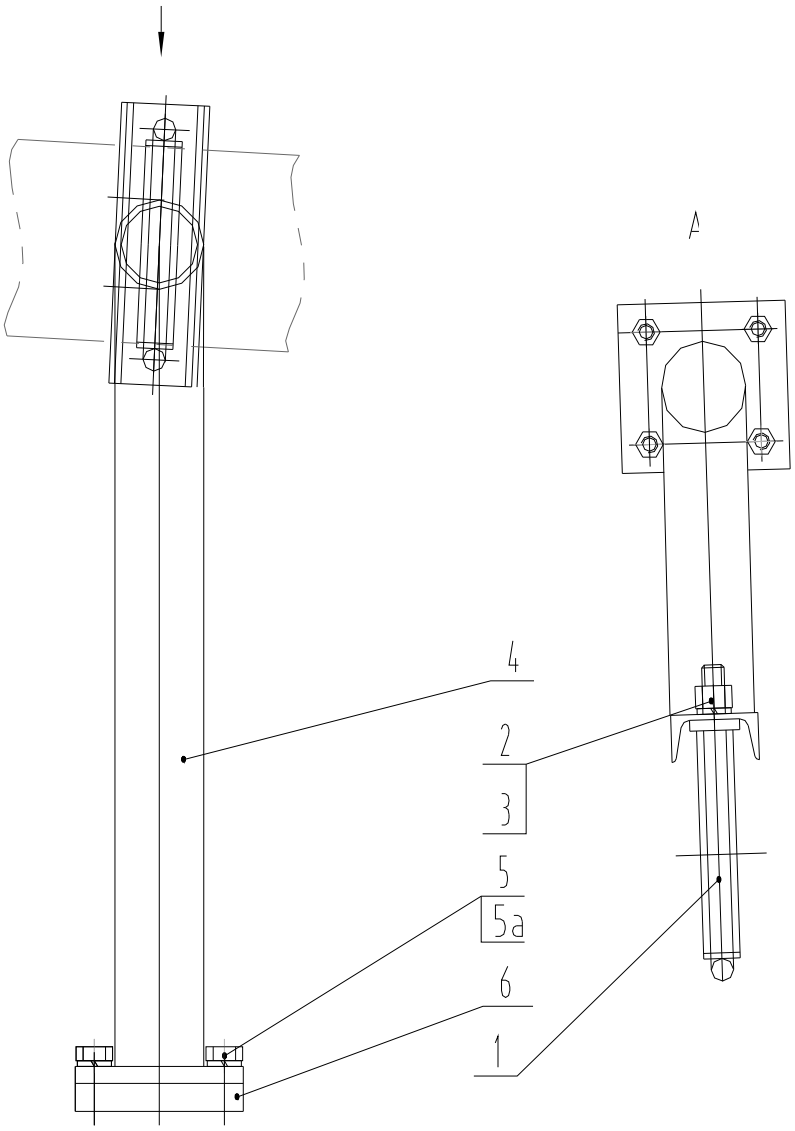
SUPPORT 2 OF DECK DELIVERY PIPE



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	U bolt	BC37.3.9.1		BC37.3		2
2	washer 14	CW00000005		BC37.3		8
3	nut M14	CN00000004		BC37.3		4
4	support rod	BC37.3.10.1		BC37.3		1
5	bolt M16 × 30	CB00000019		BC37.3		4
5a	washer 16	CW00000006		BC37.3		4
6	plate,base plate	BC37.3.9-1		BC37.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

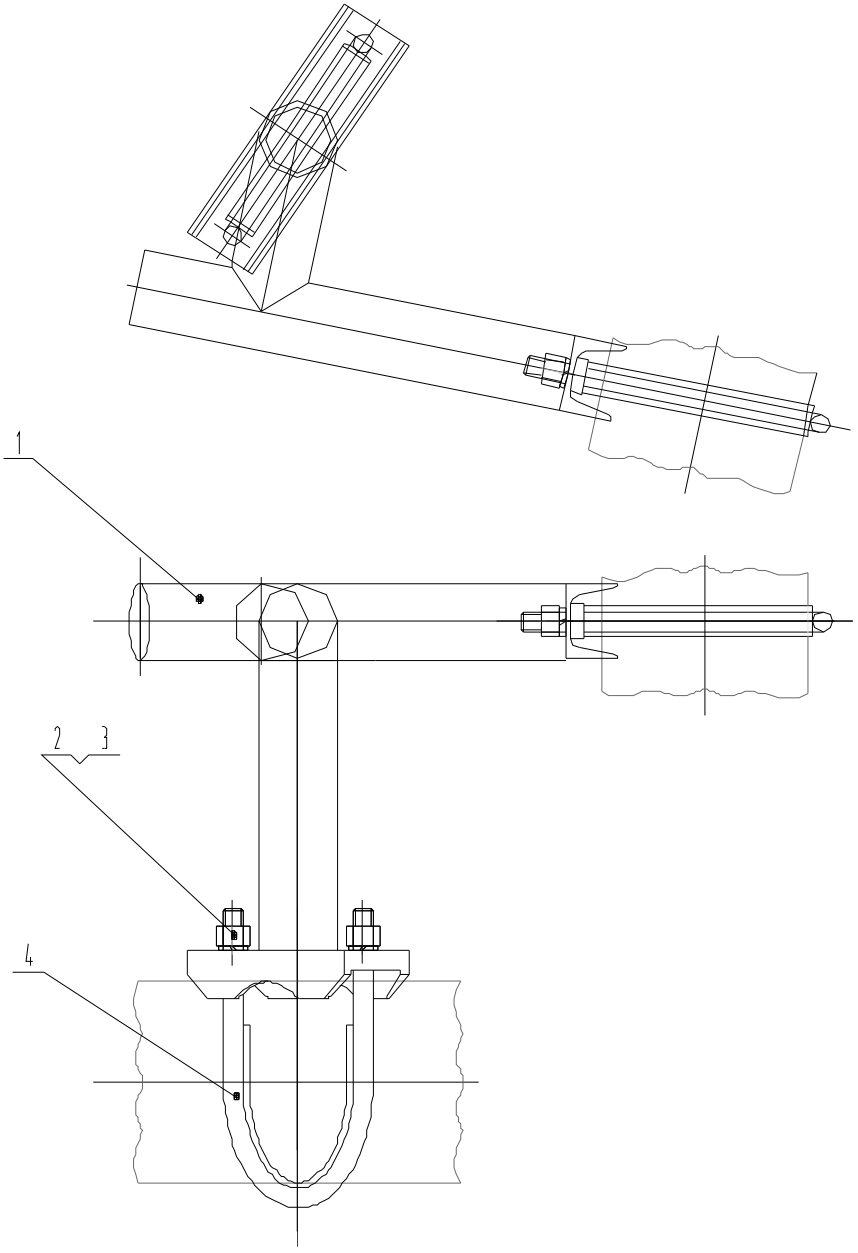
SUPPORT 3 OF DECK DELIVERY PIPE



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	U bolt	BC37.3.9.1		BC37.3		2
2	washer 14	CW00000005		BC37.3		8
3	nut M14	CN00000004		BC37.3		4
4	support rod	BC37.3.12.1		BC37.3		1
5	bolt M16 × 30	CB00000019		BC37.3		4
5a	washer 16	CW00000006		BC37.3		4
6	plate,base plate	BC37.3.9-1		BC37.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

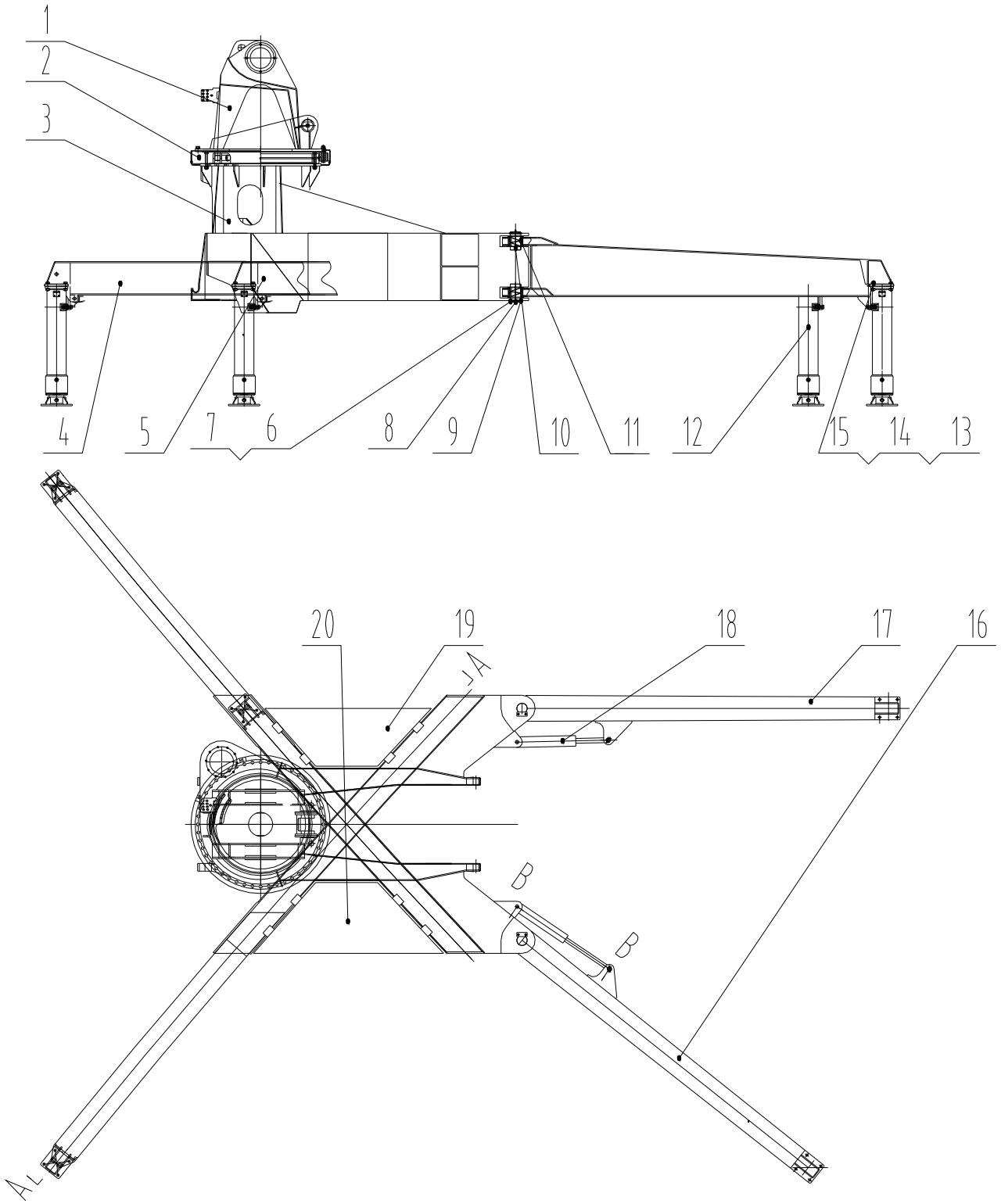
SUPPORT 4 OF DECK DELIVERY PIPE



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bar	BC37.3.18.1		BC37.3		1
2	washer 14	CW00000005		BC37.3		4
3	nut M14	CN00000004		BC37.3		4
4	U bolt	BC37.3.18.2		BC37.3		2

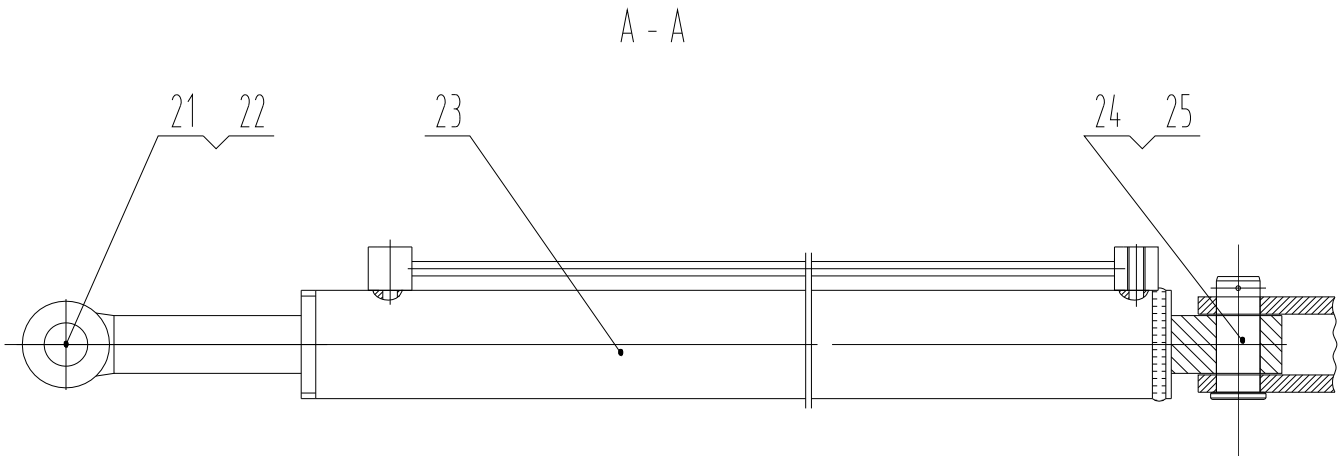
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 3 PEDESTAL AND OUTRIGGERS

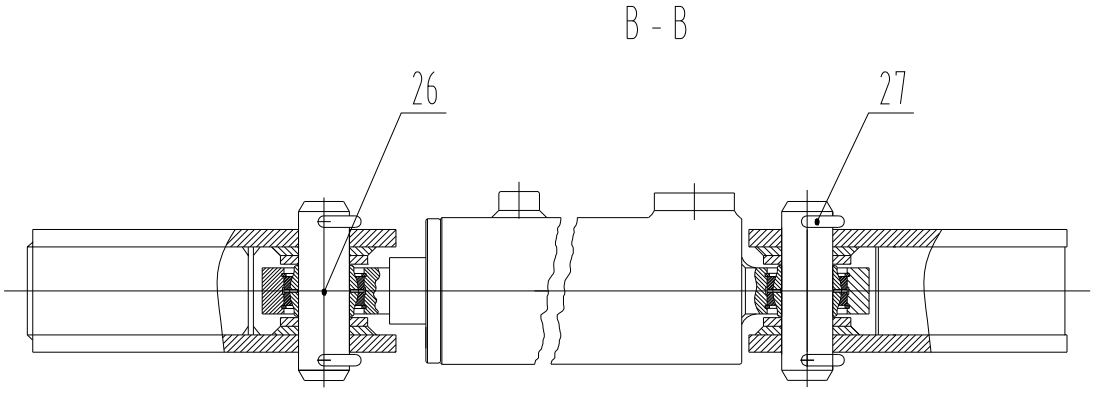


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

EXTEND CYLINDER XBC39.2.8



SWINGOUT CYLINDER ZBC37.2.7

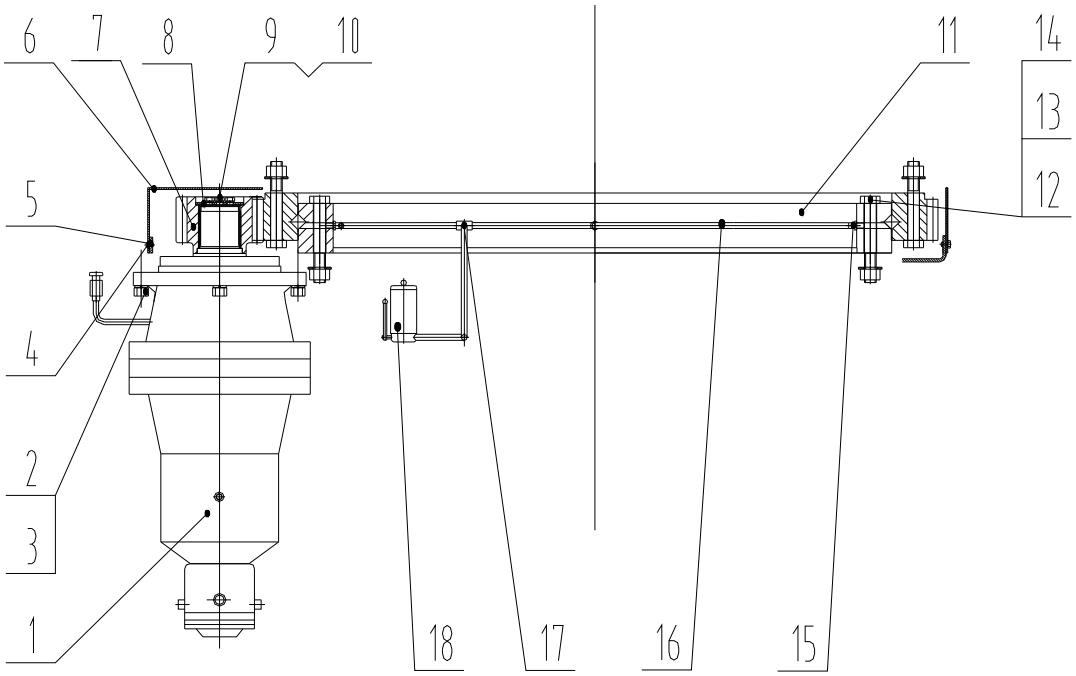


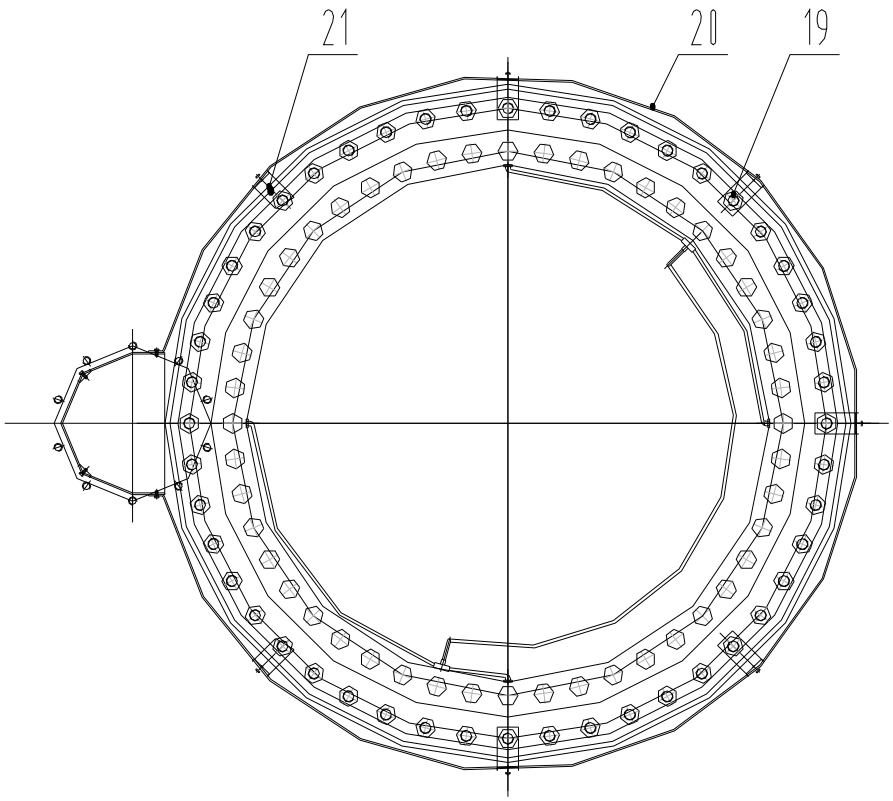
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	masthead	XBC39.2.9		XBC39.2		1
2	rotation assembly	ZBC37.2.2		XBC39.2		1
3	pedestal	XBC39.2.1		XBC39.2		1
4	outrigger,front left	XBC39.2.2		XBC39.2		1
5	outrigger,front right	XBC39.2.3		XBC39.2		1
6	bolt M12 × 20	CB00000012		XBC39.2		8
7	washer 12	CW00000003		XBC39.2		8
8	Nipple M10 × 1	CL00000001		XBC39.2		4
9	plate	ZBC37.2-2		XBC39.2		4
10	pin	ZBC37.2-3		XBC39.2		4
11	bearing	ZBC37.2-4		XBC39.2		4
12	cylinder,jack	XBC39.00-3012		XBC39.2		4
13	bolt M22×70	CB00000032		XBC39.2		8
14	washer 22	CW00000011		XBC39.2		8
15	nut M22	CN00000006		XBC39.2		8
16	outrigger,rear left	XBC38.2.4		XBC39.2		1
17	outrigger,rear right	XBC38.2.5		XBC39.2		1
18	cylinder,swingout	ZBC37.2.7		XBC39.2		2
19	tank,hydraulic tank	XBC39.2.6		XBC39.2		1
20	tank,water tank	XBC39.2.7		XBC39.2		1
21	pin 1	XBC39.2-1		XBC39.2		2
22	ring,snap ring for shaft 30	CD00000003		XBC39.2		2
23	cylinder,extend	XBC39.2.8		XBC39.2		2
24	pin 2	XBC39.2-2		XBC39.2		2
25	pin,cotter pin 6.3 × 55	C100000008		XBC39.2		2
26	pin	ZBC37.2-1		XBC39.2		8
27	pin,cotter pin 8 × 60	C100000009		XBC39.2		16

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.1 ROTATION ASSEMBLY AND DRIVE ZBC37.2.2



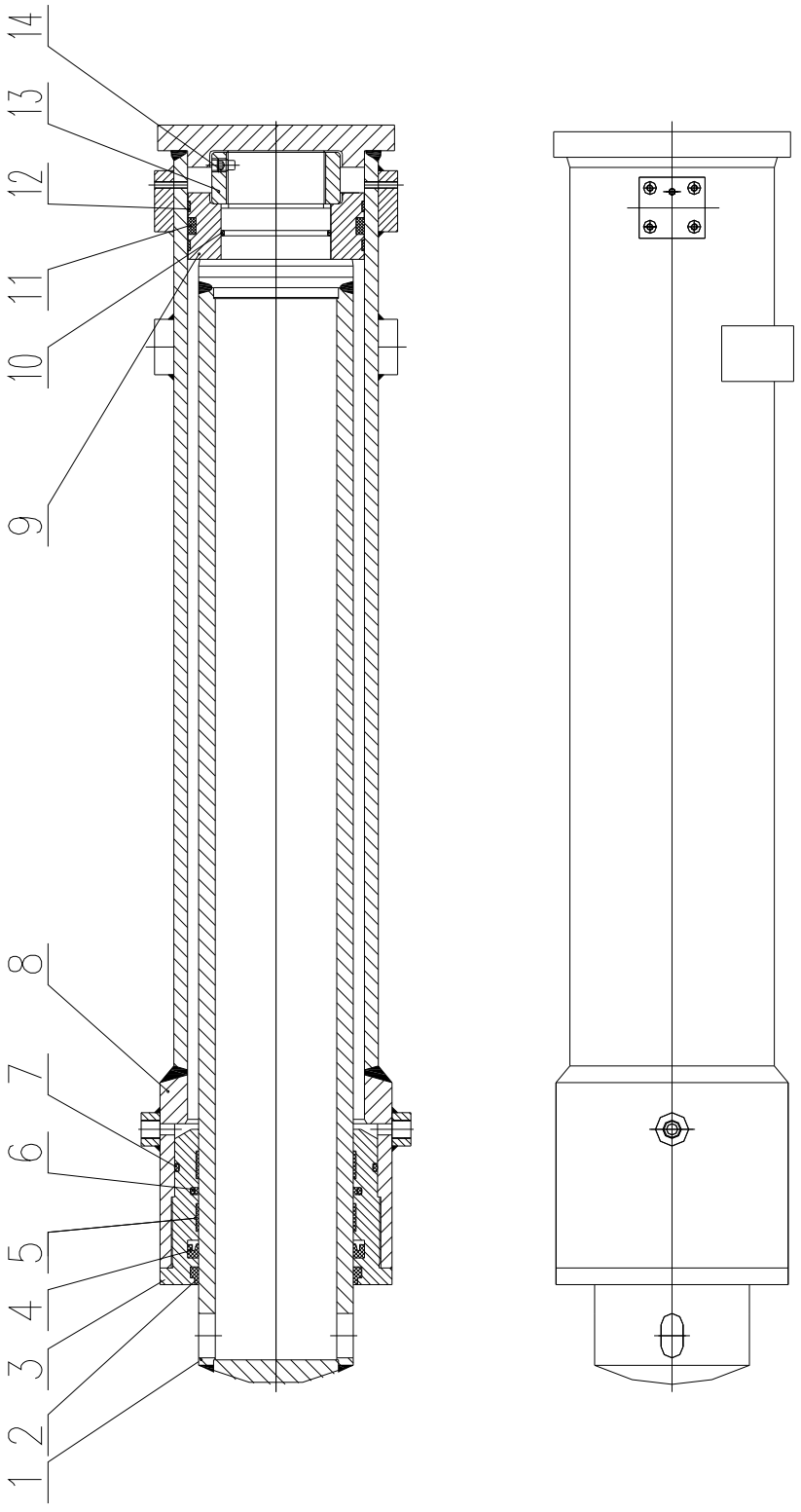


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	gearbox	ET3150/MN-S9		ZBC37.2.2		1
2	washer 16	CW00000006		ZBC37.2.2		10
3	bolt M16 × 55-10.9	CB00000023		ZBC37.2.2		10
4	bolt M8 × 12	CB00000043		ZBC37.2.2		13
5	plate,position plate	ZBC37.2.2-1		ZBC37.2.2		2
6	cover,small gear	ZBC37.2.2.1		ZBC37.2.2		1
7	gear,drive gear	ZBC37.2.2-2		ZBC37.2.2		1
8	cover	BC42.2.3-5		ZBC37.2.2		1
9	bolt M10 × 30	CB00000007		ZBC37.2.2		3
10	washer 10	CW00000001		ZBC37.2.2		3
11	bearing,rotation bearing	06.1116.21		ZBC37.2.2		1
12	bolt M22 × 150	CB00000030		ZBC37.2.2		96
13	nut M22	CN00000006		ZBC37.2.2		96
14	washer 22	CW00000010		ZBC37.2.2		96
15	fitting,tube-to-tube	XBC39.00-3215		ZBC37.2.2		4
16	tube,copper tube φ6 x1 (internal diameter φ4）	XBC39.00-3216		ZBC37.2.2		5
17	fitting,tube-to-tube,tee connector	XBC39.00-3217		ZBC37.2.2		2
18	pump,lubrication manual pump	XBC39.00-3218		ZBC37.2.2		1
19	plate,position plate 1	ZBC37.2.2-3		ZBC37.2.2		5
20	cover,gear protecting	ZBC37.2.2-4		ZBC37.2.2		1
21	plate,position plate 2	ZBC37.2.2-5		ZBC37.2.2		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.2 HYDRAULIC JACK CYLINDER XBC39.00-3012

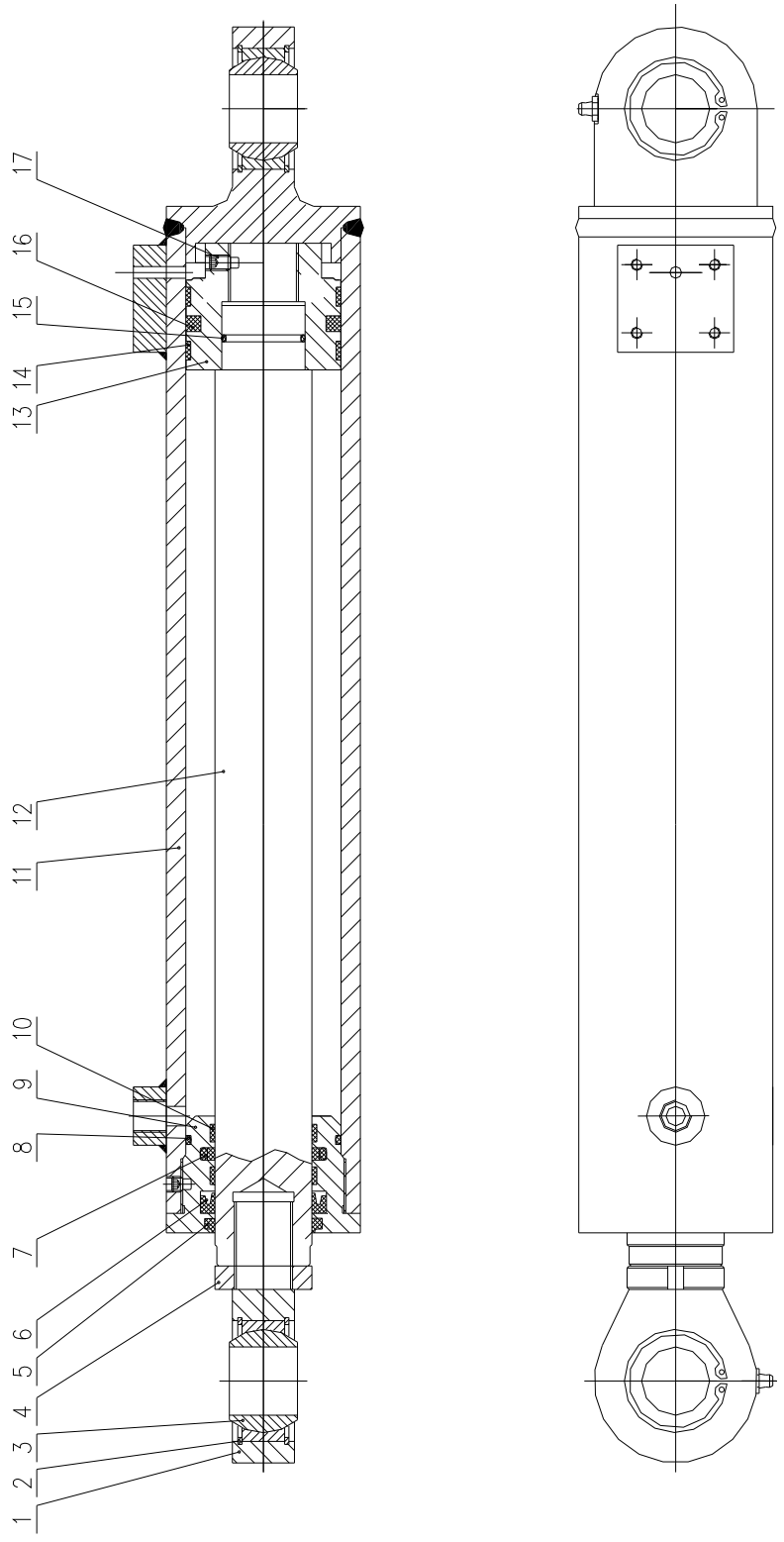


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	rod,piston rod	XBC39.00-3301		XBC39.00-3012		1
2	seal,ring 40 × 155.1 × 6.3	XBC39.00-3302		XBC39.00-3012s		1
3	ring,guide ring	XBC39.00-3303		XBC39.00-3012s		1
4	seal,bearing seal 40 × 160 × 14.5 bs	XBC39.00-3304		XBC39.00-3012s		1
5	guide ring 140 x 145 x 25	XBC39.00-3305		XBC39.00-3012s		2
6	seal,bearing seal 140 × 155.1 × 6.3 od	XBC39.00-3306		XBC39.00-3012s		1
7	O-ring	XBC39.00-3307		XBC39.00-3012s		1
8	cylinder body	XBC39.00-3308		XBC39.00-3012		1
9	piston	XBC39.00-3309		XBC39.00-3012		1
10	O-ring 91.67 × 3.53	CO00000005		XBC39.00-3012s		1
11	ring,snap ring 160 x 114.5 x 16	CD00000011		XBC39.00-3012s		1
12	ring,guide ring 160 x 155 x 15	XBC39.00-3312		XBC39.00-3012s		2
13	nut,lock nut	XBC39.00-3313		XBC39.00-3012s		1
14	bolt M12 × 16	CB00000011		XBC39.00-3012s		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.3 HYDRAULIC SWINGOUT CYLINDER ZBC37.2.7

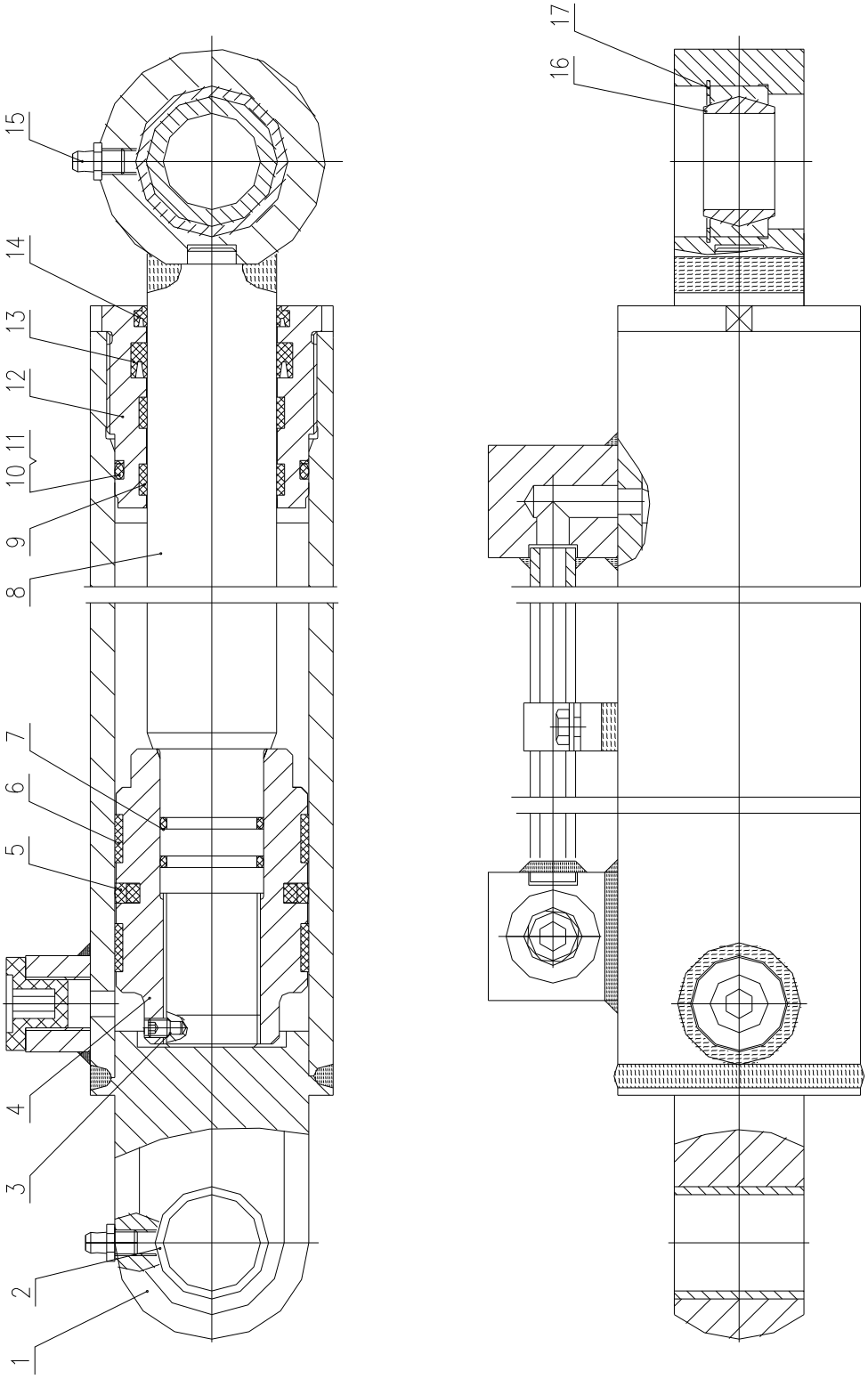


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	clevis,rod end clevis	XBC39.00-3401		ZBC37.2.7		1
2	ring,snap ring 55	CD00000001		ZBC37.2.7s		4
3	bearing,joint bearing 35	XBC39.00-3403		ZBC37.2.7s		2
4	nut	XBC39.00-3404		ZBC37.2.7s		1
5	seal,ring 50 × 60 × 7	XBC39.00-3405		ZBC37.2.7s		1
6	seal,bearing seal 50 × 65 × 11.4	XBC39.00-3406		ZBC37.2.7s		1
7	seal,bearing seal 50 × 6.3×65.1	XBC39.00-3407		ZBC37.2.7s		1
8	O-ring 72.63 × 3.53	CO00000004		ZBC37.2.7s		1
9	carrier,seal carrier	XBC39.00-3409		ZBC37.2.7		1
10	ring,guide ring 50 × 55 × 5.6	XBC39.00-3410		ZBC37.2.7s		2
11	cylinder body	XBC39.00-3411		ZBC37.2.7		1
12	rod,piston rod	XBC39.00-3412		ZBC37.2.7		1
13	piston	XBC39.00-3413		ZBC37.2.7		1
14	ring,guide ring 80 × 75×9.7	XBC39.00-3414		ZBC37.2.7s		2
15	O-ring 37.77 × 2.62	CO00000002		ZBC37.2.7s		1
16	seal,bearing seal 80 × 64.6 × 6.3	XBC39.00-3416		ZBC37.2.7s		1
17	bolt M8 × 8	CB00000046		ZBC37.2.7s		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.4 HYDRAULIC EXTEND CYLINDER XBC39.2.8

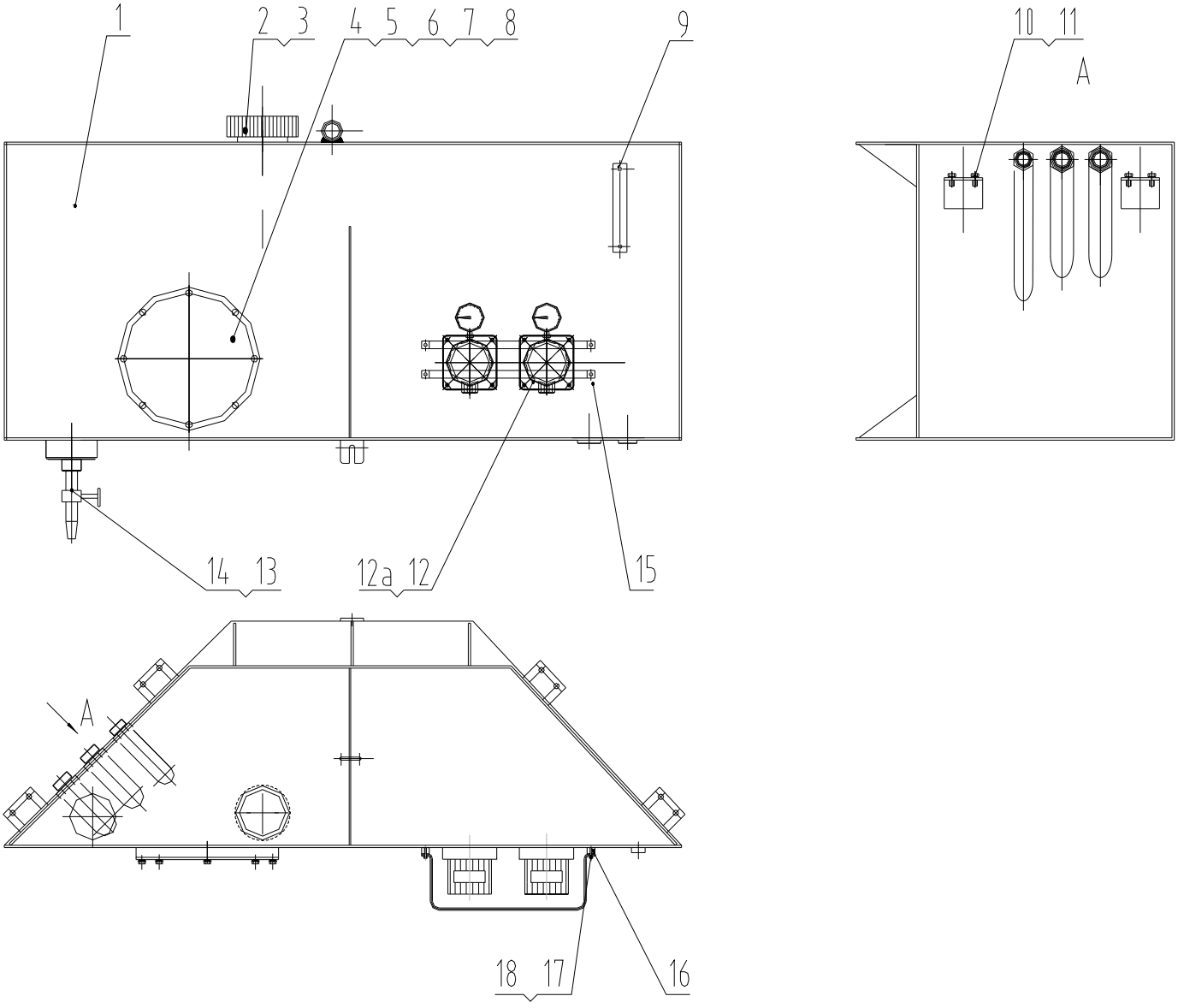


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	cylinder body	XBC39.00-3701		XBC39.2.8		1
2	bushing 30 × 34 × 40	XBC39.00-3702		XBC39.2.8s		1
3	bolt M6 × 10	CB00000040		XBC39.2.8s		1
4	piston	XBC39.00-3704		XBC39.2.8		1
5	seal,bearing seal 60 × 44.5 × 6.3	XBC39.00-3705		XBC39.2.8s		1
6	ring,guide ring 55 × 60 × 15	XBC39.00-3706		XBC39.2.8s		2
7	O-ring 26.64 × 2.62	CO00000001		XBC39.2.8s		2
8	rod,piston rod	XBC39.00-3708		XBC39.2.8		1
9	ring,guide ring 40 × 45 × 9.7	XBC39.00-3709		XBC39.2.8s		2
10	O-ring 53.57 × 3.53	CO00000003		XBC39.2.8s		1
11	ring,snap ring	XBC39.00-3711		XBC39.2.8s		1
12	carrier,seal carrier	XBC39.00-3712		XBC39.2.8		1
13	seal,piston rod seal 40 × 50 × 11	XBC39.00-3713		XBC39.2.8s		1
14	seal,ring 40 × 48 × 5.8	XBC39.00-3714		XBC39.2.8s		1
15	nipple M8	CL00000003		XBC39.2.8s		1
16	bearing,joint bearing	XBC39.00-3716		XBC39.2.8s		1
17	ring,snap ring for holes 47	CD00000002		XBC39.2.8s		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.5 HYDRAULIC TANK ASSEMBLY XBC39.2.6

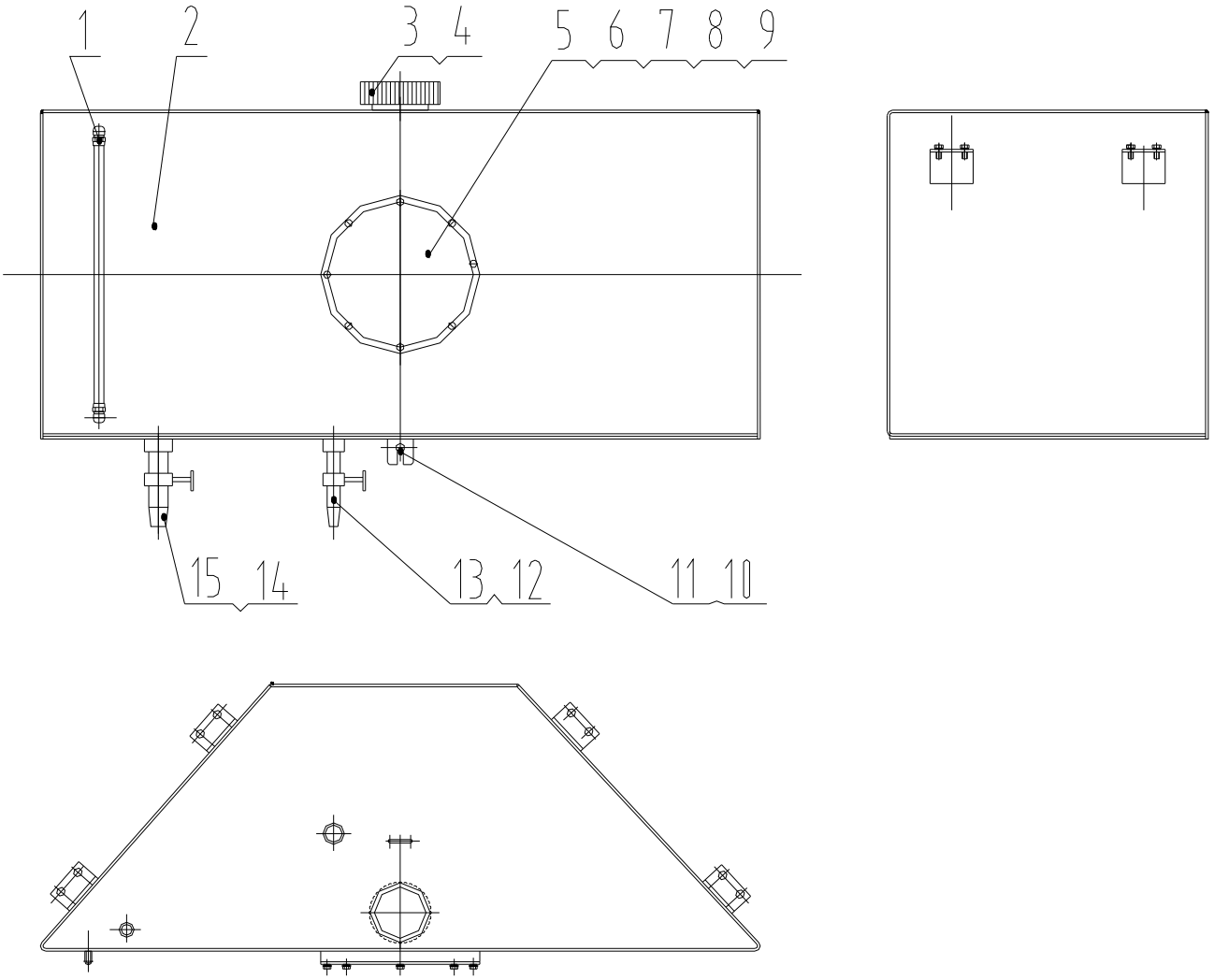


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	tank,hydraulic	XBC39.2.6.1		XBC39.2.6		1
2	filter	LE0827-91		XBC39.2.6		1
3	bolt M5 × 12	CB00000037		XBC39.2.6		4
4	flange	BC42.2-1		XBC39.2.6		1
5	o-ring 307 × 5.3	CO00000023		XBC39.2.6		1
6	bolt M10 × 16	CB00000002		XBC39.2.6		8
7	washer 10	CW00000002		XBC39.2.6		8
8	washer 10	CW00000001		XBC39.2.6		8
9	gauge,level and temperature	YWZ-200T		XBC39.2.6		1
10	bolt M12 × 25	CB00000013		XBC39.2.6		9
11	washer 12	CW00000003		XBC39.2.6		9
12	filter,oil assembly	ES094		XBC39.2.6		2
12a	element,filer oil	P20933-01		XBC39.2.6		2
13	pipe,1"	C100000002		XBC39.2.6		1
14	valve,1" copper ball valve	XBC39.00-3514		XBC39.2.6		1
15	cover,filter cover	XBC39.2.6.1-11		XBC39.2.6		2
16	plate	XBC39.2.6.1-12		XBC39.2.6		4
17	washer 5	CW00000016		XBC39.2.6		4
18	bolt M5 x 25	CB00000038		XBC39.2.6		4

