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Name of Parts		1000HP AC DRIVEN RIG PRICE			
No.	Name	Qt.	Type	Total Price (USD)	
Section 1 Mast & Accessories	1 Mast	1	JJ225/43-K		
	2 Crown	1	TC225		
	3 Fastline Stablizer	1			
	4 Anchor Assembly	1	JZG34		
	5 0.5T Air Winch	1	JQH-5*48		
	6 Buffer device	1			
	7 Falling preventer	1			
	8 Mast transportion device	1			
	9 Hoisting drill line	1			
	10 Casing stabbing board	1	YFZ20/5-2.7-C		
	11 Escape assembly	1			
	Subtotal:				
Section 2 Substructure & Accessories	1 Substructure	1	DZ225/7.5-X		
	2 Dog House	1			
	3 Toolkit House	1			
	4 Tools Elevator	1			
	5 Stand Pipe Rack	6			
	6 BOP Trail and Hydralic Lift Tools	1	DZ400		
	7 5T Air Winch	2	XJFH-5/35		
	8 Tralling block floor	1			
	9	1			
	Subtotal:				
Section 3 Drawworks &Accessries	1 Drawworks complete with single drum	1	JC40DB		
	2 Drawworks Gear reducer	1			
	3 Disk brake	1	PS40		
	4 Driller control house	1			
	5 Water cooling system	1			
	6 AC motor (chinese produce)	2	600KW		
	7 Automatic driller	1	45KW		
	Subtotal:				
Section 4 Hoisting Equipments	1 Traveling Block	1	YC225		
	2 Hook	1	DG225		
	3 Swivel with Drill pipe spinner	1	SL250		
	4 Drilling Wireline dia(1000m)	1	32mm (1000m)		
	5 Electric drill spooler	1	38mm (1000m)		

No.		Name	Qt.	Type	Total Price (USD)
	6	Elevator Link	1	DH250	
		Subtotal:			
Section 5 Rotary Table & Accessories	1	Rotary Table	1	ZP275	
	2	Chain reducer	1		
	3	Carbin shaft	1		
	4	3 1/2" and 5 1/4" Roller Bushing for Hex. Kelly			
	5	Master Bushing			
	6	Split Bushing 2 3/8"-8 5/8"			
	7	Split Bushing 9-5/8"-10-3/4"			
	8	Split Bushing 11-3/4"-13-3/8"			
	9	Bushing puller			
	10	Bit Breaker plate			
	11	AC motor (chinese produce)		600KW	
		Subtotal:			
Section 6 Power Generation,SCR Unit, MCC,& Power Distribution System	1	Engine / Generator Units (detriot)	3	CAT3512B	
	2	Generator Master Skid	3		
	3	Generator house	1	400KW	
	4	VFD / M C C	1		
		Subtotal:			
section 7 air supply system	1	Electric screw air compressor	2	LS12-50HH	
	2	Air dryer	1	HDS-6NF	
	3	Air tank	2		
	4	Air store house	1		
	5	Cold start engine drive air compressor	1		
		subtotal:			
Section 8 Well Site Lighting and AC Motor Control System/Earthing System	1	AC Supply & Lighting System	1		
		Subtotal:			
Section 9 Mud Pumps & Accessories	1	Mud Pumps F 1600	2	F 1300	
	2	Mounted Skid Mud Pumps Belt-driven Unit	2		
	3	AC motor (chinese produce)	2	1200KW	
		Subtotal:			

No.		Name	Qt.	Type	Total Price (USD)
Section 10 Stand Pipes and Rotary Hose	1	Mud Manifold 4"*5000psi wp (double stand pipe)	1		
	2	Rotary Horse (65ft)	2		
		Subtotal:			
Section 11 Mud Circulating System & Solid Control Equipments	1	Desander	1	220M ³	
	2	Degasser	1		
	3	Desilter	1		
	4	Sand Pumps	2		
	5	Mixing Pumps (75hp)	2		
	6	Charge Pumps (50hp)	2		
	7	Agitators (15hp)			
	8	Mud Tanks	5		
	9	Material House	1		
	10	Mud mixing device	1		
	12	Centrifuge	2		
	13	Shale shaker	2		
			1		
			1		
		Subtotal:			
Section 12 Fuel, Air & Water Supply System	1	Diesel Tank	2	55M ³ +45M ³	
	2	Water Tank	1	80M ³	
		Subtotal:			
Section 13 BOP Equipments	1	13-5/8"x5000 Annular BOP FH35-35/70	F35- 35	made in China	
	2	13-5/8"x10000 Double Ram BOP 2FZ35-70			
	3	13-5/8"X10000 Single Ram BOP FZ35-70			
	4	Dilling Spool FS35-70			
	5	Choke manifold 4 1/16"- 10000psi			
	6	Kill Manifold, 10000psi			
	7	Ajustable Jiont TD35-70			

