

48 MW JAGGRAN-II HYDROPOWER PROJECT **TECHNICAL SPECIFICATIONS OF HYDRAULIC HOISTS** **FOR GATES**

The technical specifications for Hydraulic Hoists are detailed as below.

1. General Site Conditions

Temperature max.	=	40 °C ~ 45 °C
Temperature min.	=	-10 °C
Height above sea level	=	1791.25 m for Radial & Intake Gates. 1815.5 m for Surge Tank Gate.

2. Hydraulic Hoists for Gates

2.1 Extent of Supply

The Extent of Supply as detailed below is required for all Hydraulic Hoists of Gates as detailed in attached Annexure-I.

The supply under this section shall comprise, but not necessarily be limited to, the design, manufacture, Supply, supervision of erection/installation, surface treatment and supervision of commissioning of the Hydraulic Gate Hoists as detailed below.

- i. 1 (one) sets of Hydraulic Hoist complete with all accessories including Hydraulic Cylinders, Pumps, hose pipes, Hydraulic Oil tank, Oil filter etc. with interconnection possibilities between the units as well as connection possibilities for external emergency pumps.
- ii. Hydraulic Cylinders shall be equipped with orifices within cylinder ports to limit the closing time.
- iii. 1 lot of Hydraulic Oil for each Hydraulic Power Unit.
- iv. 1 (one) Set of controlling equipment.
- v. 1 (one) set of Pressure equalizing pipes with valves.
- vi. 1 (one) Set of Cabinets with motor control unit.
- vii. 1 (one) Set of spare parts as detailed below at S.No. 2.3.
- viii. 1 (one) set of all tools and special equipment necessary for operation, repair and maintenance of supply.
- ix. Accumulator/DC motor for Emergency gates i.e Intake & Surge Tank Gate.
- x. All connecting piping. The piping should be connected directly by screwed fittings.
- xi. Mounting Brackets for Hydraulic Cylinders including lifting Pull Rod (SS).
- xii. Anchor Bolts for Hydraulic Power Units & Hydraulic Cylinders.
- xiii. Connection Brackets along with axles for Connection of Hydraulic Cylinders & Gates.
- xiv. Hose Breaking Protection is required for Under Sluice Service Gates Hoists.
- xv. All necessary anchors, bolts, screws, framing, pipes, lubricants, temporary and permanent items for alignment and fixing to concrete/steel frame.
- xvi. The supply shall be completely surface treated according to the renowned international standard (ISO 12944-2). A Total Dry film thickness of 180 µm according to Corrosivity criteria C2.05 (ISO 12944-2) for both indoor and outdoor locations. 1xprimer (60-120 µm) and 1-2 coats with dry film thickness of 120 µm resulting a total nominal dry film thickness of at least 180 µm.

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- xvii. Oil Heating Elements in Hydraulic Power Unit Circuits.
- xviii. Supervision of Erection & Commissioning for Hydraulic Hoists.
- xix. Preshipment Inspection of Hydraulic Hoists.
- xx. Hydraulic Oil Filters in hydraulic circuit for the operation of at least two years.
- xxi. Quality Manuals, procedures, stage wise inspection report shall be provided.
- xxii. All components, devices, items and equipment not mentioned above, but necessary for the safe and proper manufacture, testing and maintenance of the supply.

2.2 Description of Equipment

Technical Data

- a. Following are the details of Gates for which Hydraulic Hoists are required.

S.No.	Description	Radial Gates	Intake Gate	Surge Tank Service Gate	Remarks
1.	Quantity	02 Nos.	01 No.	01 No.	
2.	Capacity of Hyd. Hoist.	1250 KN	320 KN	500 KN	
3.	Stroke	Design stroke 4.8 m (Work Stroke 4.53 m)	-	-	
4.	Lift.	-	5 meters	4 meters	
5.	Sketch	Sketch-1	Sketch-2	Sketch-3	See attached
6.	Gate Open/close Velocity min.	0.25 m/min	-	-	
7.	Gate Open Velocity min.	-	0.25 m/min	2.5 m/min	
8.	Gate close Velocity max.	-	1 m/min	2.5 m/min	

b. Hydraulic Hoists

Each gate shall be operated by one oil hydraulic cylinder mounted on steel frames. The hoist shall be capable of lifting the gate when subjected to the most unfavorable loads from water pressure.

The gates shall close by their own weight against water load, damped by their hydraulic cylinders. The hoisting equipment shall be designed to enable easy operation and maintenance shall comprise the following main items:

One Single/Double acting hydraulic cylinder, designed according to the renowned international standards. The gate closure time shall be limited by an orifice in the lower cylinder port. The cylinders shall be provided with drain and ventilation plugs in

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both ends. Top and bottom covers shall be bolted to the cylinder. The connection hose pipes are to be equipped with stop cocks on each end. The cylinder shall be mounted by a trunnion with self-lubricated bearing protected by grease filling and rubber seals. The journal shall be made from stainless steel. The suspension must cinematically allow every possible movement of the cylinder. The cylinder rod shall be made of stainless steel, chromium plated with a thickness not less than 0.1 mm. The eye-piece of the cylinder rod shall have a spherical, self-lubricated bearing, protected by grease filling and rubber seals, connected directly to the gate cantilever shaft. The cylinder shall be smoothly machined and honed. The stuffing box shall have pressure actuated seals and a bronze lining for guidance of the piston rod. The seals shall be easily replaceable.

c. Hydraulic Units

The hydraulic power units are to be set up according to DIN 19704 and the following special specifications.