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

3.6 WATER TANK ASSEMBLY XBC38.2.7

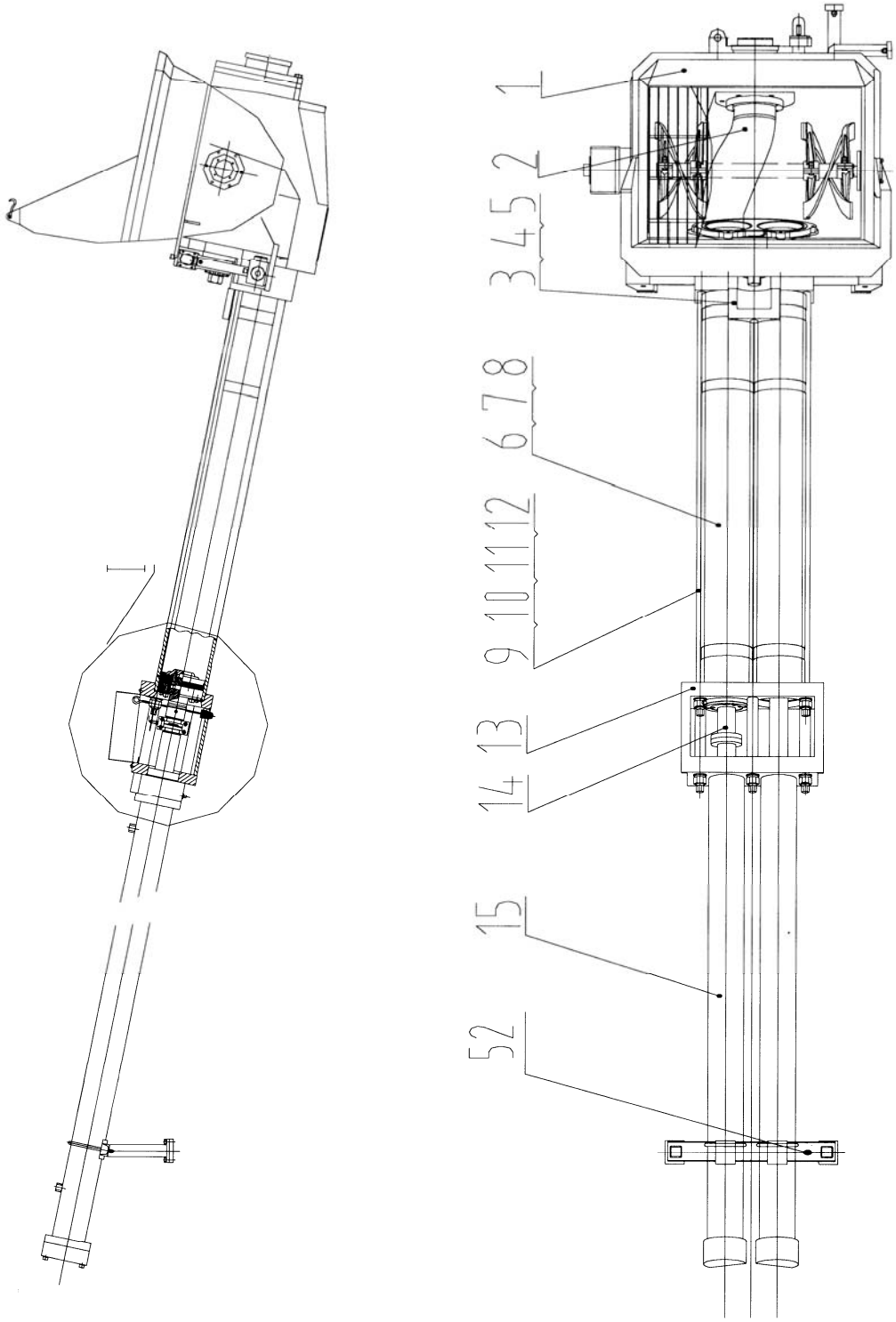


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	tube,transparent nylon tube Φ16 × 1 PA11	XBC39.00-3601		XBC38.2.7		1
2	tank,water	XBC38.2.7.1		XBC38.2.7		1
3	filter,water	EF-80		XBC38.2.7		1
4	bolt M8 × 30	CB00000045		XBC38.2.7		4
5	flange	BC42.2-1		XBC38.2.7		1
6	o-ring 307 × 5.3	CO00000023		XBC38.2.7		1
7	bolt M10 × 16	CB00000002		XBC38.2.7		8
8	washer 10	CW00000002		XBC38.2.7		8
9	washer 10	CW00000001		XBC38.2.7		8
10	bolt M12 × 25	CB00000013		XBC38.2.7		9
11	washer 12	CW00000003		XBC38.2.7		9
12	pipe,1"	C100000002		XBC38.2.7		1
13	valve,1" ball valve	XBC39.00-3613		XBC38.2.7		1
14	pipe,1 1/2"	C100000001		XBC38.2.7		1
15	valve,1 1/2' ball valve	XBC39.00-3615		XBC38.2.7		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 4 PUMPING SYSTEM

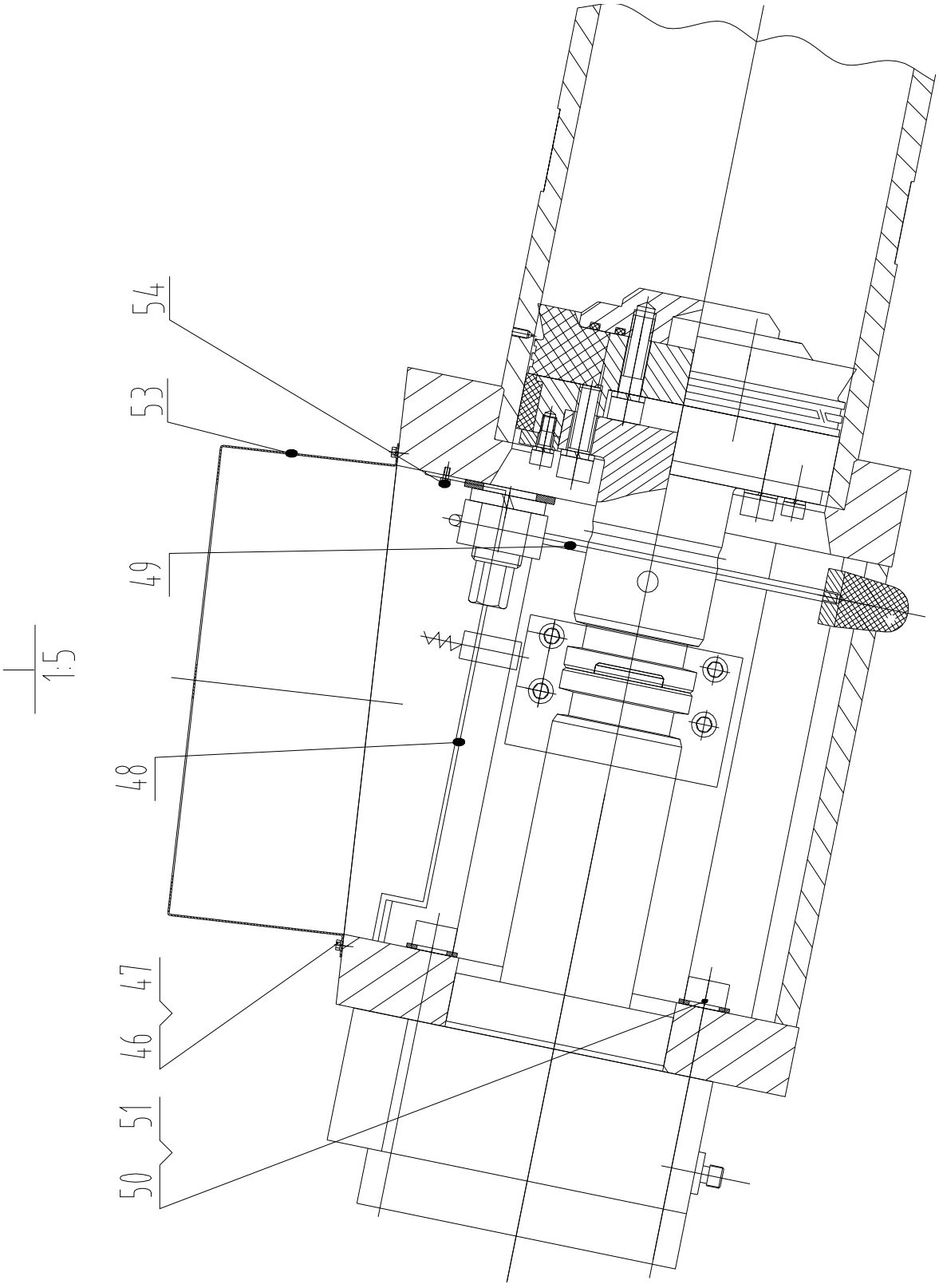


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Name	Code	Material	Parent	Weight	Quantity
1	hopper assembly	BC37.3.1		XBC39.3		1
2	s-tube assembly	BC37.3.2		XBC39.3		1
3	base,tie-rod base	BC37.3-1		XBC39.3		1
4	washer 20	CW00000009		XBC39.3		3
5	bolt M20×145	CB00000027		XBC39.3		3
6	o-ring Φ243×7	CO00000025		XBC39.3		2
7	cylinder,concrete cylinder	BC37.3-2		XBC39.3		2
8	tie-rod	BC37.3-3		XBC39.3		6
9	shield	BC37.3-4		XBC39.3		2
10	nut M36	CN00000007		XBC39.3		6
11	washer 36	CW00000014		XBC39.3		6
12	washer 36	CW00000019		XBC39.3		6
13	water box	BC37.3.3		XBC39.3		1
14	piston,concrete piston	BC37.3.4		XBC39.3		2
15	cylinder,drive cylinder	BC37.3.5		XBC39.3		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

4.1 WATER BOX BC37.3.3

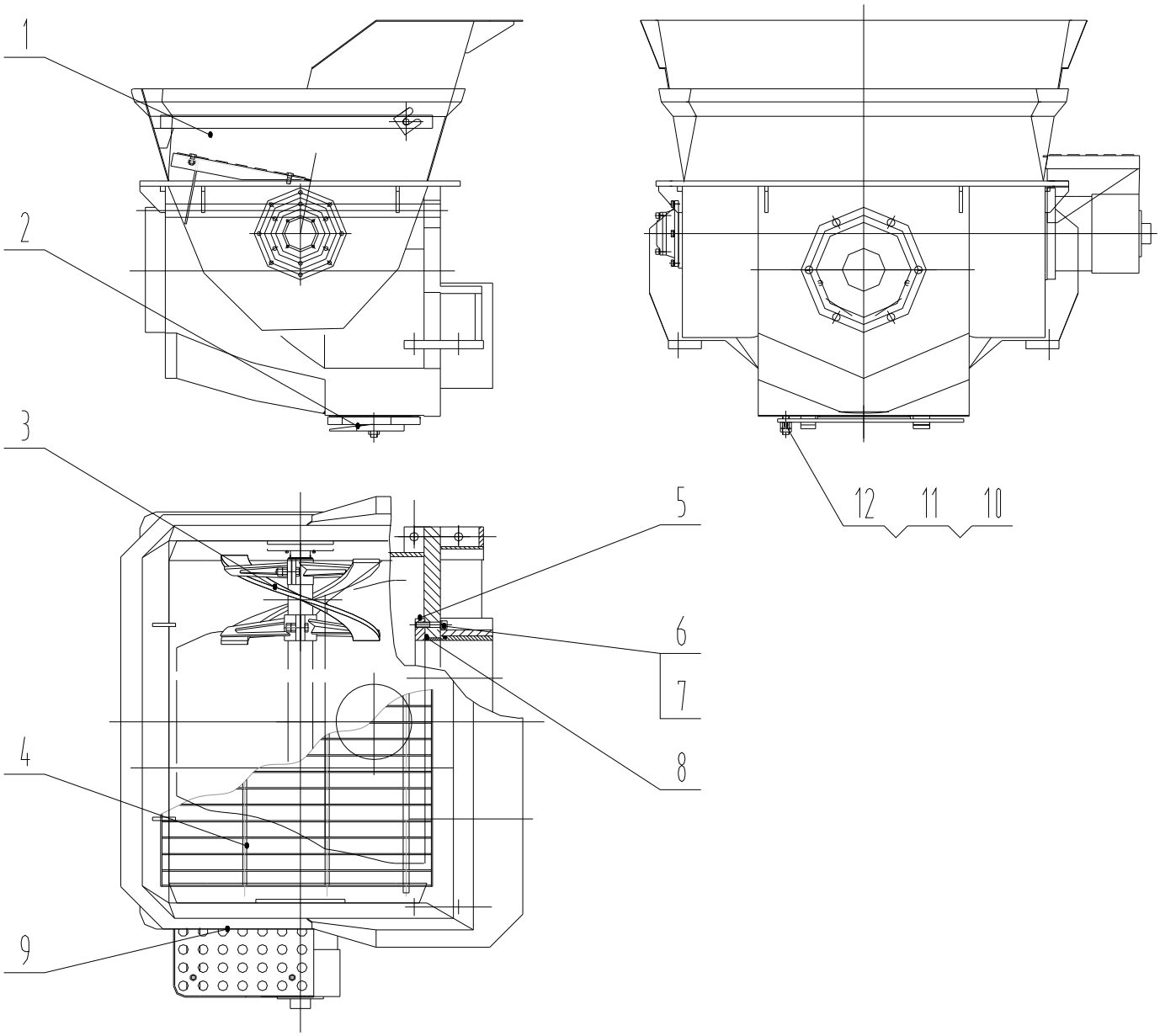


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Name	Code	Material	Parent	Weight	Quantity
46	bolt M8 x 12	CB00000047		BC37.3.3		4
47	washer 8	CW00000017		BC37.3.3		4
48	bracket,proximity switch	BC37.3.26		BC37.3.3		2
49	plug,waterbox	BC37.3.23		BC37.3.3		2
50	bolt M22 × 185	CB00000031		BC37.3.3		18
51	washer 22	CW00000012		BC37.3.3		18
52	support,drive cylinder	BC37.3.24		BC37.3.3		1
53	cover,water box	BC37.3-12		BC37.3.3		1
54	bolt M8 x 16	CB00000048		BC37.3.3		4

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

4.2 HOPPER ASSEMBLY BC37.3.1

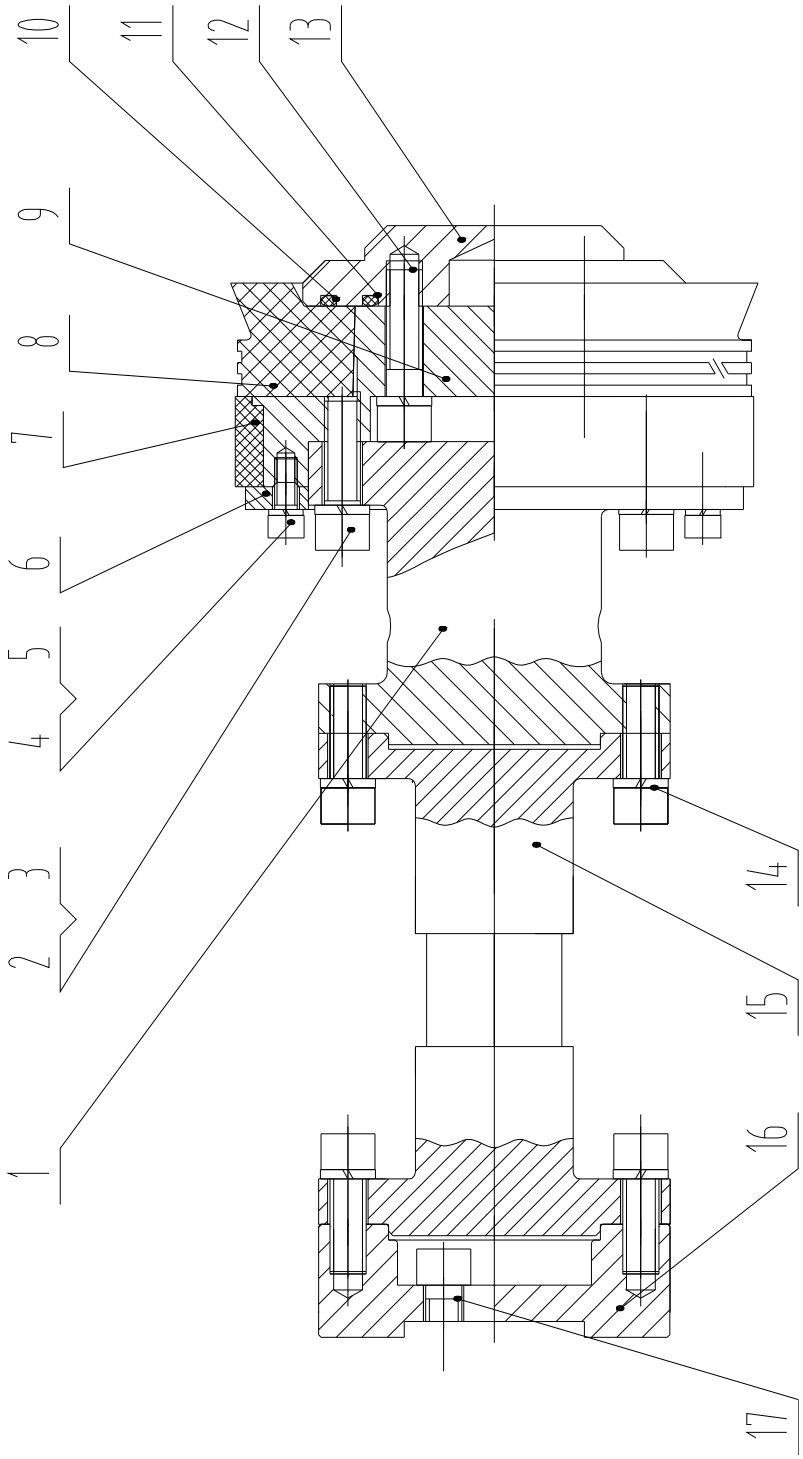


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	hopper weldment	BC37.3.1.1		BC37.3.1		1
2	door,hopper door	60S1816.3.4-2		BC37.3.1		1
3	agitator	BC37.3.1.5		BC37.3.1		1
4	grate,hopper grate	BC37.3.1.2		BC37.3.1		1
5	plate,wear plate	BC37.3.1-1		BC37.3.1		1
6	bolt M16 × 75	CB00000026		BC37.3.1		6
7	washer 16	CW00000006		BC37.3.1		2
8	o-ring 243 × 5.3	CO00000021		BC37.3.1		2
9	step	BC37.3.1.4		BC37.3.1		1
10	stud	60S1816.3.4-4		BC37.3.1		1
11	Nut M20	CN00000009		BC37.3.1		1
12	Nut M20	CN00000010		BC37.3.1		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

4.3 CONCRETE PISTON ASSEMBLY BC37.3.4

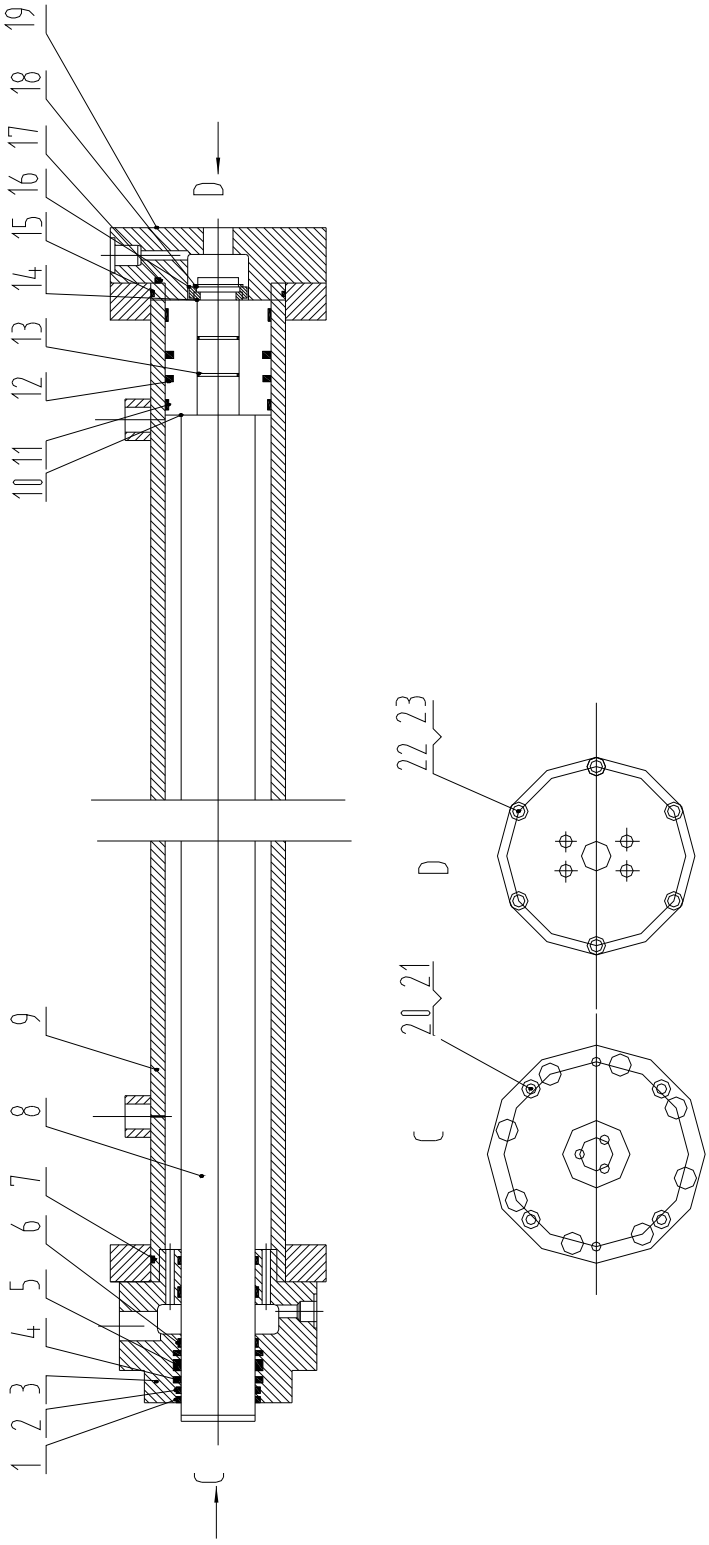


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

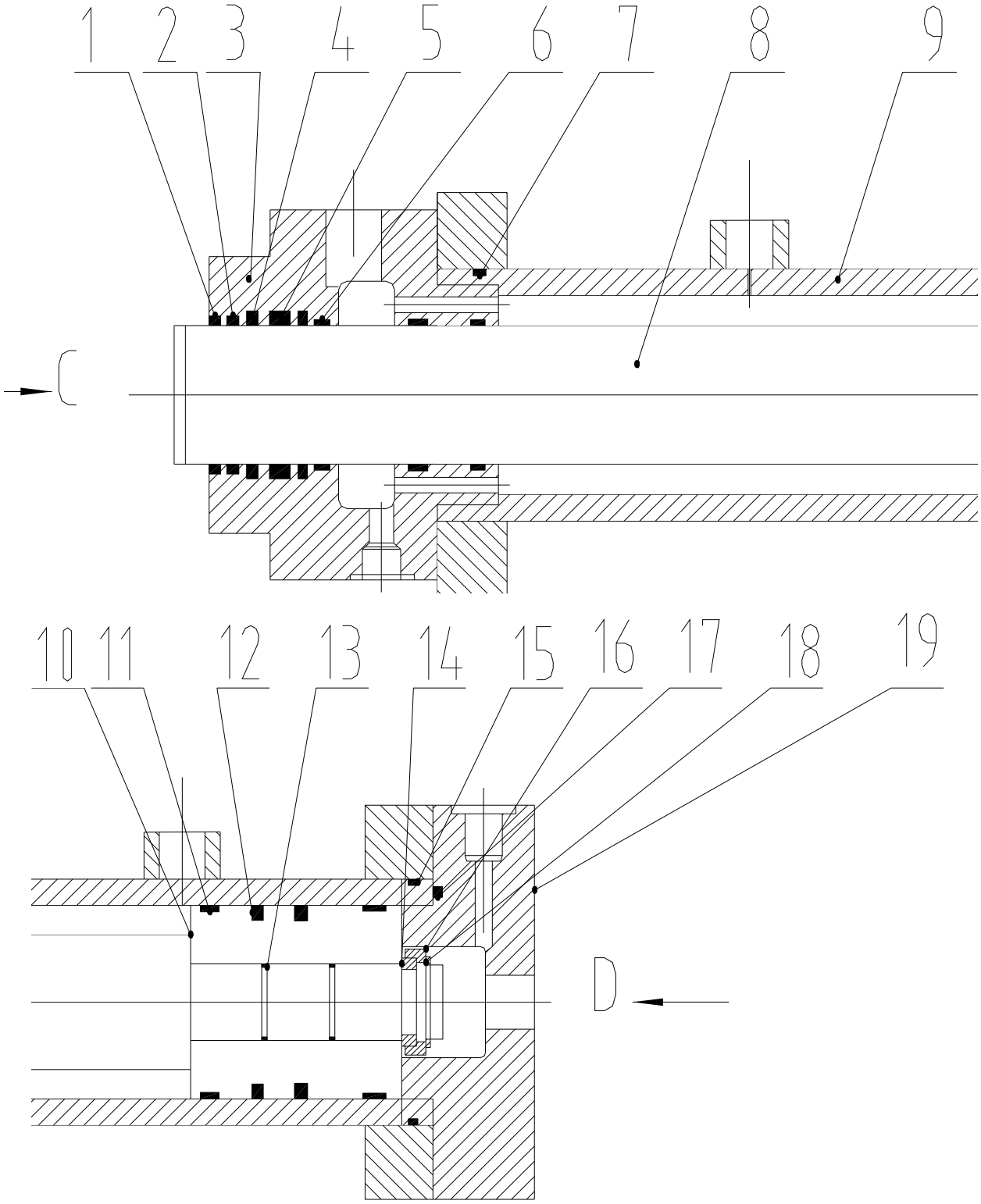
No.	Name	Code	Material	Parent	Weight	Quantity
1	connecting rod	CZB90.03.1-1	45	BC37.3.4		1
2	bolt m16x50	CB00000022	8.8	BC37.3.4		4
3	washer 16	CW00000006	65Mn	BC37.3.4		16
4	bolt m10x25	CB00000005	8.8	BC37.3.4		4
5	washer 10	CW00000001	65Mn	BC37.3.4		4
6	plate,retaining plate	BC37.3.4-2	Q235-A	BC37.3.4		1
7	band,guide band	BC37.3.4-3		BC37.3.4		1
8	seal,concrete seal	BC37.3.4-4	Polyurethane	BC37.3.4		1
9	piston body	BC37.3.4-5	45	BC37.3.4		1
10	o-ring 140x5.3	CO00000020	Rubber	BC37.3.4		1
11	o-ring 103x5.3	CO00000019	Rubber	BC37.3.4		1
12	bolt m16x60	CB00000025	8.8	BC37.3.4		4
13	plate,retaining plate	BC37.3.4-6	45	BC37.3.4		1
14	bolt m16*45	CB00000021	8.8	BC37.3.4		8
15	rod,connecting rod	60S1816.5-5	45	BC37.3.4		1
16	flange,transition flange	60S1416.5-3	45	BC37.3.4		1
17	bolt m12x40	CB00000016	8.8-grade	BC37.3.4		3

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

4.4 DRIVE CYLINDER BC37.3.5



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

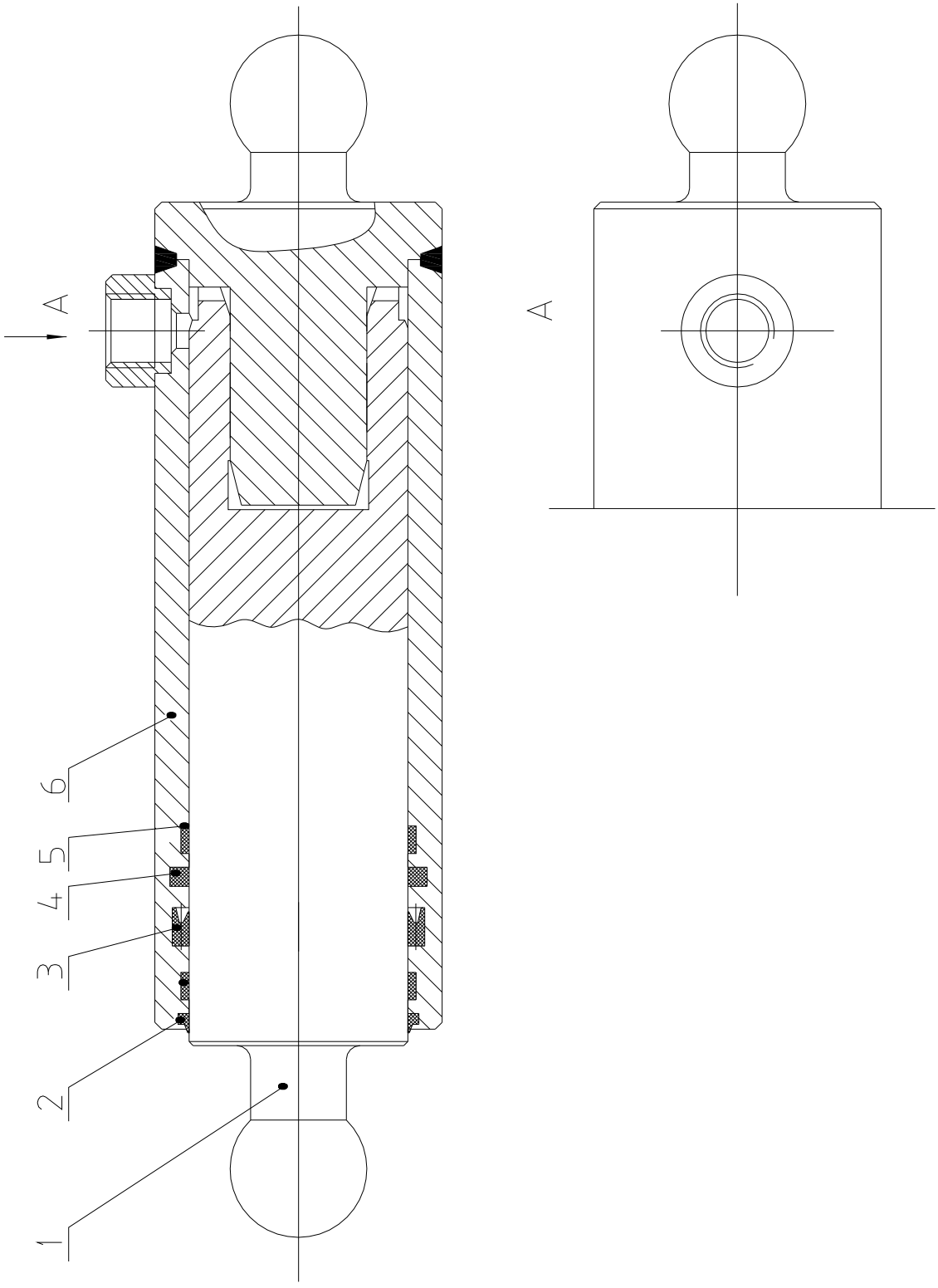


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	ring,snap ring 90	CD00000007		BC37.3.5s		1
2	ring,anti-dust ring	XBC39.00-4302		BC37.3.5s		1
3	carrier,seal carrier	XBC39.00-4303		BC37.3.5		1
4	seal,OD piston rod seal	XBC39.00-4304		BC37.3.5s		2
5	seal,BS piston rod seal	XBC39.00-4305		BC37.3.5s		1
6	ring,guide ring	XBC39.00-4306		BC37.3.5s		3
7	O-ring 125 x 3.1	CO00000016		BC37.3.5s		2
8	rod,piston rod	XBC39.00-4308		BC37.3.5		1
9	cylinder body	XBC39.00-4309		BC37.3.5		1
10	piston	XBC39.00-4310		BC37.3.5		1
11	ring,guide ring	XBC39.00-4311		BC37.3.5s		2
12	seal,piston seal	XBC39.00-4312		BC37.3.5s		2
13	O-ring 66×3.1	CO00000018		BC37.3.5s		2
14	ring,key ring for shaft	BC39.00-4314		BC37.3.5s		1
15	O-ring 115X3.1	CO00000015		BC37.3.5s		1
16	ring,snap ring cap	XBC39.00-4316		BC37.3.5s		1
17	O-ring 130X3.1	CO00000017		BC37.3.5s		1
18	ring,snap ring 65	CD00000008		BC37.3.5s		1
19	cylinder body	XBC39.00-4319		BC37.3.5		3
20	bolt M10 x 100	CB00000008		BC37.3.5s		4
21	washer 10	CW00000001		BC37.3.5s		4
22	bolt M24 x 65	CB00000034		BC37.3.5s		6
23	washer M24	CW00000013		BC37.3.5s		6

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

4.5 SHIFT CYLINDER XBCY39.00-6233

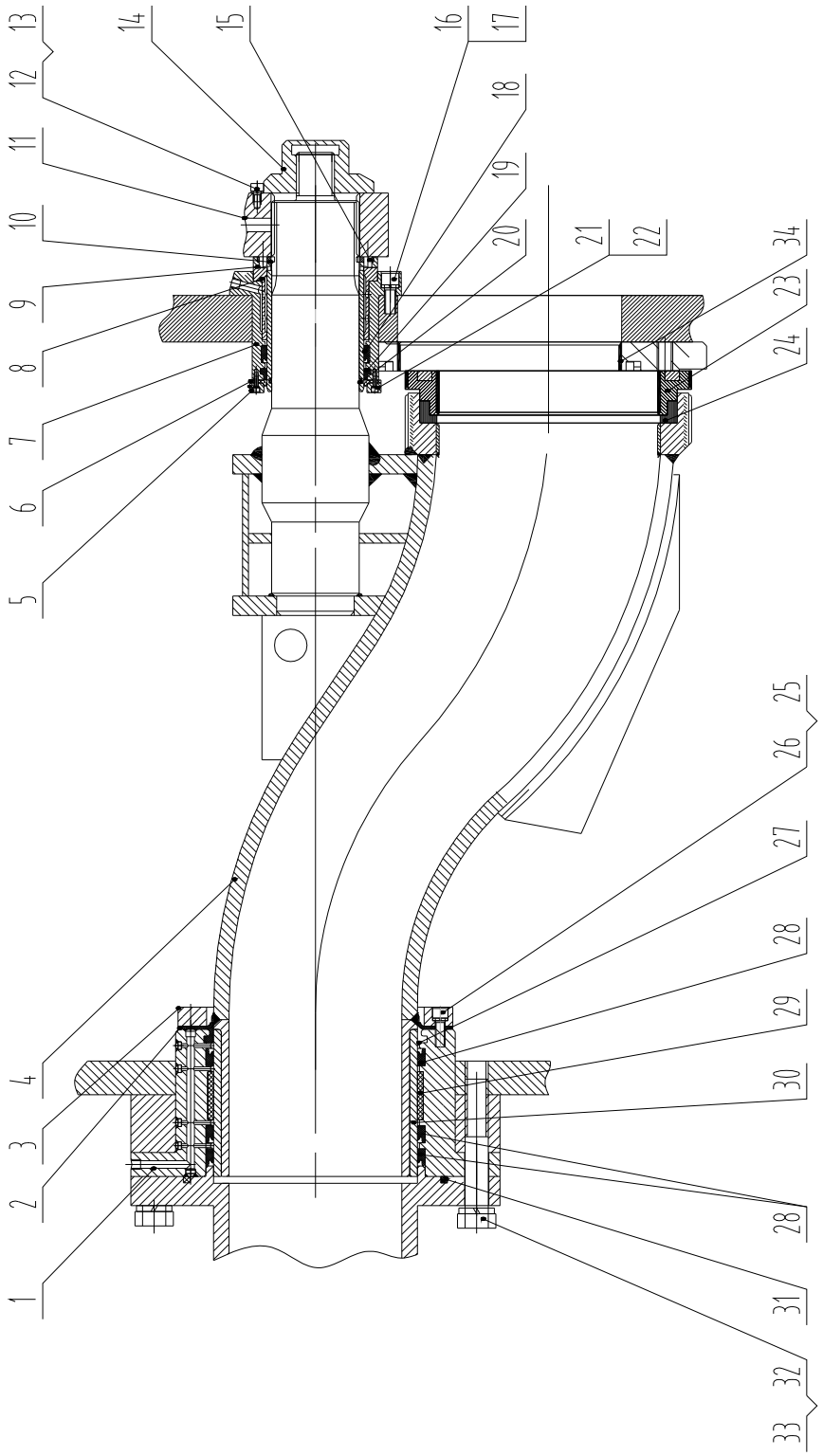


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

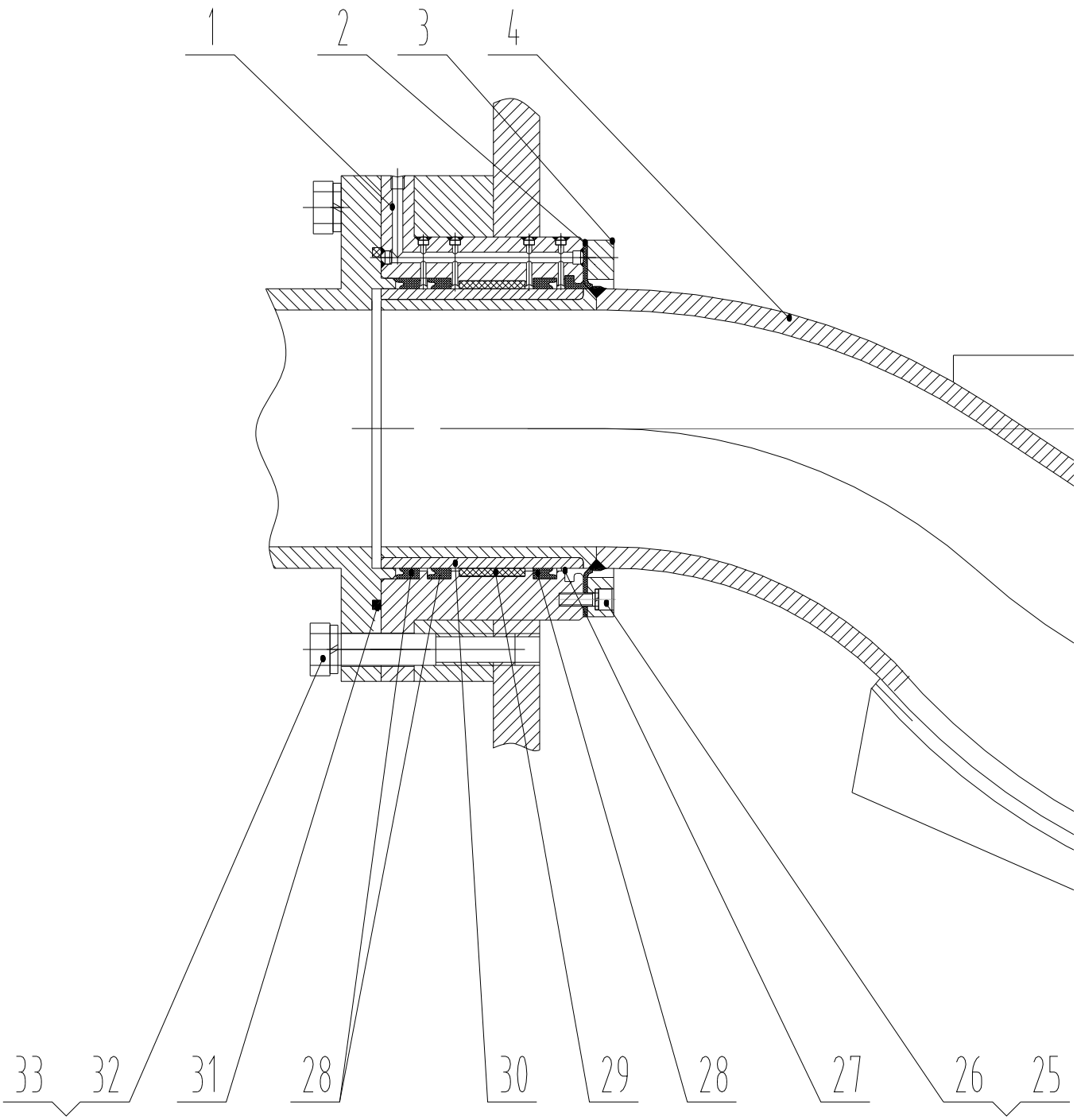
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	rod,piston rod	XBC39.00-4801		XBCY39.00-6233		1
2	ring,AY anti-dust d80	XBC39.00-4802		XBCY39.00-6233s		1
3	ring,BS bearing ring d80	XBC39.00-4803		XBCY39.00-6233s		1
4	seal,PTEE OD rod seal d80	XBC39.00-4804		XBCY39.00-6233s		1
5	ring,FR guide ring	XBC39.00-4805		XBCY39.00-6233s		2
6	cylinder assembly	XBC39.00-4806		XBCY39.00-6233		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