No.		Name	Qt.	Type	Total Price (USD)
	8	Variable Flange F28/35-70			
	9	Remote control panel FKQ 1280-7			
	10	Manifold			
		poor boy degaser	1		
		Subtotal:			
Section 14 Drilling Instruments	1	Instrumentation	1		
		Subtotal:			
Section 15 Drill String	1	Hexagonal Kelly 5-1/4"	2	75ft、 65ft	
		Subtotal:			
Section 16 Hydraulic Power Tools	1	Power Tong	1	ZQ 203-100	
	2	Hydraulic power cathead	2	100KN	
	3	Hydraulic power station	1	YZ120	
		Subtotal:			
Section 17 Assembling Parts and Other Tools	1	General assembly parts (1set)	1		
	2	Complete set of standard tool	1		
	3	Complete set of slings	1		
	4	Cable for Tray(grasshopper),oil,water and air	1		
	5	Video-supervisor	1		
	6	Catwalk	2		
		Subtotal			
Section 18 Rig-up, Commission, Packing and Training	1	Rig-up,Commission, Assembly, Test, Packing and Training in Factory	1		
	2	Rig-up,Commission, Assembly, Test, and Training on site	1		
			4		
			1		
		Subtotal:			
Section 20 Freight of Shipping to Tianjin Port	1	Inland Freight	1		
		Subtotal:			

No.		Name	Qt.	Type	Total Price (USD)
Section 21 Documents Along With Rig	1	Documents along with Rig	3		
		Subtotal:			
Section 22 Top Drive	1	Varco TDS10A	1		
Section 23 Fast Moving Device		Fast Moving Device	1		
		TOTAL PRICE			\$10,065,000.00

Price Subject To Change































Technical Agreement of ZJ40/2250D Drilling Rig

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SECTION 1 ZJ40/2250D Drilling Rig General Description

1. General Description

1.1 Uses and Features

ZJ40D drilling rig is a kind of DC electrical drilling rig designed and manufactured for exploring and developing oil and gas resources. The drilling rig is designed according to rules specified in GB5609-1999 "Model of Petroleum Drilling Rig and basic parameters" and complies with requirements in API specification of USA and other international advanced standards. Deep drilling capacity of drilling rig is 4000m.

Electrically driven mode of drilling rig is AC-SCR-DC. AC power output by generator groups is controlled by electrical control system and fed to DC motor to drive respectively draw-works, rotary table and two sets mud pumps.

Draw-works is driven by two sets 800KW DC motor. Lifting gearshift is 4 steps less speed specification. The rotary table is driven by one set 800KW DC motor. Transmission of rotary table is through 2 steps less speed specification. Reverse gear is achieved by reversal of motor. Main brake of draw-works utilizes disc brake and auxiliary brake of draw-works uses EATON brake.

Main bodies of mast and base for drilling rig are integral lifting structures. Firstly, lift the mast by draw-works and fix the mast. Then lift the base also by the drawworks until the base reach the working position.

Two sets F-1300 mud pumps are equipped on the drilling rig that is driven respectively by two sets 800KW DC motors through narrow and joined V-belt. Under the control of control system,

Two sets of electric screw air compressors, air tanks and dryer are equipped for air supply of drilling rig.

Safe and complete power supply and lighting system for well field is equipped on the drilling rig. Quick connectors that are safe and reliable and convenient for installation and dismantling are used at the connections of all cables

Solid control system of drilling rig is composed of three mud tanks and equipped with complete mud purification equipment mainly including shale shaker, vacuum degasser and mud cleaner (de-sanding and de-silting) etc

1.2 Basic Parameters of Technical

Nominal Drilling Depth

(114mm, 4 1/2") 2500m~4000m

(127mm, 5") 2000m~3200m

Max. Hook Load 2250KN

Lines Of Hoisting System 5×6 (Clockwise)

Dia. Of Drilling Line 1 1/4" (φ32mm)

Drawworks Rated Power 735kW (1000HP)