The hydraulic power units are to be accommodated in the respective buildings. An individual unit with its own oil tank is to be built for every gate. All pipes on this unit do not have to be made of stainless steel. Cutting ring bolts are not allowed. Instead, welding cones or flanges are to be used. All other pipes are to be precision pipes, made out of stainless steel. The weld seams on the pipes are to be 100% x-rayed.

The hydraulic pressure system must be equipped with two electrically motor driven pumps for regular and stand-by services and shall be supplied with all necessary connection pipes, valves and instruments for remote supervision and operation. However, it must be noted that the motors and pumps must be suitable for continuous operation. Furthermore, it must also be noted that the pumps and motors have to be standardized in such a way, so that, as far as possible, only one type will be used. This must be co-ordinated with drives for the flap gates. For emergency cases, an external supply unit is to be provided on the unit joints.

For adjustment/emergency purposes, a hand-operated pump is also to be installed on each unit. Furthermore, the operational conduits on the unit outlets are to be fitted out with manually operable stop cocks and linked in such a way, that the operation can be smoothly transferred to any of the other drives, should the pumps break down. Concerning the adjustment of the oil amount difference between the different oil tanks, appropriate connecting pipes must be provided for. In normal operation periods, the units are controlled by the control system. It must also be possible to manually operate all the relevant valves and switches.

All control valves, which must be manually operable in emergency cases, are to be clearly installed, made easily accessible and the individual functions are to be indicated. The function of the units is to be recorded by appropriate transmitters and must be monitored by the unit control. In particular, the oil level and the oil temperature are to be measured with appropriate detectors and are to be accounted for in the control system. To prevent that oil is pumped out of the unit when damages occur on the piping, a minimum pressure control is to be carried out.

Normally, the gate is in the open position and therefore, an oil leak controlling device with a limit switch must be installed, which enables the gate to be lowered by refilling the oil

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leakage. This controlling device has to have an impulse count, in order that an increasing leakage can be effectively recognized. The unit is to be set up on vibration damping feet. The connection of the units and the conduit pipes to the hoist must be made with hose pipes which have stop cocks on both ends.

The connection of the units and the conduit pipes to the hoists must be made with hose pipes which have stop cocks on both ends. Concerning the corrosion protection of the units, special attention has to be given to the compatibility of the coating with the hydraulic oil that is used. It must be possible to have all pumps working at the same and this must be especially allowed for in the electrical connection.

A control cabinet is to be provided for each unit and must be set up in the operation building. All the control elements for the drives are to be installed in this cabinet and are to be clearly arranged. Furthermore, indicators for the segment positions as well as for the headwater level are to be installed.

d. Controlling Equipment

Each gate shall have one angular indicator with cables; class IP 68, for the gate position. The indicators, feeding signal 4-20 mA, shall be factory sealed with factory mounted cables, long enough to reach the terminal block in the operation building. The indicators shall be protected against mechanical damage. Electrical cables exposed to mechanical damage or trampling shall be protected by stainless steel pipes or half-pipes, bolted to the steel structures or concrete.

The hydraulic cylinder/cylinder rods or the gate body/guides shall be provided with two adjustable limit switches with cables, class IP 68, for the bottom as well as the complete open position. The limit switches shall be factory sealed with factory mounted cables, long enough to reach the terminal block in the operation building. The limit switches shall be protected against mechanical damage. Electrical cables exposed to mechanical damage or trampling shall be protected by stainless steel pipes or half-pipes, bolted to the steel structures or concrete.

2.3 Spare Parts

The spare parts are to be compiled as detailed below.

- i. 1 (one) Set of spare parts necessary for 02 years operation and maintenance.
- ii. 1 (one) Set of all the important control devices.

2.4 Drawings / Design Calculation for Hydraulic System

Kindly see attached Drawings for Hydraulic Cylinders & Hydraulic Circuit Diagrams for following Gates.

- A. Radial Gates (Under Sluice Service Gate)
 - i. E314-HMC-HH-S-D-1001- Hydraulic Power Unit – Under Sluice Service Gate
 - ii. E314-HMC-HH-S-D-2001- Hydraulic Cylinder – Under Sluice Service Gate

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- B. Intake Service Gate
 - i. E314-HMC-HH-S-D-1004- Hydraulic Power Unit – Intake Service Gate
 - ii. E314-HMC-HH-S-D-2004- Hydraulic Cylinder – Intake Service Gate
- C. Surge Tank Service Gate
 - i. E314-HMC-HH-S-D-1007- Hydraulic Power Unit – Surge Tank Service Gate
 - ii. Annexure- II Surge Tank Service Gate Motor Data/Details.