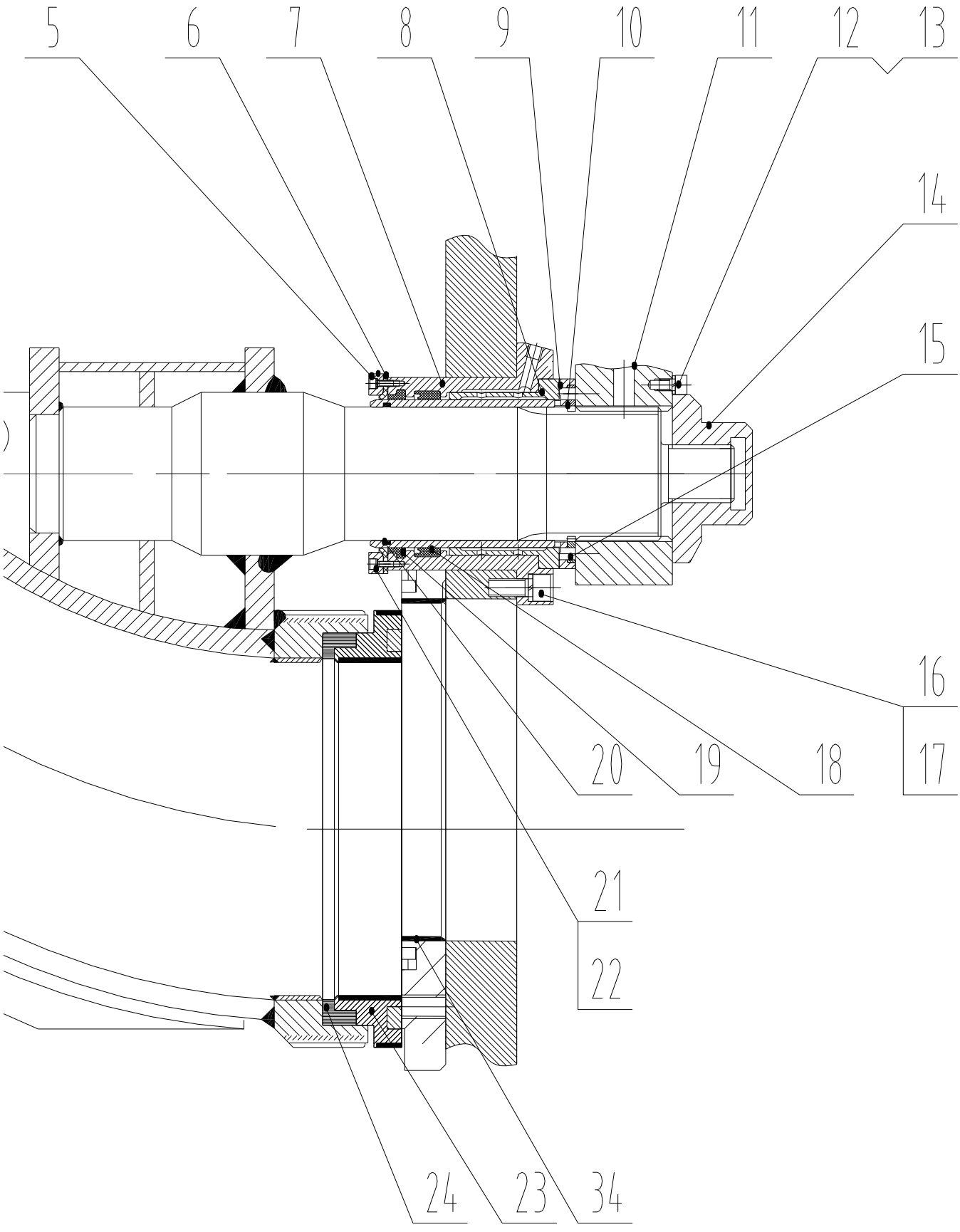
4.6 S-TUBE ASSEMBLY BC37.3.2



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

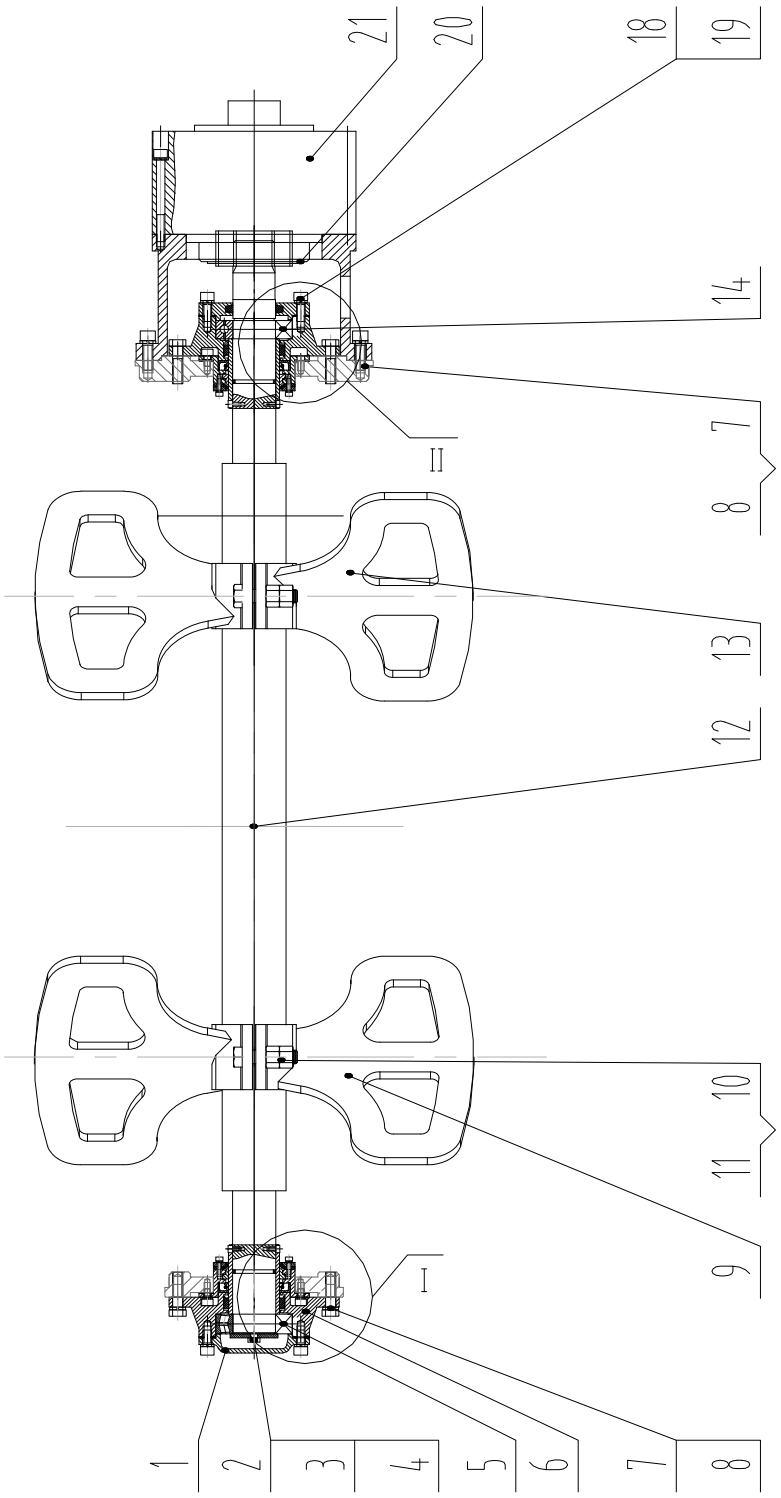


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

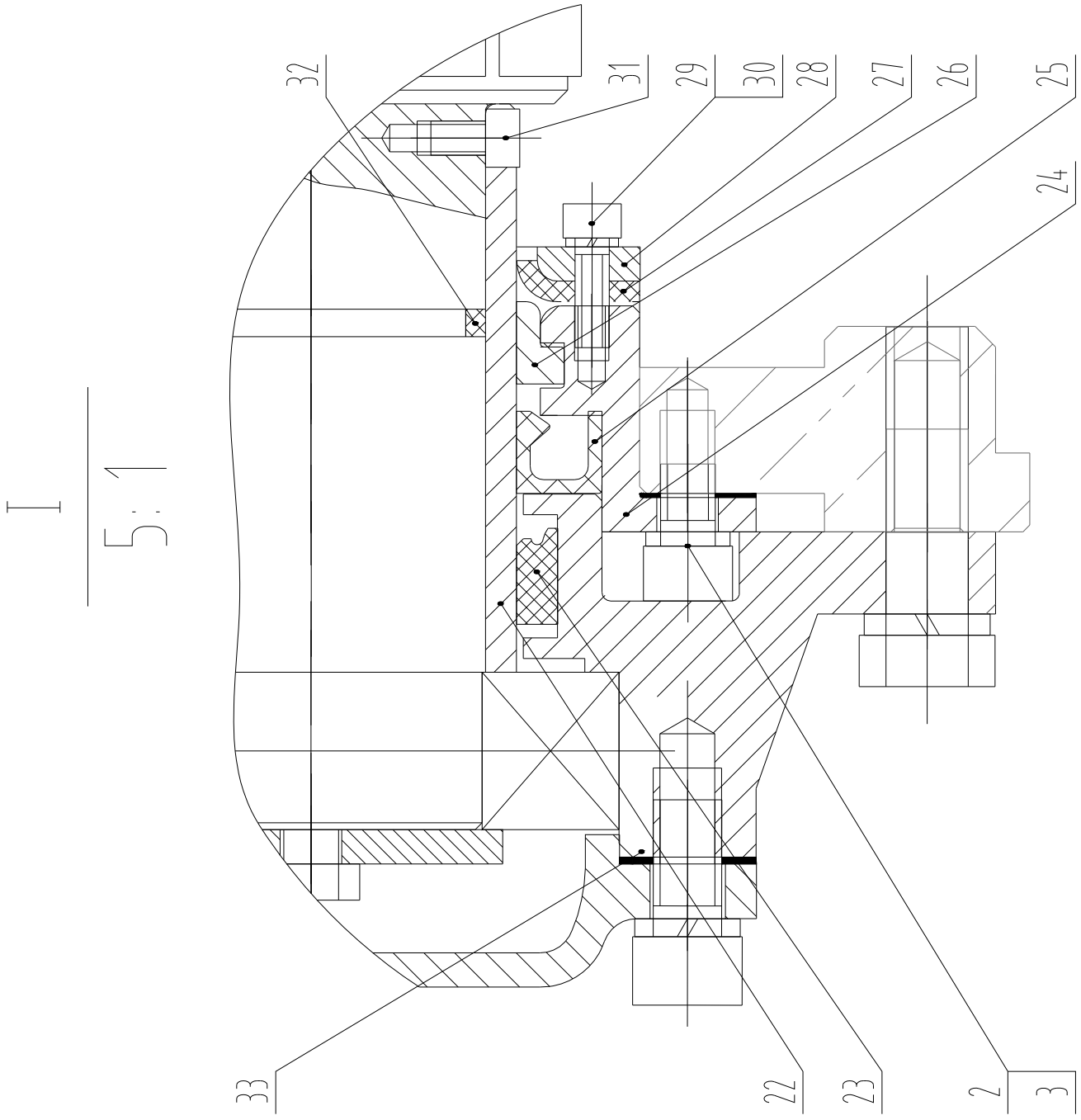
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	housing,bearing outlet	60S1816.1.2.2		BC37.3.2		1
2	seal,housing	60S1816.1.2-1		BC37.3.2		1
3	plate,retaining plate	60S1816.1.2-2		BC37.3.2		1
4	s-tube	BC37.3.2.1		BC37.3.2		1
5	plate,retaining plate	60S1816.1.2-3		BC37.3.2		1
6	seal,bearing housing	60S1816.1.2-4		BC37.3.2		1
7	housing,bearing shaft	60S1816.1.2-15		BC37.3.2		1
8	bearing,copper bearing	60S1816.1.2-5		BC37.3.2		1
9	bearing,thrust bearing	60S1816.1.2-6		BC37.3.2		1
10	spline ring	60S1816.1.2-7		BC37.3.2		1
11	lever,drive lever	60S1816.1.2-8		BC37.3.2		1
12	bolt M8 x 16	CB00000049		BC37.3.2		1
13	washer 8	CW00000017		BC37.3.2		1
14	nut,tension nut	60S1816.1.2-9		BC37.3.2		1
15	pin,positioning pin	60S1816.1.2-10		BC37.3.2		1
16	bolt M12 x 30	CB00000015		BC37.3.2		6
17	washer 12	CW00000003		BC37.3.2		6
18	seal,lip seal	XBC39.00-4918	C1A015N3571	BC37.3.2		1
19	seal,ring	XBC39.00-4919	A5A018N3587	BC37.3.2		1
20	o-ring 88.49x3.53	CO00000028		BC37.3.2		1
21	bolt M4 x 12	CB00000036		BC37.3.2		6
22	washer 4	CW00000015		BC37.3.2		6
23	ring,cutting ring	BC37.3.2-11		BC37.3.2		1
24	ring,tension ring	BC37.3.2-12		BC37.3.2		1
25	bolt M10 x 30	CB00000007		BC37.3.2		6
26	washer 10	CW00000001		BC37.3.2		6
27	seal,ring J210	XBC39.00-006		BC37.3.2		1
28	seal,lip seal YXd210	XBC39.00-007		BC37.3.2		3
29	bearing,nylon bearing	60S1816.1.2-13		BC37.3.2		1
30	sleeve,wear sleeve	60S1816.1.2-14		BC37.3.2		1
31	o-ring 258 x 7	CO00000022		BC37.3.2		1
32	bolt M24 x 150	CB00000033		BC37.3.2		6
33	washer 24	CW00000013		BC37.3.2		6
34	plate,wear plate	BC37.3.1-1		BC37.3.2		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

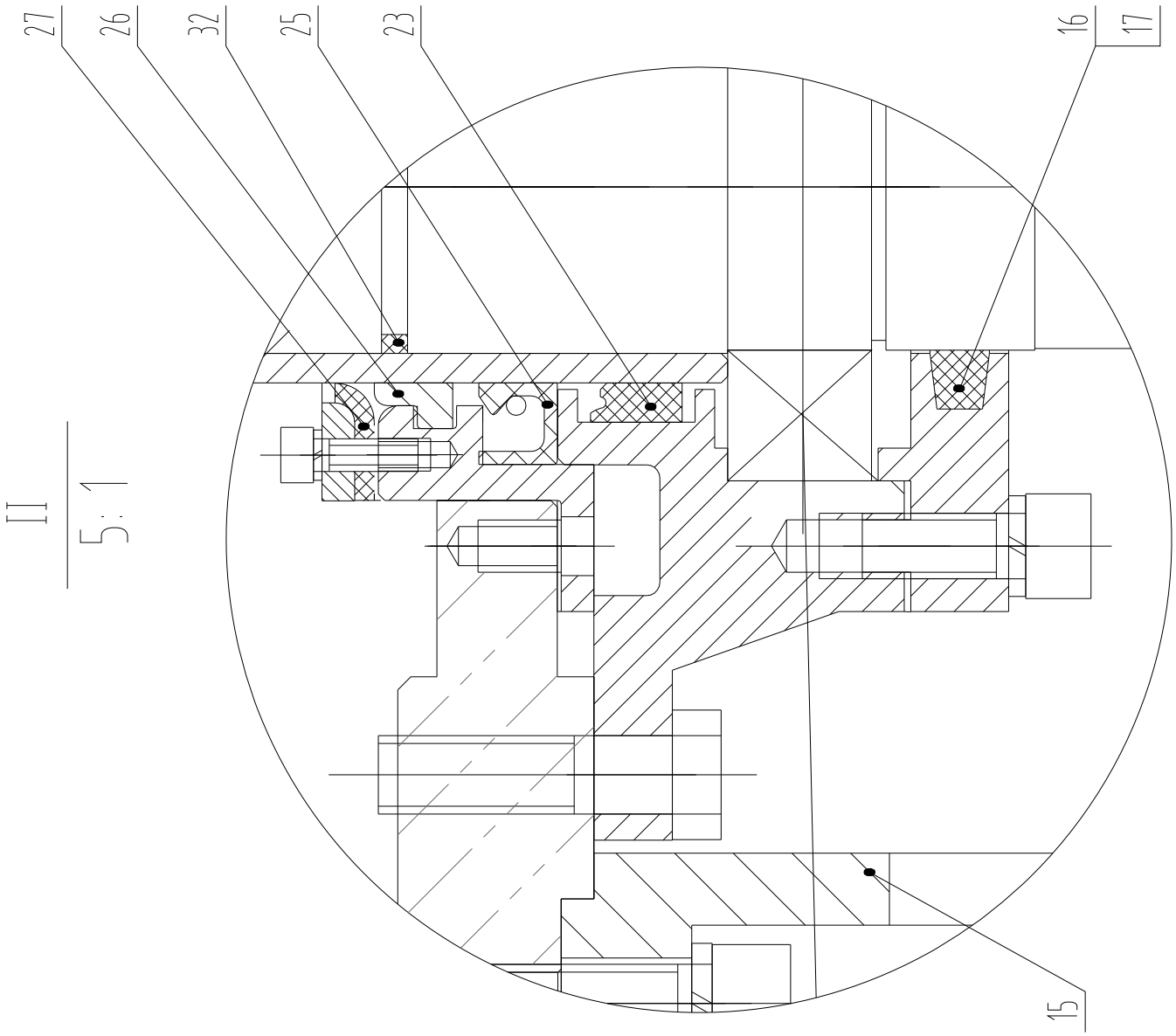
4.7 AGITATOR ASSEMBLY



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

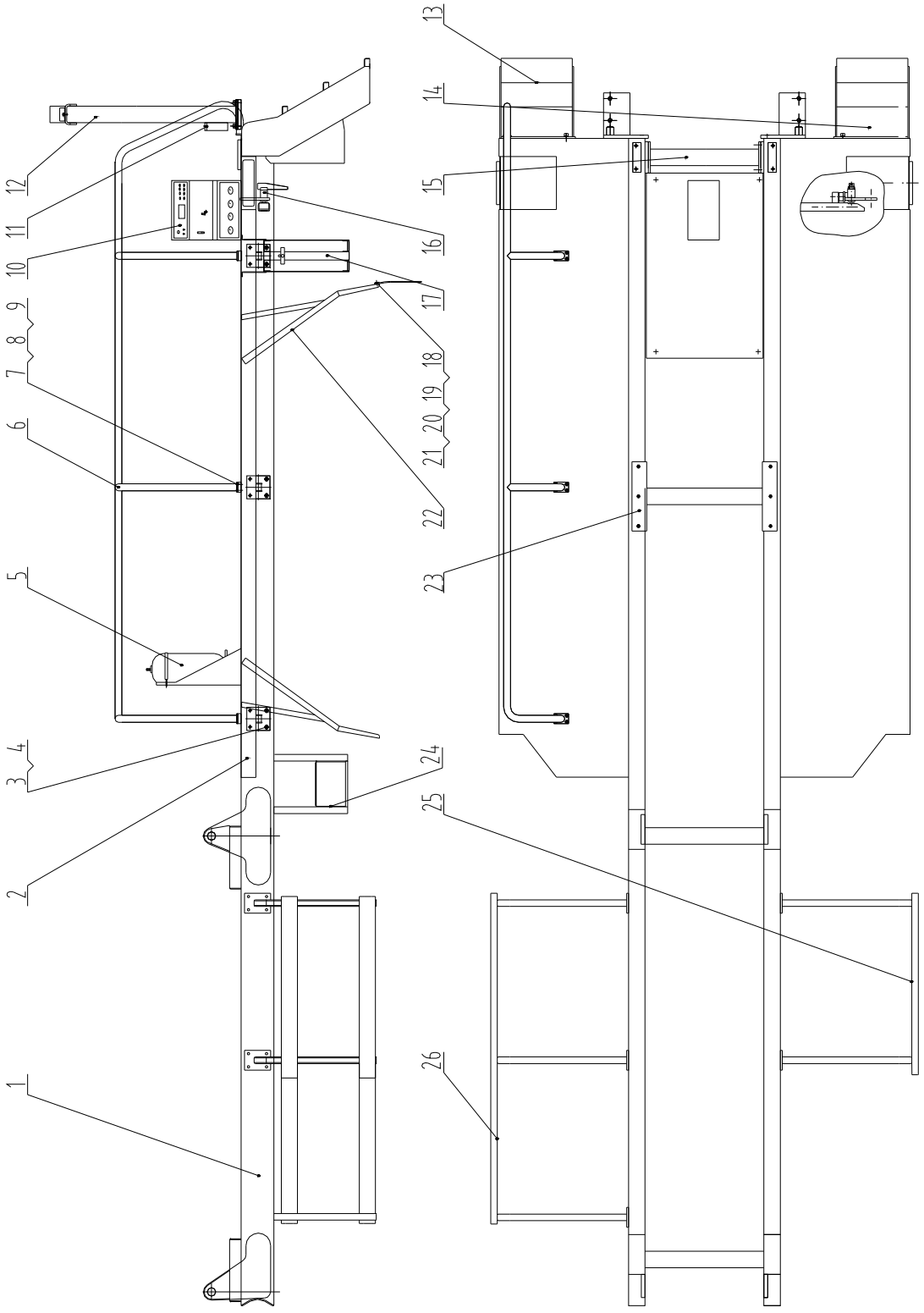
Number	Description	Part Number	Material	Parent	Quantity
1	cover	60S1816.3.2-1	HT200		1
2	bolt m8x16	CB00000099	GB70-85		9
3	Washer 8	CW00000017	GB93-87		9
4	Pressure plate	60S1816.3.2-2	钢板 B-5/Q235-A		1
5	bearing,copper bearing 22210	CZ00000001	GB/T288-94		1
6	housing,bearing outlet	60S1816.3.2-3	HT200		2
7	bolt m12x35	CB00000106	GB70-85		20
8	Washer 12	CW00000003	GB93-87		20
9	Agitator,Right Side	60S1816.3.2.1			2
10	Bolt M16x65	CB00000107	GB8782-86		8
11	Nut M16	CN00000012	GB41-86		16
12	shaft	60S1816.3.2-4	35CrMoV 或 42CrMo		1
13	Agitator, Left Side	60S1816.3.2.2			2
14	bearing,copper bearing 6210	CZ00000002	GB/T276-94		1
15	Motor Base	60S1816.3.2-5	ZG200-400		1
16	cover	60S1816.3.2-6	B-20/Q235-A		1
17	felt ring	60S1816.3.2-7			1
18	bolt m10x25	CB00000085	GB70-85		12
19	Washer 10	CW00000001	GB93-87		12
20	Spline sleeve	60S1816.3.2-8			1
21	Agitator Motor	1QJM12-1.25			1
22	axle sleeve	60S1816.3.2-9	45		2
23	ring, bearing ring Yxd60×72×14	CO00000048			2
24	sealing cover	60S1816.3.2-10	Q235-A		2
25	Lip seal	CO00000047	GB9877.1-88		2
26	seal ， Dustproof seal J60	CO00000049			2
27	Dustproof mat of rubber	60S1816.3.2-11			2
28	Pressure plate	60S1816.3.2-12	钢板 B-5/Q235-A		2
29	Washer 5	CW00000026	GB93-87		12
30	bolt M5×14	CB00000108	GB70-85		12

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

31	bolt M5×8	CB00000109	GB70-85		4
32	O-ring φ50×3.1	CO00000046	GB1235-76		2
33	sealing gasket	60S1816.3.2-13	软钢纸板 δ0.5		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 5 SUBFRAME ASSEMBLY

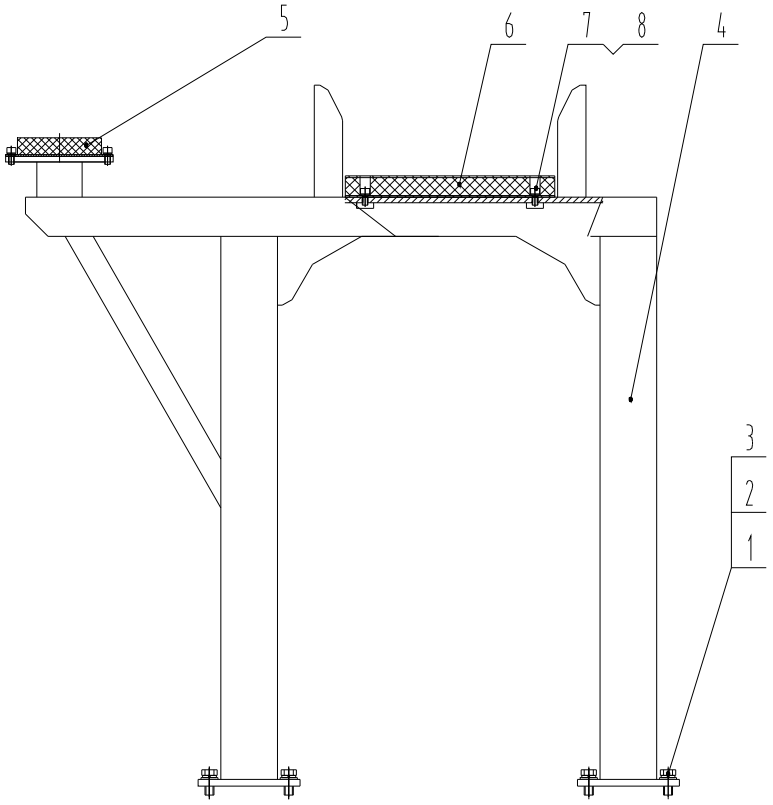


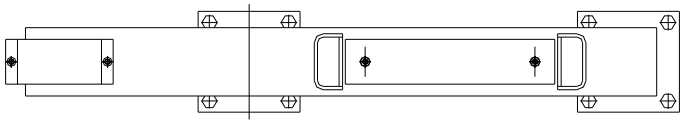
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	subframe	XBC39.4.1		XBC39.4		1
2	deck	XBC39.4.2		XBC39.4		1
3	bolt M16 x 35	CB00000020		XBC39.4		32
4	washer 16	CW00000006		XBC39.4		32
5	support,accumulator	XBC39.4.20		XBC39.4		1
6	rail,deck rail	ZBC39.4.4		XBC39.4		1
7	base,rail	BC42.4.10-1		XBC39.4		3
8	bolt M12 x 25	CB00000013		XBC39.4		12
9	washer 12	CW00000003		XBC39.4		12
10	control box	XBC39.4.21		XBC39.4		1
11	lubrication reservoir	XBC39.4.22		XBC39.4		1
12	rest,boom rest	ZBC37.4.7		XBC39.4		1
13	steps,right	BC42.4.16		XBC39.4		1
14	steps,left	BC42.4.15		XBC39.4		1
15	brace,subframe base	ZBC39.4.7		XBC39.4		1
16	lock,rear outrigger	ZBC37.4.5		XBC39.4		2
17	bracket,outrigger pad	BC42.4.13		XBC39.4		2
18	flap,rubber mudflap	800999		XBC39.4		2
19	plate	BC42.4.5-4		XBC39.4		2
20	bolt M8 x 20	CB00000051		XBC39.4		8
21	nut M8	CN00000008		XBC39.4		8
22	fender,wheel	BC42.4.5		XBC39.4		1
23	bracket,pumping system	BC42.4.6		XBC39.4		1
24	toolbox	802719		XBC39.4		1
25	guardrail,left	NA		XBC39.4		1
26	guardrail,right	NA		XBC39.4		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

5.1 BOOM REST

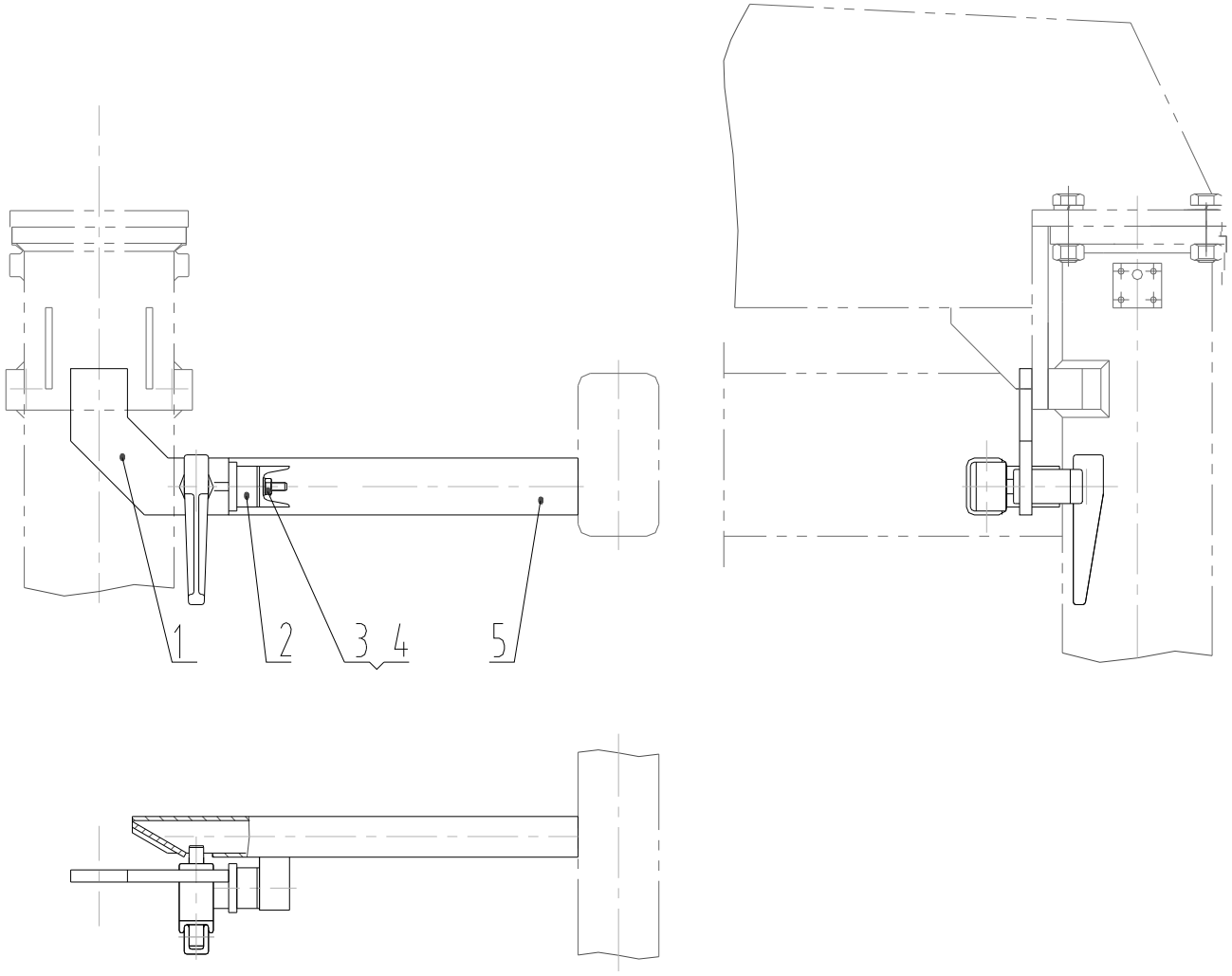




No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bolt M16 × 35	CB00000020		XBC39.4		4
2	washer 16	CW00000006		XBC39.4		8
3	washer 16	CW00000007		XBC39.4		8
4	rest,boom frame	BC37D.4.7.1		XBC39.4		1
5	pad,rest pad	BC42.1.7.1.1		XBC39.4		1
6	pad,rest pad	BC42.4.4.7		XBC39.4		1
7	bolt M10 × 20	CB00000003		XBC39.4		4
8	washer 10	CW00000001		XBC39.4		4

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

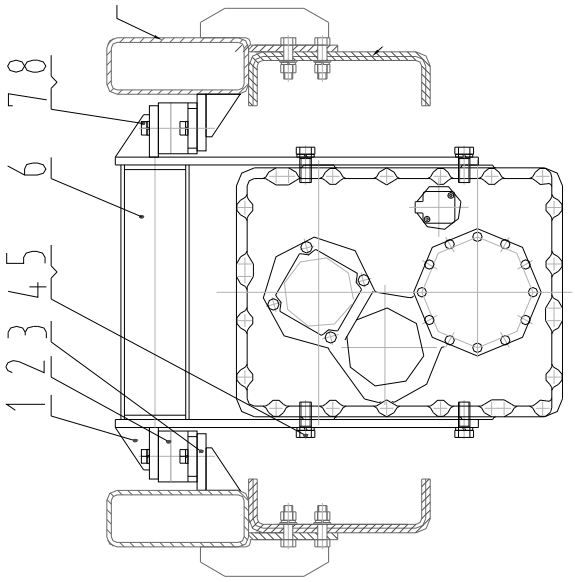
5.2 REAR OUTRIGGER LOCK ZBC37.4.5

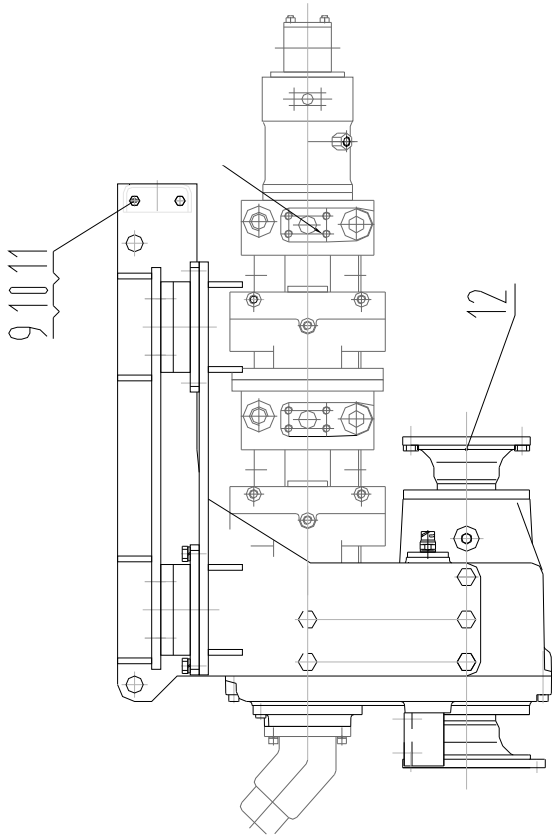


No.	Description	Part Number	Material	Parent	Weight	Quantity
1	plate,rear bracket	BC37D.4.5.1		XBC39.4		1
2	pad,bumper pad	WAI 103494		XBC39.4		1
3	nut M10	CN00000001		XBC39.4		1
4	washer 10	CW00000001		XBC39.4		1
5	tube,rear rectangular	BC37D.4.5.2		XBC39.4		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

5.3 GEARBOX ASSEMBLY BC42.5.2





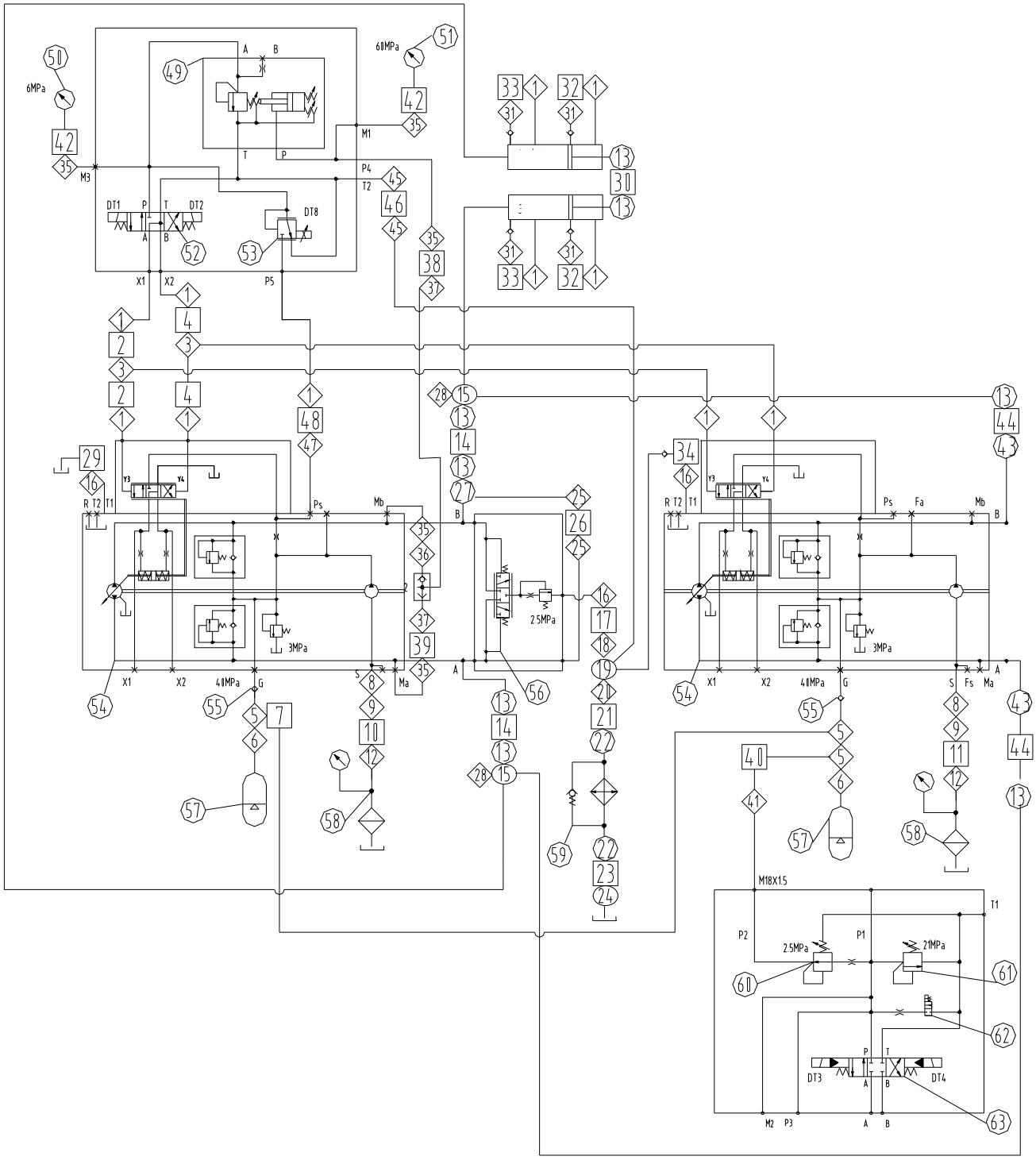
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	bracket,gearbox pto	BC42.5.2.1		BC42.5.2		2
2	mount pad	SH-500		BC42.5.2		4
3	bracket,frame pto	BC42.5.2.2		BC42.5.2		2
4	bolt M20 × 50	CB00000028		BC42.5.2		10
5	washer 20	CW00000008		BC42.5.2		10
6	brace,pto	BC42.5.2.3		BC42.5.2		1
7	bolt M16 × 35	CB00000020		BC42.5.2		16
8	washer 16	CW00000006		BC42.5.2		16
9	bolt M10 × 30	CB00000006		BC42.5.2		4
10	washer 10	CW00000001		BC42.5.2		4
11	nut M10	CN00000001		BC42.5.2		4
12	gearbox assembly	XBC39.00-5412		BC42.5.2		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 6 HYDRAULIC SYSTEM

6.1 PUMPING SYSTEM XBC39.6.1



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

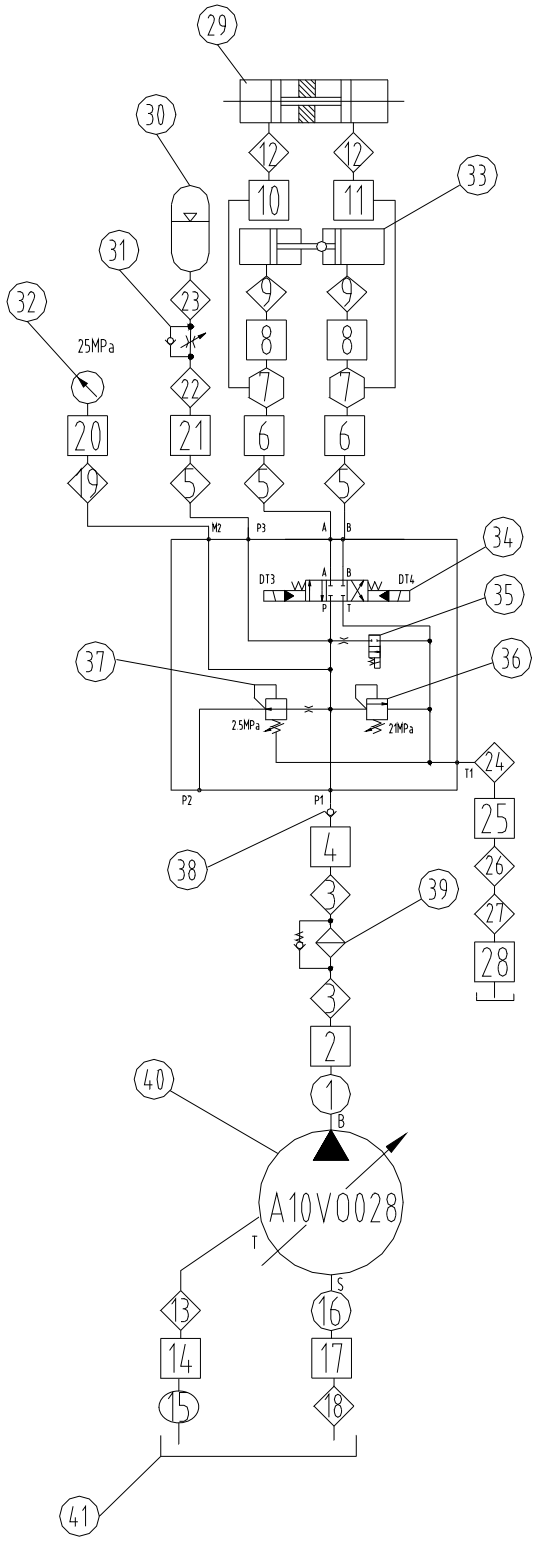
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	straight thread connector	XBCY39.00-6101		XBC39.6.1		11
2	hose	XBCY39.00-6102		XBC39.6.1		2
3	tee connector	XBCY39.00-6103		XBC39.6.1		2
4	hose	XBCY39.00-6104		XBC39.6.1		2
5	tee connector	XBCY39.00-6105		XBC39.6.1		3
6	straight thread connector	XBCY39.00-6106		XBC39.6.1		2
7	hose	XBCY39.00-6107		XBC39.6.1		1
8	straight thread connector	XBCY39.00-6108		XBC39.6.1		2
9	union elbow	XBCY39.00-6109		XBC39.6.1		2
10	hose	XBCY39.00-6110		XBC39.6.1		1
11	hose	XBCY39.00-6111		XBC39.6.1		1
12	oil absorption joint	XBCY39.00-6112		XBC39.6.1		2
13	flange,split flange	XBCY39.00-6113		XBC39.6.1		16
14	hose	XBCY39.00-6114		XBC39.6.1		2
15	tee block	XBCY39.00-6115		XBC39.6.1		2
16	straight thread connector	XBCY39.00-6116		XBC39.6.1		3
17	hose	XBCY39.00-6117		XBC39.6.1		1
18	straight thread connector	XBCY39.00-6118		XBC39.6.1		1
19	fluid gathering block	XBCY39.00-6119		XBC39.6.1		1
20	straight thread connector	XBCY39.00-6120		XBC39.6.1		1
21	hose	XBCY39.00-6121		XBC39.6.1		1
22	flange joint component	XBCY39.00-6122		XBC39.6.1		2
23	hose	XBCY39.00-6123		XBC39.6.1		1
24	oil return block	XBCY39.00-6124		XBC39.6.1		1
25	hinged joint	XBCY39.00-6125		XBC39.6.1		2
26	hose	XBCY39.00-6126		XBC39.6.1		1
27	flange FS20	XBCY39.00-6127		XBC39.6.1		1
28	bulkhead	XBCY39.00-6128		XBC39.6.1		2
29	hose	XBCY39.00-6129		XBC39.6.1		1
30	hose	XBCY39.00-6130		XBC39.6.1		1
31	transitional joint	XBCY39.00-6131		XBC39.6.1		4
32	hose	XBCY39.00-6132		XBC39.6.1		2
33	hose	XBCY39.00-6133		XBC39.6.1		2
34	hose	XBCY39.00-6134		XBC39.6.1		1
35	straight thread connector	XBCY39.00-6135		XBC39.6.1		5
36	straight thread connector	XBCY39.00-6136		XBC39.6.1		1
37	straight thread connector	XBCY39.00-6137		XBC39.6.1		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

38	hose	XBCY39.00-6138		XBC39.6.1		1
39	hose	XBCY39.00-6139		XBC39.6.1		1
40	hose	XBCY39.00-6140		XBC39.6.1		1
41	straight thread connector	XBCY39.00-6141		XBC39.6.1		1
42	hose,check pressure 5m	XBCY39.00-6142		XBC39.6.1		2
43	component of flange joint	XBCY39.00-6143		XBC39.6.1		2
44	hose	XBCY39.00-6144		XBC39.6.1		2
45	straight thread connector	XBCY39.00-6145		XBC39.6.1		1
46	hose	XBCY39.00-6146		XBC39.6.1		1
47	straight thread connector	XBCY39.00-6147		XBC39.6.1		1
48	hose	XBCY39.00-6148		XBC39.6.1		1
49	valve,hp limiter valve	XBCY39.00-6149		XBC39.6.1		1
50	gauge,pressure 6 MPa	XBCY39.00-6150		XBC39.6.1		1
51	gauge,pressure 60 MPa	XBCY39.00-6151		XBC39.6.1		1
52	valve,directional 4/3 valve	XBCY39.00-6152		XBC39.6.1		1
53	valve,proportional valve	XBCY39.00-6153		XBC39.6.1		1
54	pump,A4VG125	XBCY39.00-6154		XBC39.6.1		2
55	valve,check valve	XBCY39.00-6155		XBC39.6.1		2
56	valve,flushing valve	XBCY39.00-6156		XBC39.6.1		1
57	accumulator	XBCY39.00-6157		XBC39.6.1		2
58	filter,oil suction filter	ES094		XBC39.6.1		2
59	cooler,oil	XBCY39.00-6159		XBC39.6.1		1
60	valve,pressure reducing	XBCY39.00-6160		XBC39.6.1		1
61	valve,relief valve	XBCY39.00-6161		XBC39.6.1		1
62	valve,dump valve	XBCY39.00-6162		XBC39.6.1		1
63	valve,directional 4/3 valve	XBCY39.00-6163		XBC39.6.1		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

6.2 SHIFTING SYSTEM XBC39.6.2



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

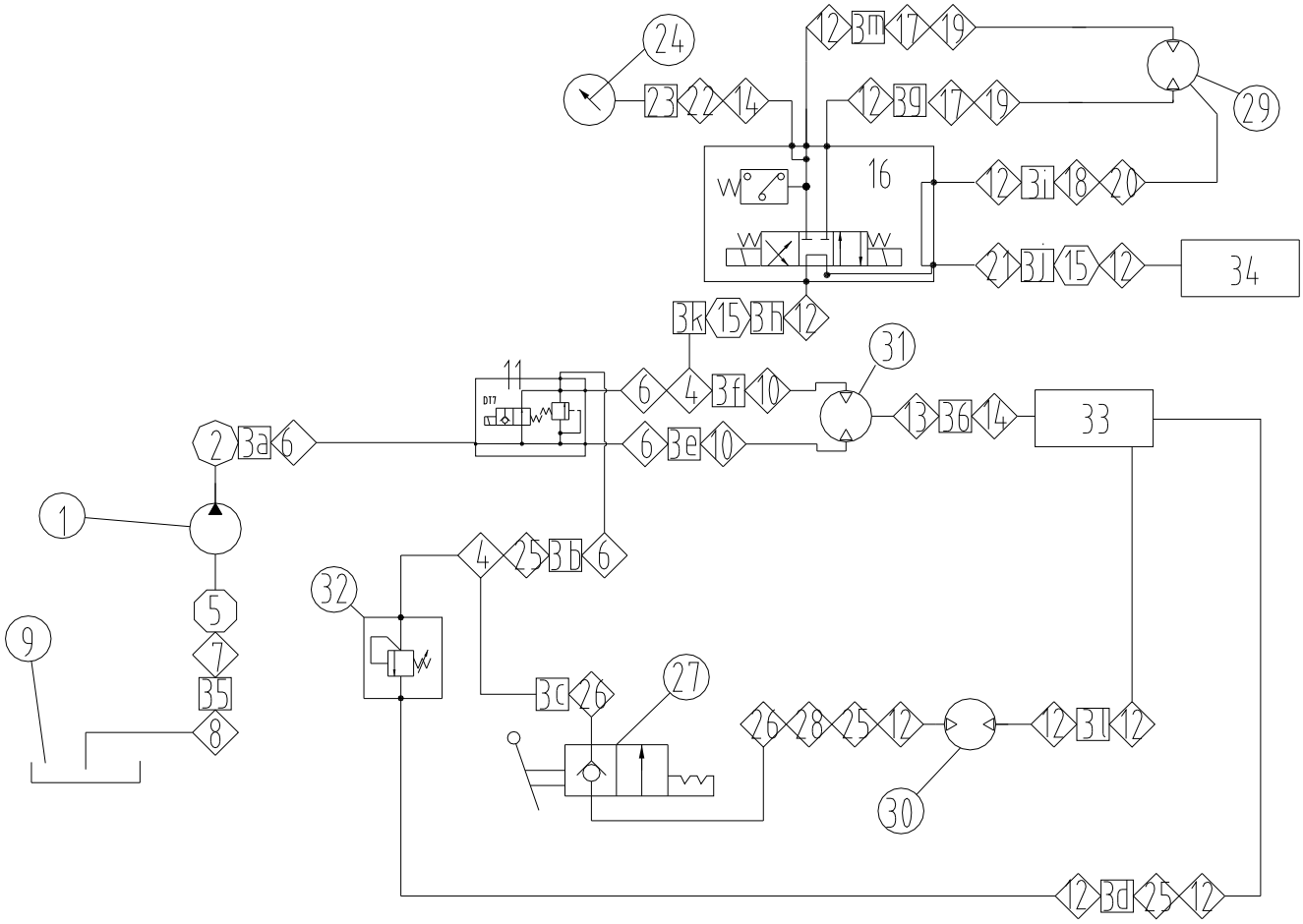
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	flange,split flange	XBCY39.00-6201		XBC39.6.2		2
2	hose	XBCY39.00-6202		XBC39.6.2		1
3	straight thread connector	XBCY39.00-6203		XBC39.6.2		2
4	hose	XBCY39.00-6204		XBC39.6.2		1
5	straight thread connector	XBCY39.00-6205		XBC39.6.2		2
6	hose	XBCY39.00-6206		XBC39.6.2		2
7	pipe,steel pipe	XBCY39.00-6207		XBC39.6.2		2
8	hose	XBCY39.00-6208		XBC39.6.2		2
9	joint	XBCY39.00-6209		XBC39.6.2		2
10	hose	XBCY39.00-6210		XBC39.6.2		1
11	hose	XBCY39.00-6211		XBC39.6.2		1
12	straight thread connector	XBCY39.00-6212		XBC39.6.2		2
13	straight thread connector	XBCY39.00-6213		XBC39.6.2		1
14	hose	XBCY39.00-6214		XBC39.6.2		1
15	oil return block	XBCY39.00-6215		XBC39.6.2		1
16	flange joint FL20/L42	XBCY39.00-6216		XBC39.6.2		1
17	hose	XBCY39.00-6217		XBC39.6.2		1
18	straight thread connector	XBCY39.00-6218		XBC39.6.2		1
19	straight thread connector	XBCY39.00-6219		XBC39.6.2		1
20	hose,check 5m	XBCY39.00-6142		XBC39.6.2		1
21	hose	XBCY39.00-6221		XBC39.6.2		1
22	straight thread connector	XBCY39.00-6222		XBC39.6.2		1
23	joint M60/S30	XBCY39.00-6223		XBC39.6.2		1
24	straight thread connector	XBCY39.00-6224		XBC39.6.2		1
25	hose	XBCY39.00-6225		XBC39.6.2		1
26	joint of changeable diameter	XBCY39.00-6226		XBC39.6.2		1
27	bulkhead union elbow	XBCY39.00-6227		XBC39.6.2		1
28	hose	XBCY39.00-6228		XBC39.6.2		1
29	pump,grease pump	XBCY39.00-6229		XBC39.6.2		1
30	accumulator	XBCY39.00-6230		XBC39.6.2		1
31	valve,throttle check valve	XBCY39.00-6231		XBC39.6.2		1
32	gauge,pressure 25 MPa	XBCY39.00-6232		XBC39.6.2		1
33	cylinder,shift	XBCY39.00-6233		XBC39.6.2		2
34	valve,directional 4/3	XBCY39.00-6234		XBC39.6.2		1
35	valve,dump valve	XBCY39.00-6235		XBC39.6.2		1
36	valve,relief valve	XBCY39.00-6236		XBC39.6.2		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

37	valve,pressure reducing	XBCY39.00-6237		XBC39.6.2		1
38	valve,check valve	XBCY39.00-6238		XBC39.6.2		1
39	filter,pressure filter	XBCY39.00-6239		XBC39.6.2		1
40	pump,A10	XBCY39.00-6240		XBC39.6.2		1
41	tank,hydraulic tank	XBC39.2.6		XBC39.6.2		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