Drawworks gears 4gears, stepless

Main brake Hydraulic Disk Brake (wind cooling)

Auxiliary Brake 236WCB2 EATON brake (Water cooling)

Rotary Table Opening Size φ698.5mm (27 1/2")

Rotary gears 2 gears, stpless

Mud Pump Rated Power 956KW (1000HP)

Height of Mast 43m

Mast Type K

Capacity of Standpipe (4 1/2" drill pipe, 28m standpipe)	4000m
Height of drill floor	7.5m
Main Generator No.	3
Main Parameters	1085KW,60Hz,1200r/min, 600V
Electrical Transmission Mode	AC-SRC-DC
Drawworks motor power×No.	800kW×2
Single pump motor power×No.	800kW×2
Rotary table motor power×No.	800kW×1
Drilling Fluid Manifold (Double Stand Pipe)	Φ103mm (4") ×35MPa
Mud tank	3
Effective Capacity	200m ³
Air Storage Tank	2+2×2.5m ³
Air Source Pressure	1MP a
Diesel Tank	2 (45 m ³ +55m ³)
Industry Water Tank	80m ³
Forced Cooling Water tank	20m ³

1.3 General layout of drilling rig

Layout of drilling rig is divided into substructure zone, power zone, pump room, solid control zone and supply oil & water zone etc. Pipeline and cable trough are laid on the ground. Pipeline and cable trough of top substructure are folded in order that cables and pipelines need not be removed during moving and transportation as the whole can be realized

In drilling floor zone, there are various implement required in drilling operation including mast, base, drawworks, rotary table, traveling block, hook block, swivel, driller's house, doghouse, tools house, hydraulic cathead and 5 ton air winches etc

In power zone, there are generation house, gas source device and electrical control house.

In pump room, there are two sets F-1300 pump units and high-pressure mud manifold etc.

In solid control zone, solid control system includes mud tank and mud processing equipment etc.

In supply oil & water zone, there are industry water tank, diesel tank, diesel backing tank and engine oil tank etc.

Cable trays are used in cable connection among all zones of drilling rig. Oil, gas and water pipelines and all kinds of cables are laid in cable tray. Ramp and racking of drilling rods are installed in front of the substructure.

1.4. Range of use for drilling rig

The range is mountain area that is within 1000m higher than the sea level.

Ambient temperature(summer): 45℃, humidity: 35%

Ambient temperature(winter): -20℃, humidity: 60%

Section 2 Mast and Accessories

2.1 1set JJ225/43-K₂Mast

2.1.1 General description

JJ225/43-K₂ mast is connected by the pins, which takes the H-type steel as the main supporting leg and front open without guy line. It is assembled at low position and raised up by the drawworks. The mast assembles with the crown block, drawworks and other part to the complete drilling rig. As the key part of the rig, the mast perform the following services like assembling crown block, hanging traveling system, hanging drilling tools for drilling pipe and casing job. The design conform the API Spec 4F and satisfied with assembling top drive.

2.1.2 Technical parameter

Nominal drill depth

114mm (4 1/2"DP) 4000m

Max. Hook load 2250 kN

Working height (From drilling floor the crown block beam bottom surface) 43.2 m

Top span (front ×side) 2 m×2 m

Bottom span (front ×side) 8 m×2.7m

Height of the monkey board 24.5m; 25.5m; 26.5m

Capacity of standpipe 4000m

Wind load capacity

Full setback no hook load 36m/s

No setback no hook load 47.8m/s

Rig-up & rig down ≤8.3m/s

2.1.3 Main structure and working principle

2.1.3.1 The mast make up of main body、A-frame、monkey board、ladders、standpipe console、raising devise and other accessories.

2.1.3.2 Mast is connected by the pins, which takes the H-type steel as the main supporting leg and front open without guy line. It is assembled at low position and raised up by the drawworks

2.1.3.3 The main body of the mast is divided into four sections connecting with pins and auricular board. Transport storage can be stacked equipment, transport vehicles and reduced inventory area.

2.1.3.4 The mast shall be mounted at low-altitude and level, and raised & lowered integrally via the A frame on drilling floor. The mast is connected with the A frame using pins.

2.1.3.5.A- guide pulley is set on the main cross beam of A frame for winding of the fast line during lifting of the mast for support and guide of fast line.

2.1.3.6 The ladders are placed on left/right of mast, the worker can go to the casing stabbing、monkey board and crown block through drill floor by left one; and can go to the standpipe console by right one.