2.5 Other terms & Conditions:

- i. Bidder to provide supporting Drawings/Sketches along-with the offer.
- ii. Bidder to provide the loading/anchoring data/details for the Hoisting system.
- iii. Specifications mentioned above are minimum and for reference only. Bidder may quote with details of latest specifications along-with sketches.
- iv. The bidder to provide complete set along with all standard accessories. Optional items may please be quoted separately.
- v. All electrical cables/installation accessories may also be quoted as required.
- vi. Bidder to specify clearly, make and origin of the offered equipment.
- vii. Bidder to provide electrical connection/wiring diagram along with offer.
- viii. Supplied item should have provision to indicate/control /transmit all types of signals through DCS/PLC at control room.
- ix. Bidder to provide free replacement guaranty/ warranty for a period of 12 months from commissioning or 18 months from the date of shipment whichever is later.
- x. The bidder to mention available, after sale services.
- xi. Bidder to provide the reference list of the supplied equipment.
- xii. Bidder to also provide six set of erection/Installation/operation/maintenance manuals one month prior to the shipment.
- xiii. Any defect found in the supplied items shall be replaced free of cost.

2.6 Vendor Qualifications:

- i. The vendor shall be an ISO 9001:2000 certified company.
- ii. The vendor shall have previous experience in the manufacturing and supplying of the similar components and shall also provide reference list for similar supplies made within and outside Pakistan.
- iii. There shall be a minimum of Two (2) previously supplied components of similar design in operation and each of the component shall be in successful operation for a minimum period of two (2) years.
- iv. Necessary documentary proof supporting S.No.iii above shall be provided.

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LIST OF HYDRAULIC GATES WITH HOIST

Annexure-I, Rev-01
Date: 23-08-2021

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No.	Description of Gates	Quantity of Hydraulic Hoists	Name of drawings	Reference data for Hoist	Remarks
1	Under sluice service gate	2	Sketch-1	1250kN Hydraulic hoist Design stroke 4.8m (work stroke 4.53m)	
2	Intake service gate	1	Sketch-2	320kN Hydraulic hoist Lift 5m	The hydraulic hoist needs connecting the between hoist and gate, length reference Sketch is attached herewith.
3	Surge tank service gate	1	Sketch-3	500kN Hydraulic hoist Lift 4m	The hydraulic hoist needs connecting the between hoist and gate, length reference Sketch is attached herewith.

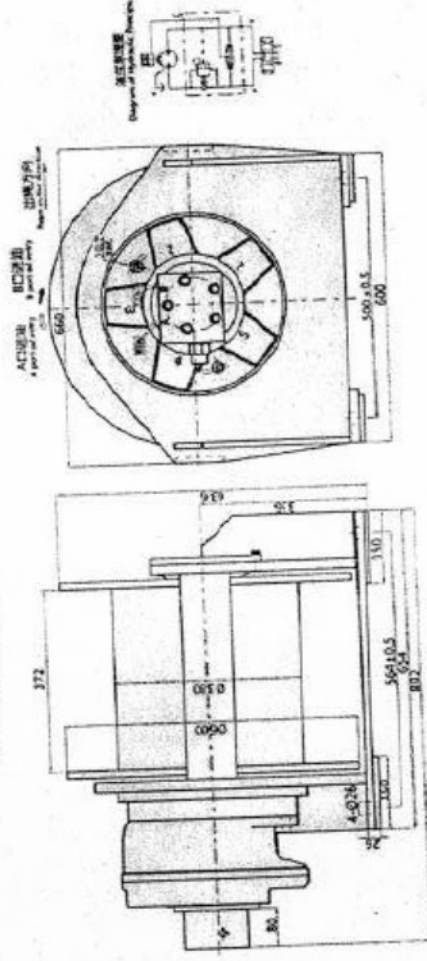
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Annexure-II

Subject: Surge Tank Service Gate Hoist Motor Details for Reference

ZYJ4外形及安装尺寸/ ZYJ4 Installation Dimensions



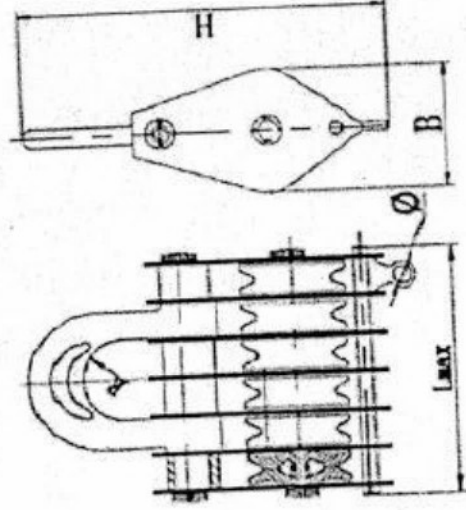
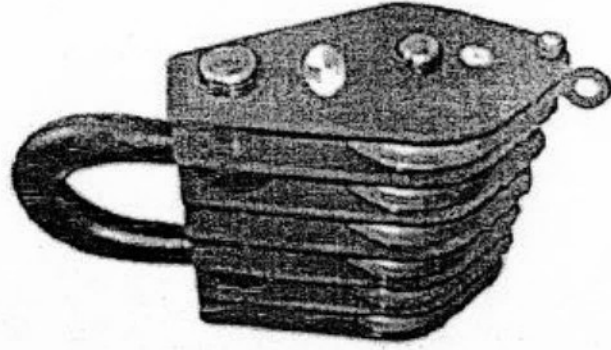
技术参数/ Technical Specification

型号 Model	第一层 First Layer	绳底径 Rope bottom diameter	总绳径 Total displacement	工作压力 Difference of working pressures (MPa)	钢丝绳直径 Wire rope diameter (mm)	容绳量 Rope Capacity (m)	液压马达型号 Model of hydraulic motor	行星减速机型号 Model of planetary reducer
ZYJ4-50-75-20-2P	拉力 (kN) Pull force 50	绳速 (m/min) Rope speed 0-40	380	10.3	80	70	ZGM3-000240101	C4-5
ZYJ4-60-68-21.5-2P	60	0-40	360	16	21.5	68	ZGM3-1000040101	C4-5.5

注: 1. 工作压力为额定工作时AB进出口的压力差; 2. 容绳量是指三层时的容绳量。
Note: 1. The differential pressure at work and for the when AB pressure are mouths. 2. Rope capacity is three layers of rope capacity.