6.3 AUXILARY SYSTEM XBC39.6.3



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

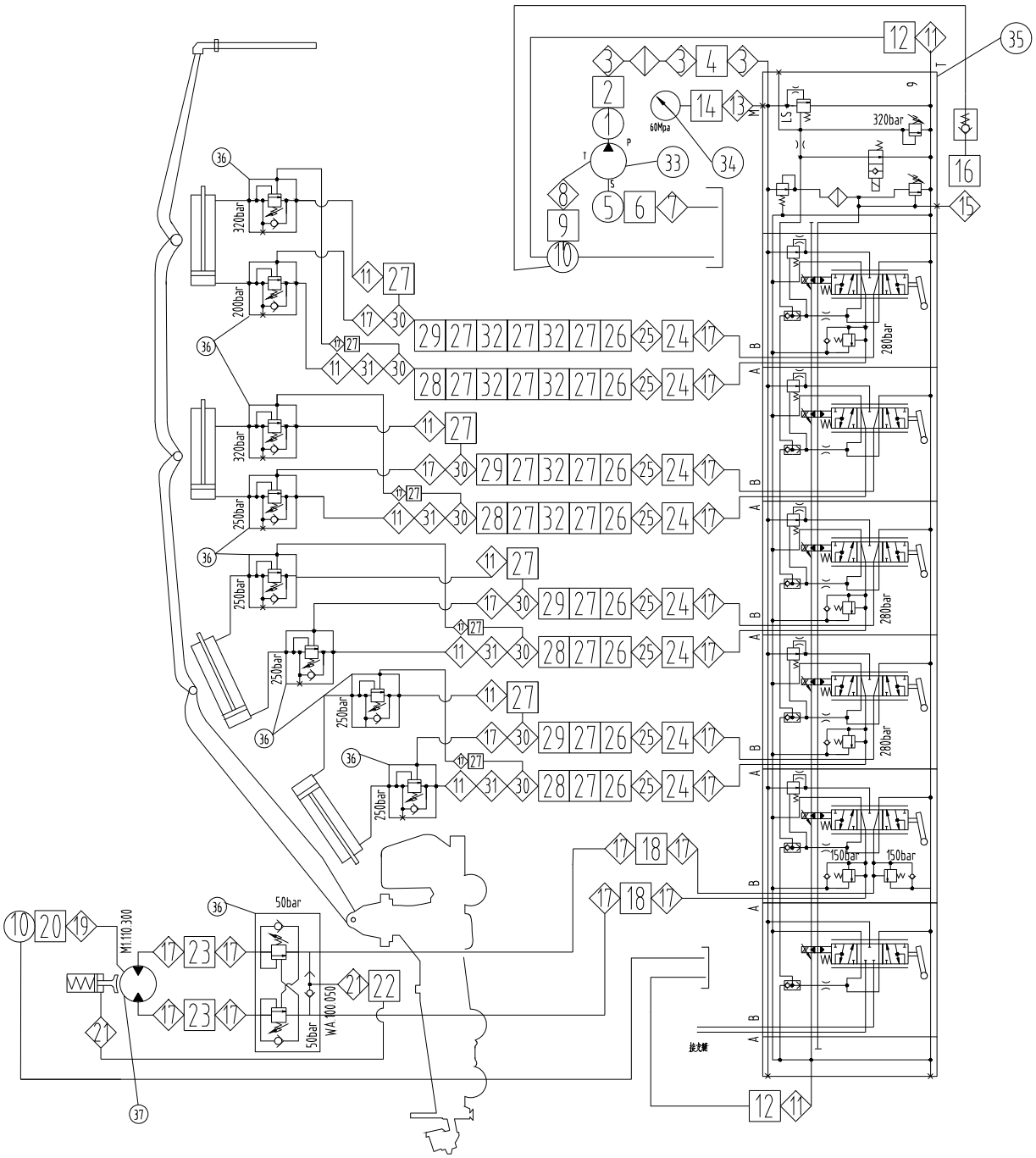
No.	Description	Part Number	Material	Parent	Weight	Quantity
1	pump,gear pump	XBCY39.00-6301		XBC39.6.3		1
2	flange,square flange	XBCY39.00-6302		XBC39.6.3		1
3a	hose	XBCY39.00-633a		XBC39.6.3		1
3b	hose	XBCY39.00-633b		XBC39.6.3		1
3c	hose	XBCY39.00-633c		XBC39.6.3		1
3d	hose	XBCY39.00-633d		XBC39.6.3		1
3e	hose	XBCY39.00-633e		XBC39.6.3		1
3f	hose	XBCY39.00-633f		XBC39.6.3		1
3g	hose	XBCY39.00-633g		XBC39.6.3		1
3h	hose	XBCY39.00-633h		XBC39.6.3		1
3i	hose	XBCY39.00-633i		XBC39.6.3		1
3j	hose	XBCY39.00-633j		XBC39.6.3		1
3k	hose	XBCY39.00-633k		XBC39.6.3		1
3l	hose	XBCY39.00-633l		XBC39.6.3		1
3m	hose	XBCY39.00-633m		XBC39.6.3		1
4	tee	XBCY39.00-6304		XBC39.6.3		1
5	square flange	XBCY39.00-6305		XBC39.6.3		1
6	joint	XBCY39.00-6306		XBC39.6.3		3
7	union elbow	XBCY39.00-6307		XBC39.6.3		1
8	joint	XBCY39.00-6308		XBC39.6.3		1
9	tank,hydraulic	XBC39.2.6		XBC39.6.3		1
10	joint	XBCY39.00-6310		XBC39.6.3		2
11	manifold,cooling valve	XBCY39.00-6311		XBC39.6.3		1
12	joint	XBCY39.00-6312		XBC39.6.3		13
13	joint	XBCY39.00-6313		XBC39.6.3		1
14	joint	XBCY39.00-6314		XBC39.6.3		2
15	pipe,steel pipe	XBCY39.00-6315		XBC39.6.3		2
16	manifold,agitator valve	XBCY39.00-6316		XBC39.6.3		1
17	joint	XBCY39.00-6317		XBC39.6.3		2
18	joint	XBCY39.00-6318		XBC39.6.3		1
19	combination pad	XBCY39.00-6319		XBC39.6.3		2
20	combination pad	XBCY39.00-6320		XBC39.6.3		1
21	joint	XBCY39.00-6321		XBC39.6.3		1
22	pressure-testing joint	XBCY39.00-6322		XBC39.6.3		1
23	hose,check 3m	XBCY39.00-6323		XBC39.6.3		1
24	gauge,pressure 25	XBCY39.00-6232		XBC39.6.3		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

25	union elbow	XBCY39.00-6325		XBC39.6.3		2
26	joint	XBCY39.00-6326		XBC39.6.3		2
27	valve,ball valve	XBCY39.00-6327		XBC39.6.3		1
28	movable straight tee	XBCY39.00-6328		XBC39.6.3		1
29	motor,agitator motor	XBCY39.00-6329		XBC39.6.3		1
30	motor,water motor	XBCY39.00-6330				1
31	motor,radiator motor	XBCY39.00-6331				1
32	manifold,pressure valve	XBCY39.00-6332				1
33	return flow block	XBCY39.00-6333				1
34	fluid gathering block	XBCY39.00-6334				1
35	hose	XBCY39.00-6335				1
36	hose	XBCY39.00-6336				1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

6.4 BOOM SYSTEM XBC39.6.4

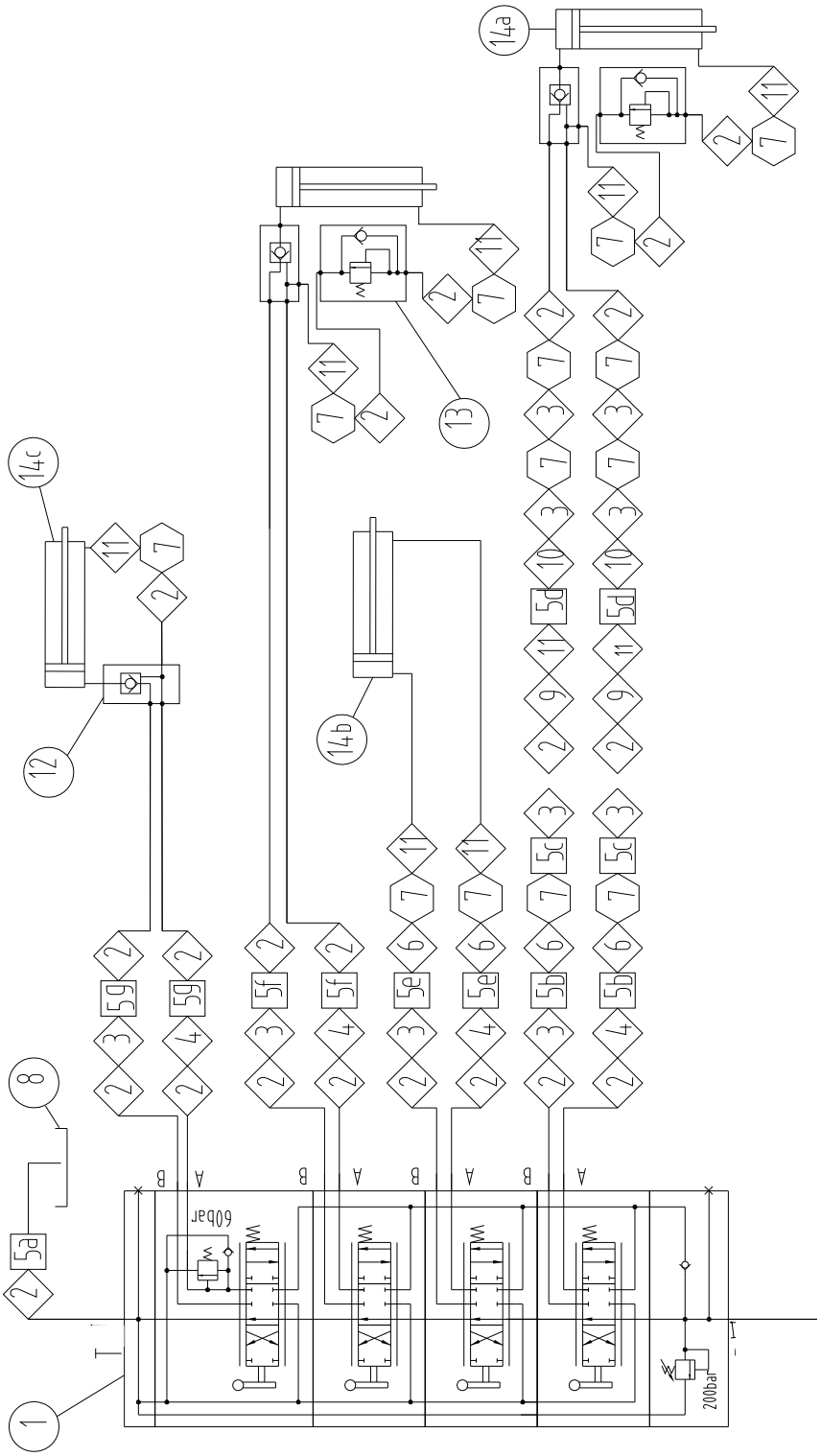


REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	flange,split flange	XBCY39.00-6401		XBC39.6.4		2
2	hose	XBCY39.00-6402		XBC39.6.4		1
3	straight thread connector	XBCY39.00-6403		XBC39.6.4		3
4	hose	XBCY39.00-6404		XBC39.6.4		1
5	flange joint FL12/L42	XBCY39.00-6405		XBC39.6.4		1
6	hose	XBCY39.00-6406		XBC39.6.4		1
7	straight thread connector	XBCY39.00-6407		XBC39.6.4		1
8	straight thread connector	XBCY39.00-6408		XBC39.6.4		1
9	hose	XBCY39.00-6409		XBC39.6.4		1
10	oil return flange of boom	XBCY39.00-6410		XBC39.6.4		1
11	straight thread connector	XBCY39.00-6411		XBC39.6.4		9
12	hose	XBCY39.00-6412		XBC39.6.4		1
13	pressure-testing joint	XBCY39.00-6413		XBC39.6.4		1
14	hose,check .5m	XBCY39.00-6414		XBC39.6.4		1
15	straight thread connector	XBCY39.00-6415		XBC39.6.4		1
16	hose	XBCY39.00-6416		XBC39.6.4		1
17	straight thread connector	XBCY39.00-6417		XBC39.6.4		20
18	hose	XBCY39.00-6418		XBC39.6.4		2
19	straight thread connector	XBCY39.00-6419		XBC39.6.4		1
20	hose	XBCY39.00-6420		XBC39.6.4		1
21	straight thread connector	XBCY39.00-6421		XBC39.6.4		2
22	hose	XBCY39.00-6422		XBC39.6.4		1
23	hose	XBCY39.00-6423		XBC39.6.4		2
24	hose	XBCY39.00-6424		XBC39.6.4		8
25	neighboring straight thread connector	XBCY39.00-6425		XBC39.6.4		8
26	hose	XBCY39.00-6426		XBC39.6.4		8
27	pipe,steel pipe φ12x2	XBCY39.00-6427		XBC39.6.4		40
28	hose	XBCY39.00-6428		XBC39.6.4		4
29	hose	XBCY39.00-6429		XBC39.6.4		4
30	tee connector	XBCY39.00-6430		XBC39.6.4		8
31	union elbow	XBCY39.00-6431		XBC39.6.4		4
32	hose	XBCY39.00-6432		XBC39.6.4		6
33	pump,boom pump	XBCY39.00-6433		XBC39.6.4		1
34	gauge,pressure 60mpa	XBCY39.00-6151		XBC39.6.4		1
35	valve,boom control valve	XBCY39.00-6435		XBC39.6.4		1
36	valve,balancing valve	XBCY39.00-6436		XBC39.6.4		10
37	motor,rotation motor	XBCY39.00-6437		XBC39.6.4		1

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

6.5 OUTRIGGER SYSTEM XBC39.6.5



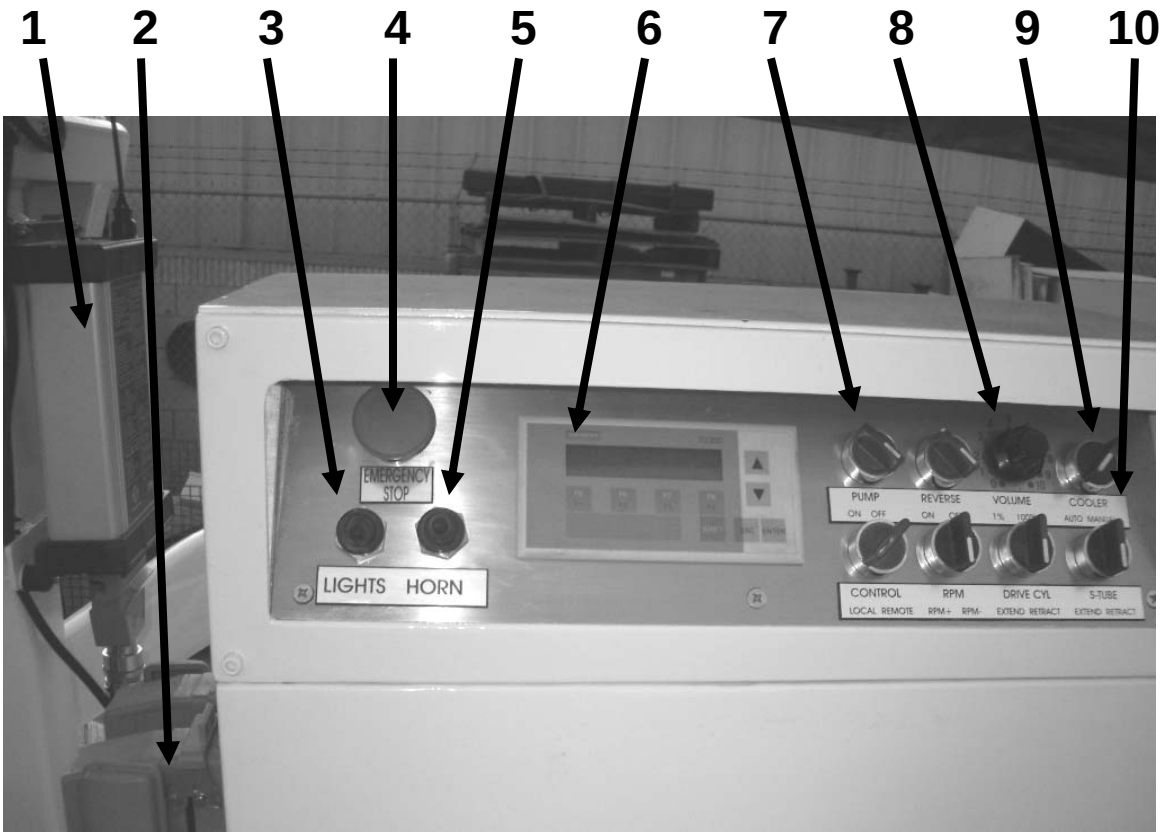
REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	valve,outrigger control	XBCY39.00-6501		XBC39.6.5		2
2	joint	XBCY39.00-6502		XBC39.6.5		44
3	union elbow	XBCY39.00-6503		XBC39.6.5		20
4	joint	XBCY39.00-6504		XBC39.6.5		8
5a	hose	XBCY39.00-655a		XBC39.6.5		2
5b	hose	XBCY39.00-655b		XBC39.6.5		4
5c	hose	XBCY39.00-655c		XBC39.6.5		4
5d	hose	XBCY39.00-655d		XBC39.6.5		4
5e	hose	XBCY39.00-655e		XBC39.6.5		4
5f	hose	XBCY39.00-655f		XBC39.6.5		4
5g	hose	XBCY39.00-655g		XBC39.6.5		4
6	joint	XBCY39.00-6506		XBC39.6.5		8
7	pipe,steel pipe	XBCY39.00-6507		XBC39.6.5		22
8	tank,hydraulic	XBC39.2.6		XBC39.6.5		1
9	rotating joint	XBCY39.00-6509		XBC39.6.5		4
10	joint	XBCY39.00-6510		XBC39.6.5		4
11	hinged joint	XBCY39.00-6511		XBC39.6.5		18
12	valve,check valve	XBCY39.00-6512		XBC39.6.5		6
13	valve,holding valve	XBCY39.00-6513		XBC39.6.5		4
14a	cylinder,jack cylinder	XBC39.00-3012		XBC39.6.5		4
14b	cylinder,extend cylinder	XBC39.2.8		XBC39.6.5		2
14c	cylinder,swingout cylinder	ZBC37.2.7		XBC39.6.5		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 7 ELECTRICAL CONTROL SYSTEM

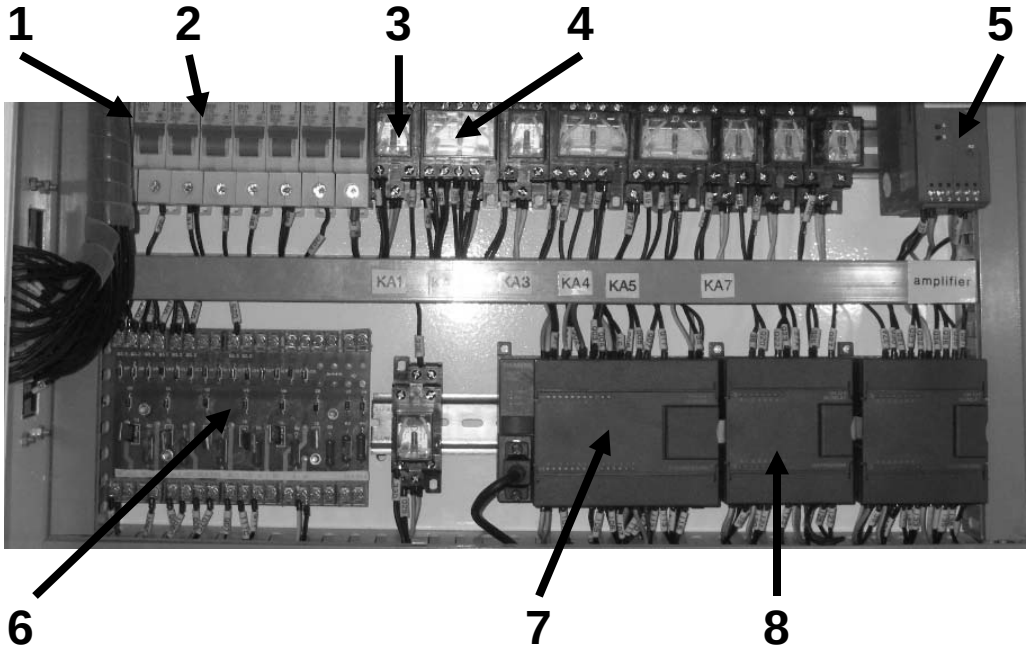
7.1 CONTROL SYSTEM XBC39.7



No.	Description	Part Number	Material	Parent	Weight	Quantity
1	receiver,radio receiver	FST719		XBC39.7		1
2	plug	ACJ3X-16A/24		XBC39.7		2
3	switch,toggle	201		XBC39.7		1
4	emergency stop button	ZB2BS54C		XBC39.7		1
5	switch,momentary toggle	212		XBC39.7		1
6	display,text display	TD200		XBC39.7		1
7	switch,2 position knob	ZB2BD3C		XBC39.7		3
8	potentiometer	2-2K		XBC39.7		1
9	switch,2 position knob	ZB2BD2C		XBC39.7		1
10	switch,3 position knob	ZB2BD5C		XBC39.7		3
NA	sensor,proximity sensor	XS1-M18DA210				3
NA	COIL, 24V, 1.25A	900021389.E-66				NA

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

7.2 CONTROL BOX

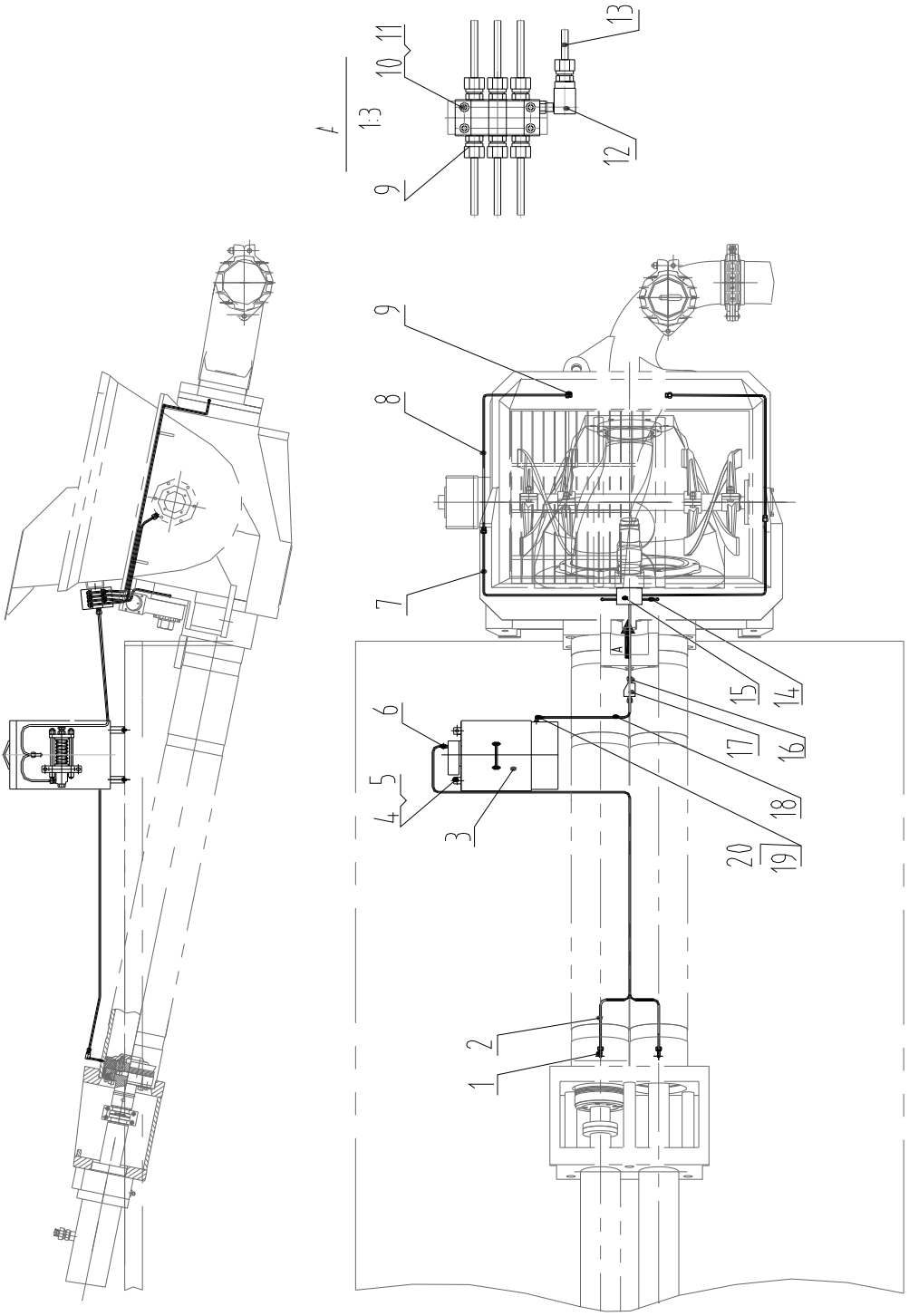


No.	Description	Part Number	Material	Parent	Weight	Quantity
1	breaker,circuit breaker	BKNIP/16A		XBC39.7		1
2	breaker,circuit breaker	BKNIP/10A		XBC39.7		7
3	relay	LY2NJ24V		XBC39.7		5
4	relay	LY4NJ24V		XBC39.7		2
5	amplifier	VT11015-11UB24V		XBC39.7		1
6	board,amplifier board	BC37/42		XBC39.7		1
7	PLC	CPU224		XBC39.7		1
8	module,expansion module	EM223		XBC39.7		2

REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

CHAPTER 8 LUBRICATION SYSTEM

8.1 LUBRICATION SYSTEM



REED
13822 Oaks Avenue
Chino, CA 91710
909-287-2100
www.reedpumps.com

No.	Description	Part Number	Material	Parent	Weight	Quantity
1	elbow,union Z1/8	22646T		XBC39.8		2
2	tube,copper tube φ6×1	BC37.8-1		XBC39.8		2
3	lubricant reservoir	HA5923800A		XBC39.8		1
4	bolt M8 × 15	CB00000054		XBC39.8		4
5	washer 8	CW00000017		XBC39.8		4
6	elbow,union Z1/8	22646T		XBC39.8		2
7	tube,copper tube φ6×1	BC37.8-2		XBC39.8		2
8	tube,copper tube φ6×1	BC37.8-3		XBC39.8		2
9	straight thread connector	22587-1T		XBC39.8		6
10	bolt M6 × 65	CB00000055		XBC39.8		4
11	washer 6	CW00000021		XBC39.8		4
12	elbow,union M10 × 1	22646-1T		XBC39.8		1
13	tube,copper tube φ6×1	BC37.8-4		XBC39.8		1
14	tube,copper tubeφ6×1	BC37.8-5		XBC39.8		2
15	distributor block	28835-37-022		XBC39.8		1
16	straight thread connector	25732T		XBC39.8		2
17	filter,oil and grease filter	28985-2		XBC39.8		1
18	tube,copper tube φ6×1	BC37.8-6		XBC39.8		1
19	joint	BC37.8-7		XBC39.8		1
20	elbow,union M10×1	22646-1T		XBC39.8		1

A guide for the prevention of accidents when driving, operating, cleaning, and maintaining concrete pumps, placing booms, and related equipment.

American Concrete Pumping Association
606 Enterprise Drive
Lewis Center, OH 43035
614 431 5618
www.concretepumpers.com

REED

REED, LLC
13822 Oaks Avenue
Chino, CA 91710 USA
www.reedpumps.com

Version 5.0.1

CALIFORNIA

Proposition 65 Warning

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

SAFETY MANUAL

A GUIDE FOR THE PREVENTION OF ACCIDENTS WHEN DRIVING, OPERATING, CLEANING, AND MAINTAINING CONCRETE PUMPS, PLACING BOOMS AND RELATED EQUIPMENT

Introduction

Safety is one of the major concerns of every person involved in the concrete pumping industry. Although much of the responsibility for everyday safety rests upon the pump operator, it is vital that everyone involved makes safety the top priority. This includes the owners, the mechanics, the ready mix drivers, the placing crew, the concrete contractors and the machine manufacturers.

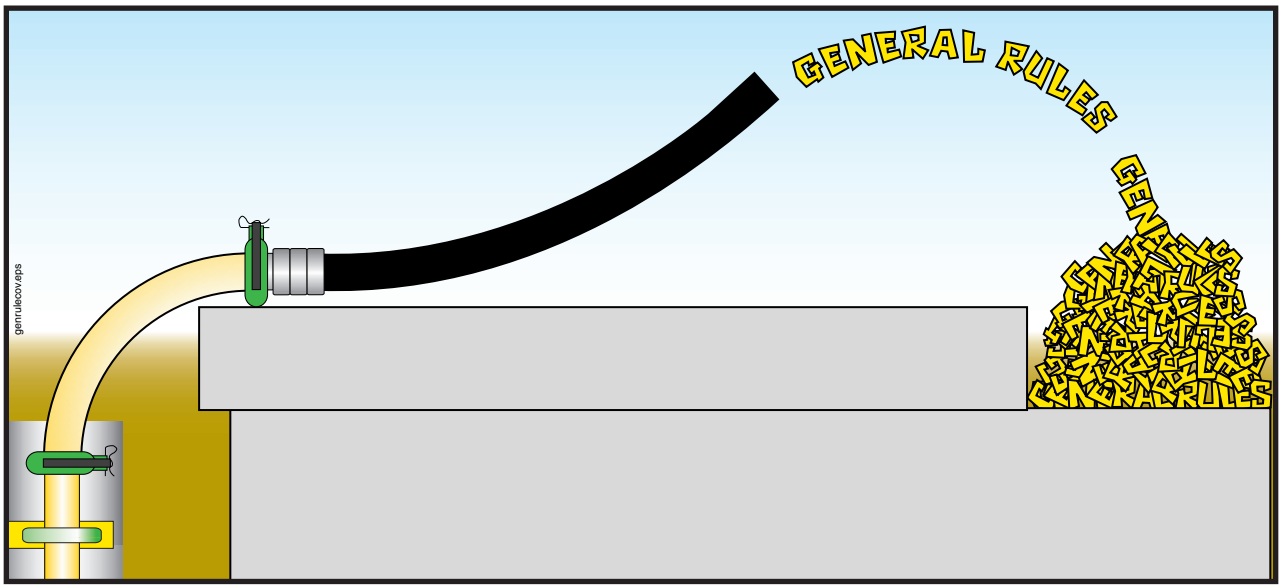
Although this Safety Manual covers a great deal of information regarding the prevention of accidents while operating a concrete pump or placing boom, it is unlikely that every conceivable circumstance has been covered. Regardless of how thorough a manual like this may be, there is always the unexpected. Please understand that there is no substitute for **common sense** and dedication to the idea that **you are responsible for your own safety**, and affect the safety of those around you. You have to know the rules first, but you must keep your mind on the job if knowledge of the rules is going to keep you and your co-workers alive and well. No attempt has been made in this Safety Manual to provide the highly specialized knowledge of the workings of the individual machines that is also critical for safe and proper operation. For that, you must **read and understand the operation manual for the machine(s) that you operate**!

This Safety Manual is a guide for the prevention of accidents and is to be used in conjunction with **professional training**. Additional information and materials are available through the American Concrete Pumping Association, including, specifically, an Operators Certification Program. Make the commitment to be professional - get your certification!

Version 5.0.1
January, 2006

SAFETY MANUAL

Table of Contents



General Rules
Table of Contents

I. Before You Leave The Yard

1. Safety Alert Symbol And Signal Word Explanation

1.1

The triangle with the exclamation point inside is used to alert you to an important safety point, and is called a *Safety Alert Symbol*. One of the following color-coded signal words will appear after the safety alert symbol:

- If the safety alert symbol is followed by the signal word **DANGER** with white letters in a red box (DANGER), it indicates a hazardous situation which, if not avoided, **WILL** lead to **death or serious injury.**
- If the safety alert symbol is followed by the signal word **WARNING** with black letters in an orange box (WARNING), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **death or serious injury.**
- If the safety alert symbol is followed by the signal word **CAUTION** with black letters in a yellow box (CAUTION), it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **minor to moderate injury.**
- The signal word **CAUTION,** used in a yellow box, but **without the safety alert symbol** (CAUTION), means the point addresses a hazard which, if not avoided, **COULD** cause **damage to equipment or property.**

2. What To Do Before You Arrive At Work

2.1

Get enough sleep to be ready for the day's work. Accidents can happen when the body is on the job, but the mind is not.

Dress in appropriate apparel and Personal Protective Equipment (P.P.E.) (see Figure 1). You should always wear these items when pumping concrete:

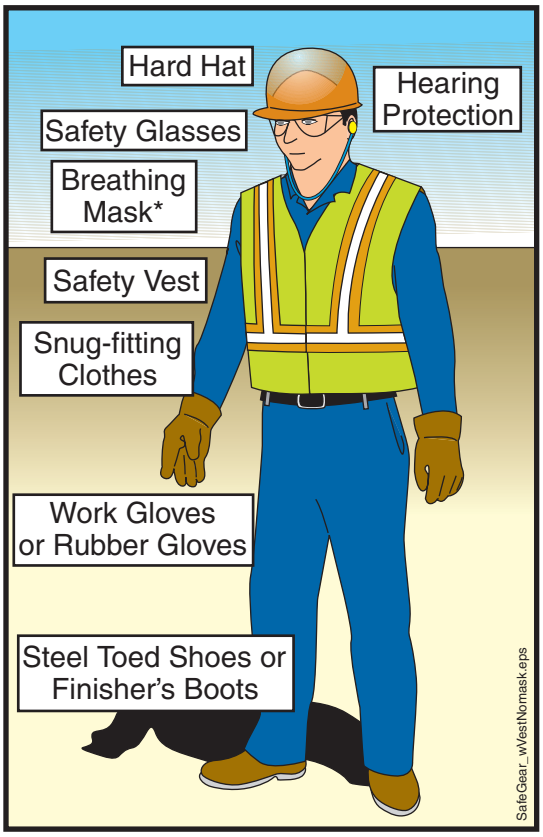
- hard hat
- safety glasses or goggles
- snug fitting clothes
- gloves
- steel toed shoes

In addition, you should wear:

- hearing protection if you stand near the pump
- breathing mask when mixing slurry or whenever there is cement dust in the air

- rubber gloves during cleanout
- rubber boots anytime you have to stand in concrete

Jewelry, athletic shoes, sandals, and shorts are examples of clothing that should NOT be worn when pumping.



* Breathing mask needed when cement dust (or other toxic dust) is present in the air.

Figure 1
Personal Protective Equipment (P.P.E.)

2.2

⚠WARNING Be sure that any clothing you wear does not have strings, fringes, or other external tightening means that could be caught in moving parts (Figure 2).

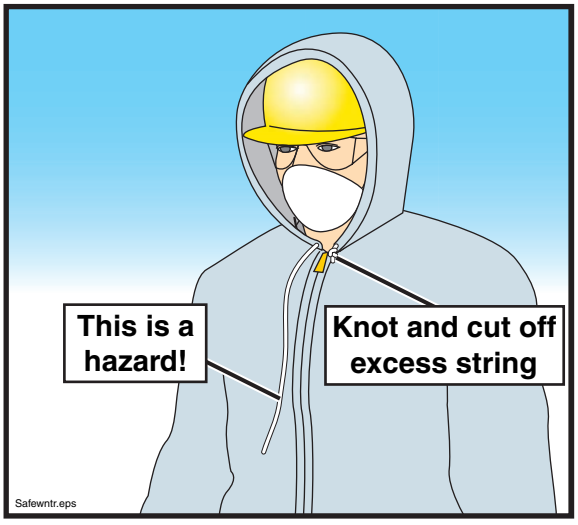


Figure 2
No strings attached

2.3 Arrive to work on time. Accidents can be caused by hurrying through procedures.

2.4 **⚠WARNING** **Never** go to work on a construction site or work on, around or near a piece of machinery when under the influence of drugs or alcohol. Beware of "over the counter" drugs, many of which have specific warnings about operating machinery after taking the medication (Figure 3).

Figure 3
Your co-workers depend upon you for their safety

2.5 **⚠WARNING** Don't bring your personal problems to work with you. In an office setting this may be annoying to co-workers, but on a construction site it can be deadly. The workers around you depend on you for their safety.

3. What To Check Before You Leave The Yard

3.1 **⚠WARNING** Do not operate the machine until you read and understand the unit's operation manual. Lack of understanding of proper operating procedures could result in unsafe operation. Operation manuals are issued with each new unit. If you haven't seen it, ask your supervisor. Replacements are available from the manufacturer.

3.2 **⚠WARNING** Inspect delivery pipes, concrete delivery hoses, and end hoses for wear. Never use a worn hose or worn or dented pipe. **Know the maximum pressure that your machine can exert on the concrete, and be sure that the pipes, hoses and clamps are capable of handling the pressure**. Maximum pressure on concrete is stated in operation manuals, service manuals, and on the serial number plate of the machine. A chart showing the minimum wall thickness of pipeline versus maximum pressure is found on page 73 in the appendix section of this Safety Manual.

3.3 **⚠WARNING** If you will need to use compressed air to clean out the boom or system pipeline, BE SURE that you have the proper training, equipment, and attachments to do this procedure safely! Proper attachments include:

- A blow out head with properly sized air discharge regulator valve and separate water/air inlet. The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once.
- A *go devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or go devil catcher that will catch the go devil or ball when the line has been purged of all concrete. There are two types of catchers (see paragraph 7.23 on page 31).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blow out head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage. Do **NOT** improvise on this. **Make sure** that you have the right part (Figure 4).

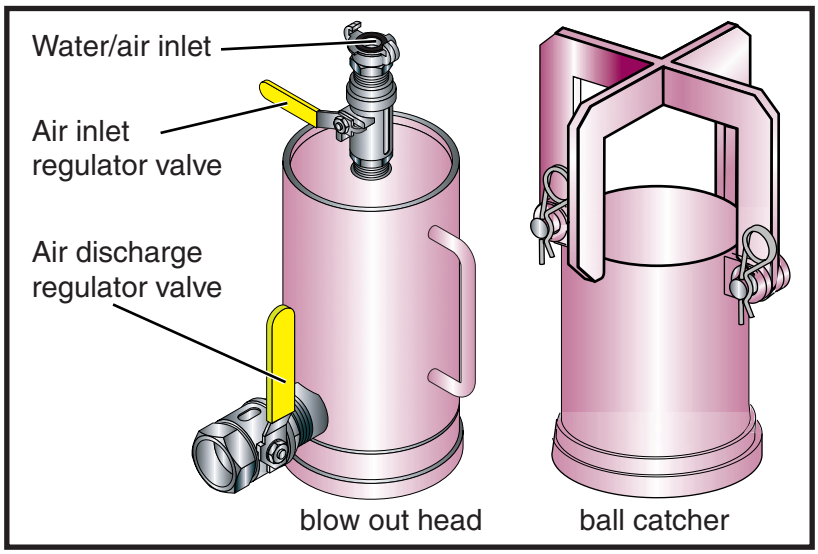


Figure 4
Compressed air accessories

3.4 ⚠**WARNING** Be sure that the unit is equipped with all the pipes, clamps, gaskets and hoses, blow out adapters, ball catchers, and other accessories that you will need for the day's work. "Making do" with inappropriate equipment could cause accidents.

3.5 On trailer mounted units, check the oil and cooling system (air or water cooled systems) of the pump drive engine. Accidents could occur when lack of maintenance is causing a distraction while operating the equipment.

3.6 Be sure the battery has enough charge to start the pump drive engine. You will be rushed on the job if you have to do repair work before you can begin operation.

3.7 **⚠WARNING** The operator is responsible for checking to see that the concrete pump, placing boom, and delivery system are in safe and proper working condition. If an unsafe condition exists, **work must not begin** until necessary repairs have been completed, or until the machine can be operated safely.

3.8 **⚠WARNING** The operator is responsible for checking that all safety equipment and guards are in place and in good condition. If found to be missing, incomplete, or damaged, **work must not begin** until the situation has been made safe.

3.9 **⚠WARNING** The operator is responsible for checking that all safety decals are in place and are in readable condition. If found to be missing or unreadable for any reason, steps should be taken to obtain replacements.

3.10 **⚠WARNING** Inspect the tires and brakes on the truck. Never drive a truck with bald or cracked tires, or with weak or worn brakes. If you have air brakes, be sure that the air system is free from leaks and will maintain pressure when driving. Loss of air pressure will cause the brakes to be applied while driving. If driving continues after the brakes are applied, the resulting friction could cause enough heat to start a fire.

3.11 Drain moisture from the air tanks that supply the unit's brakes (if so equipped). This is especially important if weather conditions could cause the moisture to freeze. If you lose air pressure because of frozen moisture, the brakes will apply themselves, and you will have to stop driving until the unit is repaired.

3.12 **⚠WARNING** (See Figure 5.) Mount or dismount the pump or truck using the *3 Point Rule* (i.e. keep two hands and one foot or one hand and two feet in contact with a secure surface at ALL times).

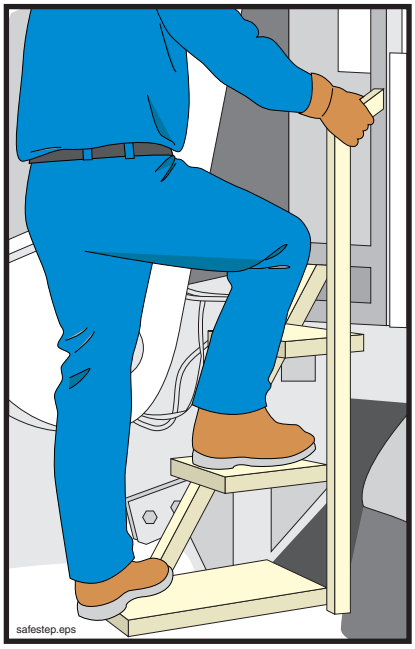


Figure 5
The 3 Point Rule

3.13 **⚠WARNING** Never mount or dismount the truck or pump while carrying objects that prevent you from using the "3 Point Rule." Move the objects separately, if needed.

3.14 **⚠WARNING** Be sure that outriggers are pinned and locked before traveling. If the locking device is damaged or worn, it should be repaired immediately and the unit **must not be driven until the outriggers can be positively locked** against accidental opening (see Figure 6).

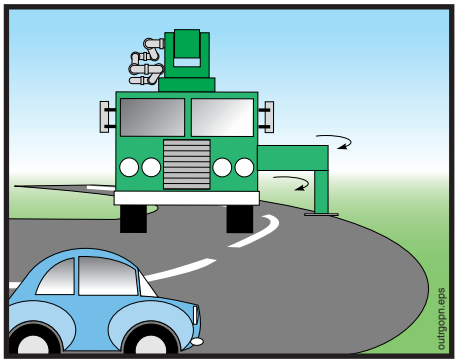


Figure 6
Before driving, be sure outriggers cannot open

3.15 **⚠WARNING** Be sure there is nothing in the cab of the truck (such as empty soda cans, loose tools, etc.) that could interfere with the operation of the vehicle.

3.16 Be sure that all road-related safety devices (warning signs, flares, fire extinguisher, etc.) are present and secured for travel.

3.17 Be sure all personal protective equipment (hard hat, safety goggles, rubber gloves, etc.) are secured for travel.

3.18 **⚠WARNING** Be sure the windshield and mirrors are clean and free of frost or ice, and that the mirrors are properly adjusted.

3.19 **⚠WARNING** Verify that head lights, tail lights, turn signals, brake lights, backup warning horn, and backup lights are operational.

3.20 In some cases you may be asked to operate a machine other than the one with which you are familiar. In these cases, be sure to:

- Know the weight, height, and width of the machine.
- Have a copy of the operation manual with you.
- Ask the machine's normal operator, the dispatcher, or your supervisor questions regarding any unusual or unique operational characteristics of the machine.
- Familiarize yourself with the machine by setting it up in the yard and running the functions, and by familiarizing yourself with the operation manual. This is especially important if the new machine is significantly different than the one you normally operate. Your co-workers depend on you to know the machine.

3.21 **⚠WARNING** Before driving the unit, be sure the boom is securely in its cradle, resting on approved boom rests that are in good condition, and secured by the tie-down strap (if so equipped). On some makes and models, the boom can be damaged by the bouncing motion that occurs while driving, but this damage is easily avoided by using the strap (Figure 7).

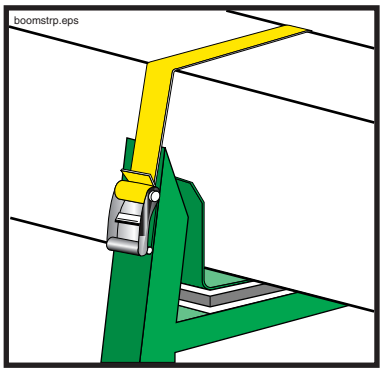


Figure 7
If your unit has a boom strap, use it

3.22 **⚠WARNING** Be certain that all loose items on the unit are secured for travel before driving.

4. Safety Rules For Driving Truck Mounted Concrete Pumps

4.1 **⚠WARNING** **Electrocution hazard!** (See figure 8.) If you're going to drive under low-hanging overhead power lines and it is not possible to maintain adequate safety distance between the pump and the wires, **you should look for another route!** If none is available, contact the power company responsible for the lines and have them de-energized.

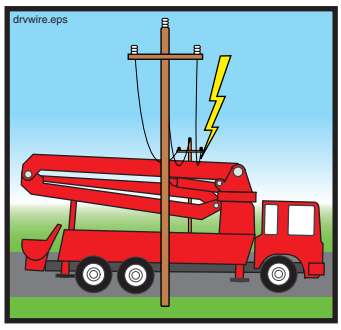
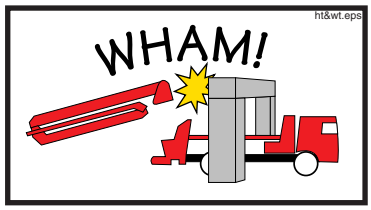


Figure 8
Watch for low-hanging power lines

4.2 Carefully select your route of travel. Avoid steep hills, residential areas, construction, low overpass clearances and narrow bridges whenever possible. **The driver is responsible for knowing the weight and height** of the machine.

4.3 **⚠WARNING** **Collision/falling hazard!** Before driving on bridge or elevated roadways, **be sure that they can support the weight of the vehicle** (Figure 9).



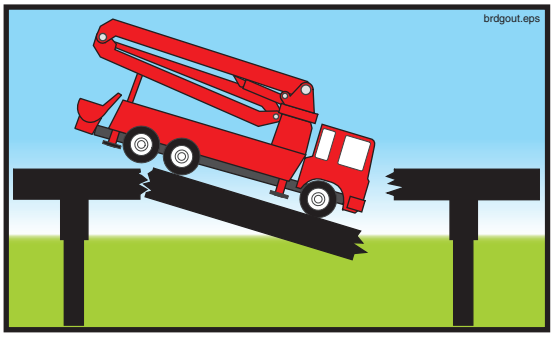


Figure 9
Know your height and weight

4.4 **⚠WARNING** **Collision hazard!** Before driving under ANY structure, **BE SURE** that the machine will clear (Figure 9).

4.5 **⚠WARNING** **Explosion hazard!** Never refuel the unit near hot surfaces, sparks, or open flames (Figure 10).

Figure 10
Be careful when refueling

4.6 **⚠WARNING** **Tipping hazard!** The vehicle must **not** be driven with an unfolded placing boom.

4.7 **⚠WARNING** **Possible boom movement.** Before driving the unit be sure that the distribution gearcase (PTO) has **disconnected** the hydraulic pumps. **Driving with the hydraulic pumps engaged creates a hazard** and is destructive to the pumps.

4.8 **CAUTION** Never drive the unit with concrete in the hopper. Concrete could splash out and damage other cars or property.

4.9 **⚠WARNING** **Runaway truck hazard!** When going down a hill, use one gear lower going down than it would take to go up.

4.10 **⚠WARNING** Truck mounted concrete pumps are generally top-heavy. Use caution when making sharp turns with the vehicle (Figure 11).