2.1.3.7 After the mast is lifted in place, the amortizing hydraulic cylinder which is fixed on A-frame will work and perform original top-shoving for lowering of the mast.

2.1.3.8 Wind deflectors shall be mounted for the mast body near the monkey board and around the monkey board, so as to reduce wind attack during operation of the mast.

2.2 Crown block

2.2.1 Technical Parameter

Max hook load 2250KN

Number of pulleys	6
Pulley OD	Φ1120mm
Pulley BD	Φ1010mm
Sand pulley OD and Q'ty	Φ610mm 1
Dia. of wire rope	Φ32mm

2.2.2 Constitution and feature

2.2.2.1 Crown block mainly consists of frame, pulley block assembly, fast line pulley assembly, auxiliary pulley, handrails, anti-collision equipment, sand pulley, hoist frame and guard etc.

2.2.2.2 The crown block frame is designed complying with specification API Spec 4F. It is a complete weld structure, the main two carlings and two beams are welded using 16Mn plate, and the main weld is detected by magnetic powder. The upper part of crown block frame is connected with the pulley block axle base and fast line guide pulley axle base via bolts. The crown block frame is connected with the mast via 2 Φ30 position pins, and fixed onto the mast via 12 M30 bolts.

2.2.2.3 The pulley block assembly consists of main shafts, supports, 5 pulleys and bearings etc. One conical dual-row roller bearing is mounted between each pulley and shaft to ensure easy rotation of the pulley, steady and anti-axial force. One grease nozzle for applying grease for the pulley is mounted at the end of shaft, and each bearing is equipped with an independent lubricant path, convenient for filling grease into the bearing to keep smooth pulley rotation. The pulley rope groove is designed according to API Spec 8A specification.

2.2.2.4 The fast line pulley assembly consists of shafts, supports, pulleys and bearings etc. One grease nozzle is mounted at the end, convenient for applying grease for the bearing

2.2.2.5 The crown block is equipped with 4 groups of auxiliary pulleys, and one grease nozzle is mounted at the end of each pulley. The auxiliary pulley is used for lifting by pneumatic drawworks with max load 5T.

2.2.2.6 Sawn lumbers are set under the crown block frame for anti-collision of crown block, which amortizes knocking into the crown block by traveling block

2.2.2.7 The cantilever-type hoist frame is used for maintenance of crown block. The capacity of truss type pulley hoist frame is 2T, sufficient for lifting of heaviest parts on the crown block.

2.2.2.8 One top driving guide eyebolt is mounted on the crown block frame for top driving of Varco.

2.3 1 set Crown Block Collision Preventer

The anti-collision system of ZJ40/2250D drilling rig adopts three (3) safety systems:

1. The collision preventer that is mounted on the upper section of the mast to limit the elevating position of the traveling block;
2. Drawworks anti-collision overwind valve device.
3. Traveling block digital screen anti-collision device (included in the electric control system)

2.4 1set JQH-5×48 Air Winch

Rated Air pressure	0.8 MPa
Rated air consumption	≤1.34m ³ /min
Rated Force	5kN
Rated Speed	48m/min
Dia. of Wire Line	8mm (0.3")
Rated power	2.6kw

Capacity of wire line	60m
Weight	116kg
With Φ8 mm wire rope 60 meters, with a fierce repression, with shirking clasp, wire rope painting protective oil exports	

2.5 Hydraulic Casing Stabbing

Parameters of technical

Vertical range of operation:	5.0m
Maximum angle of lifting of the major arm:	0-90°
Maximum reach of the major arm:	0-0.6m
Capacity of the mechanical hands:	5"-20"
Maximum angle of swing of the mechanical hands:	±12°
Upgrade weight:	200kg
Rated displacement:	15 L/min
Rated pressure:	16MPa

2.5.2 Platform technical Parameters

a) Upper platform	400mm
b) Load of the platform	200kg

2.5.3 Hydraulic fountain parameters

- a) Rated working pressure 10MPa
- b) Max. Working pressure 16MPa
- c) Max. Flow 15 L/min
- d) Motor power 3kw

2.5.4 Function

The Full-hydraulic Casing Centralizing machine can accomplish Casing's Centralizing (to link with the Casing) while the dill-well's working of the setting down Casing so it replaces worker to set down Casing by hand and comes true mechanization's working of the setting down Casing.