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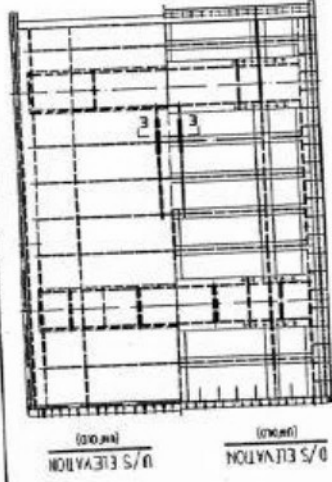
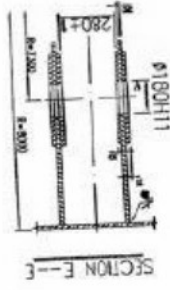
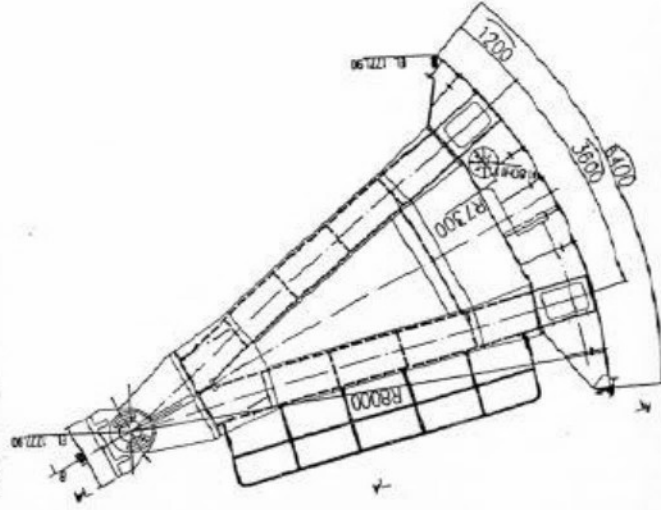
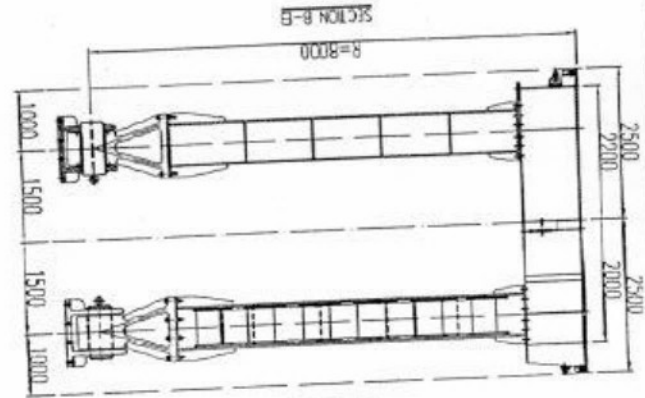


吊环六轮滑车 SIX WHEELS LIFTING RING PULLEY BLOCK

SIX WHEELS LIFTING RING & CABLE											
型号 ITEM NO.	额定 起重量 WLL(T)	实验载荷 TESTING LOAD (KN)	外形尺寸 OUTSIDE SIZE				钢丝绳直径 DIAMETER OF WIRE ROPE			环型尺寸 DIAMETER OF WIRE ROPE	重量 WEIGHT (Kg)
			H	B	Lmax	Φ	适用 STABILITY	最大 MAX			
SL-HQD6-32	32	448	770	236	430	32	17	20	63	110	
SL-HQD6-50	50	700	965	316	520	45	23	25	81	250	
SL-HQD6-80	80	1040	1230	405	620	59	28	31	90	460	
SL-HQD6-100	100	1300	1275	460	670	60	31	35	110	630	

HEAVY MECHANICAL COMPLEX TAXILA

SKETCH-1



UNDER SLUICE SERVICE GATE HOIST DETAILS

 $\Delta 1791.25$

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STEEL SLAB

1250kN HYDRAULIC HOIS
Design Stroke 4.8 m
Work Stroke 4.53 m

Design Stroke 4.8 m
Work Stroke 4.53 m

Design Stroke 4.8 m
Work Stroke 4.53 m

71784.00

1782.00

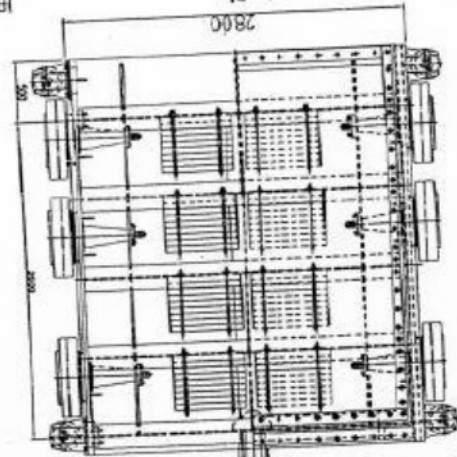
$$\Delta 1771.90$$

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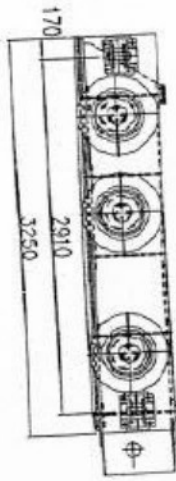
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SURGE TANK SERVICE GATE