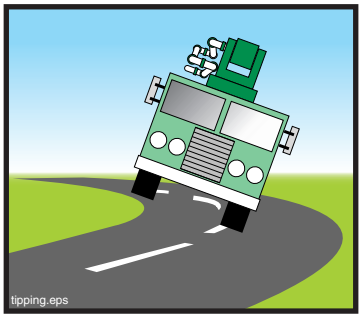


Figure 11
Maintain control on the curves

4.11 **⚠WARNING** Slow down at intersections, near playgrounds, residential areas, and near schools. Children have no knowledge of the increased stopping distances required by heavy vehicles.

4.12 **⚠CAUTION** Be familiar with your emergency equipment. Know how to light a flare, etc.

4.13 **⚠WARNING** Drive defensively. You are at a distinct disadvantage when it comes to maneuverability and stopping distance.

4.14 **CAUTION!** If you must tow the unit, know the correct places to hook the towing cable(s). Improper towing can damage the vehicle or pump.

4.15 **⚠WARNING** **Never** back up without a guide.

4.16 **⚠CAUTION** Know the rules and laws that apply to your state and locality. They have been enacted for your protection and the protection of those around you.

5. Safety Rules For Towing Trailer Mounted Concrete Pumps

5.1 **⚠WARNING** Be sure the towing vehicle is heavy enough and has enough horsepower and braking ability to tow the trailer. This is critical to maintaining control at highway speeds and to braking ability. If the trailer is heavier than the towing vehicle, braking distances will be greatly increased (Figure 12).

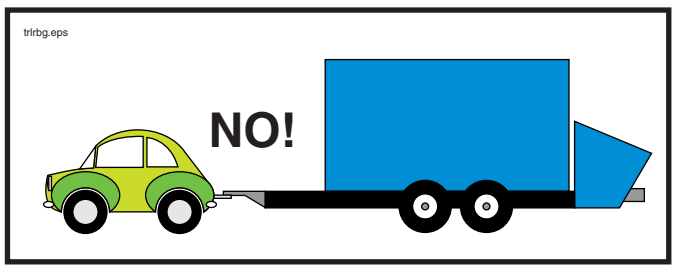


Figure 12
Do not under size the towing vehicle

5.2 **⚠WARNING** Check the tires, tire pressure, and brakes on the trailer before towing. Never tow a vehicle with cracked or bald tires. A trailer tire blowout can cause loss of control in the towing vehicle.

5.3 **⚠WARNING** Be especially careful on ice or slippery roads when towing a trailer. A skid that would normally be easily correctable can be multiplied by the trailer, causing loss of control.

5.4 **⚠WARNING** Be sure that the electrical connections between the towing vehicle and the trailer are sturdy and reliable, and that the lights on the towing vehicle and trailer are working.

5.5 **⚠WARNING** Always use safety chains and break-away protection when towing a trailer.

5.6 **⚠CAUTION** Be aware of local or state regulations regarding mirrors and lights when towing a trailer.

5.7 **⚠WARNING** When towing a trailer, your stopping distance and turning radius are greatly increased. Be aware of this **at all times**.

5.8 **⚠WARNING** When towing a trailer long distances, it is important to check the hitch, wiring, and safety chains frequently.

5.9 **⚠WARNING** Be aware of your length when towing a trailer. A common cause of trailer accidents is turning too close to curbs or objects.

5.10 **⚠WARNING** Never back up a trailer without a guide.

II. On The Job site

6. Safety Rules For Job Setup

SETTING UP A TRUCK MOUNTED BOOM PUMP

6.1 **The job setup phase can set the stage for accidents.** Taking a few extra moments to correctly set up the job will improve your chances of having a safe, trouble-free day.

6.2 **The operator is responsible for the safe operation of the machine**. Notify your employer, the job superintendent, and/or O.S.H.A. if you are being asked to set up in an unsafe manner. **You are never required to take a chance with safety.** You are the **only** person who can determine that the job circumstances under your control are safe.

6.3 Canadian law requires that the boom remains a minimum of 7 meters from electric wires. To conform to the Canadian law, any text in this manual that refers to a 17 foot or 5 meter safety distance from electric wires should be read as 7 meters for use in Canada.

6.4 **⚠ DANGER** **When overhead wires are in the area that the boom will be moving to complete a pour, a spotter must be employed whose only job is to warn the operator if the boom comes within 17 feet of the wires.** The spotter must understand the responsibilities assigned, and must be able to judge a 17 foot distance.

6.5 **⚠ DANGER** **You MUST avoid hazardous proximity or contact with electric lines at all times!** Position the machine so a minimum safety distance of **17 feet (5 meters)** is maintained in all boom positions needed to do the job (Figure 13). **Never decrease the safety distance to reach an unsafe area with the boom.**

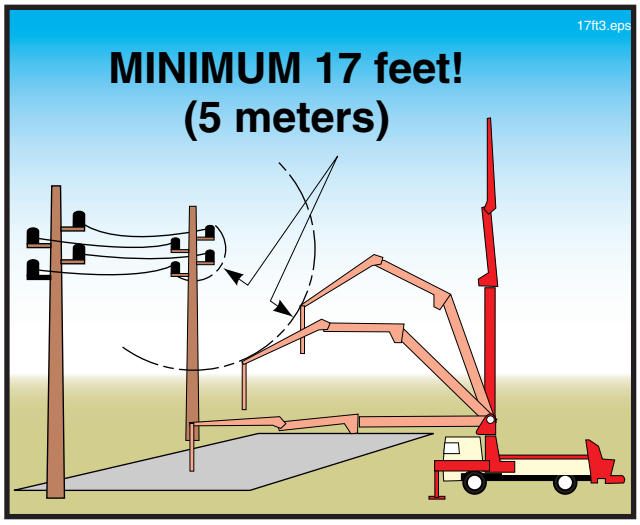


Figure 13
Always maintain the safety distance

6.6 **⚠ DANGER** If you are in doubt about your proximity to high voltage wires, or if it is not possible to maintain 17 feet of clearance, you must lay a separate pipeline or use a different placement method. **Never take chances with high voltage!** (See Figure 14.)

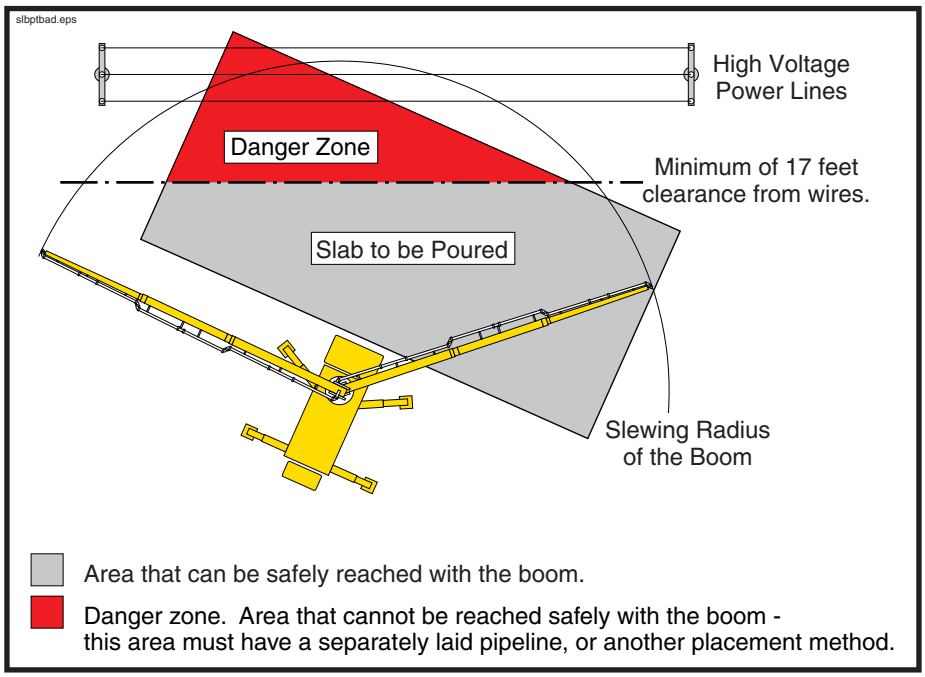


Figure 14
Lay a separate pipeline if you can't maintain the safety distance

6.7 **⚠ DANGER** Do not put the boom on top of electrical wires, even if you can maintain 17 feet of clearance. Mechanical or hydraulic malfunction may cause the boom to move down (Figure 15).

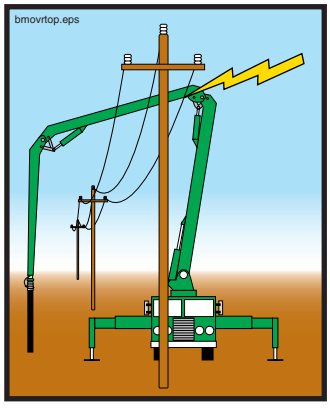


Figure 15
Never boom over wires

6.8 **⚠ DANGER** **It is crucial to take electric wires into consideration during setup, even if they are away from the area to be pumped!** Accidents may occur during cleanout and moving that can be avoided by proper initial setup. In the illustrations below, the pour is outside of the minimum safety distance, but the danger still exists. You **must** be aware of the wires at all times! (See Figure 16.)

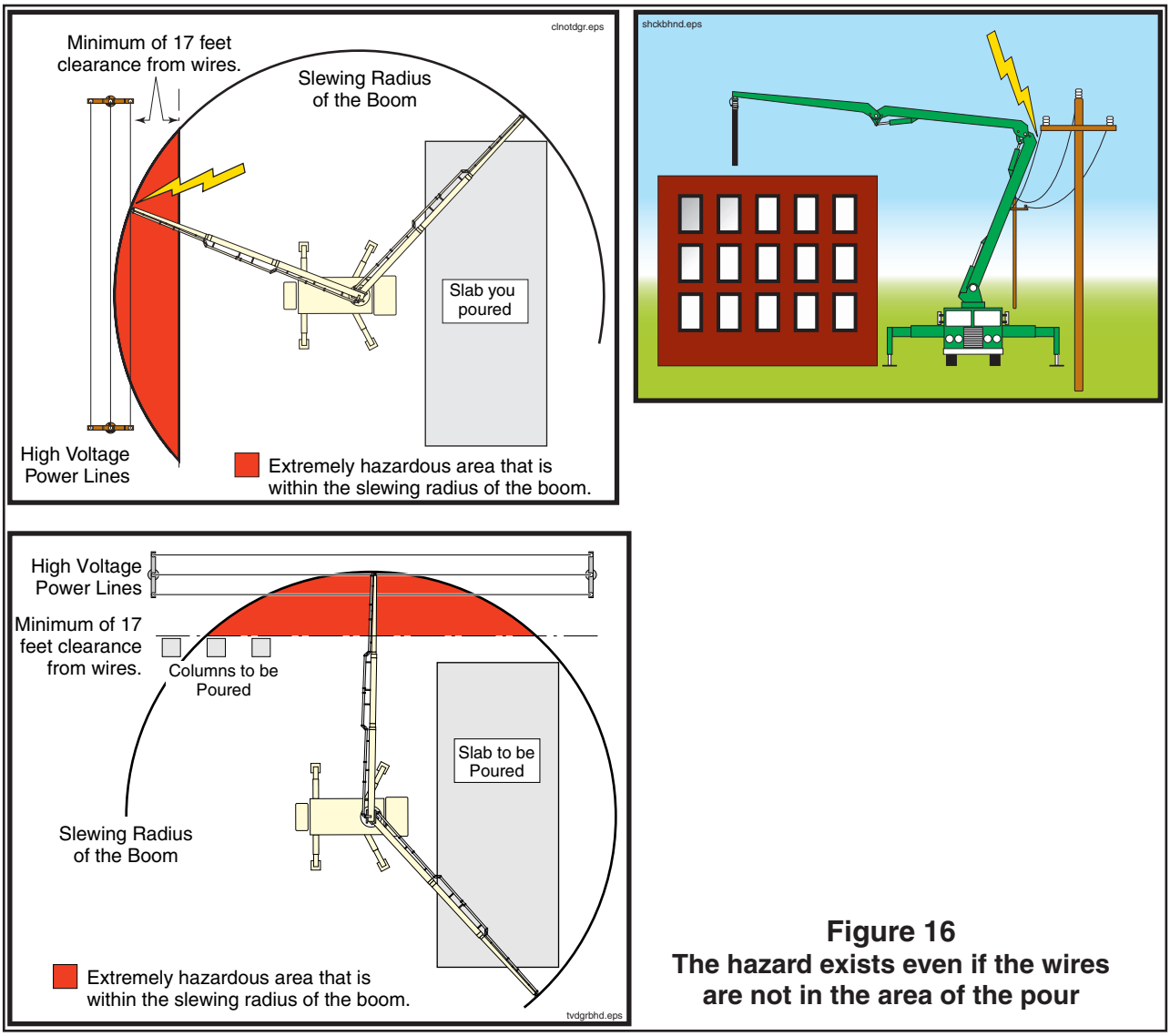
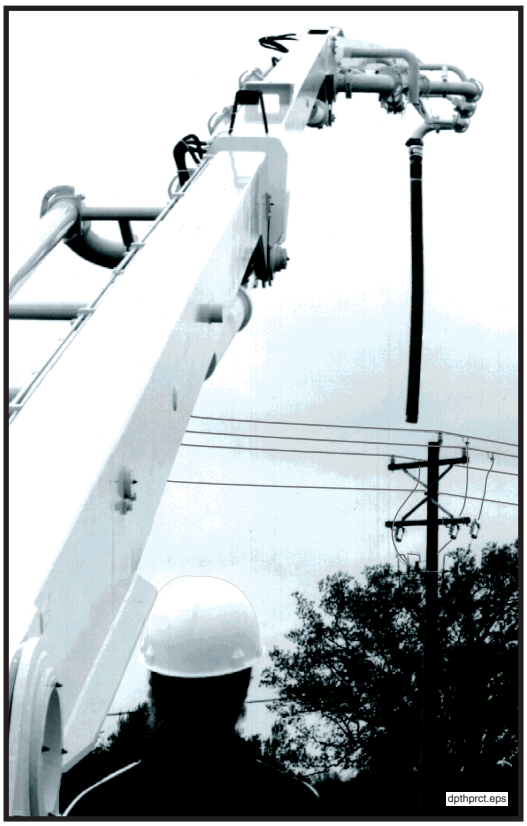


Figure 16
The hazard exists even if the wires are not in the area of the pour

6.9 **⚠ DANGER** Depth perception varies from person to person and is affected by the distance from the objects being observed. Minimum distances from electrical wires and other obstructions should always be judged by placing yourself in a viewing position that does not require depth perception judgements. If this is not possible, a spotter **must** be used! See the glossary for the definition of spotter (Figure 17).



Will it hit the wires?
You can't tell from here.

Get the best possible vantage point

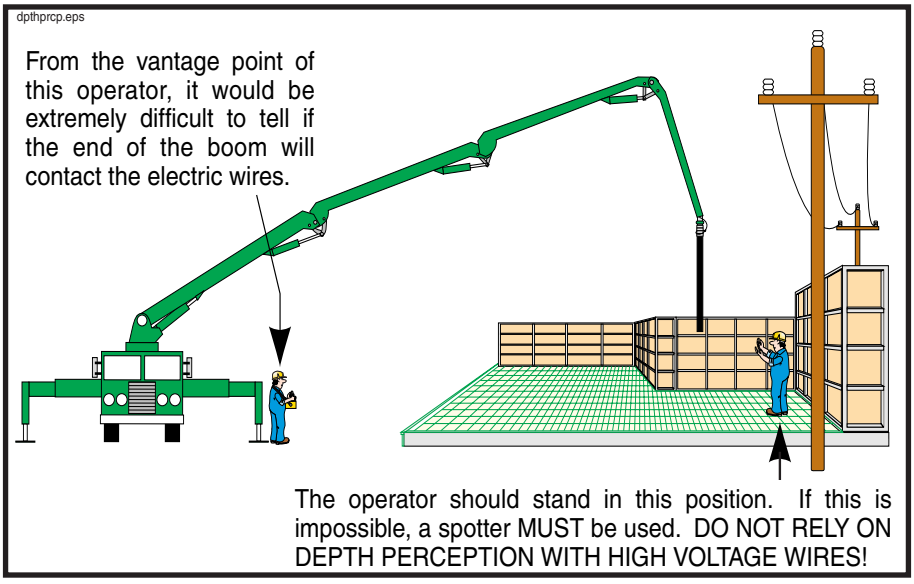


Figure 17
Never rely on depth perception with electric wires

6.10 **⚠ DANGER** Always assume that a power line is live. Never take the word of someone on the job site that it has been de-energized. **Only a qualified representative of the responsible power company can verify that a line has been de-energized** (see Figure 18).

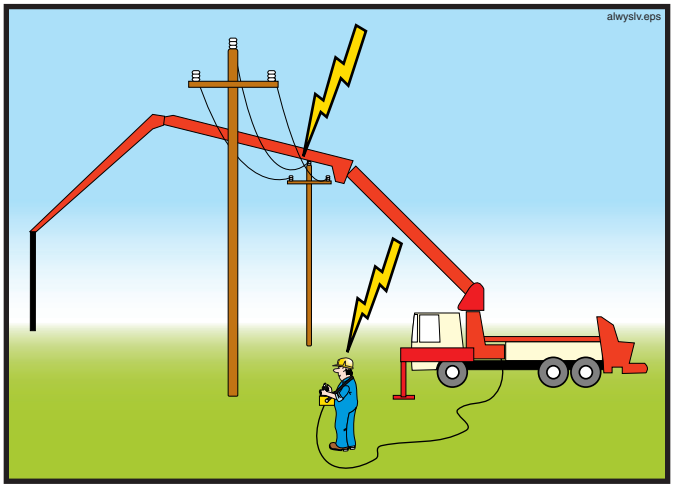


Figure 18
Assume the wires are energized

6.11 **⚠WARNING** Maintain a safe distance from obstructions, such as cranes, scaffolding, and buildings (Figure 19).

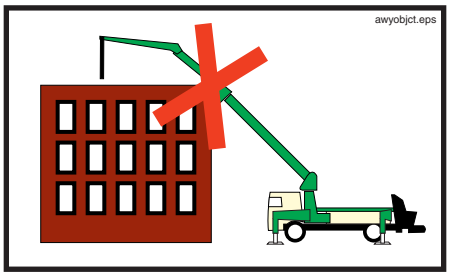


Figure 19
Maintain a safe distance from obstructions

6.12 **⚠WARNING** Place wheel chocks under the tires on sloping terrain. Release the brakes and allow the machine to settle against the chocks, then reapply the brakes.

6.13 **⚠CAUTION** Remove any snow, ice, oil, or dirt from steps and platforms.

6.14 **⚠WARNING** Possible boom damage! Never add extensions to the end of the placing boom! If continuation pipes are connected to the end hose, they must **NOT** impose any load on the boom (Figure 20).

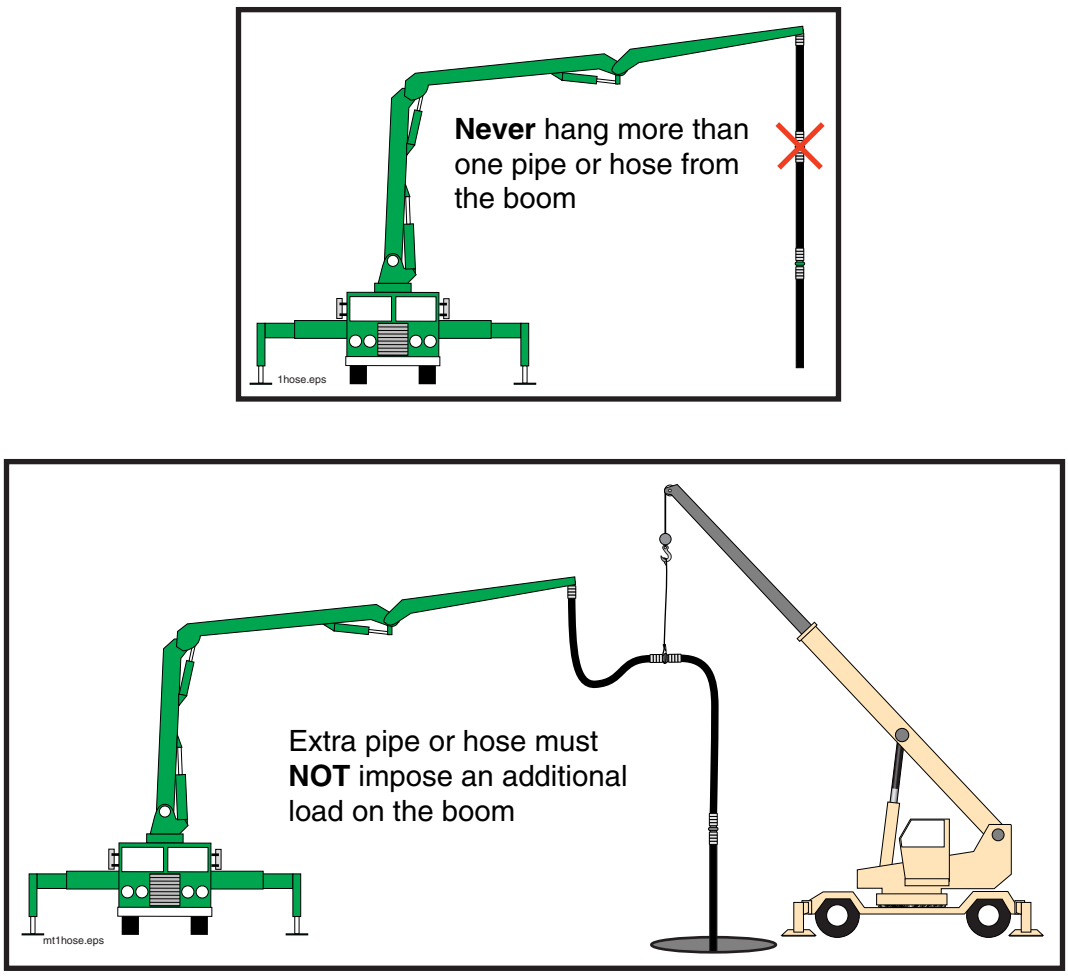


Figure 20
Know and do not exceed the maximum weight allowed to hang from the boom

6.15 **⚠WARNING** The length of a 125mm boom end hose may not exceed 13 feet (4 meters). Certain machines may require a shorter length or smaller diameter end hose. Check with the boom manufacturer.

6.16 **⚠WARNING** Possible structural damage. If you remove the supplied tip hose and replace it with a combination of reducers and hoses, the total weight of all hanging pieces (including the weight of the concrete) must not exceed the weight of the supplied tip hose (including concrete). The supplied tip hose is typically 12 feet long and 125mm (or 5 inch) diameter. When filled with normal, hard rock concrete it weighs 376 pounds. Certain units may have a lower allowable weight and, thus, a different tip hose. The operation manual included with the unit will inform you of the specification if the unit requires a smaller than standard tip hose. It is the operator's duty to know the specification of the unit in operation (Figure 21). **Find out if your unit has special requirements!**

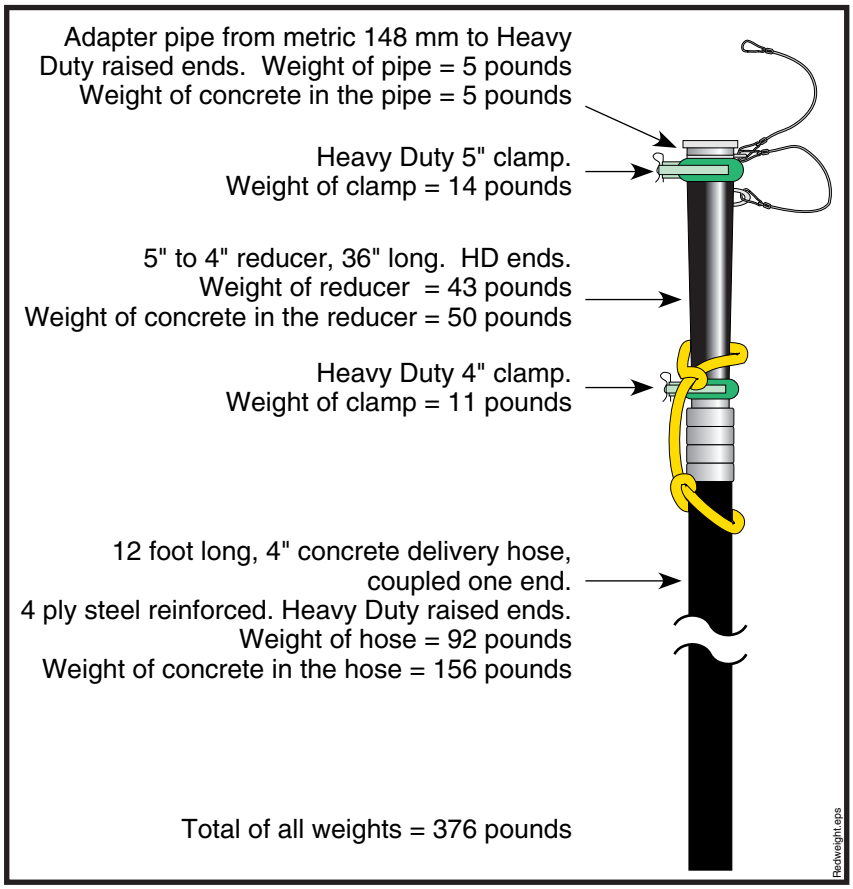


Figure 21
A typical reducer/hose combination

6.17 **⚠WARNING** A *concrete delivery hose* is a flexible concrete hose that has two end couplings. An *end hose* is a flexible concrete hose that has one end coupling. In normal usage, it is preferable to have an end hose as the last piece of delivery system. If you will be swinging the full boom over workers or property you must be able to plug the delivery system. See the instructions for plugging the delivery hose on page 43.

6.18 **⚠WARNING** All hanging system components must be fastened with safety cables or straps, and **each component must be capable of handling the maximum concrete pressure of the machine** (see Figure 22).

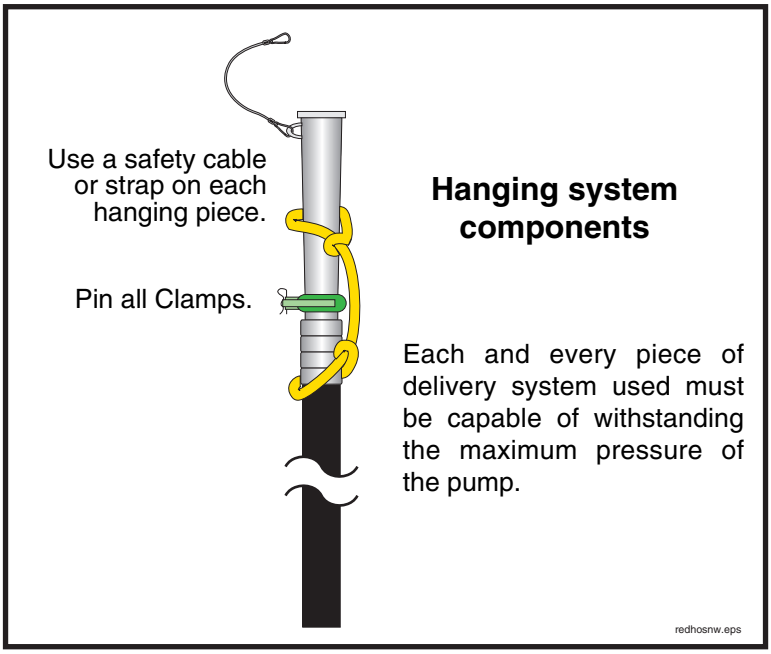


Figure 22
Assure the safety of hanging system components

6.19 **⚠WARNING** Placing booms possess a very wide effective operating range. Due to this high degree of mobility, some placing booms can reach a position unsuitable for practical operation. Under certain circumstances **overloading, tipping, or damage to the boom is possible**. These unsuitable areas are documented on safety decals and in operation manuals (see Figure 23). **Be aware of these areas if they apply to your unit and set up the pump taking these areas into consideration**.

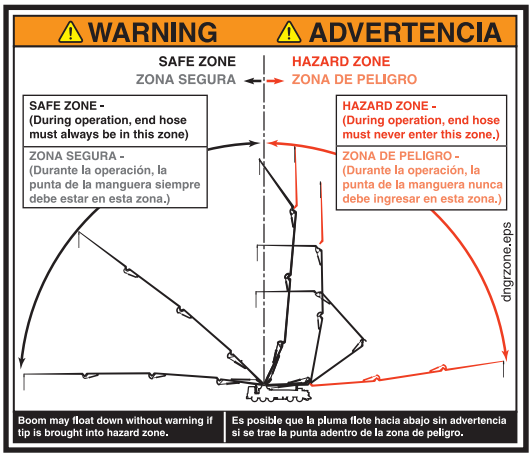


Figure 23
An example of a hazard area decal

6.20 **⚠WARNING** Collision hazard! Secure the immediate area of the machine from public traffic in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).

6.21 **⚠WARNING** Consider the safe approach and departure of the ready-mix trucks and adjust your setup accordingly. Adjusting your setup position by a few degrees one way or another could mean the difference between a safe approach and an unsafe approach. Some examples of unsafe approaches are: too near an excavation or sticking out into traffic.

6.22 **⚠WARNING** If you set up the unit with one or more outriggers not fully extended on the side away from the pour (shortrigging), you will tip the machine if you forget and rotate the boom over the side with the unextended outriggers. That being said, it is known that under certain circumstances, shortrigging is unavoidable (see Figure 24). If no alternatives are practical and you must shortrig for a particular job, keep these points in mind.

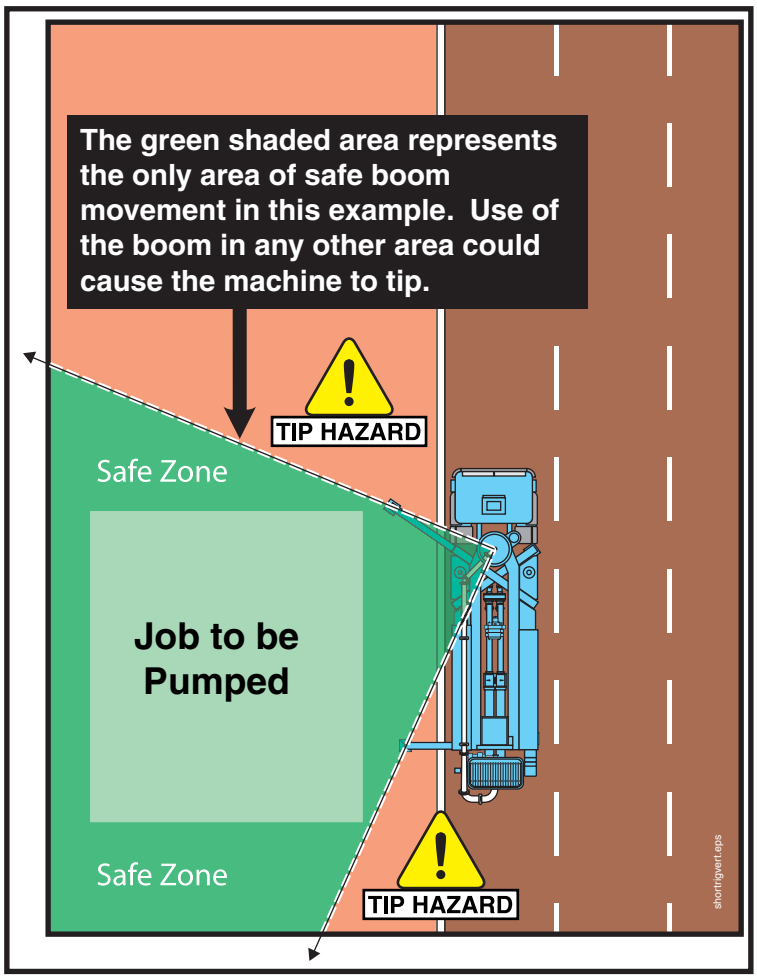
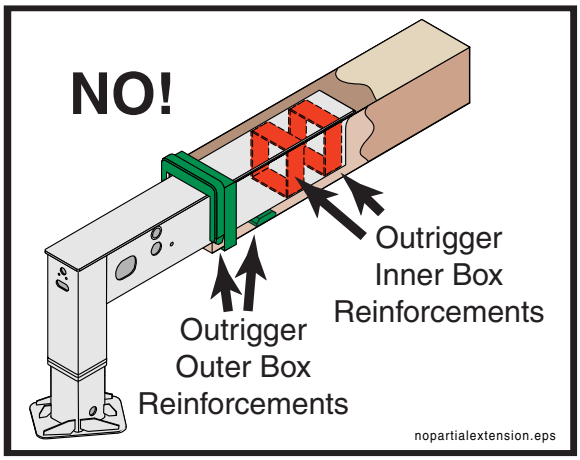


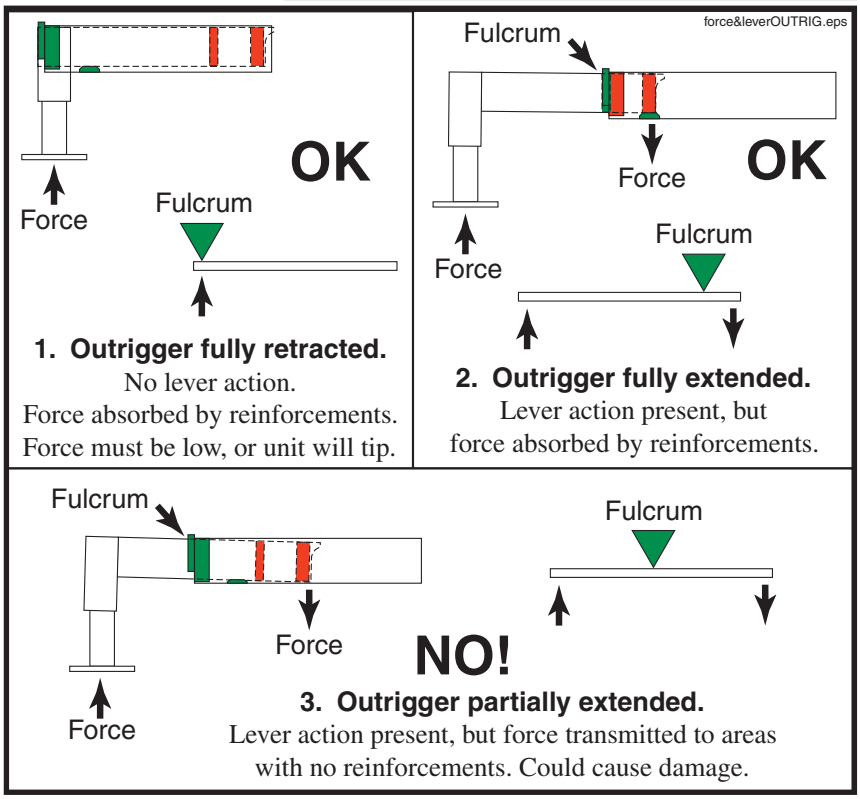
Figure 24
Shortrigging

- You may only operate the boom when it is placed between outriggers that are completely extended; you may tip if the boom is placed anywhere else.

- You should still jack the outriggers that are not fully extended. This will assist in stabilizing and preventing the unit from rocking. The margin of safety this gives you is very small; and won't prevent you from tipping.
- Don't get lazy! If it is possible to extend all of the outriggers, do it!
- Don't forget that you didn't fully extend all the outriggers. Explain to other workers on the job what will happen if you forget and slew the boom over unextended outriggers. That way, if they see you are moving the boom into a tipping area, they may be able to warn you.
- Outriggers that cannot be fully extended should NOT be partially extended unless specifically allowed by the manufacturer. The inner and outer outrigger box reinforcements will not align in intermediate positions. (Figure 25.)

Figure 25
Partial extension is not allowed





⚠WARNING When setting the outriggers, jack the unit to within 3° of level, or according to the operation manual of your unit. If the unit is not set up within the specification for level, the boom brakes could fail, causing the boom to rotate downhill by the force of gravity.

6.23 **⚠WARNING** Tipping hazard! Do not unfold the boom until the outriggers have been correctly positioned and secured! The outriggers must be completely extended and opened as described in the operation manual. Do not partially extend the outriggers because intermediate positions are **not safe!** See the information regarding shortrigging (paragraph 6.22).

6.24 **⚠WARNING** Tipping hazard! Check soil conditions before jacking the outriggers. If necessary, use cribbing or suitable pads under the outrigger legs to increase the area of soil contact. See the chart in Figure 26 for examples of load bearing capacities of various soil types and for an example of how to calculate how much cribbing is needed. If in doubt, the site management may be able to supply the load bearing capacity of the soil.

APPROXIMATE PRESSURE SUPPORTING CAPABILITY OF VARIOUS TYPES OF SOIL

Virgin ground	22 PSI
Asphalt, min. 8" thick	29 PSI
Compressed crushed stone	36 PSI
Clay/silt soil, firm	43 PSI
Mixed granular soil	51 PSI
Firm compacted gravel	58 PSI
more compacted	72 PSI
more compacted (e.g. class 5)	109 PSI
Brittle weathered rock	145 PSI

To calculate soil pressure: Divide the force on the outrigger leg (from the decal) by the number of square inches of soil contact.

PSI = LOAD÷AREA

PSI = pressure on the soil
Load = force in pounds
Area = square inches of soil contact.

EXAMPLE: Load bearing capacity of the soil (8 inches of asphalt) = 29 PSI
Force on the soil by the outrigger leg = 40,000 Pounds (from decal)
Pad on outrigger = 12" x 12" (144 square inches)
40,000 ÷ 144 = 278 PSI.
In this example you could expect the outrigger to sink into the asphalt and possibly cause a tip-over. To prevent this, you install additional cribbing:
Additional cribbing = 40" x 40" (1600 square inches)
40,000 ÷ 1600 = 25 PSI
Now the asphalt should support the outrigger.

soilpres.eps

Figure 26
Calculating load bearing capacity

6.25 **⚠WARNING** Tipping hazard! Regardless of whether you know the load bearing capacity of the soil or not, you must test your setup by slowly moving the empty boom over each outrigger (Figure 27). If the outrigger begins to sink, retract the boom or move it back in the direction from which it came, until the weight of the boom is removed from the outrigger. Add more cribbing under the outrigger pads and retest until the outriggers are stable. When you put concrete in the boom, again check the outriggers for sinking. Continue to add more cribbing until the soil can support the load. After the pour begins, continue to check the outriggers for sinking throughout the course of the day. The stability of the unit **must** be ensured.

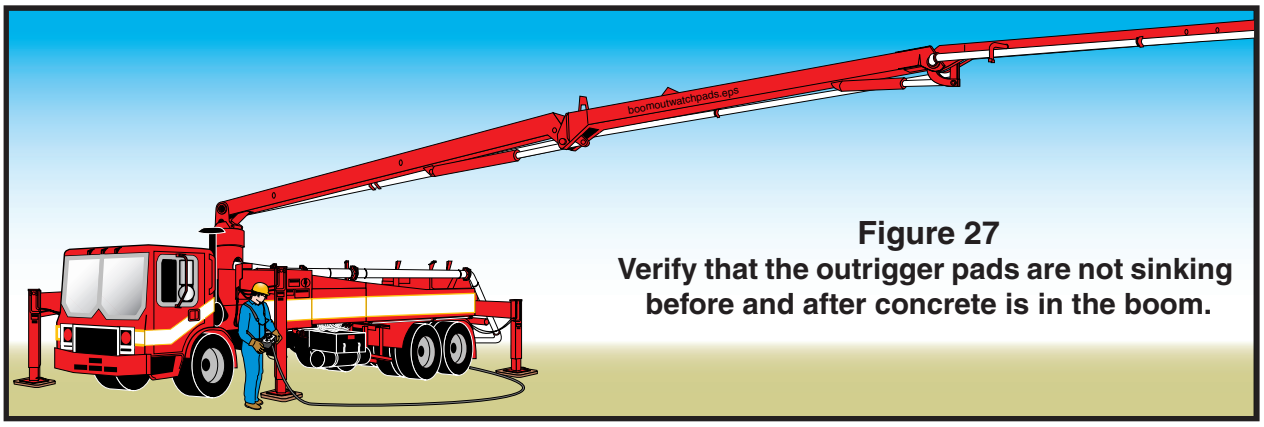


Figure 27
Verify that the outrigger pads are not sinking before and after concrete is in the boom.

6.26

⚠WARNING TIPPING HAZARD! Maintain a safe distance between the unit and the edge of a cliff or any excavation. The rule of thumb is: for every foot of drop, stay back from the base edge at least 1 foot (the one to one rule). (See Figure 28.) Note that the forces on the outriggers are transferred to the soil at a 45° angle. Watch out for the condition shown in Figure 29.

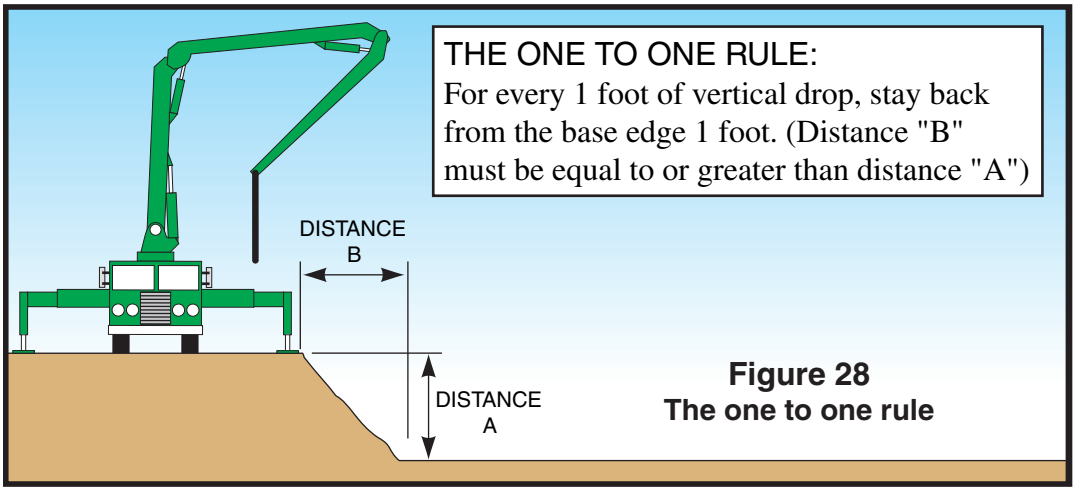


Figure 28
The one to one rule

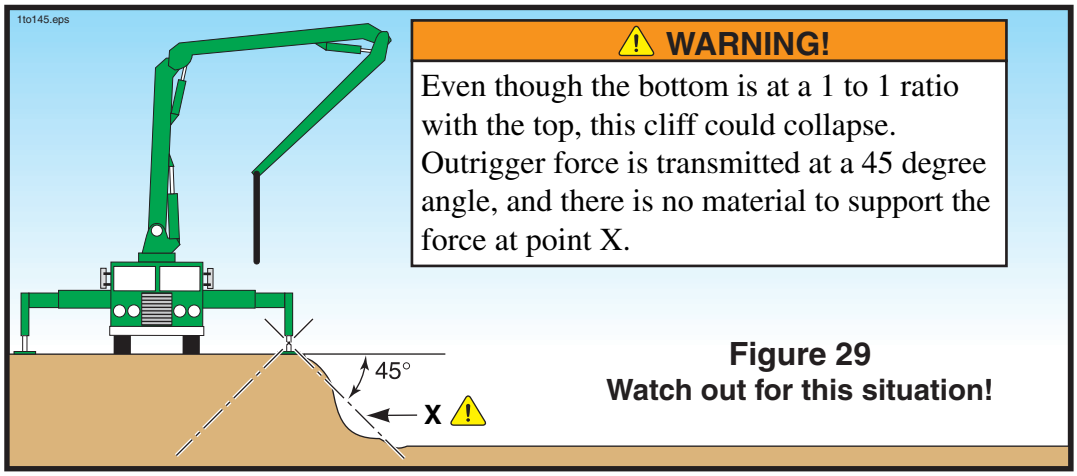


Figure 29
Watch out for this situation!

6.27 **⚠WARNING** Tipping hazard! Take care when setting the outriggers (Figure 30). Never set up on uneven or hilly soil or try to bridge a hole with cribbing. In these cases, you could dig a flat spot in the soil (A, B, & C). Be sure that the outrigger pad contacts all pieces of cribbing. Run cribbing in the opposite direction, if needed (D).

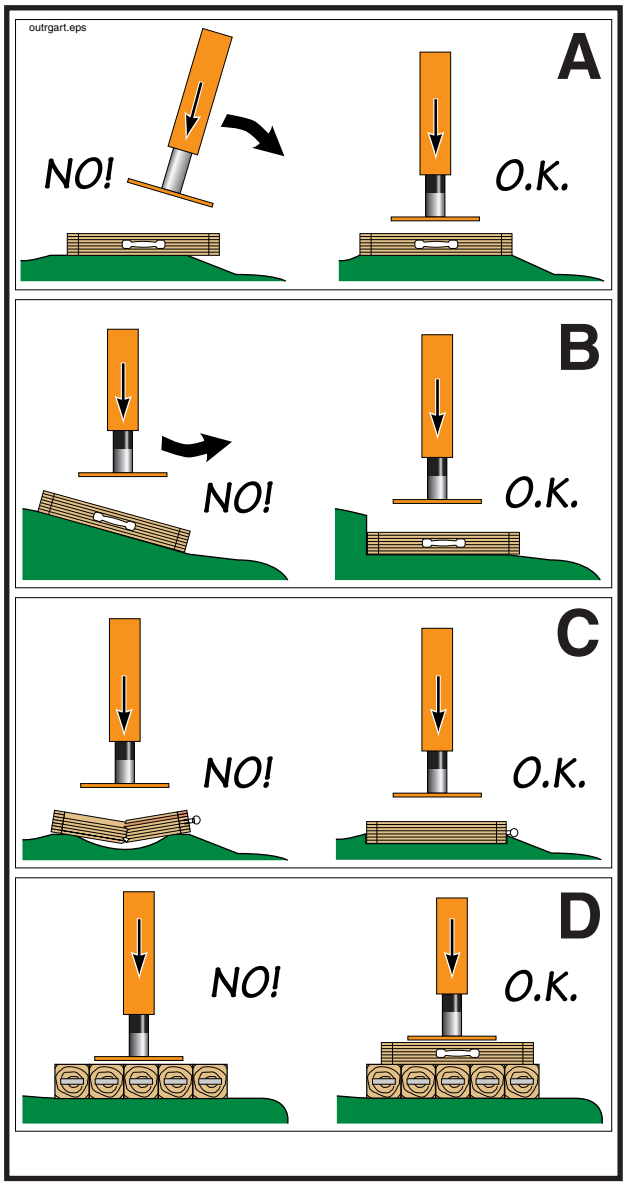


Figure 30
Beware of these outrigger hazards

6.28 **⚠WARNING** When you have the outriggers positioned correctly, close all outrigger hydraulic shutoff valves (if your machine is so equipped).

6.29 **⚠WARNING** Do not unfold or operate the placing boom when lightning is present in the immediate area. If you are operating and lightning moves into the area, put the boom into the transport position, or another low position, and seek shelter until the lightning is gone.

6.30 **⚠WARNING** Tipping hazard! Do not operate the placing boom when wind velocity exceeds 48 m.p.h. (77 k.p.h.)! When wind velocity exceeds 48 m.p.h. the machine could tip, and the boom may not be able to slew into or resist slewing away from the wind.

6.31 **⚠WARNING** If you will be unable to see the point of placement, establish a system of communications with the workmen who will be there. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter. If a spotter is used, **agree on hand signals before beginning the pour!** If the boom will be moved extensively, arrange for a workman to stay with the pump and to put yourself in a position to see the end of the boom (Figure 31).