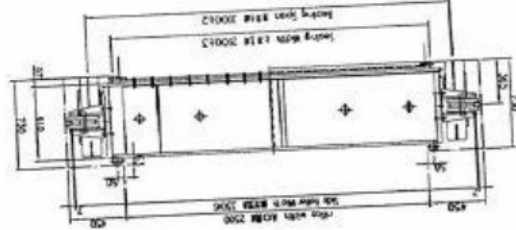
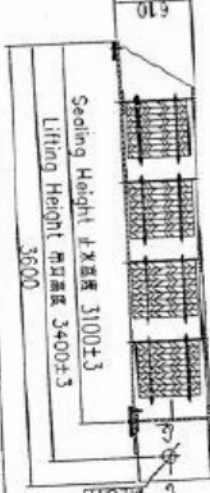
D/S ELEVATION



VIEW C-C



SECTION D-D



VIEW B-B

VIEW A-A

SECTION C-C



HEAVY MECHANICAL COMPLEX TAXILA

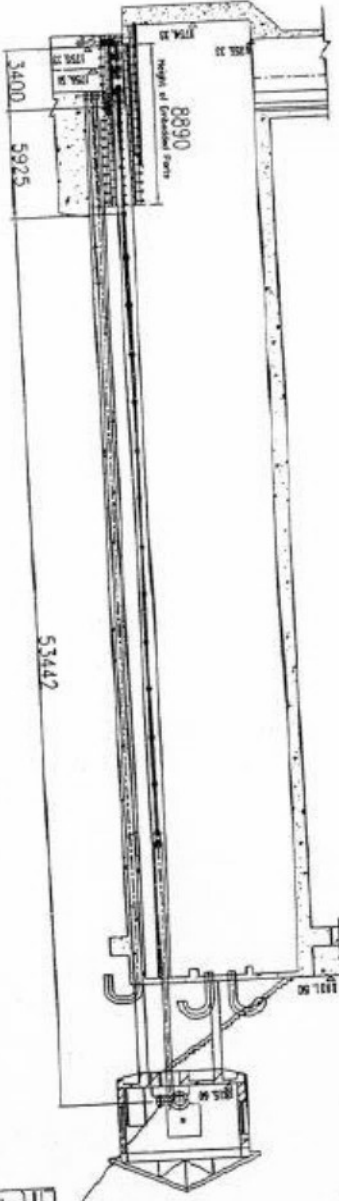
SKETCH-3

JAGGRAN-II HYDROPOWER PROJECT

SURGE TANK SERVICE GATE HOIST DETAIL

500 KN Hydraulic Hoist

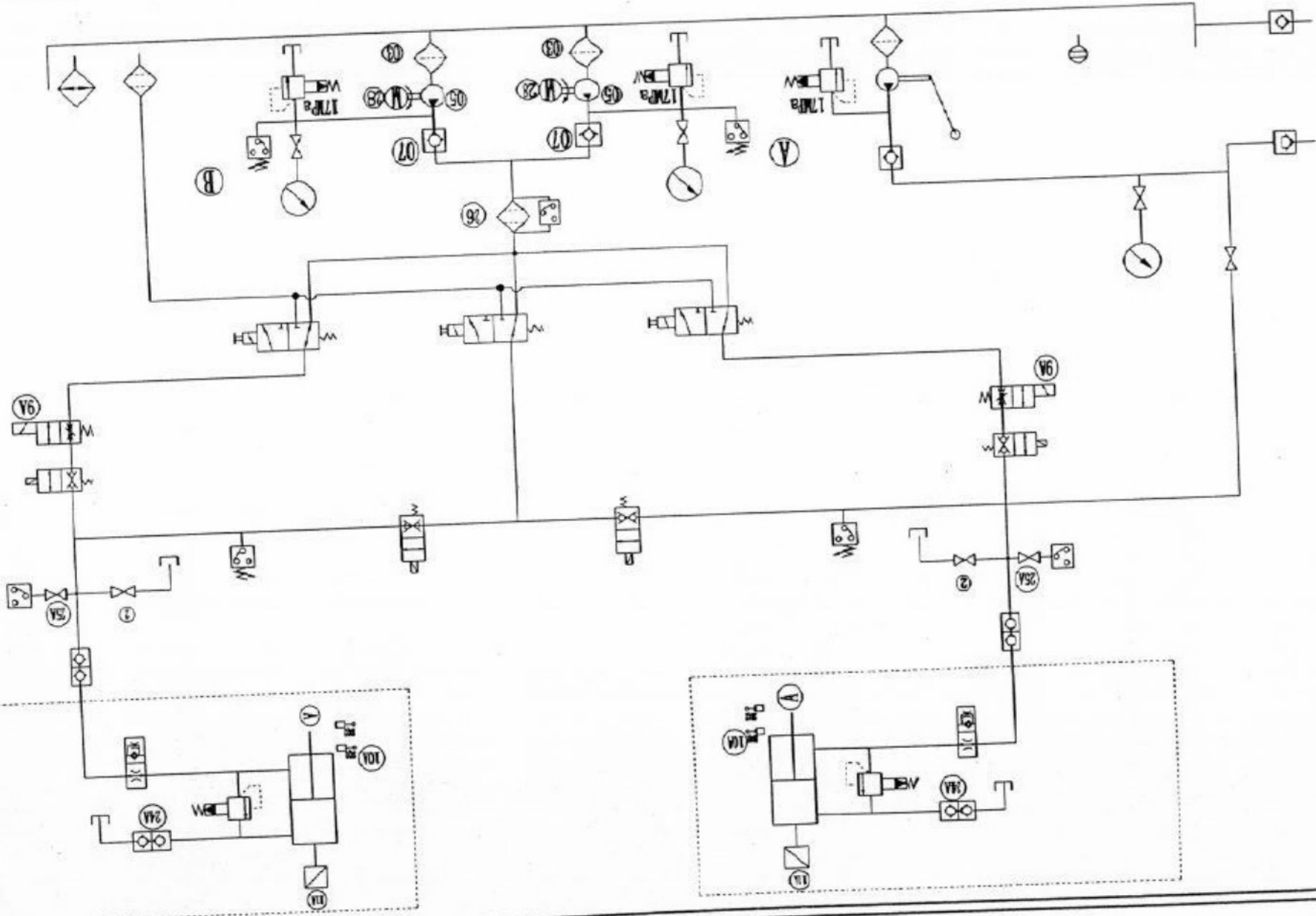
Lift 4m



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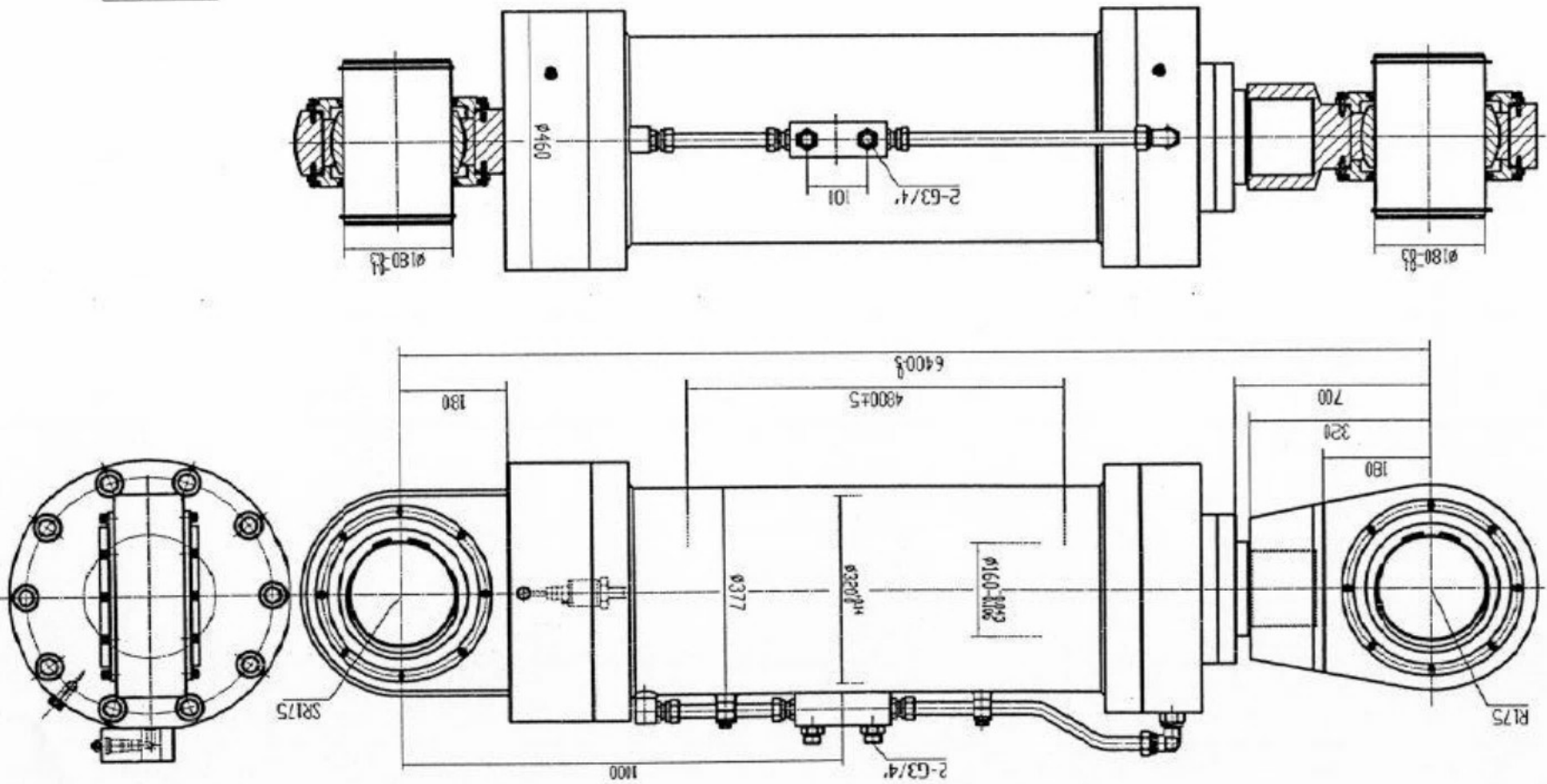
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DWG No. E314-HMC-HH-S-D-1001- Rev-B
Hydraulic Power Unit-Undersluice Service