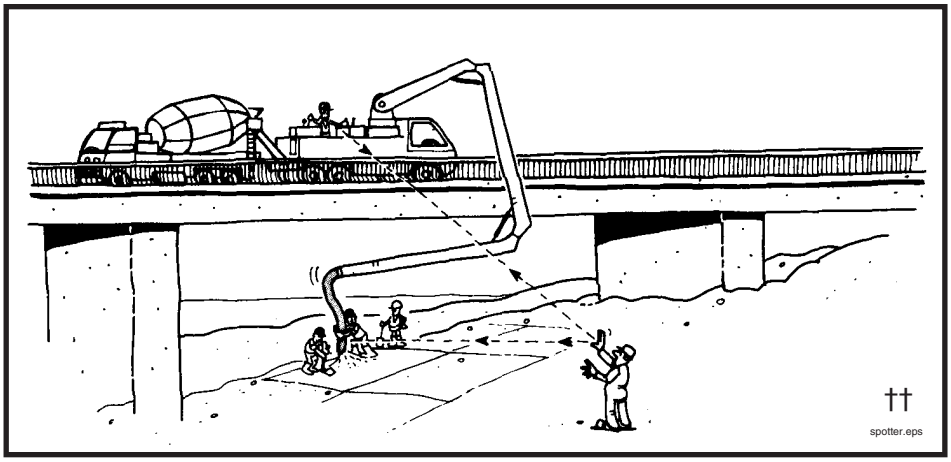


Figure 31
Arrange communications before starting

6.32 **⚠WARNING** **Possible boom damage**! If you will be pumping out of the boom into a separately laid pipeline, you must use a flexible hose to connect them. Do not connect steel pipe directly to the boom. **Be sure that the hose is capable of handling the maximum concrete pressure of the pump**. Do not let the end of the boom rest on the ground when connected to a separately laid pipeline.

6.33 **⚠WARNING** **It is extremely important to verify that the material delivery system of the boom is capable of handling the pressure of the concrete pump.** In some cases, you may not be able to use the boom if you are pumping on piston side. It is up to the machine owner and operator to determine if the boom can be used when pumping on piston side. Keep in mind that pipeline wears out with each stroke of the pump. Verify pipe wall thickness and compare it to pressure handling capabilities of that pipe style. The chart for this comparison is found in the appendix of this manual.

6.34 **⚠WARNING** **Use only material delivery system components in good condition.** The useful life of delivery system components is affected by pumping pressure, concrete composition, pipeline material, velocity of moving concrete, and other factors. The use of ultrasonic equipment for determining pipe wall thickness is highly recommended (Figure 32). Read and understand the minimum wall thickness chart in the appendix section of this manual. If you don't understand the chart, contact the service department of the manufacturer of your machine; they will assist you.

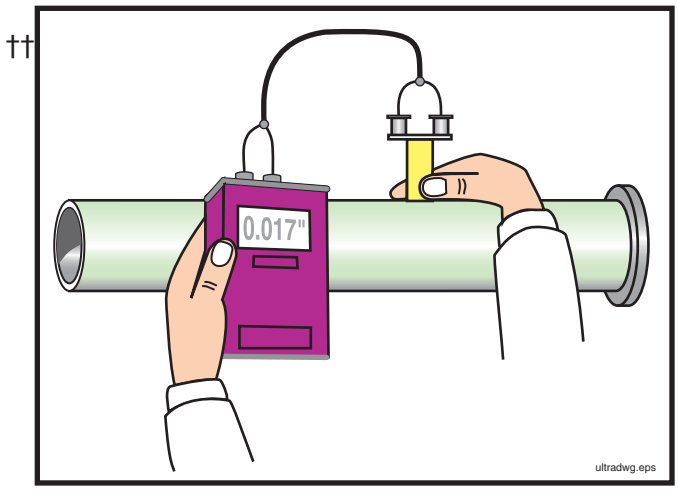


Figure 32
Check for wear on the delivery system components

6.35 **⚠WARNING** **When the machine is ready to work, secure it against unauthorized use!** Either stay with the unit or make sure no one can start it without you. This could be accomplished, for example, by activating the emergency stop switch of the remote control box (cable or radio, whichever is active), then locking it in the cab of the truck. Another way would be to take the transmission out of gear, lock the cab of the truck, and take the key with you.

6.36 **⚠WARNING** **Watch for children!** When the machine outriggers are jacked up, it is very easy for children to access the space underneath the machine. The rotating driveline(s) and hot components pose serious hazards. Do not let anyone remain under the machine while it is running.

6.37 **⚠WARNING** If spectators will be near the pour, cordon off an area where they will be safe. Never operate the machine if it is not safe to do so, even if the spectators just want to see a certain operation or function.

7. Setting Up A Trailer Mounted Pump and/or A Separate Pipeline

7.1 **The job setup phase sets the stage for most accidents.** Taking a few extra moments to correctly set up the job will improve your chances of having a safe, trouble free day.

7.2 **The operator is responsible for the safe operation of the machine**. Notify your employer, the job superintendent, and/or O.S.H.A. if you are being asked to set up in an unsafe manner. **You are never required to take a chance with safety.** You are the **only** person who can determine that the job circumstances under your control are safe.

7.3 **⚠WARNING** The **power connections for electrically driven concrete pumps or separate placing booms must be made by a licensed electrician.** The supply power and appropriate disconnect boxes are the responsibility of the contractor.

7.4 **⚠WARNING** **Electrical power on the job site may be taken only from a fused, grounded disconnect box with a disconnect switch that can be locked against activation.** If you will be making repairs to the concrete pump or separate placing boom, first lock out the power at the disconnect box**.**

7.5 **⚠WARNING** On units equipped with electric motors, **check the power cables every day.** If they are frayed or have open spots in the insulation, replace the wire. If the connectors are worn or loose, have repairs made by a licensed electrician.

7.6 **⚠WARNING** **Consider the safe approach and departure of the ready-mix trucks and adjust your setup accordingly.** Adjusting your setup position by a few degrees one way or another could mean the difference between a safe approach and an unsafe approach. Some examples of unsafe approaches are: too near an excavation or sticking out into traffic.

7.7 **⚠WARNING** **Avoid collisions!** Secure the immediate area of the machine from public traffic in accordance with all applicable regulations (warning lights, safety cones, barricades with flashers, etc.).

7.8 **⚠WARNING** Pipelines, end hoses, couplings, and all other **material delivery components must be able to withstand the maximum concrete pressure of the pump. Be sure** of it! Read and understand the minimum wall thickness chart found in the appendix of this manual.

7.9 **⚠WARNING** Do not use a piece of pipeline, end hose, coupling, or any other material delivery component that is not in good condition. **Replace, do not repair damaged pipes and hoses.** Concrete pipeline system is subject to wear, and the rate of wear is affected by pumping pressure, concrete composition, pipeline

material, and other factors. Read and understand the minimum wall thickness chart in the appendix of this manual. **Bursting pipes and concrete escaping under pressure is a serious safety hazard!** (See Figure 33.)

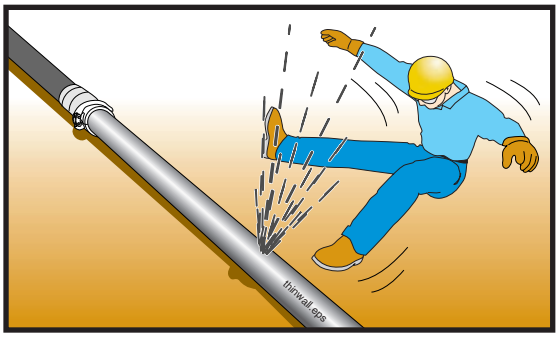


Figure 33
Delivery system components must be able to withstand maximum pump pressure

7.10 When laying out a pipeline, it is preferable to use an elbow instead of a hose to make direction changes. Elbows have less resistance to flow than hoses, and will therefore reduce the overall pressure required to push the concrete.

7.11 Always use the largest diameter pipeline that is practical, and use steel pipe instead of rubber hose. This will keep the pressure required to push the concrete to a minimum.

7.12 Support the delivery pipeline. Either an "S" transition pipe should be used to bring the pipe to ground level, or **each** section of the pipeline should be supported at the pump outlet level.

7.13 **⚠WARNING** The sections of pipe nearest the pump are subjected to the highest pressure and the greatest wear. Because of this increase of pressure near the pump, you should install only thick walled pipe, in "like new" condition there. Read and understand the minimum wall thickness chart in the appendix of this manual.

7.14 **⚠WARNING** **The maximum concrete pressure of the pump must be the only factor used to determine what thickness of pipe and what type of ends are needed**. In the case of a rock jam or any other type of blockage, **the maximum pressure of the pump will be exerted**.

7.15 Grooved (Victaulic) ends are **not recommended** for concrete pumping. Read and understand the comparison between heavy duty raised, metric, and grooved ends in the appendix of this manual.

7.16 **⚠WARNING** If the pipeline remains on the job (as is the case when pumping a high rise building), **the operator is responsible for checking the pipeline for dents, cracks, wear, and continuity each day before the pour begins**.

7.17 **⚠WARNING** In vertical runs, the weight of the vertical sections of pipe must be supported by a thrust block (often called a *deadman,* Figure 34) or other load-bearing device. **Each section of pipeline in a vertical run must be secured from lateral and horizontal movement.**

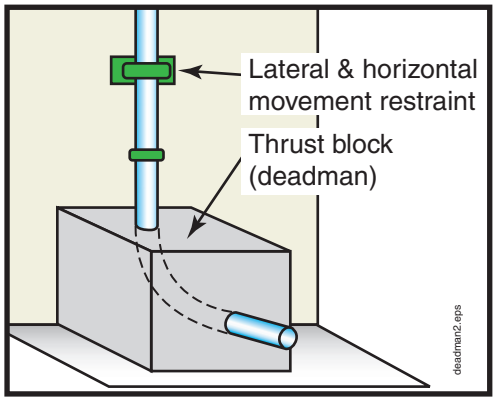


Figure 34
A thrust block (deadman)

7.18 **⚠WARNING** If you will be unable to see the point of placement, establish a system of communications with the workmen who will be there. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter (Figure 35). If a spotter is used, **agree on hand signals before beginning the pour!**

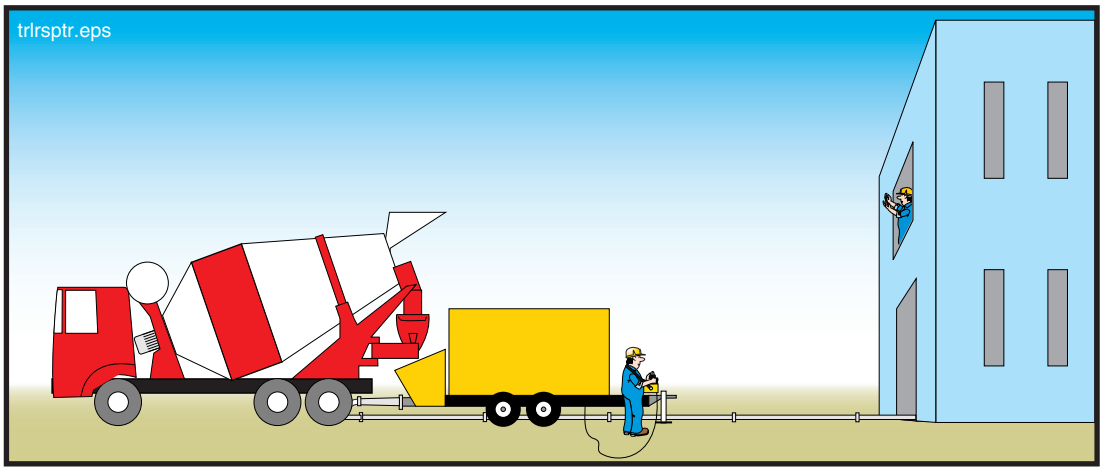


Figure 35
Arrange communications before starting

7.19 **⚠WARNING** Never leave the machine unattended when it is running or ready to run. Stop the engine and remove the key if you must leave the area. Make sure no one can start the machine without you. If you're unsure that the engine would restart, you must leave someone to monitor the unit. This is especially critical if there are children in the vicinity.

7.20 **⚠WARNING** Watch for children! It is easy for children to access the space underneath the machine, but it is not safe for them to do so.

7.21 **⚠WARNING** If spectators will be near the job, cordon off an area where they will be safe.

7.22 **⚠WARNING** If you will be cleaning the pipeline with compressed air at the completion of the job, **be sure that you have all the necessary accessories to do the job safely.** If you don't have all of them, make arrangements to get them before you begin to pump. **Do not improvise on this. Make sure** that you have the right parts. The minimum accessories include:

- A blow out head with properly sized air discharge regulator valve, and separate water/air inlet. The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once.
- A *go devil*, or a hard sponge ball. Regardless of which is used, it **must** fit into the pipeline tight enough that air cannot escape ahead of it.
- A ball or "go devil" catcher that will catch the go devil or ball, or some other method of controlling the discharge while the line is being purged of material. There are two types of catchers (see paragraph 7.23).
- A hose that is rated for the pressure of the air compressor you will use and that is able to connect with both the air compressor and the blow out head. The hose must be in good working condition and must be free of cracks, frays, tears or other damage.
- If you will be cleaning the pipeline with compressed air at the completion of the job, be sure an adequate air compressor is available before starting the job.
- If you will be cleaning a vertical pipeline with compressed air at the completion of the job, you **must have a shutoff valve or switching valve installed at the bottom of the vertical run!**

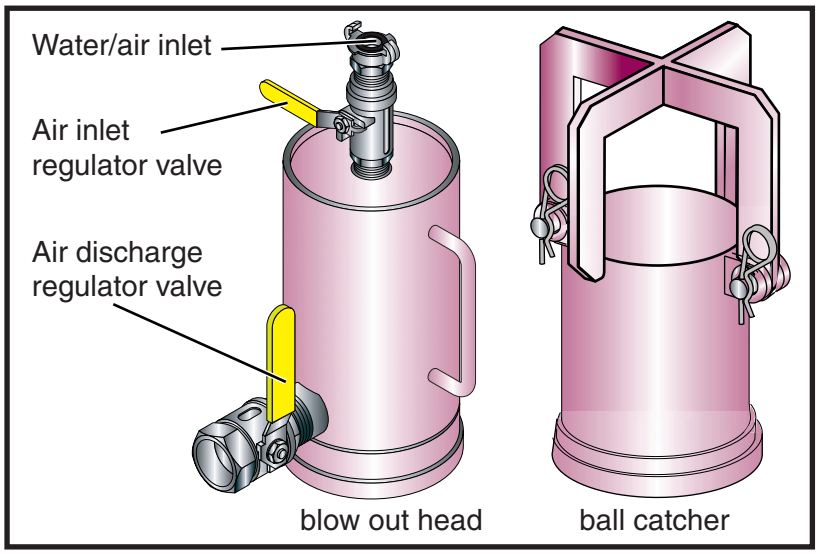


Figure 36
Ball catcher and blow out head

7.23

⚠WARNING There are two types of ball catchers. Know which type of catcher you are using. You may need to adjust your clean out procedure according to which type you have. The two types are as follows.

1. Catchers that stop the ball or go devil before air can escape, and
2. Catchers that allow the air out of the pipeline after the ball or go devil has reached the end.

Each type has advantages and disadvantages (Figure 37).

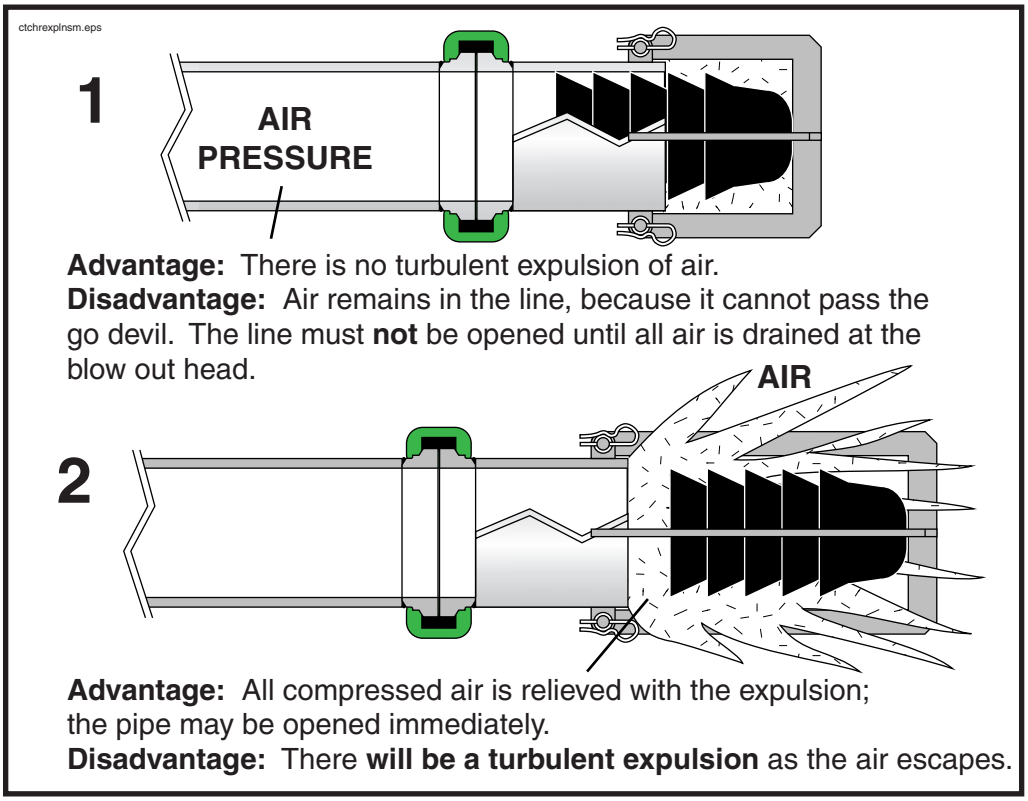


Figure 37
Types of catchers

With catcher type 1, the go devil stops, but air is still trapped behind it. The advantage is prevention of the sometimes violent expulsion of air at the end of the pipe. The disadvantage is that the air must be drained from the blow out head before the pipe line is safe to open. The pipeline must be controlled; allow no one to open it until all compressed air is relieved.

Catcher type 2 is long enough that the compressed air escapes behind the go devil. **Note!** This would happen with either catcher when used with a ball instead of a go devil. The advantage of this is that once you hear the turbulent expulsion, there is no pressurized air remaining in the line, and the line may be opened immediately. The disadvantage is the expulsion itself. In this case, the end of the line must be controlled because flying concrete and aggregate pose a hazard.

Both catchers can be safely used if care is given to the hazards involved.

III. Concrete Pump Operation

8. Safety Rules For Pump Operators

8.1 **⚠WARNING** Only qualified operators are allowed to operate the pump. A "Qualified Operator" is defined as someone who:

- has reached the age of 18 years (21 for interstate travel),
- is physically and mentally capable,
- has been trained in the operation and maintenance of the pump and the placing boom (if applicable),
- has demonstrated his/her capabilities to the employer in respect to the operation and maintenance of the pump and placing boom, and
- can be expected to perform these duties, as assigned, in a reliable manner.

8.2 **⚠WARNING** Because the operator is responsible for the safe operation of the machine, it is crucial that he/she understands the proper operation of the machine and the safety rules that apply to the job at hand, so the course of action taken in unforeseen circumstances will be a safe one. Only thorough training and supervised job experience can supply the necessary understanding.

8.3 **⚠WARNING** When operating the machine, **wear Personal Protective Equipment.** (See Figure 38.)

* Needed when exposed to airborne cement particles (or any other toxic dust).

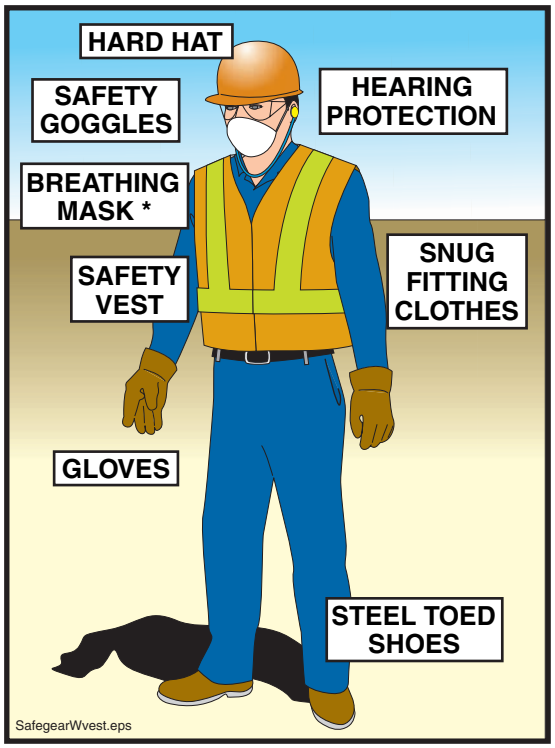


Figure 38
Wear Personal Protective Equipment (P.P.E.)

8.4 **⚠WARNING** All guards, covers, and service flaps must be closed and locked during operation.

8.5 **⚠WARNING** **Electrocution hazard!** If you are operating and lightning moves into the area, put the boom into the transport position, or another low position, and seek shelter until the lightning is gone.

8.6 **⚠WARNING** **Crushing hazard! Never, ever** position yourself between a ready mix truck and the pump! Stand off to the side, so the ready mix driver can see you at all times (Figure 39).

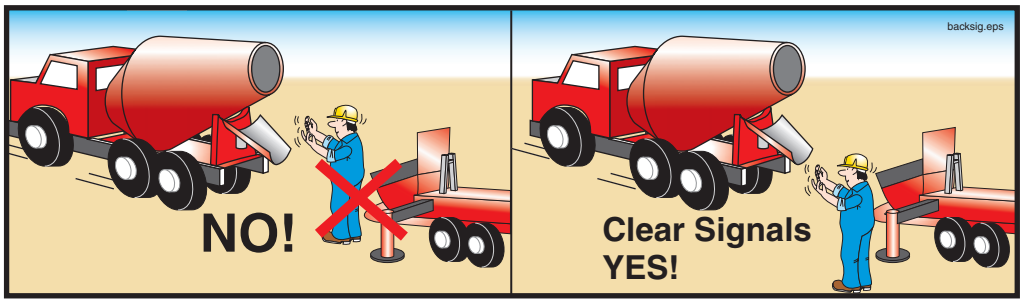


Figure 39
Never stand between the ready mix truck and the pump
Use clear and concise hand signals

8.7 **⚠WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 39).

8.8 **⚠ DANGER** You must avoid hazardous proximity or contact with power lines under all circumstances. **Be <u>sure</u>** that you maintain 17 ft. (5 meter) clearance! The 17 foot clearance allows room for the movement of the wires and the boom by wind force, electrical arcing, and human error (Figure 40). **Do not take chances with high voltage; it is the number one killer of concrete pump operators!**

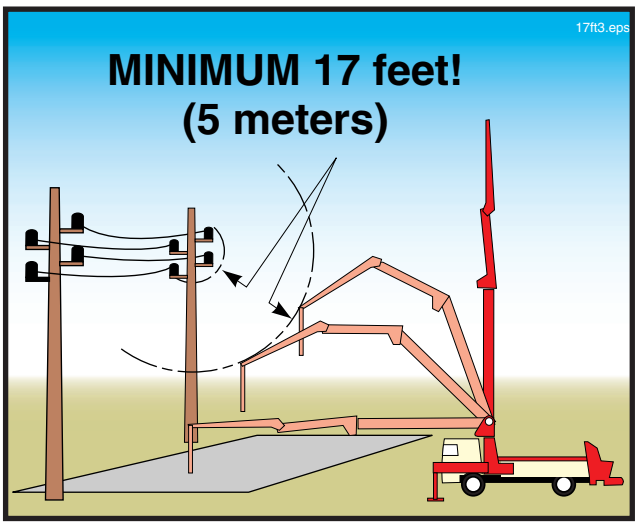


Figure 40
Maintain a clearance of at least 17 feet from wires

8.9 **DANGER** **When overhead wires are in the area that the boom will be moving to complete a pour, a spotter must be employed whose only job is to warn the operator if the boom comes within 17 feet of the wires.** The spotter must understand the responsibilities assigned, and must be able to judge a 17 foot distance.

8.10 **DANGER** Direct contact with a live power line is always dangerous to everyone and anyone electrically connected to the machine (Figure 41). **Use extreme caution** near high voltage wires.

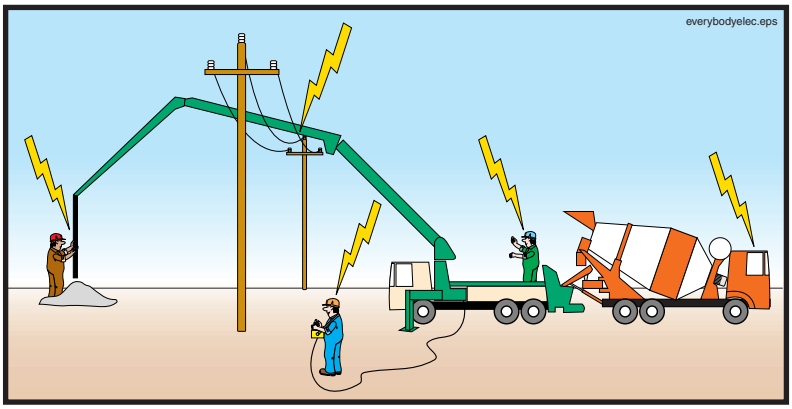


Figure 41
If the pump is energized, everything that touches the pump is also energized

8.11 **DANGER** Do not rely on depth perception when working near high voltage lines. Put yourself at the best possible vantage point to see the distance between the boom and the wires. If that is not possible, then **you must use a spotter!** (See Figure 42.) See the definition of "spotter" in the glossary found in the appendix of this manual.

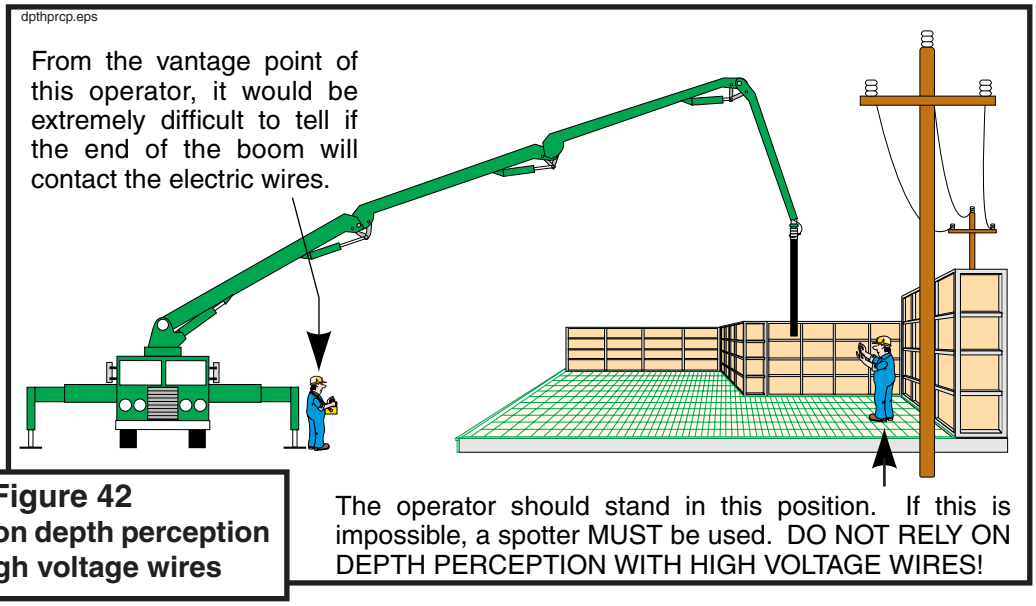
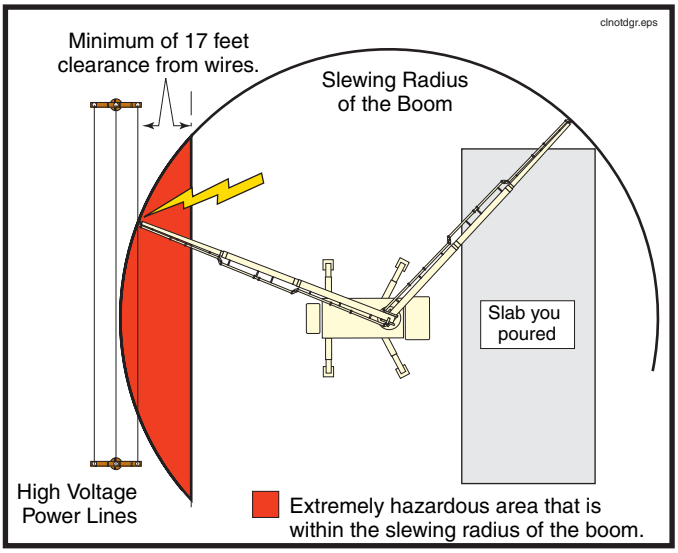


Figure 42
Never rely on depth perception with high voltage wires

8.12 **⚠ DANGER** Watch for wires that are not directly in the area of the pour. Accidents can happen when moving between points of placement, or when moving the boom after the pour is completed (Figure 43). **Never let down your guard when the boom is in the air!**



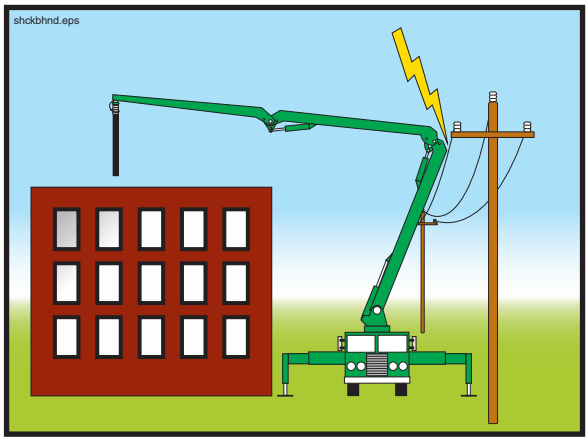


Figure 43
Never let down your guard when moving the boom

8.13 **⚠ DANGER** **High voltage makes conductors out of materials that would normally not conduct**! Many nonconductors will conduct enough current to kill you if you contact the 8000 volts to ground that is normally found on power poles in the United States (Figure 44). Voltage in the wires may be higher than 8000, especially in industrial areas.

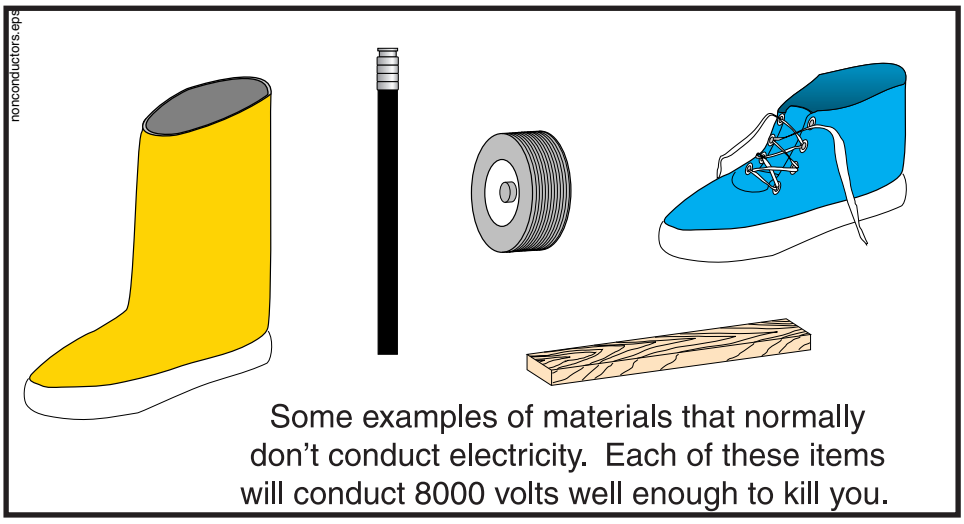


Figure 44
Even poor conductors will conduct high voltage

8.14 **⚠CAUTION** **Loss of hearing!** While standing near a working concrete pump, sound pressure levels may exceed O.S.H.A. standards for constant exposure (Figure 45).

PERMISSIBLE NOISE EXPOSURES*

*Under part 1910.95 "Occupational Noise Exposure," (Dept. of Labor) of the Code of Federal Regulations, Chap. XVII of Title 29 (39 F.R. 7006).

DURATION per DAY in HOURS	Sound level in dB (A) Slow response
8	90
6	92
4	95
3	97
2	100
1 1/2	102
1	105
1/2	110
1/4 or LESS	115

††

WEAR HEARING PROTECTION!

Figure 45
Noise level and exposure time limits

8.15 **⚠WARNING** Do not allow unauthorized persons in the operational area of the pump and boom. Warn unauthorized persons present in the area to leave and stop work if they do not comply.

8.16 **⚠WARNING** Do not use the boom as a hoist or crane! (Figure 46.)

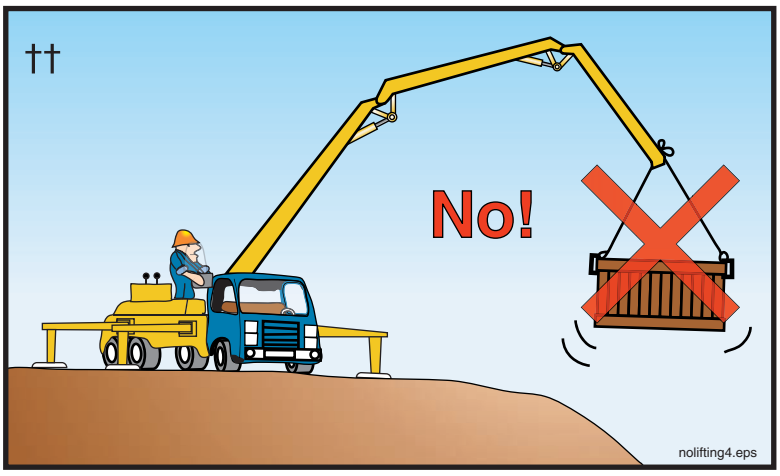


Figure 46
No lifting with the boom

8.17 **⚠WARNING** **Explosion hazard.** Never remove the fuel cap or refuel the unit near hot surfaces, sparks, or open flames. Never smoke while refueling.

8.18

⚠WARNING **Do not let the concrete level in the hopper become low!** If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 47). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop button if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts, which can be safely absorbed by filling the hopper with concrete.
2. Pump slowly in reverse for a couple of strokes. This will not remove all the air, but it should minimize the amount left in the pipeline.
3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 47).
4. When the pump is restarted, the slowest possible speed should be used until **all** air is removed from the pipeline. Don't assume that the first little air bubble is the end of the compressed air.
5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.

If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.

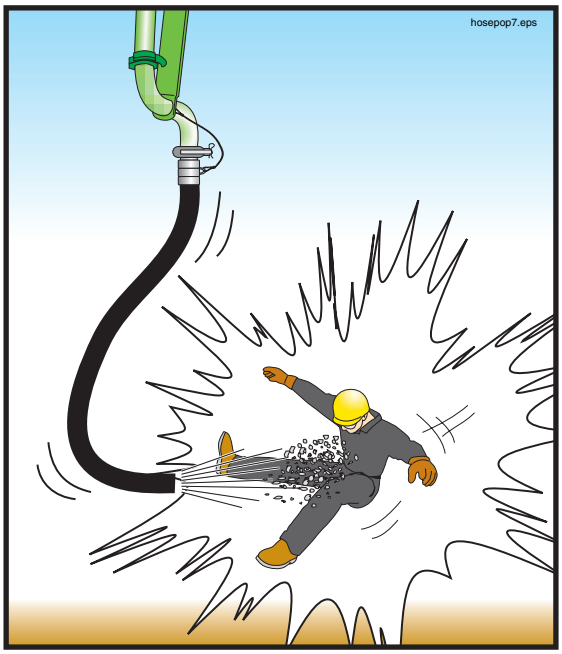


Figure 47
Remove everyone from the discharge area whenever air is in the line

8.19 **⚠WARNING** When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, when attempting to remove a blockage by "rocking" the concrete, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until material runs steadily. Personnel should move a prudent and reasonable distance beyond the end-hose movement area or the point of discharge, and personal protective equipment (PPE) should be worn (Figure 47).

8.20 **⚠WARNING** A bulk density of approximately 150 pounds per cubic foot is assumed for the material to be pumped with a placing boom (normal concrete). If you intend to pump material with a higher bulk density (e.g., steel fiber entrained concrete), you must contact the manufacturer for advice. Failure to do so may result in damage to the boom and/or instability in certain operating positions.

8.21 **⚠WARNING** **Blockages in the pump or delivery pipeline can create an unsafe condition.** Blockages are caused by many different factors, as outlined below.

CAUSES OF BLOCKAGES

- **Faulty concrete mix design.** The concrete that is being supplied may not be a pumpable mix, for example there may be too much sand or too little cement. There may be bleeding or segregation. Some admixtures adversely affect pumpability (e.g., too much air entrainment). If the mix is not pumpable, no amount of operator expertise will make it so.
- **The line size may be inadequate.** The line size should always be at least 4 times larger than the largest aggregate being pumped, or blockages could occur.
- **Worn concrete valve parts.** Worn parts allow the finest material and water to escape back into the hopper when pressure is applied.
- **Pipeline and joint deficiencies.** This would include dirty pipes (pipes that have not been cleaned properly), worn and leaking pipe joints that allow loss of concrete fines and water, pipes that haven't been properly primed before starting, and too many sections of rubber hose, which increases friction. These are all causes of blockages that can be controlled by the operator.
- **Pump inadequate for the application.** The pump selected for the job may not have enough pressure or horsepower available for the required duty.
- **Concrete setting up in the pipeline.** This may be caused by delays on site (e.g., repairing a broken form), or by attempting to pump "old" concrete (concrete that was batched hours before pumping and is being kept alive only by adding water and constant agitation). Weather conditions can also affect how quickly the concrete becomes hard. Companies should establish procedures for these situations. A good rule of thumb is: **If in doubt...wash out**.
- **Foreign matter in the concrete.** Pieces of old concrete that break away from mixer fins, unmixed clumps of cement, mixer fins, hammers, and furry mammals are examples of foreign matter that have caused blockages.
- **An inexperienced operator can cause blockages by setting up the job improperly.** For example, if the placing crew is forced to add hose or pipe to reach a far point after the pour is already in progress, there is a great chance of creating a blockage due to the dry conditions inside the pipe or hose. It is for this reason that the job should be set up so pipe or hose need only be removed (never

added) as the day progresses. If dry pipe or hose must be added, it must be lubricated just like the rest of the pipe was lubricated when you first started.

- **An inexperienced placing crew can cause blockages by kinking the end hose.** This type of blockage can lead to serious accidents because the hose may un-kink by the force of the pump.
- **The concrete becomes segregated in the hopper.** When it's raining hard, the cement and fine material get washed from the stone and course sand. This mix will not pump. **Cover the hopper** as you wait out the passing storm. It is also for this reason that you should **never allow a truck mixer to wash out in your hopper!**

8.22 **⚠WARNING** Never try to remove a pipeline blockage by applying high pressure to it, because that will cause the blockage to become a plug. If you have a blockage, immediately stop the pump. Stroke the pump a couple of times in reverse. Slowly stroke the pump in forward, and try to dislodge the blockage. If you are moving the blockage, continue to do so slowly and gently. While attempting to clear the blockage, remove all personnel from the discharge area, as air may be introduced into the placing line during this process.

8.23 **⚠WARNING** If the pump or associated equipment develops a problem that creates an unsafe condition, you must stop pumping immediately! Do not restart until the unsafe condition has been remedied.

8.24 **⚠WARNING** The following points must be observed when locating a blockage.

- Pump in **reverse** for **at least two stroke**s, then stop the pump. **Do not allow anyone to open the pipeline** until this is done (Figure 48).
- Wear personal protective equipment when opening a blocked pipeline.
- Clear the area of nonessential personnel before opening the line.
- Plugs will be found in (in the order of likelihood) reducers, hoses, elbows, and pipe.
- If you are tapping the pipe to find the plug, the sound will be a dull thud (tik-tik) rather than a ringing sound (tong-tong) at the spot of the plug, because the jammed material will keep the pipeline from vibrating. (This method won't find a plug in a hose.)

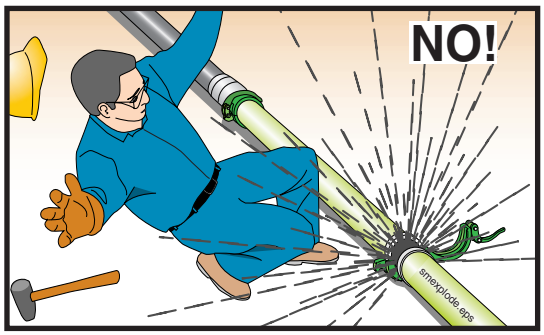


Figure 48
Never open a pressurized pipeline

8.25 **⚠WARNING** It is possible that some pressure will remain in the pipeline after reversing the pump. Use a shovel or pry bar to open the clamps on a blocked pipeline. Wear face protection, and turn away from the pipeline when opening the clamp.

8.26 **⚠WARNING** It would be better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Always use safe practices when cleaning pipe. Remember, pipeline is replaceable, you are not.

8.27 **⚠WARNING** **Do not kink hoses**. Kinking will cause the pump to create maximum concrete pressure. **The pump may unkink the hose with force!** (See Figure 49.)

Figure 49
Kinking the hose creates a hazard

8.28 **⚠WARNING** Never use compressed air to clear a blockage! It is unsafe and unnecessary. The pump can develop much more pressure than an air compressor. If the pump pressure can't move it, air pressure won't either.

8.29 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 50).

Figure 50
Never straddle or sit on a pressurized pipeline

8.30 **⚠WARNING** Crushing/amputation hazard. Do not remove the water box covers or grates when the machine is stroking (Figure 51). If you must remove the water box cover (to add water, for example), and there is not a bolt-down grate over the water box, then stop the pump, take the transmission out of gear, and lock the cab so the pump cannot be restarted until you are finished and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

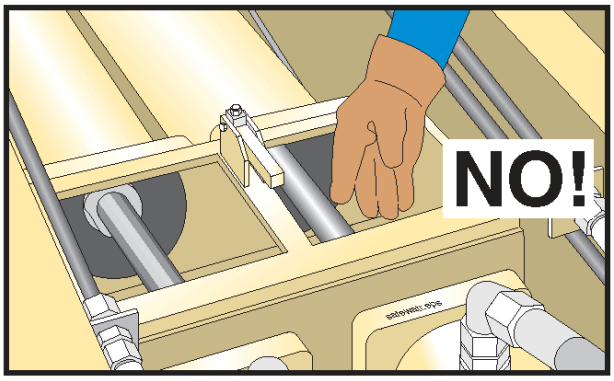


Figure 51
Keep your body out of the waterbox

8.31 **⚠WARNING** **Never leave the pump unattended!** Before you leave a laborer, ready mix driver, or any other worker alone with the pump for any reason, make sure the worker who you leave with the pump knows:

- the safety rules for a person stationed at the pump (the rules are listed in this Safety Manual, beginning on page 57)
- how to stop the pump
- the location of the emergency stop switches
- how to signal you.

8.32 **⚠WARNING** To prevent any unintentional movements of the machine, **all** control devices on the operator's panel and the remote control box must be switched off before changing from remote control to local control, or vice-versa. Whenever you are connecting or disconnecting the remote cable, push in the emergency stop button.

8.33 **⚠WARNING** Crushing/amputation hazard. Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! (See Figure 52.)

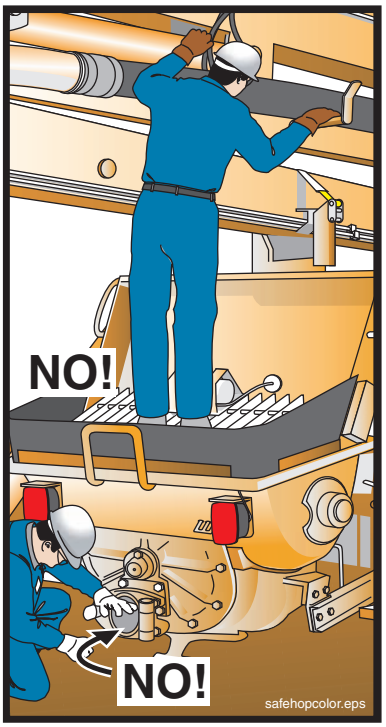


Figure 52
Don't put your body in the machine

8.34 **⚠WARNING** Do not work on the hopper, water box, concrete valve, or the hydraulic system unless the drive engine is turned off and the accumulator pressure (if so equipped) has been released! On units with internal combustion engines, the key must be removed. If there is more than one key, you should tag the ignition. On units driven by electric motors, the main disconnect must be locked out according to applicable standards.

8.35 **⚠WARNING** Never operate the boom "blind." If you can't see the point of placement, you must establish a system of communications with the workmen who can see the point of placement. Arrange for radio communications, a system of visual or auditory signals (lights or bells), or a spotter. If a spotter is used, **agree on hand signals before beginning the pour!** (Use of the ACPA standardized hand signals is highly recommended.) If the boom will be moved extensively, arrange for a workman to stay with the pump and put yourself in a position to see the end of the boom (Figure 53).

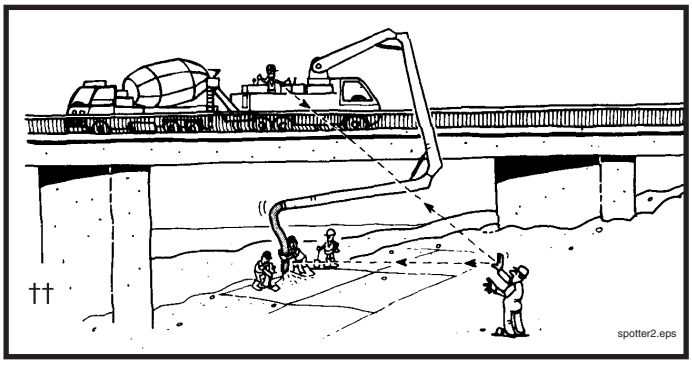


Figure 53
Never pump blind

8.36

⚠WARNING Always block the discharge end when you must swing a full boom over workers or property. You must stop concrete from falling out of the boom. This can be done with a shut-off valve, or by removing the hose and putting a blanking plug on the last elbow (Figure 54), or by kinking the end hose and securing it in the kinked position. Please note— hoses that can be easily kinked may not be strong enough to withstand the pressure of the pump. Verify the working pressure of the hose against the maximum pressure of the pump before using this type of hose.

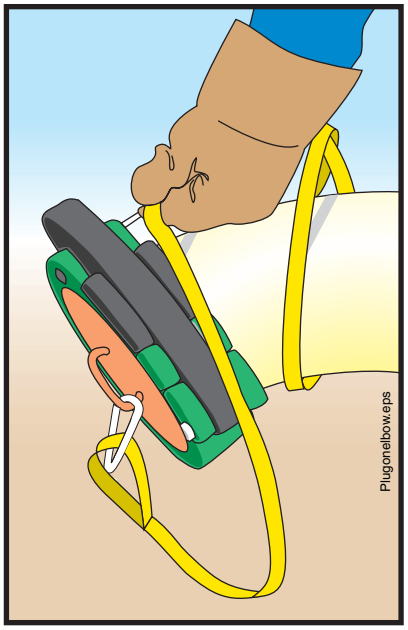


Figure 54
A blanking plug in place on a tip elbow with safety sling

IV. Cleaning The Pump And System

9. Safety Rules For Cleaning The Boom

9.1 **⚠WARNING** Do not let down your guard when the pour is completed. Accidents also happen during cleanout and the drive back to the yard. It is important not to become relaxed about job safety until you are no longer on the job.