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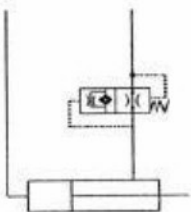
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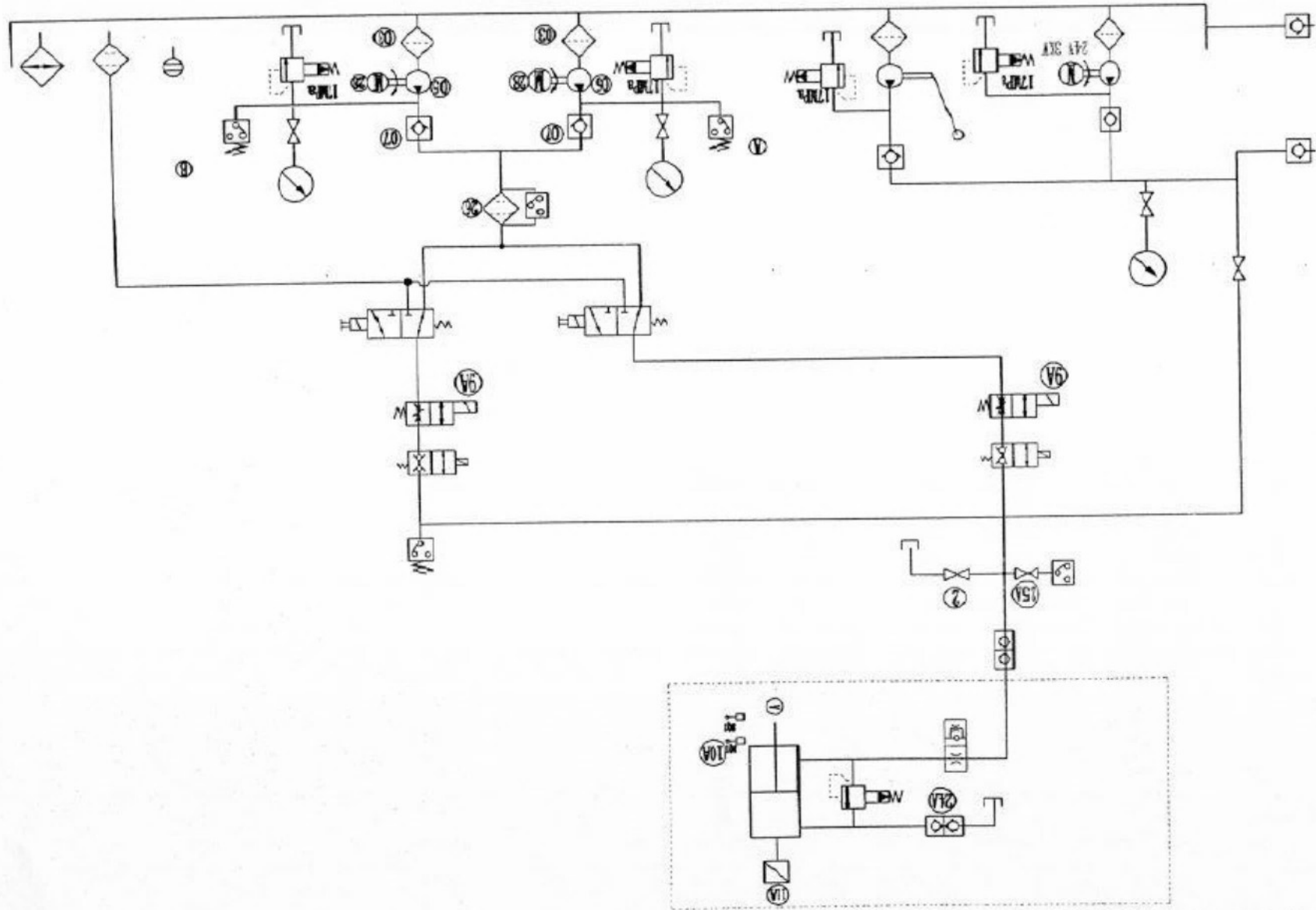
DIMENSION		Cylinder Bore 320mm, ISO H9	
Cylinder Bore	$R_a=0.2\sim0.4\mu m$	Cylinder Bore	20#
	160mm, ISO f8	Rod Diameter	30#
	$R_a=0.2\sim0.4\mu m$	Head	45#
	480mm S	Piston	45#
	6400mm S	Rod Seal	PU
	11200mm	Rod Seal Brand	
DIMENSION	Static Seal	'O' Ring Seal	
Working Pressure 21Mpa	Chrome Thickness	FUNCTION	
EFT Pressure 25Mpa	Chrome Hardness		
MIN: -25 °	MAX: +80 °	Rod Hardness	
Temperature	Working	700~900HV	

DWG.No. E314-HMC-HH-S-D-2001- Rev-B
Hydraulic Cylinder-Under Sluice Service gate

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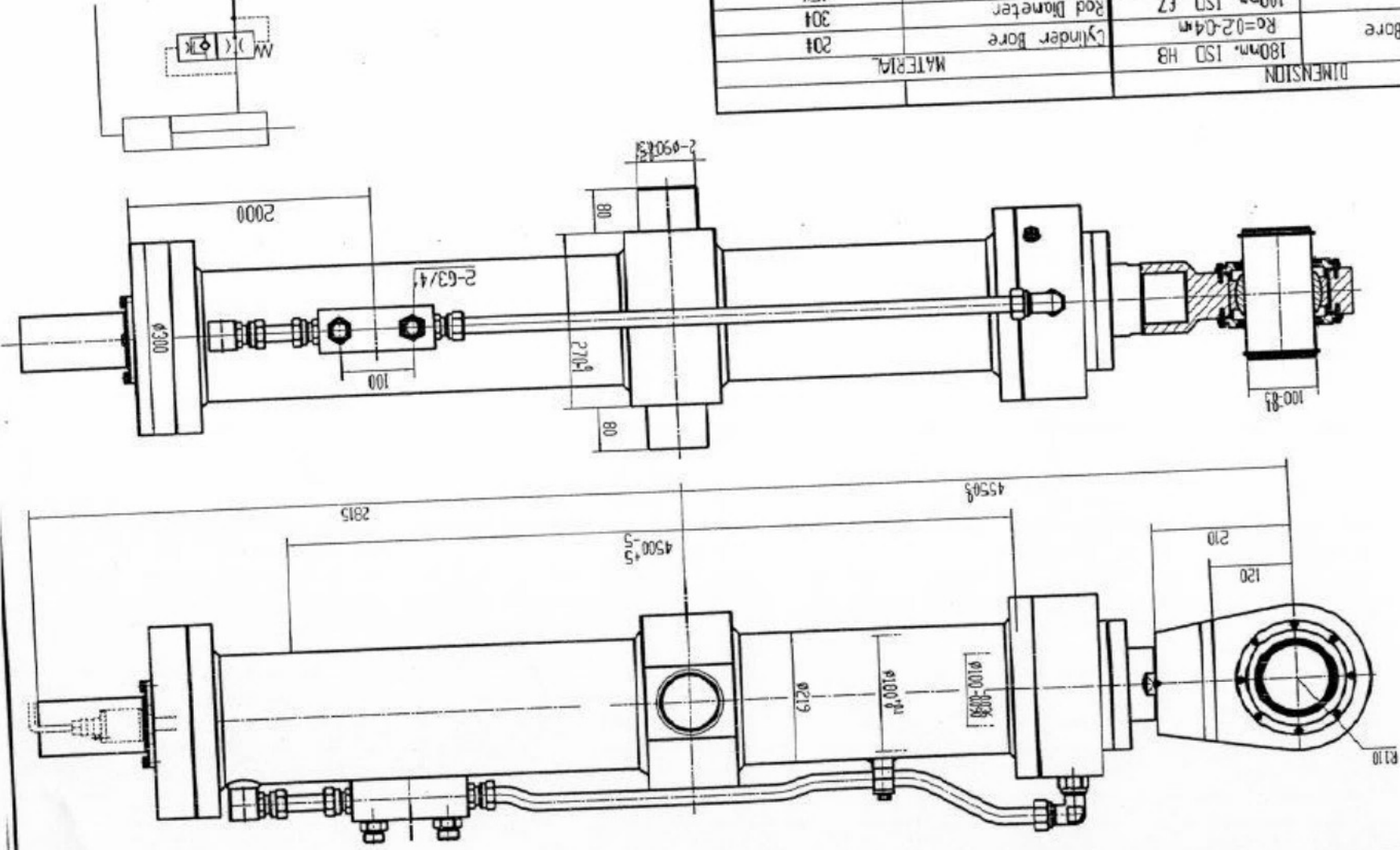


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DWG. No. E314-HMC-HH-S-D-1004-Rev-C
Hydraulic Power Unit-Intake Service go

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DIMENSION		MATERIAL	
Cylinder Bore	180mm, 1SD H8	Cylinder Bore	204
	Ra=0.2-0.4µm	Rod Diameter	304
Rod Diameter	100mm, 1SD f7	Head	45#
	Ra=0.2-0.4µm	Piston	45#
Stroke	450mm 5	Rod Seal	PU
Closed	450mm 5	Rod Seal Brand	
Open	905mm	Static Seal	O-Ring Seal
DIMENSION		FUNCTION	
Working Pressure	21Mpa	Chrome Thickness	250µm
TEST Pressure	25Mpa	Chrome Hardness	700~900HV
Working Temperature	MIN: -25 °	Rod Hardness	
	MAX: +80 °		

DWG.No. E314-HMC-HH-S-D-2004 - Rev-B
Hydraulic Cylinder-Intake Service gate
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