9.2 **⚠WARNING** Watch for electric wires when moving the boom for cleanout or folding the boom for transport!

9.3 **⚠WARNING** Using compressed air to clean the boom delivery system should only be done when no other method is practical or as recommended by the manufacturer.

9.4 **⚠WARNING** If you have to use compressed air for cleaning the boom you **must** have all of the necessary accessories. Read and understand the complete safety rules regarding cleaning out with compressed air (point 12.4 on page 47 of this Safety Manual). Cleaning with compressed air should only be done by a qualified person.

9.5 **⚠WARNING** **Never** use compressed air to blow through rubber hoses or short sections of pipe. In the case of rubber hoses, their flexibility will allow them to "whip" wildly with the force of the air and moving concrete. Short sections of pipe will not have sufficient mass to allow the concrete to move slowly, so there will be rapid expulsion of the material.

9.6 **⚠WARNING** If the ball or go devil doesn't come out of the delivery system after applying compressed air, **you must relieve the pipe of air pressure before opening it.** If the bleed off valve plugs when you are draining the air, the only safe way to proceed is to drill small holes into the pipeline, which will then allow the air to escape. Wear a full face shield when drilling the holes. Pipe you have drilled into is ruined and must be replaced. Drill the holes to relieve the air pressure even if the concrete has set up in the pipe. The pipe is hazardous until the pressure is relieved.

9.7 **⚠WARNING** Exercise care when "tapping" on the pipeline to find the location of the cleanout ball. Applying too much force will dent a standard pipe (making it weak and unsafe) and could break the carbide insert of double wall pipe.

9.8 **⚠WARNING** It is better to let the pipe be ruined by setting concrete than to risk injury by ignoring safe procedures. Remember, pipeline is replaceable, you are not.

10. Safety Rules For Cleaning The Concrete Valve & Hopper

10.1 **⚠WARNING** Tipping hazard! Before moving the unit for cleaning, **fold the boom and secure the outriggers into the travel position.**

10.2 **⚠WARNING** Wear protective clothing and equipment when cleaning the concrete pump. Protect against concrete burns and concrete poisoning by wearing rubber boots and gloves during cleanout or any other time that you will be **in** contact with the concrete.

10.3 **⚠WARNING** Crushing and amputation hazard! **Never put your hands or any other body part into the concrete valve.** Instead, use water jets and the supplied rake (Figure 55).

10.4 **⚠WARNING** **Never put your hands or any other body part into the machine when the hydraulic system is operational.** If you must remove the grate to chip at hardened concrete, you must first disable the system by taking the transmission out of gear and locking the cab door, or stopping the engine, relieving pressure in the accumulator circuit (if so equipped) and securing the controls against unintended operation. Reinstall the grate before restarting the engine (Figure 55).

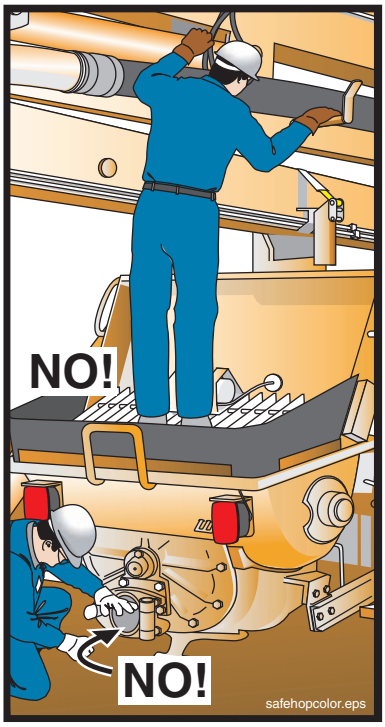


Figure 55
Keep your body parts out of the machine

11. Safety Rules For Cleaning The Water Box

11.1 **⚠WARNING** Crushing and amputation hazard! Stop the concrete pump before removing the water box covers. If your unit has bolt down guards, do not remove them for cleaning. If there is not a bolt-down guard over the water box, then stop the pump, take the transmission out of gear, and lock the cab so the pump cannot be restarted until you are finished cleaning and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

11.2 **⚠WARNING** If possible, position the folded boom in a slightly raised position when cleaning the water box (watch for wires when raising the boom). The outriggers must be extended and jacked. If the boom is raised, it will be unnecessary to bend over the water box for cleaning.

11.3 **⚠WARNING** Falling hazard! Be sure of your footing when cleaning the water box.

11.4 **⚠WARNING** Crushing and amputation hazard! Do not remove the water box guards for cleaning. Clean the water box with water jets only. **Do not put your hands or any other body part into the water box for cleaning, or at any other time when the machine is running or ready to start.**

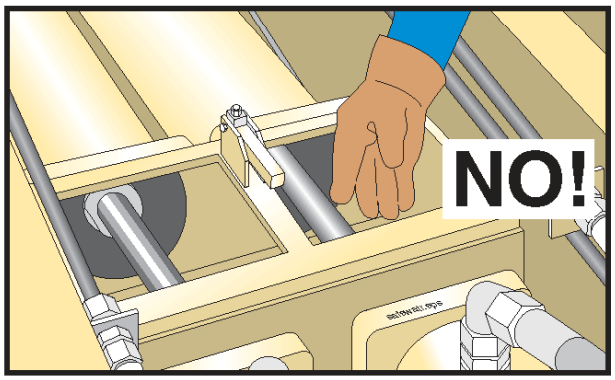


Figure 56
Keep your hands out of the waterbox

12. Safety Rules For Cleaning A Separately Laid Pipeline

12.1 **⚠WARNING** Flying particle hazard! Clear the discharge area of personnel and equipment before forcing a ball or go devil through the pipeline, even if you are cleaning with water. Some air will be trapped in the pipeline, and the trapped air will become compressed before discharge.

12.2 **⚠WARNING** Short pipelines and single pipe sections should be cleaned by removing the clamps and dumping the pipe sections. Remember to lift with your legs, not with your back.

12.3 **⚠WARNING** The point of discharge must be controlled. Use a ball catcher or some other containment device at the point of discharge, even when cleaning with water.

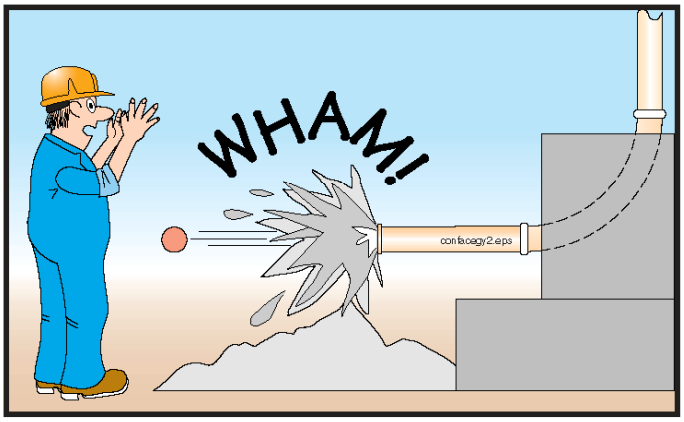


Figure 57
Cleaning with compressed air can be extremely hazardous if you don't follow the safety rules

12.4 **⚠WARNING Blowing out with compressed air creates potential hazards! Serious injury or death could result** if you do not adhere to these safety points.

- **Blowing out must be performed under the supervision of a qualified person.** (See the glossary for the definition of *qualified person*.)
- **Blowing out requires two people!** One trained person must be at the inlet end to operate the air insertion, and the other trained person must be near (but safely back from) the discharge point to monitor the discharge and to make sure that no one enters the hazard area.
- **No pipe bends or flexible delivery hoses may be connected to the end of the pipeline during the blowing out process,** unless there is a pre-planned cleanout station erected to route the discharge into the ready mix truck.
- **The point of discharge must be controlled. Clear the discharge area of personnel and equipment** before beginning the blowing out process. Do not allow anyone to enter the area during the blow out process. If a ball catcher is used, be aware of which type you have, and adjust your procedure accordingly. Ball catcher types are described in paragraph 7.23 on page 31.
- **The concrete outlet must be positioned high enough to permit easy discharge of the material**.
- If you are going to divert the discharge into a discharge pipe system, **you must lubricate the discharge line with slurry, or a plug could occur.**
- **The pipe cleaning blow out head must be equipped with a properly sized air discharge regulator valve and a separate water/air inlet.** The two openings should be spaced apart far enough that a blowout ball could not cover both openings at once (Figure 58).

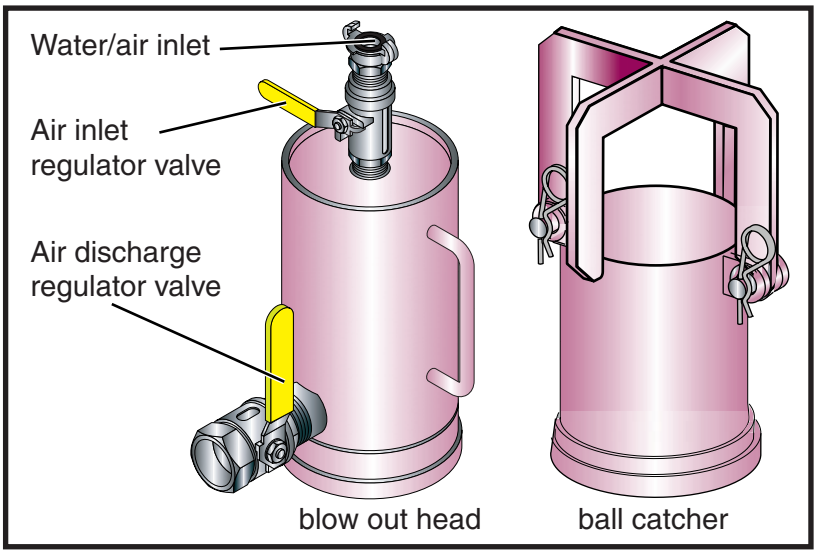


Figure 58
Ball catcher and blow out head

- The plug or go devil must be thick enough to prevent compressed air flow around the plug into the concrete.

- **The pipeline must not be disassembled until it has been completely relieved of air.** Be **sure** of this! (See Figure 59.)

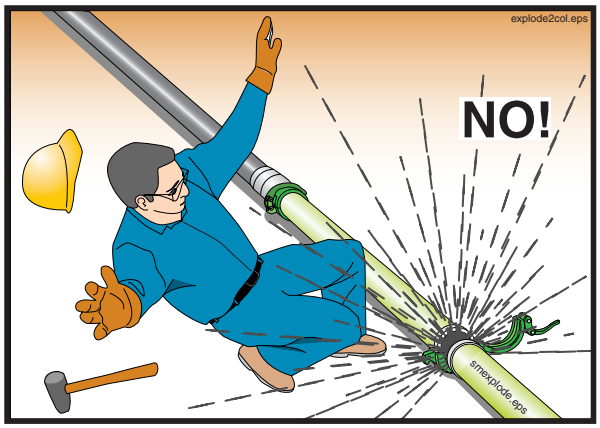


Figure 59
Never open a pressurized pipeline

- **Do not use compressed air to blow out concrete delivery hose, single pipe sections and short pipelines up to a length of 40 feet.** Hoses will jump and move unpredictably; short pipelines don't have enough concrete to resist the force of the air, causing it to discharge too quickly, like a cannon (Figure 60).

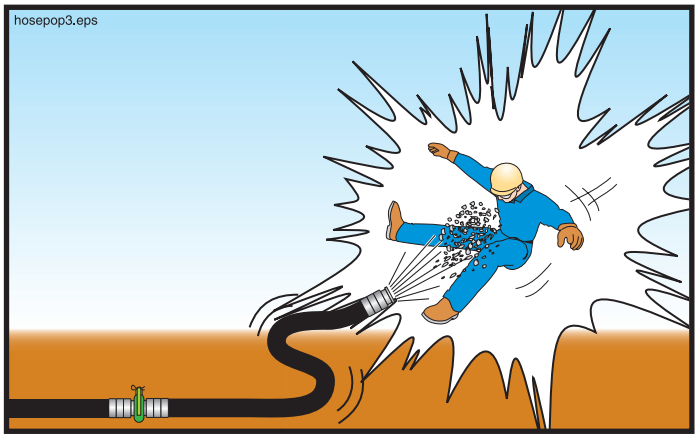


Figure 60
Never use air to blow out hoses or short pipelines

- **When air pressure begins to drop rapidly, shut off the air supply from the compressor, and immediately begin bleeding air out of the pipeline.** (The drop in pressure signifies that the pipeline is almost empty of concrete.)

12.5 **⚠WARNING** When blowing out a vertical line, a shutoff valve is required to prevent the following scenario.

1. (See diagram A in Figure 61.) Without a shutoff valve installed, the pipeline is disconnected from the pump. Immediately, the concrete drains out of the vertical sections of pipe, leaving concrete in both horizontal sections, and air trapped in between.

2. (See diagram B in Figure 61.) The ball is inserted, and pushed with compressed air. This also compresses the air that is trapped in the vertical sections of pipe. The trapped air will be violently expelled when it reaches the end of the pipe, but the pipe will not yet be empty.

A shutoff valve installed at the bottom of the vertical run will prevent this hazardous situation. The shutoff valve must be capable of handling the maximum concrete pressure of the pump and, of course, must be installed before the pour begins. Several different styles are available, ranging from a manually operated flat gate that is put into place with a hammer to fully hydraulic types that will also divert the concrete to a different pipeline. With a shutoff valve installed, you can proceed as indicated below.

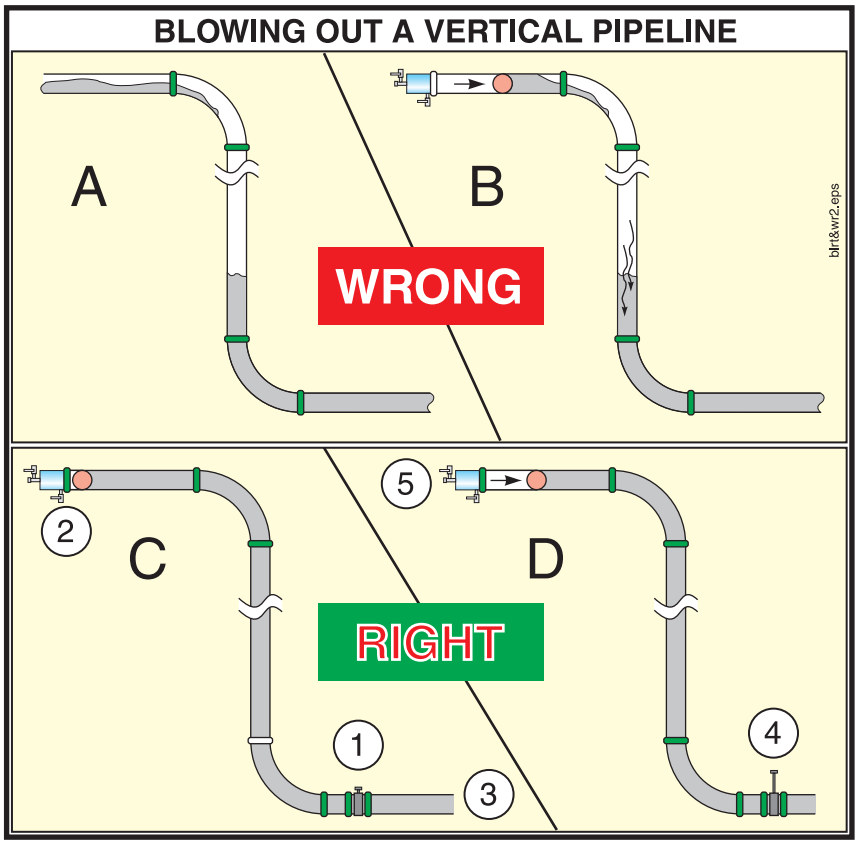


Figure 61
Blowout of a vertical line

12.6 **⚠WARNING** **Blowing out vertical sections of pipe** (for example on a high rise building) **requires additional safety precautions.**

1. **Know where the discharge area for blowing out will be before the pour begins**. Ready the area and accessories before the pour begins so you will not waste time when pumping is completed.
2. **Blowing out with compressed air requires two qualified persons.**

3. **The persons at both ends of the pipeline must be able to communicate without delays**, which means you must establish communications (for example, with a radio).
4. **When pumping is complete, close the shutoff valve before disconnecting the pipeline from the pump** (item 1, Figure 61). Failure to do this will cause the concrete to fall out of the vertical sections of pipe, leaving concrete in the horizontal sections of pipe and an air pocket in the vertical sections. This does not apply if you are using a switching (diversion) valve.
5. Install the ball(s) in the pipeline, secure the blow out head and hook up the air compressor. **Do not apply the air yet!** (Item 2, Figure 61.)
6. If you will be diverting the discharge to a cleanout area, lubricate the discharge line with slurry, or a plug could occur.
7. **Position the ready mix truck at the cleanout standpipe**, or install the ball catcher or other containment device at the end of the discharge line. (Item 3, Figure 61.)
8. **Clear the discharge area of personnel.** You must allow no one to enter the discharge area until the pipeline is depressurized.
9. **Divert the vertical pipe line to the clean out area, or open the shutoff valve in the delivery pipe line now.** Allow gravity to start the concrete moving through the discharge line. As the concrete falls from the vertical sections, it will take the ball with it, making it impossible to trap air in the line. (Item 4, Figure 61.)
10. **Apply the compressed air to the pipeline.** Close communications must be maintained at this time. Add only enough air to keep the concrete moving. Do not allow the concrete to accelerate. (Item 5, Figure 61.)
11. **When concrete starts to accelerate, shut-off the air supply from the compressor, and open the air regulator to bleed air from the line.** Rapidly accelerating concrete indicates that the pipeline is almost empty. After the ball has been expelled from the pipeline, leave the air regulator open to be sure that all air is removed from the system.
12. All the rules for blowing out found in point 12.4 on page 47 also apply to blowing out a vertical pipe line. These rules are in addition to the general "cleaning a pipeline with compressed air" rules.

12.7 **⚠WARNING** **Never use compressed air to attempt to clear a blockage!** It is unsafe and unnecessary. If the pump pressure can't move it, air pressure won't either.

V. Maintenance Of The Machinery

13. Safety Rules Regarding Inspection

13.1 **⚠WARNING** It is imperative that your boom, outriggers, and other structural members be inspected by a certified boom inspector on a regular basis. The results should be documented carefully and a record kept. Consult the manufacturers recommendations for the proper interval for your machine.

13.2 **⚠WARNING** Visually inspect your unit each day before it is put into operation. If any problem is found that will affect the safe operation of the pump, don't use the pump until it is repaired!

13.3 **⚠WARNING** Any structural problem found on the placing boom, outriggers, or tower section of the unit should be reported to the manufacturer so that proper repair procedures can be designed and implemented. You do not need to report any structural problem that has been previously reported and for which a repair procedure has already been designed and implemented.

13.4 **⚠WARNING** If safety decals are faded, missing, damaged, or otherwise unreadable, they must be replaced immediately. Contact the manufacturer of your unit to obtain replacements.

13.5 **⚠WARNING** If safety devices or guards are removed for inspection purposes, they must be replaced before someone uses the machine.

13.6 **⚠WARNING** Pay attention to the *Operation Manual* and manufacturer's service bulletins regarding maintenance and inspection procedures and intervals.

13.7 **⚠WARNING** If inspection reveals something that looks wrong, or even suspicious, report it to the manufacturer for consideration. Don't just assume that it's OK.

13.8 **⚠WARNING** Inspect the tip hose safety cable and mounting hardware on a regular basis. Replace it if it becomes old, frayed, or rusted.

13.9 **⚠WARNING** Inspect the boom tie down and boom rest assemblies regularly (if your unit is so equipped). The boom must not be allowed to bounce during travel.

13.10 **⚠WARNING** Visual inspection of the concrete pump circuits and safety devices should be done daily. Hands on inspection and documentation of results should be done weekly, or at least when preventive maintenance is scheduled.

13.11 **⚠WARNING** Do not neglect the delivery pipeline, clamps, or hoses. Check them often for wear, dents, and frays. Never send a unit to a job with a worn or damaged delivery system. Ultrasonic thickness testers are more accurate than the tap method.

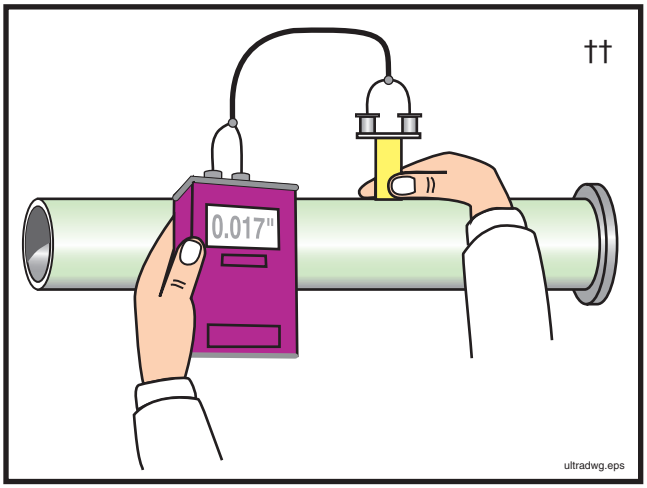


Figure 62
Check delivery system wall thickness with an ultrasonic thickness tester

14. Safety Rules Regarding Scheduled Maintenance

14.1 **⚠WARNING** Proper and timely maintenance is important to the safe operation of a concrete pump and placing boom. The proper procedures are outlined in the operation manual supplied with the pump. Do not put it off. Do not treat it lightly. Do not "fudge" results. The lives of the operator, oiler, and workers on the job are depending on it.

14.2 **⚠WARNING** Keep the machine clean! Oil spills, grease, loose tools, and displaced accessories are hazards.

14.3 **⚠WARNING** Pins should be used on all delivery system clamps. Clamps that will hang over workers, and clamps used on system that will be dragged shall be pinned (Figure 63).

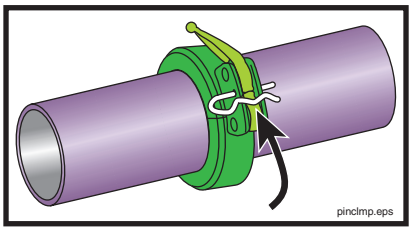


Figure 63
Pin the clamps

14.4 **⚠WARNING** Be sure that you are installing the correct clamps for the types of pipe ends used. Never try to mate dissimilar pipe ends unless using a clamp specifically made for this purpose. See the comparison regarding weld-on ends on page 72 in the appendix of this manual.

14.5 **⚠WARNING** When installing new pipe and/or hose on the machine be sure that it is capable of handling the maximum concrete pressure of the pump.

14.6 **⚠WARNING** Remember that boom pipe cannot weigh more than 10.14 pounds per foot, when empty. Certain models and brands may have different requirements. Check the operation manual for your machine.

14.7 **⚠WARNING** If safety devices or guards are removed for servicing, they must be replaced before the machine is put back in service.

14.8 **⚠WARNING** Do not change the maximum relief valve setting on any hydraulic circuit without permission from the manufacturer. **Never** change an accumulator circuit pressure setting without specific instructions from the manufacturer.

14.9 **⚠WARNING** Never make unauthorized modifications to structural members or pressure circuits.

14.10 **⚠WARNING** You must **replace, not repair** damaged hydraulic or concrete hoses or pipes.

14.11 **⚠WARNING** Never try to repair a machine using worn, damaged, or defective components.

14.12 **⚠WARNING** Welding on the boom, outriggers, tower, or any other structural member may be done **only** by a welder certified to A.W.S. D1.1 (Sections 3, 5 and paragraph 9.25 of Section 9). All structural welding must be done to the manufacturer's specifications.

14.13 **CAUTION** **Never allow welding current to travel through bearings or hydraulic cylinders**. Keep the ground cable on the component that is being welded.

14.14 **CAUTION** **Electronic components can be destroyed by welding current**. Before welding on the unit, you must disconnect the battery cables, and unplug all radio remote control power wires. If you have a proportional boom system, the proportional amplifiers must be removed from the mother board before welding. If in doubt, contact the service department of the manufacturer for instructions **before** proceeding.

15. Safety Rules When Servicing The Machinery

15.1 **⚠WARNING** **Repairs should be carried out by qualified workshop personnel** (See the glossary for the definition of *qualified personnel*.)

15.2 **⚠WARNING** **Read and understand the maintenance procedures in the *Operation Manual* of the machine before attempting any repairs.** If in doubt, call the manufacturer. Incorrectly done repairs affect the safe use of the machine.

15.3 **⚠WARNING** Burn hazard! **Never work on a hot hydraulic system.**

15.4 **⚠WARNING** **If it is necessary to unfold the placing boom to do maintenance work, the outriggers must be extended and jacked, just as if the machine were on a job site**. If you are not an operator, have the operator set up the machine for you. The need to repair the machine does not qualify you to operate the machine.

15.5 **⚠WARNING** Electrocution hazard! **If it is necessary to unfold the placing boom to do maintenance work, you must watch for overhead power lines.** You must maintain a minimum of 17 ft. (5 meters) clearance between the power line and any part of the unit.

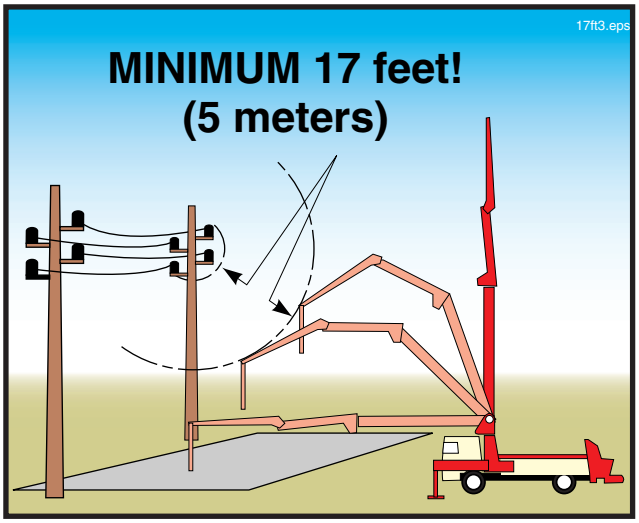


Figure 64
Watch for power lines if you must unfold the boom

15.6 **⚠WARNING** Falling hazard! If you cannot work at ground level, you must find and use a suitable work platform, a tie-off harness system, or otherwise secure yourself from falling.

15.7 **⚠WARNING** If maintenance work requires that you use a crane, hoist, fork truck, or similar machine, read and understand the safety regulations for that equipment. Remember, **the boom may not be used as a hoist or crane!**

15.8 **⚠WARNING** Crushing hazard! **Secure the placing boom and relieve all pressure before working on the boom hydraulic system.**

15.9 **⚠WARNING** **Only operators should operate the unit.** If work on the machine requires that it be operated and you are not qualified as an operator, you must get someone who is qualified to assist you.

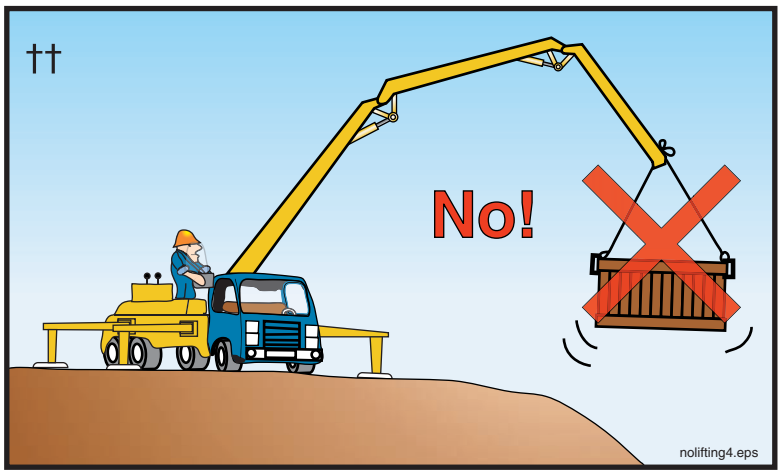


Figure 65
No lifting with the boom

15.10 **⚠WARNING** Electrocution hazard! **Repair work on high voltage electrical systems must be done by qualified electricians.** For this rule, high voltage means anything over 24 volts.

15.11 **⚠WARNING** Explosion hazard! **Be sure that you understand the potential danger of spring loaded or compressed gas components before you service them.** (Examples: nitrogen accumulators, gas springs for toolbox doors, tires, brake chambers.) If you don't know the dangers, call the manufacturer **before** beginning work!

15.12 **⚠WARNING** If you will be working in a hidden area inside the machine, lock it out as follows.

- With a gas or diesel engine, remove the ignition key and place a *Do Not Operate* sign on the controls. Carry the key with you.
- With an electrically driven pump, lock out the main breaker and tag the controls.

The above rules are one simple "Lock Out-Tag Out" procedure. There may be state or local regulations that require a more advanced or stringent Lock Out-Tag Out program. Be aware of the regulations in your area.

15.13 **⚠WARNING** **Never activate the system hydraulics without checking if another workman is in a hidden position.** Always yell "clear" before starting the engine or electric motor, and allow time for response.

15.14 **⚠WARNING** **Never work on a pressurized hydraulic system.** Stop the engine or electric motor and relieve the accumulator circuit (if so equipped) before you open the hydraulic system.

15.15 **⚠WARNING** **Never use gasoline or diesel fuel as a cleaning solvent**. This is critical to remember when cleaning hydraulic oil reservoirs, because gas and diesel fuels are highly explosive and **traces left in the oil may ignite when compressed!**

15.16 **⚠WARNING** Remember to mount and dismount the unit using the "3 Point Rule." One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 66).

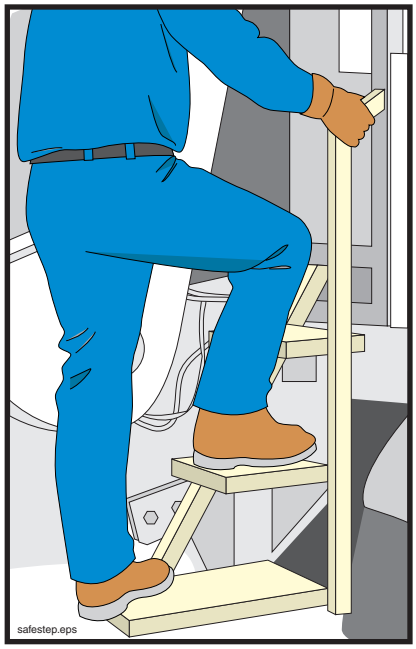


Figure 66
The 3 Point Rule

15.17 **⚠WARNING** **Inspect the repairs.** After modifications to structural members (boom, outriggers, tower, etc.) the repair must be inspected by qualified personnel before use.

15.18 **⚠WARNING** **Always use the correct tools for the job.** Tools should be kept clean and in good condition.

15.19 **⚠WARNING** If you see a co-worker engaging in an unsafe practice, warn him about the dangers. Safety is always in the hands of those on the job!

15.20 **⚠WARNING** After any repair is completed, test the function of the repaired part to be sure that repairs were done correctly.

VI. Co-worker Safety

16. Safety Rules For Workers Assigned To The Pump.

16.1 **⚠WARNING** **You must know how to stop the pump and boom.** Have the operator show you the locations of the emergency stop switches (Figure 67).

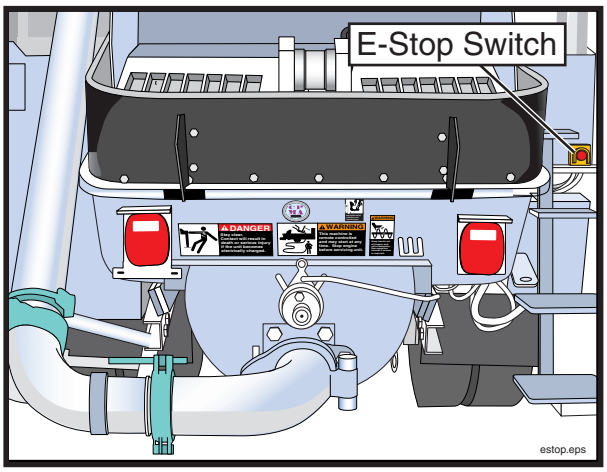


Figure 67
Know how to stop the unit in an emergency

16.2 **⚠WARNING** **You should wear the same personal protective equipment as the operator.** Goggles, hard hat, ear protection, and rubber gloves are especially important when working near the hopper (Figure 68).

* Breathing mask needed when cement dust (or other toxic dust) is present in the air.

Figure 68
Wear the same personal protective equipment as the operator

16.3 **⚠WARNING** **Electrocution hazard!** If the pump or boom becomes energized with high voltage and you are in contact with **any** part of it, you are at **risk of electrocution!** You should monitor the movement of the boom and **alert the operator if the boom comes within 17 feet of an electrical wire.** (See Figure 69.)

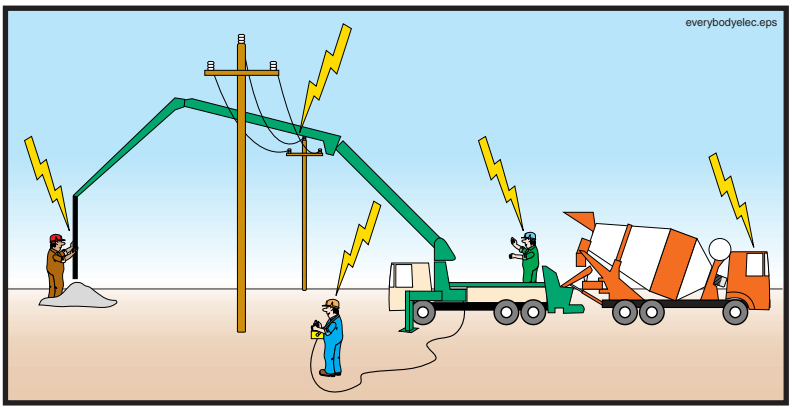


Figure 69
If the pump becomes energized, everything that touches the pump is also energized

16.4 **⚠WARNING** Keep an eye on the movements of the boom, even when there are no electrical wires nearby. Alert the operator if the boom is nearing any obstruction or hazard. Where job site safety is concerned, two sets of eyes and ears are better than one.

16.5 **⚠WARNING** **Crushing hazard. Never, ever position yourself between the ready mix truck and the pump!** Stand to the side, where the driver can see you (Figure 70).

Figure 70
Never stand between the ready mix truck and the pump

16.6 **⚠WARNING** When backing in ready mix trucks, use clear and concise hand signals (Figure 71).

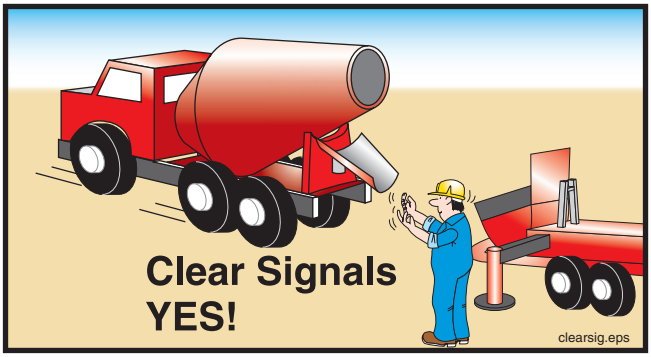


Figure 71
Use clear, concise hand signals

16.7 **⚠WARNING** Do not allow the ready mix driver to put concrete in the pump hopper until the pump operator gives him the OK. Filling the hopper early can cause the pump to plug.

16.8 **⚠WARNING** If you see foreign material that could create a blockage coming from the ready mix truck, alert the operator to stop the pump. Do not attempt to remove the material from the hopper or grate while the hydraulic system is ready to work. (See point 16.17 on page 62.) If necessary, depress the E-stop button to stop the pump and alert the operator.

16.9 **⚠WARNING** **Never allow the ready mix driver to clean out in the hopper,** because it can create a blockage. (Water will wash the cement and fine sand from the course aggregate causing segregation.)

16.10 **⚠WARNING** Do not operate the pump or boom unless you are also a trained operator and the regular operator has released the controls to you. **There must not be more than one operator at a time.** This does not apply to stopping the pump or boom if there is a need to do so.

16.11 **⚠WARNING** Do not let the concrete level in the hopper become low! If air is sucked into the material cylinders, the pump will compress the air. Compressed air always poses a hazard as it is expelled from the hopper or the delivery pipeline (Figure 72). If air is taken into the material cylinders, take the following steps to minimize the hazard:

1. Stop the pump immediately. Hit the emergency stop button if that is the quickest way to stop the pump. There will be an expulsion of compressed air the next time the concrete valve shifts. If possible, fill the hopper with concrete to help contain the expulsion.
2. Alert the operator of the problem. It is his job to know the procedures for safe removal of air from the pump and delivery system. These procedures include pumping in reverse for a couple of strokes.
3. Persons standing at the discharge end or near the delivery line must be warned to move away until all of the air has been purged. Warn them to stay

a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 72).

4. When the pump is restarted, the slowest possible speed should be used until **all** air is removed from the pipeline. Don't assume that the first little air bubble is the end of the compressed air.
5. Do not allow anyone near the discharge until concrete runs steadily from the end and there is no movement of the delivery system.

- If workers are positioned in high or precarious places, warn them to expect a loud sound as the air escapes the pipeline. (Warn them even if they are well away from the discharge.) That way, we can prevent the worker from falling as a result of being startled by the noise.

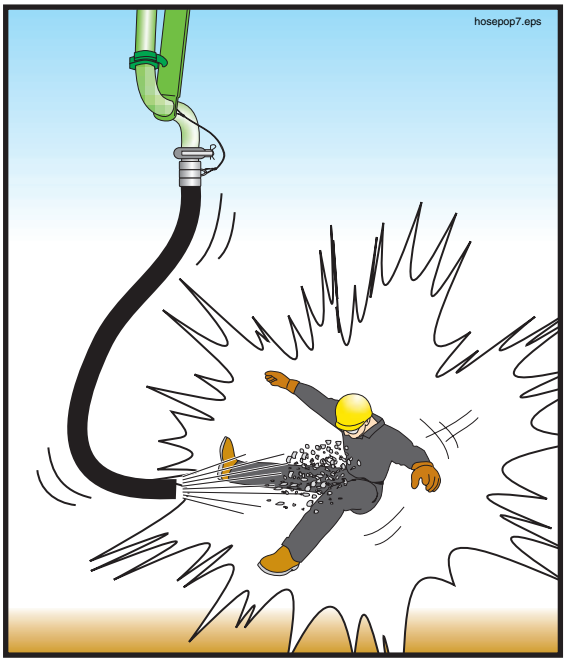


Figure 72
Remove everyone from the discharge area whenever the pump is first starting, restarting after moving, or if air has been introduced into the line

16.12

⚠WARNING When initially priming the delivery system, when restarting after moving, when restarting after adding or removing hoses, or whenever air has been introduced into the line, warn everyone to stay away from the discharge until concrete runs steadily and there is no movement of the delivery system. Personnel should stay back a reasonable and prudent distance beyond the reach of the end hose or point of discharge (Figure 72). Air will be in the line when first starting, when restarting after moving, when a blockage has been successfully removed by "rocking" the concrete, and after the line has been taken apart or opened for any reason.

16.13 **⚠WARNING** **Never use compressed air to clear a blockage!** The operator is responsible for knowing the safe blockage removal procedures. It is unsafe and unnecessary to use compressed air. If the pump pressure can't move it, air pressure won't either.

16.14 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized. Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it (Figure 73).

Figure 73
Never straddle or sit on a pressurized pipeline

16.15 **⚠WARNING** Expulsion hazard! (See Figure 74.) **Never open a pipeline that is under pressure.** The pump must be run in reverse for at least two strokes and then stopped before opening a pipeline. If you don't know how to reverse the pump, have the operator do it. If the pipeline is pressurized with air, do not open it. The operator is responsible for knowing how to safely release the air pressure.

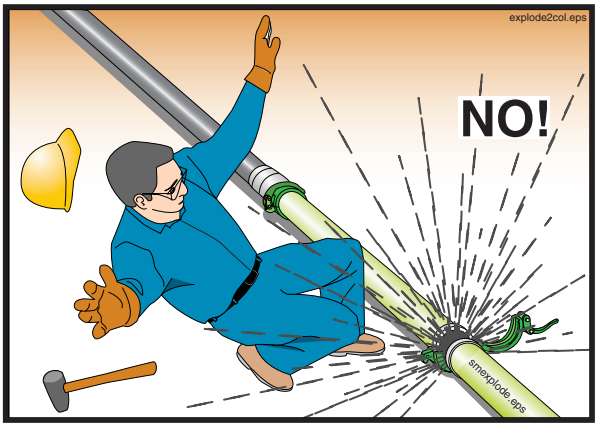


Figure 74
Never open a pressurized pipeline

16.16 **⚠CAUTION** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

16.17 **⚠WARNING** Crushing/amputation hazard! Never put your hands, feet, or any other body part into the water box, concrete valve, or hopper when the hydraulic system is operational or ready to operate! Never stand on the hopper grate! (See Figure 75.)

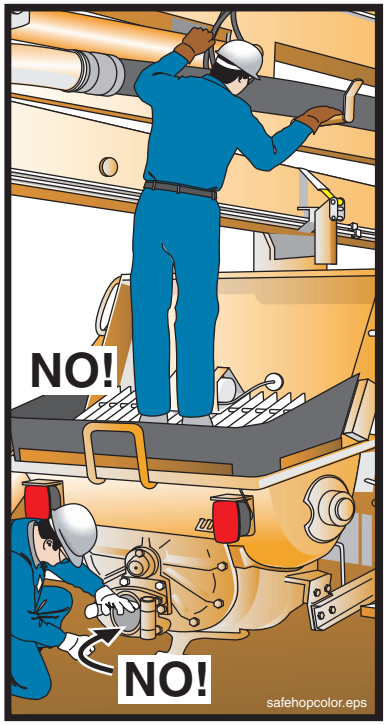


Figure 75
Never put your body in the machine!

16.18 **⚠WARNING** Never lift or remove the hopper grate for any reason (Figure 76).

Figure 76
Lifting hopper grate exposes the agitator and the concrete valve

16.19 **⚠WARNING** Do not remove the water box covers or grates when the machine is stroking (Figure 77). If you must remove the water box cover (to add water, for example), and there is not a bolt-down grate over the water box, then stop the pump and engine, and put the key in your pocket so it cannot be restarted

until you are finished and the covers are back in place. If a bolt-down grate is installed, you may simply stop the pump from stroking before removing the water box covers. Replace the covers before restarting the pump.

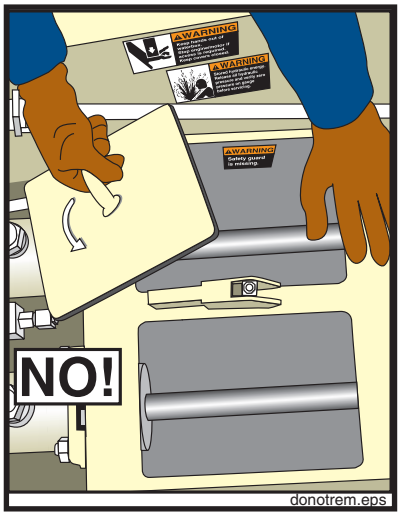


Figure 77
Do not remove the water box covers when the machine is stroking

16.20 **⚠WARNING** Mount or dismount the pump or truck using the *3 Point Rule.* One hand and two feet or two hands and one foot are to be in contact with a secure surface at all times (Figure 78).

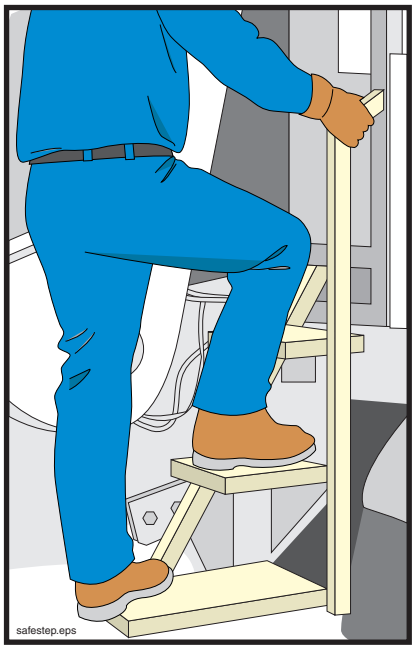


Figure 78
The 3 Point Rule

16.21 **⚠WARNING** Keep unauthorized personnel off of the pump.

17. Safety Rules For The Placing Crew

17.1 **⚠WARNING** **Electrocution hazard!** If the pump or boom becomes energized with high voltage and you are in contact with **any** part of it, you are at **risk of electrocution!** You should monitor the movement of the boom and **alert the operator if the boom comes within 17 feet of an electrical wire.** (See Figure 79.)

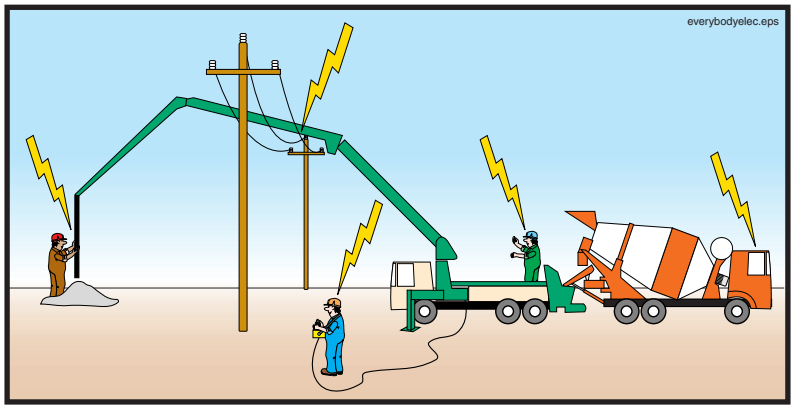


Figure 79
If the pump becomes energized, everything that touches the pump is also energized

17.2 **⚠WARNING** If the boom can contact overhead wires a spotter must be used to warn the operator if the boom is coming near the wires (Figure 80.)

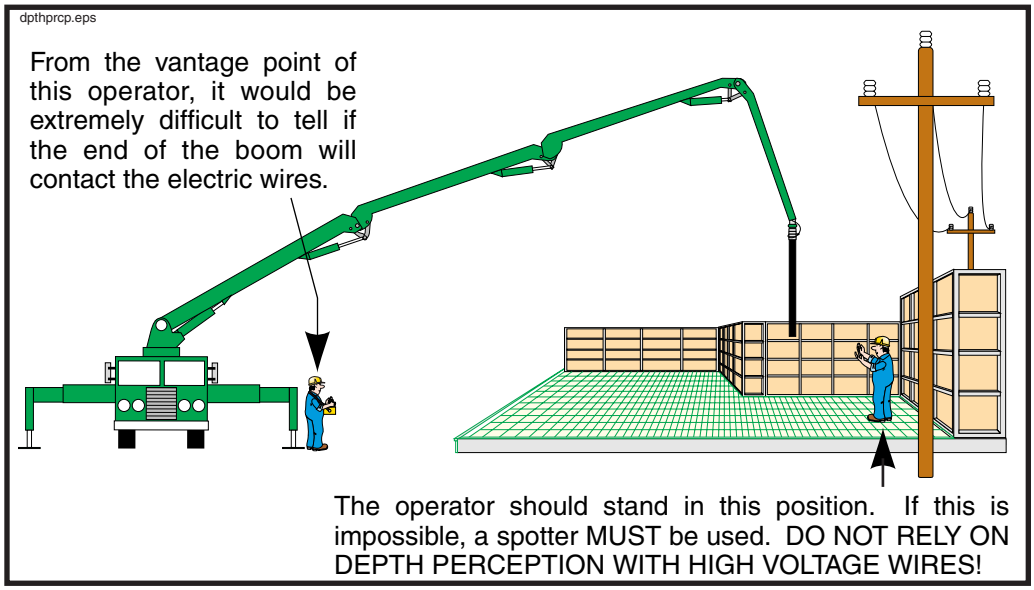


Figure 80
Use a spotter near obstructions or wires

17.3 **⚠WARNING** Keep an eye on the movements of the boom, even when there are no electrical wires nearby. Alert the operator if he is nearing any obstruction or hazard. Where job site safety is concerned, two sets of eyes and ears are better than one.

17.4 **⚠WARNING** Wear Personal Protective Equipment (P.P.E.) when working around a concrete pump (Figure 81). The gloves should resist concrete lime burns. If you will be working **in** the concrete, protect your feet and hands with rubber boots and gloves.

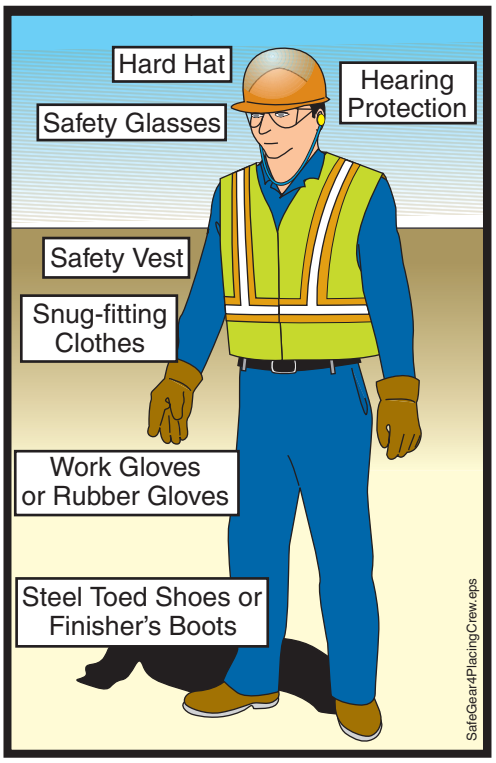


Figure 81
Wear Personal Protective Equipment (P.P.E.)

17.5 **⚠WARNING** When the operator is initially priming the delivery system, restarting after moving, restarting after adding or removing pipes or hoses, or any time that air has been introduced into the delivery system, stand a reasonable and prudent distance away from the tip hose or point of discharge. Do not get near the discharge until material runs steadily and there is no movement of the delivery system. (Figure 82). Compressed air in the line can cause rubber hose to move violently. If the operator tells you that air is coming in the delivery system, proceed as follows:

- Get to ground level (if in a high place) and remain well away from the discharge or at least take cover.
- Stay away from the discharge. Be sure that **all** the air is gone before getting near the point of discharge again. It is the operator's job to know when it's safe to go back to normal pumping.

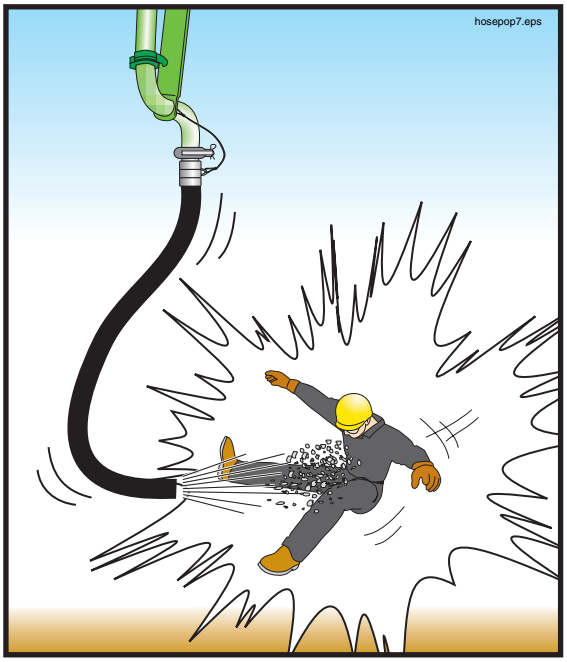


Figure 82
Stay away from the point of discharge when starting or restarting, and when there's air in the pipeline

17.6 **⚠WARNING** **Never use compressed air to clear a blockage!** It is unsafe and unnecessary. If the pump pressure can't move it, air pressure won't either. Stand away from the discharge and the line if anyone attempts to use compressed air in this manner.

17.7 **⚠WARNING** **Do not look into the end of a plugged hose or pipe!**

17.8 **⚠WARNING** When the pump crew is using compressed air to clean the boom or system pipeline, stay away from the discharge area. **Never try to hold down a pipe or hose that is being cleaned with air.**

17.9 **⚠WARNING** Never open a pressurized pipeline (Figure 83). The pump operator must release the pressure before you open the line. If the line is pressurized with compressed air, let the operator release the pressure and verify that the air has escaped before you proceed.

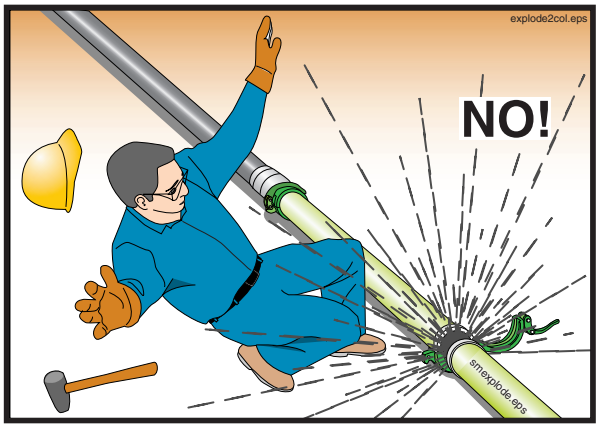


Figure 83
Never open a pressurized pipeline

17.10 **⚠WARNING** After removing pipe sections you must **reassemble using gaskets and clamps.** Pipelines assembled without gaskets will leak cement and water, which can cause a blockage.

17.11 **⚠WARNING** Concrete is being moved through the delivery system by pressure. Failure of a pipe, clamp, hose, or elbow is possible. For this reason, spend as little time as possible standing under the boom, and wear protective clothing.

17.12 **⚠WARNING** The hose man should not hug the hose, but hold it with both hands, to allow the hose to move freely (Figure 84).

Figure 84
Do not hug the boom hose

17.13 **⚠WARNING** The hose man should not walk backwards (Figure 85). Walking forward will allow him to see obstacles and avoid tripping.

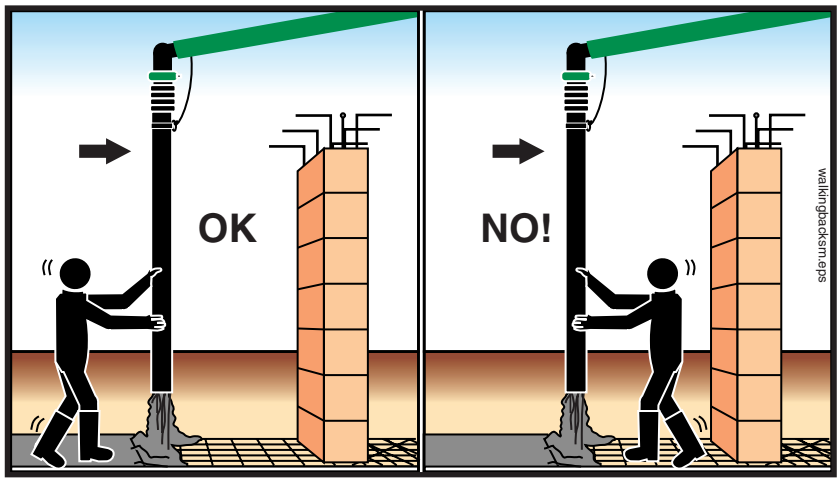


Figure 85
Do not walk backwards, stay out of the path of the boom

17.14 **⚠WARNING** The hose man should never position himself between the boom or boom hose and any fixed object like a wall or column (Figure 85).

17.15 **⚠WARNING** Do not kink the end hose. Kinking will cause the pump to create maximum concrete pressure. The pump may unkink the hose by force! (See Figure 86.)

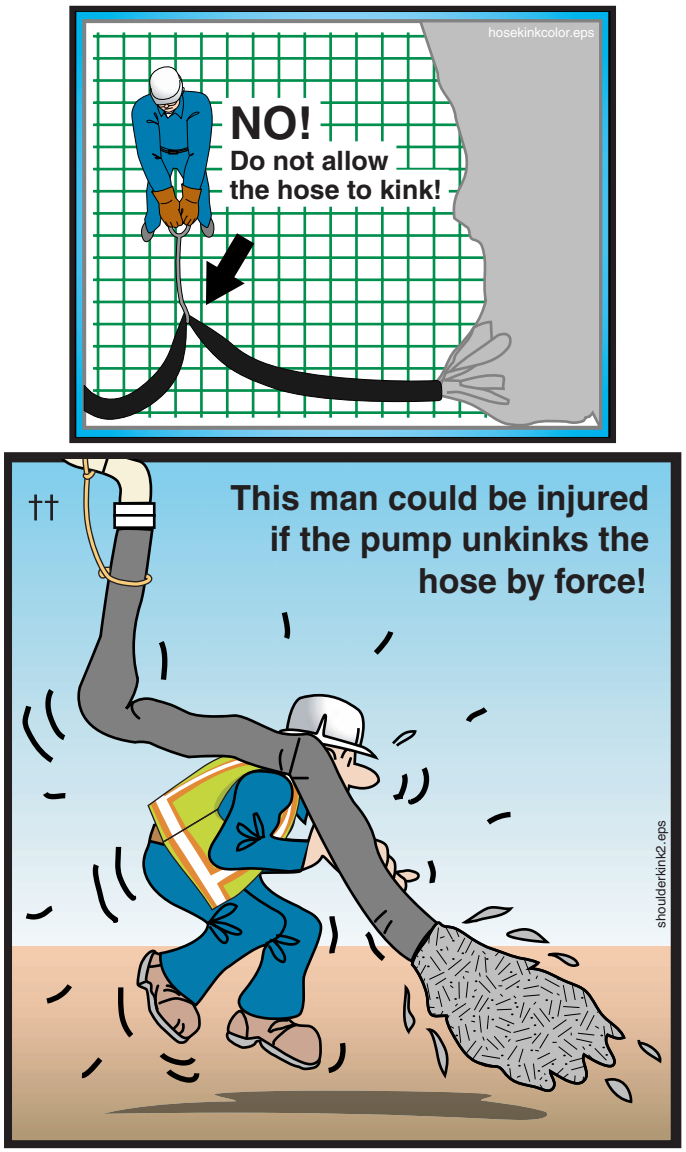


Figure 86
Never kink the hose; Never hold the hose with your shoulder

17.16 **⚠WARNING** Never try to support the tip hose with your back or shoulders. Let the hose hang from the boom (Figure 86).

17.17 **⚠CAUTION** Be careful when handling pipeline or any other heavy object. Learn how to lift without using your back. Get assistance if needed.

17.18 **⚠WARNING** Crushing hazard! Never position your hands or any body part between the end of the delivery system and a fixed object (e.g., between the tip hose and the concrete form) (Figure 87). Watch for clamps lowering with the line, because they have a larger diameter than the pipes/hoses they connect.

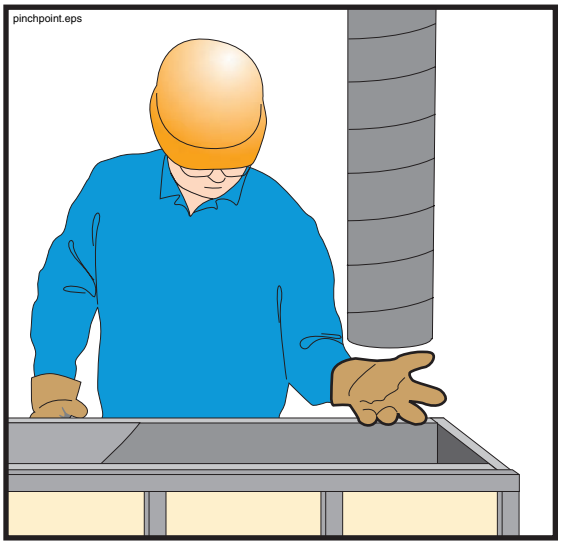


Figure 87
Watch out for the pinch points

17.19 **⚠WARNING** Do not allow the boom hose to get lower than two feet above the deck to prevent the boom hose from hitting the feet of the hose man, and to prevent the hose opening from being blocked by the deck, which could cause the hose to whip.

17.20 **⚠WARNING** Falling hazard! When pouring columns, slabs, or walls above ground, secure yourself from falling.

17.21 **⚠WARNING** Never stand on, sit on, or straddle a pipeline while it's in use, or whenever it is pressurized (Figure 88). Pipeline wears out with each stroke of the pump. If the pipe bursts, you want to be to the side of it, not on top of it.

Figure 88
Never straddle or sit on a pressurized pipeline

17.22 **⚠WARNING** To avoid confusion and conflicting signals, only one person should signal the pump operator.

17.23 **⚠WARNING** Before the pour begins, the hose man, the operator and the spotter should agree on the hand signals (Figure 89).

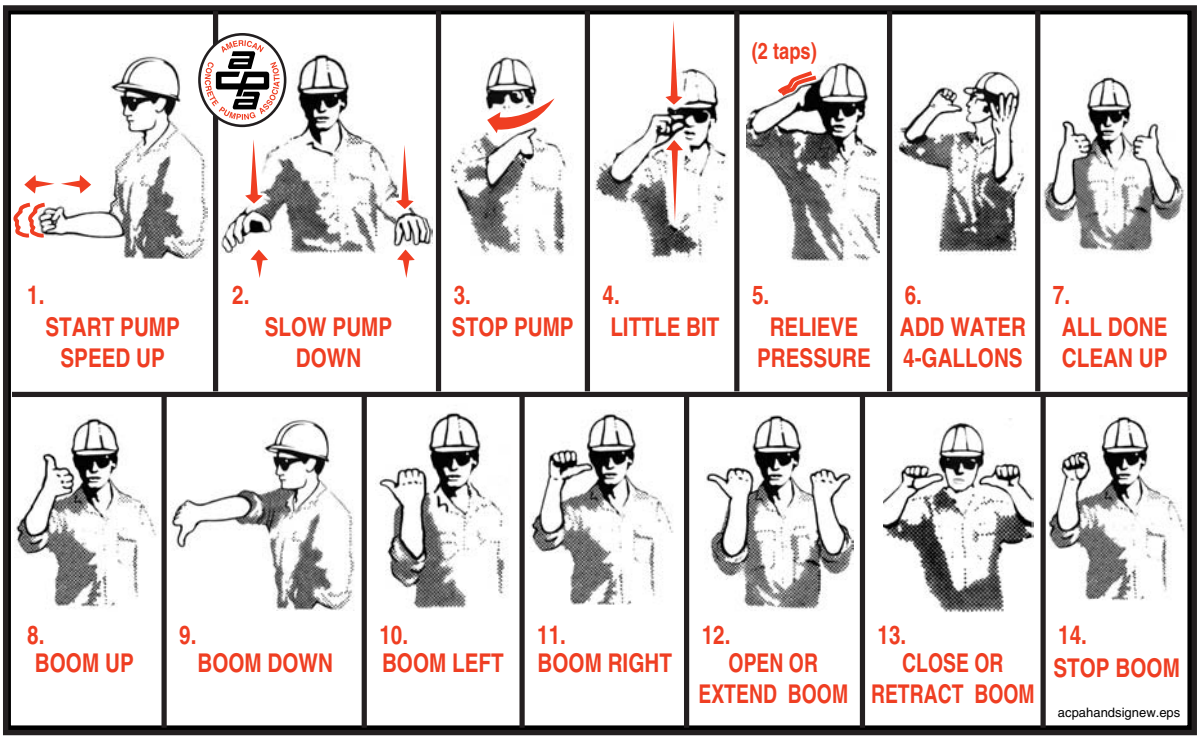
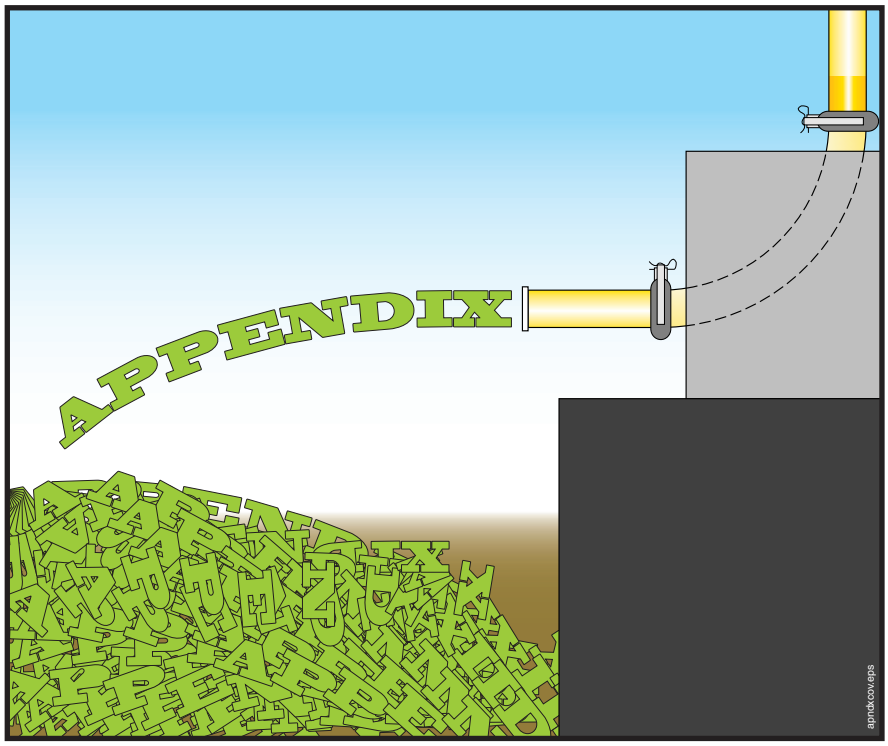


Figure 89
ACPA recommended hand signals



Appendix

Table of Contents

VII. Weld On Ends / Coupling Comparison

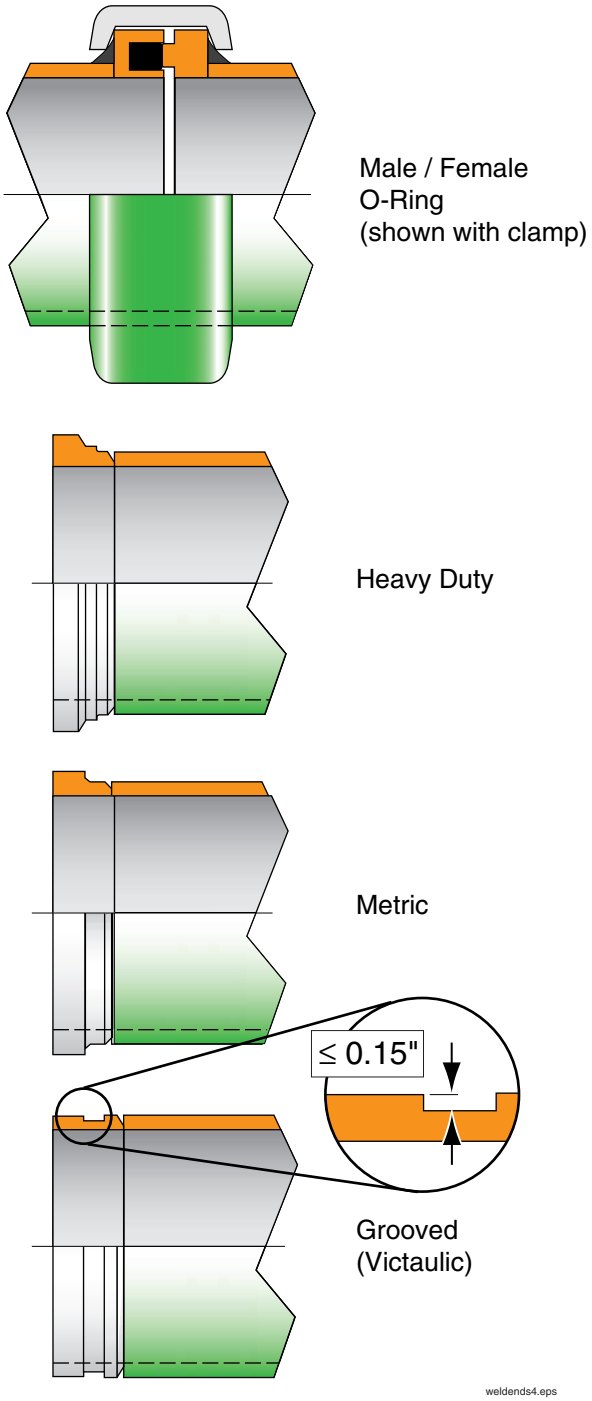
Shown is a comparison among commonly used ends/couplings. No two ends shown can be joined without the use of an adapter pipe or a special adapter clamp. Clamps and pipe strength must also be considered when determining proper system requirements. The ratios shown in the text below represent the safety factor from burst : working

1. Male / female o-ring type couplings have the highest pressure rating of the ends commonly used for concrete pumping. They can withstand 4350 PSI @ a 2:1 safety factor. They are self aligning and waterproof when used with o-rings in good condition. Typically not used on booms because of their weight. Pipes equipped with this style coupling cannot be swapped end-for-end.

2. Heavy-Duty couplings are designed for pressures up to 2250 PSI @ 2:1. They have 20% more contact area than metric couplings, and a tapered face that draws the pipe sections together during assembly. Both the ends and clamps weigh more than metric style, and therefore should not be used on booms without consulting the manufacturer.

3. Metric couplings are designed for pressures up to 1400 PSI @ 2:1. They have 85% more contact area than grooved couplings. The face is flat and will not draw pipe together. Although they have a raised edge, they are not compatible with Heavy Duty couplings unless a special clamp or an adapter pipe is used to change from one style to the other. Metric connections are standard equipment on booms because of the weight savings compared with other styles.

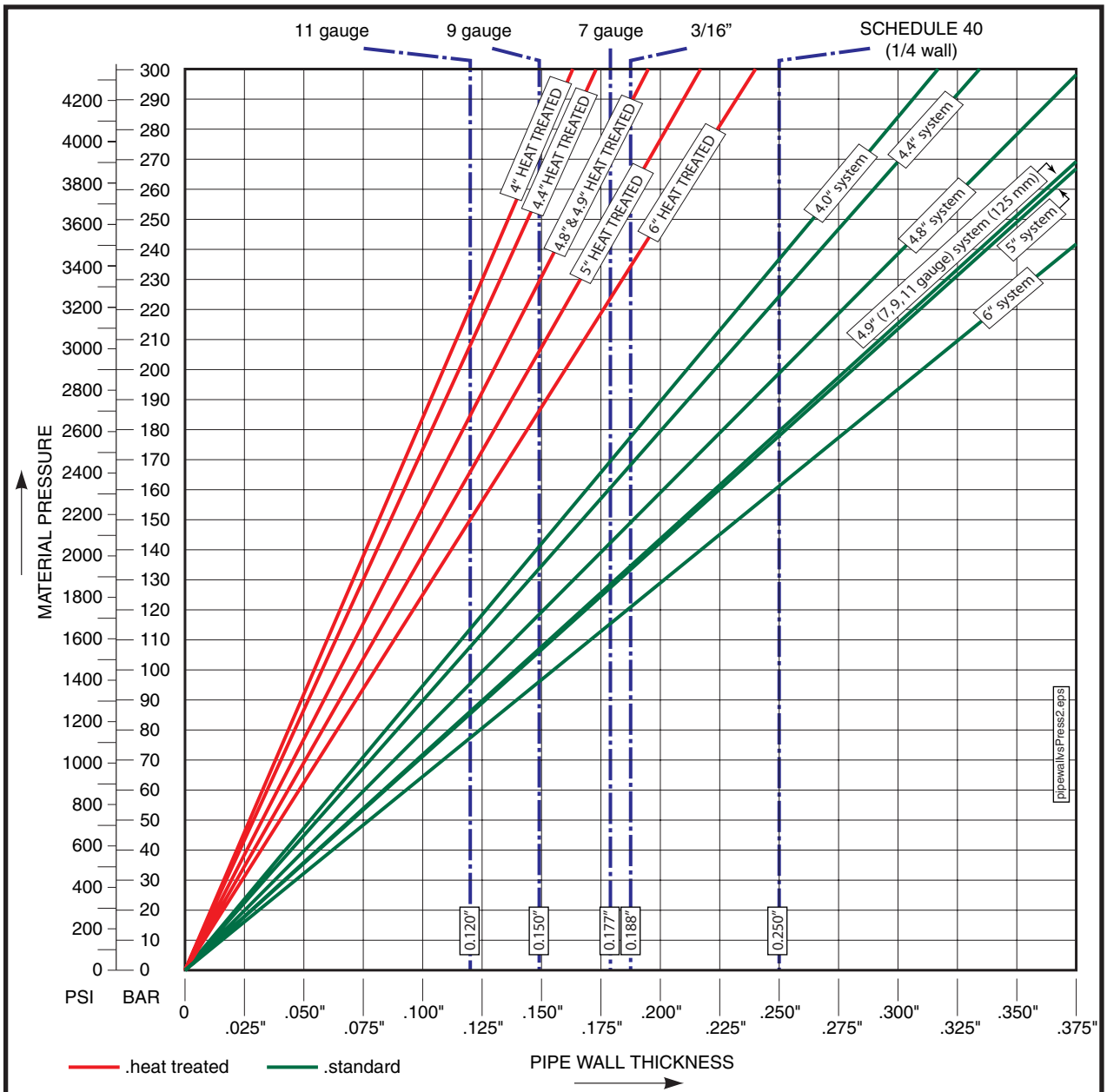
4. Grooved couplings (lip height of 0.15” or less) are designed for pressures only up to 750 PSI @ 2:1. The recessed groove is hard to clean when changing pipe on a job. The weld-on end fails before the pipe because the groove is cut into the pipe thickness, making it the weakest spot. Grooved couplings are not recommended for concrete pumping applications.



NOTE: All pressure ratings listed refer to 5 inch (125mm) diameters in like-new condition. Other pressures would apply to other sizes.

SAFETY MANUAL

VIII. Minimum Pipe Wall Thickness Chart



1. This chart assumes a safety factor of 2:1. Higher safety factors may be required in some circumstances.
2. Wear reduces wall thickness. Thickness must be checked on a regular basis.
3. Pressures may be limited even more by clamp style or pipe end used.
4. The chart is based on 62,000 PSI tensile strength. Heat-treated calculations are based on 120,000 PSI tensile strength.
5. The chart is for pressure calculations ONLY. There is no allowance for mechanical forces other than pressure, and thicker walls may be needed for mechanical strength because of support or restraint considerations.
6. The chart does not take into account metal fatigue caused by pressure cycles.

Note! This chart is intended as a guide for concrete pumping applications and is subject to the notes, assumptions, and conditions listed above. Any other use of this chart is not recommended.

This chart does not apply to double-wall pipe. Double wall pipe can be checked by inspecting the inside of the pipe. If the insert is intact, the pipe is okay. If the insert is worn through, the pipe must be replaced. Contact your pipe supplier for the pressure capacity of your double-wall pipe.

IX. Glossary Of Terms

Accumulator

A hydraulic device that stores fluid power energy in much the same way that a battery stores electrical energy. Because an accumulator will store energy, it MUST be drained and depressurized before work begins on an accumulator equipped actuator or hydraulic system.

Agitator

A device that sits in the concrete hopper to keep concrete moving, preventing it from setting. It is typically a rotating shaft to which several paddles have been mounted. *See Also:* Hopper Grate

AWS D1.1

The code for structural welding with steel as defined by the American Welding Society. Sections 3, 5, and paragraph 9.25 of section 9 apply. *See Also:* Certified Welder and EN 287-1

Blanking Plate

Also known as a blanking plug or end cap. It's purpose is to prevent material from falling out of the delivery system (typically the end hose) when moving a boom with a full pipeline over personnel or property.

Blockage

Simply put, if the pump is pushing and concrete fails to come out at the point of discharge, it is called a blockage. Blockages can be removed with pump pressure, by rocking the pump between forward and reverse, or some other remedial measure. If the blockage can not be removed in such a manner, it's called a plug. *See Also:* Plug, Rock Jam. The causes of blockages are detailed in section 8.21 of this manual. In all cases, blockages create a hazard by causing high concrete pressure, combined with the sometimes uncoordinated efforts of untrained workmen to remedy the problem.

Bulk Density

The mass of a substance per volume. For example, one cubic foot of air weighs much less than one cubic foot of water. One cubic foot of lightweight concrete weighs less than one cubic foot of steel entrained concrete. We could say that steel entrained concrete has a higher bulk density than lightweight concrete. All calculations for the operation manuals and specifications of concrete pumps are based upon 150 pounds per cubic foot, which is the approximate mass of hard rock (normal) concrete.

Certified Operator

An operator that has been issued a certification card by the American Concrete Pumping Association. There are several classes of certification, each relating to a different category of pump. For an operator to become certified, he (she) must pass the written tests regarding operation, setup, and clean out for each category of pump, pass the safety rules test which is common to all certification categories, meet the experience requirements set forth for each category, and maintain a safe and clean driving record. The certification card only certifies that the operator has passed a written test administered by an A.C.P.A. certification tester and does not attest to their ability to operate a concrete pump. *See Also:* Qualified Person, Qualified Operator.

Certified Welder

As it relates to concrete pumping and this Safety Manual, a Certified Welder is a person that has applied for, taken and passed the American Welding Society (AWS) or the European Norm (EN) test for structural steel welding. Anyone welding on a concrete pump placing boom, outriggers, towers, etc. must be certified to AWS D1.1 sections 3, 5, and paragraph 9.25 of section 9 **and/or** EN287-1/PREN288-3.

Concrete Delivery Hose
A flexible concrete hose that has two end couplings.

Concrete Pressure
The force per square area that is exerted on the concrete. The concrete pressure will always be a ratio in direct proportion to the hydraulic oil pressure on the concrete pump circuit. *See Also*: Maximum Pressure

Conductors
Materials that will conduct electricity. Copper, silver, aluminum, gold, steel, and water are considered GOOD conductors of electricity. Air, fiberglass, rubber, ceramics and glass are considered POOR conductors. All of these conductors have a resistance to the flow of electricity that can be measured in terms of ohms per linear foot. As voltage gets higher, more current flows through the same resistance. In the case of high voltage electric wires (8000 volts, for example) even the poor conductors will carry enough current through your body to ground that you could be killed. (As little as 35 milliamps can cause fibrillation of the heart.) Some conductors, like air, resist electricity very well, but if the voltage gets high enough, current will flow (lightning is a good example of this). *See Also:* Electrocution

Decibels
One tenth of a bel. Abbreviated dB. It is a measurement of sound volume. As it applies to concrete pumps, it is a measurement of the sound pressure level one meter away from a noise source. O.S.H.A. has developed guidelines for time limits on exposure to sound at different volume levels. The chart can be found on page 36 of this manual.

Drive Engine
The primary source of power for a hydraulic system. Typically, the word “engine” denotes and internal combustion device, whereas the word “motor” denotes an electrical device.

Electrocution
Made from the words “Electric” + “Execution.” It means death by electricity. *See Also:* Conductors

EN 287-1 / PREN 288-3
The code for structural welding with steel as defined by the European Norm. *See Also:* Certified Welder, AWS D1.1.

End Hose
A flexible concrete hose that has one end coupling.

Foreign Material
Material that was never intended to be pumped, which ends up in the concrete hopper. Examples of foreign material include small animals, hammers, ready mix truck fins, unmixed clumps of cement, hardened concrete that breaks away from ready mix truck fins, and soda pop cans. These items could create a blockage if pumped.

Go Devil
A plug made from a rubber composite, usually with several fins that expand to seal when pressure is applied. They are intended to be inserted in a steel delivery pipeline and pushed with water or compressed air for the purpose of cleaning the pipe. *See Also:* Sponge Ball

Guide
An assistant brought in to help in backing up a truck or trailer, or to help in other circumstances where the driver cannot see enough to assure safety. *See Also:* Spotter

SAFETY MANUAL

High Voltage

For the purposes of this manual, anything over 24 volts is to be considered high voltage. In the U.S., electrically driven concrete pumps normally operate the motors at 480 volts AC (high voltage) and the controls at 24 volt DC (low voltage). When dealing with electric wires in residential or industrial areas the voltage will be approx. 8000 volts to ground, or 13,800 volts from phase to phase (distribution voltage). When dealing with electric wires that are mounted on steel towers high above the ground, the voltage will range from 100,000 to 1,000,000 volts (transmission voltage).

Hopper Grate

A meshwork placed over the concrete hopper, typically made from steel bars. It serves the functions of keeping human body parts away from the agitator (when left in it's proper position) and keeping large foreign objects from falling into the hopper, which could cause blockages if they were pumped.

Jacking the Outriggers

Adjustment of the outriggers in the vertical direction. With boom mounted concrete pumps you should strive to make the adjustments so that the unit sits within 3° of level.

Licensed Electrician

A qualified electrician licensed by the state, county or municipality where the connections are to be made. In some locations electricians are not required to be licensed, and in these cases the work should still be carried out by competent professionals. Under no circumstances should high voltage connections be made by a concrete pump operator or related personnel.

Maintenance

All procedures for service, inspection, and repair of concrete pumps and related equipment and devices. Maintenance and inspection are methods of ***maintaining*** the desired state of the equipment. Repair is the method of ***restoring*** the desired state of the equipment.

Maximum Pressure

When talking about a hydraulic system, maximum pressure refers to the highest pressure that can be achieved with the settings of the circuit relief valves. When discussing concrete output, maximum pressure refers to the pressure that will be developed if the hydraulic system pressure reaches the relief valve setting. Concrete pressure is the force at which the differential cylinders are moving, divided by the cross sectional area of the concrete cylinder. Maximum concrete pressure, then, is developed when the differential cylinders are moving with maximum force, which is determined by the hydraulic system relief valve setting. *See Also:* Concrete Pressure.

Minimum Safety Distance

In this manual, the term "minimum safety distance" refers to the closest distance that you are allowed to approach an object, electrical wires, etc. and still leave room for errors in human judgement or machine malfunction. With electrical wires in the U.S., this distance is 17 feet, as recommended by the American Concrete Pumping Association. This distance may have other values in different countries (Canada specifies 7 meters). It is up to the operator to know the value for the place of operation.

Operational Area

The area around a working piece of equipment or point of discharge where hazards can be encountered due to the nature of the machinery or process in use.

O.S.H.A.

Occupational Safety and Health Administration. A branch of the United States federal government that deals with job safety. They establish and enforce safety regulations for industry and

business. Among the areas over which they have authority are construction job sites and work shops.

Personal Protective Equipment (P.P.E.)

Things you can wear to protect yourself from potential dangers in a concrete placing environment. Examples are:

- Snug fitting work clothes
- Steel toed work boots
- Lime resistant gloves
- Safety glasses
- Ear muffs or ear plugs
- Rubber boots when you have to stand in concrete
- Hard hat
- Breathing mask when working with cement dust

Plug

A plug is a blockage that cannot be removed with the pump pressure, or by other remedial measures. A plug must be removed manually. *See Also:* Blockage.

Point of Discharge

Also known as the point of placement. The location of concrete expulsion from a delivery system. This can be the point of placement (the actual form that is being filled with concrete) or the clean out area after completion of the job.

Pour

Used by the concrete pumping industry and in this manual as a noun. It is the specific job for the pump during any given time period. (e.g. "We'll grab lunch right after the pour.")

Qualified Person

As used in this Safety Manual, a *qualified person* is defined as: a person who, by possession of a recognized degree of certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. Other qualified persons may include master mechanics and after-sales service technicians of the manufacturer. *See Also:* Certified Operator

Qualified Operator

Operators shall be considered qualified when they have completed a program of training and supervised operation of concrete pumps and have passed a practical operating examination of their ability to operate a specific model and type of equipment as well as their understanding of the controls and operating procedures. Furthermore, the operator must meet the knowledge and physical requirement sections of the concrete pumping safety standard.

Qualified Personnel

A generic term used to describe a person who is qualified in the area of application. For example, having your boom repairs inspected by "qualified personnel" before use would refer to inspection by a certified welder or certified welding inspector. Having repairs to your hydraulic system done by "qualified personnel" would refer to repairs made by qualified workshop personnel.

Qualified Workshop Personnel

An individual who:

- has reached the age of 18 years,
- is physically and mentally capable,
- has been trained in proper repair, maintenance, and inspection procedures plus the pertinent safety rules for concrete pumps and related equipment,
- has demonstrated their capabilities to their company in regards to the above mentioned

procedures and rules, and
- can be expected to perform these duties, as assigned, in a reliable manner.

Rock Jam

A specific type of blockage caused when the cement and fines of the concrete are not present in sufficient quantity to fully coat the larger aggregates and the walls of the delivery system. In these cases, the rock (larger aggregates of the mix) will form a wedge inside of the pipe. Resistance to movement then becomes overpowering and the concrete stops. *See Also:* Blockage.

Separate Pipeline

A pipeline that is laid between the concrete pump and the point of discharge, other than the placing boom pipeline.

Shutoff Valve

In hydraulics: a valve with the ability to stop the flow or pressure of hydraulic oil. It must be able to withstand the maximum pressure of the hydraulic circuit that it controls. In concrete: A manually or hydraulically operated valve that will prevent the flow of concrete in either direction. The shutoff valve must be able to withstand the maximum pressure on the concrete of which the pump is capable of exerting.

Soil Pressure

The force per square area that is exerted on the ground by the outrigger legs. The amount of pressure that the soil will support varies with the composition and compaction of the soil. To make a determination on the stability of the soil, see the chart on page 22 of this manual.

Sponge Ball

A medium to hard sponge formed into a sphere and used to clean the inside of delivery pipelines. *See Also:* Go Devil

Spotter

A spotter is a person who stands at a vantage point where he (she) can see both the point of discharge and the operator of the pump. The spotter would then direct the operator to operate the unit as required by the job circumstances with two-way radios or hand signals. A spotter can be anyone who is familiar with the safety rules for the pump and workers and is equipped with a radio or knows the appropriate hand signals. A spotter is needed whenever the operator cannot safely see the point of placement or the distance between the unit and an unsafe area. *See Also:* Guide

Sucking Back

The act of putting the concrete pump into the reverse mode for any of several reasons.

Thrust Block

Also known as a “dead man”. This is a large block of poured concrete, usually with one or more sweep elbows cast inside, placed at the bottom of a vertical run for the purpose of supporting the weight of the vertical run and for lateral stabilization of the pipeline. It stabilizes and supports the vertical run by virtue of its enormous mass (normally one cubic yard or larger).

Towing Vehicle

In this manual, *Towing Vehicle* applies only to vehicles that tow trailer mounted concrete pumps. It is the vehicle that you will use to tow the trailer on the road, on the job site, or in the yard. See the safety rules regarding this subject on page 10 of this Safety Manual.

Transport Position

This relates to the position of the boom when you will be driving the unit. The travel position of the boom is the position of the boom when it is completely folded and lowered into the rests.

Unauthorized

Without authority, without permission. Examples: Unauthorized operation of the boom could be operation by a passer-by, unauthorized repairs to the boom could be repairs designed without the manufacturer's knowledge.

Unintentional Movement

Movement of the pump, boom or related equipment without a specific intentional command by the operator. An example of an unintentional movement would be if an operator fell while walking with the remote control box and accidentally hit a joystick, causing a boom movement.

Vertical Run

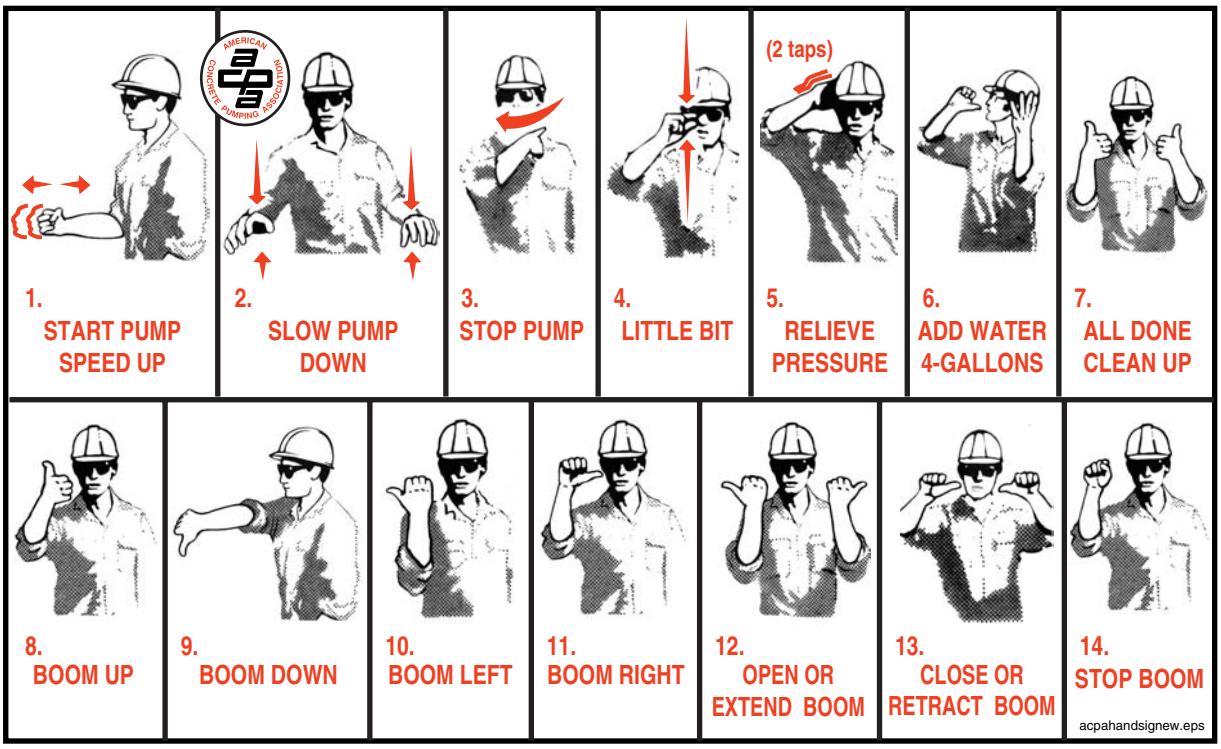
Sections of concrete delivery pipeline that are running in an up (or down) direction. Vertical runs have very specific procedures and rules for installation, support, cleaning, and inspection. Concrete pumping personnel should, therefore, have specific training in these procedures and rules before attempting to use them in a job setting.

Water Jet

The actual stream of water that comes out of the end of a water hose or pressure washer. This is the only part of the water system that needs to go into the hopper, concrete valve, or water box for cleaning.

X. Recommended Hand Signals

The American Concrete Pumping Association (ACPA) recommends using the following hand signals as standard procedure.



XI. Bibliography

Further information regarding concrete pumping is available from the sources listed below. Information for this book was gathered from several different sources, including the following books:

PUMPING CONCRETE AND CONCRETE PUMPS © F. W. Schwing, GmbH

CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association

The MANUAL and ADVISORY SAFETY CODE of PRACTICE for CONCRETE PUMPING © British Concrete Pumping Association

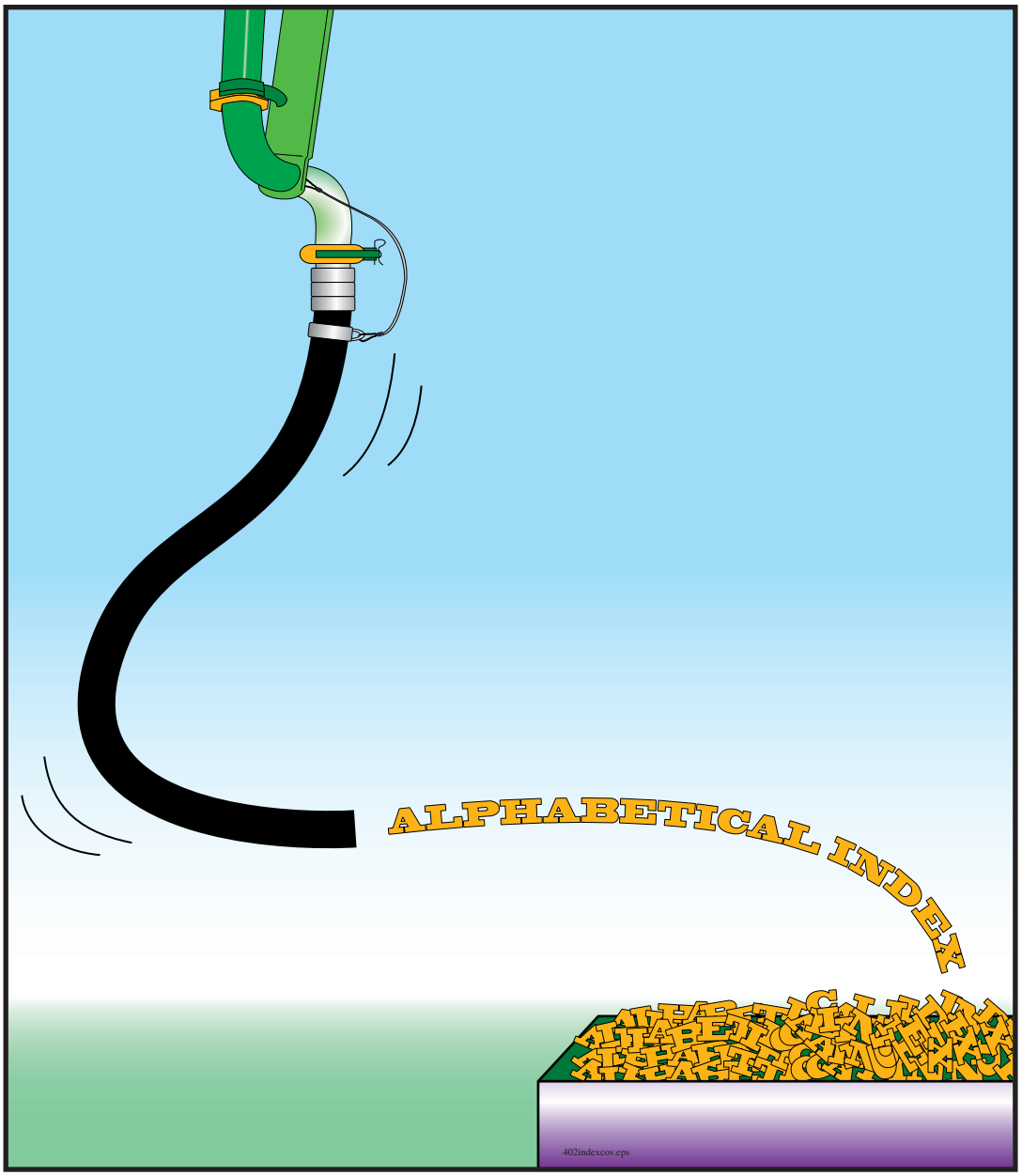
SAFETY STANDARD FOR CONCRETE PUMPS, PLACING BOOMS, AND DELIVERY SYSTEM by the Concrete Pump Manufacturers Bureau

Additional technical information and/or graphic were supplied by:

Construction Forms, Inc.

The American Concrete Pumping Association

Some cartoons were scanned from the book CONCRETE PUMP OPERATOR'S GUIDE TO SAFETY © British Concrete Pumping Association. Used by Permission.



Alphabetical Index