Use working of centralizing Platform

When it will be by manual work the platform is sling and fixed to the spare aures-plank on sliding carriage, to put on the peg and insert the pin. Then the machine is rise to need position and insert the anti-fall peg, in this way the worker may come to there and operating.

2.6. 1 set RG10D Escape Device

The RG 10 D escape device with which one person, or several persons sequentially, can descend from a high place to a low place at a limited speed

2.6.1 Executive standard: production followed by European Standard EN341

2.6.2 Technical Parameters

Max load capacity:	130kg
Diameter of wireline:	φ10mm
Length of the wireline:	45m

2.7 1set Deadline anchor

Executive standard:	SY/T5320-2000
Anchor:	JZG34A, 1-1/4" (Φ32mm)
weight indicator type:	JZ400B
Available wire line:	10

The deadline anchor is fixed on the right I section mast which it is 2.445m to the drilling floor opposite to the driller's house.

2.8 1 set Traveling block floor

Support the traveling block and hook before rig-up and store spare parts.

SECTION 3 Substructure and Accessories

3.1 Substructure

3.1.1 Usage and scope

This DZ225/7.5-s base is one of the important components of ZJ40D drilling rig, designed to arrange, support and fix the mast, rotary table etc, as well as their own weight, drill tools load and casting load. In addition, it is used to store DP and necessary drilling tools, and provide necessary platform for roughneck.

Nominal drilling depth (4-1/2" DP)	4000m
Rotary table Max. Load	2250kN

3.1.2 Technical parameters

Height of substructure surface	7.5m
Area of substructure	12.4m×10.3m
Clearance height (from beam Bottom surface of rotary table to the ground)	6.26m
Rotary table beam load	2250KN
Mast lower span	8m
Stand box volume	5" 28 m stand 4000m

3.1.3 Main constitution

3.1.3.1 This base is of lift parallelogram structure, mainly consisting of bottom layer, middle layer, top layer as well as rotate oblique ladder, ramp, tools ramp, slide escape and handrails etc.

3.1.3.2 Bottom layer consisting of left/right front lower base and left/right rear lower base, and Ø100 pins are used to connect front/rear lower bases. The bottom layers are connected via two bottom beams and one slanting beam.

3.1.3.3 Middle layer mainly consist of two front poles, two rear poles and four diagonal bars.

3.1.3.4 Top layer mainly consisting of left/right upper base, pipe setback beam, rotary table beam, support beam and BOP lifting device.

3.1.4 Principle

3.1.4.1 Mount the bottom layer and top layer of base, connect the front pole, diagonal bars and rear pole, and mount the substructure at low-altitude. The left/right beams of top layer will be mounted after the mast and base are lifted in place.

3.1.4.2 Remove the 8 pins between the bottom layer and top layer after the mast is lifted in place. The base is lifted to work position after changing the parallelogram which consists of bottom layer, top layer, front pole, diagonal bars and rear pole by power from drilling rig drawworks and via the traveling system in upright mast as well as the rope for lifting of the mast

3.1.4.3 Hydraulic buffer device helps to raise the substructure reaching the working position smoothly.

3.1.4.4 Before lifting the base in place, open the amortizing hydraulic cylinder (fixed on the A frame) for raising & lowering of the base, to extend the cylinder lever against the base. Retract the cylinder lever as lifting the base to position the base steady and safe. For lowering of the base, after the top layer of base is pushed over the dead point by the raising & lowering cylinder, the base is lowered slowly by gravity. Insert pins after the base is in place.

3.2 2 sets Dog House and Toolkit house

3.2.1、Overall dimensions	7m×2.5m×2.8m
	7.4m×2.6m×2.8m。

3.2.2 Substructure of house

3.2.2.1 Bottom girder adopts 25# I beam, bridging beam adopts 12# channel beam, hanging bar and towing bar adopt $\phi 114$ steel tube; roof board adopts 560--type profiling corrugated board with the depth of 3mm, and the roof is designed with cable caging device.

3.2.2.2 The drilling worker side-room is divided into two parts: the left part is installed hydraulic power source, the right part is retiring room for workers and staff members with 1 long chair, 1 stainless steel, 1 set of fixed chair and table, steel document cabinet and 2 .2kg Fire Extinguisher.

3.2.2.3 The tool-house is divided into two parts: one part is the position for implement hydraulic power source, with the width of 1500mm; the other part is the position for tool box, table vice and storage racks etc.

3.2.2.4 Indoor decoration: the inner wall adopts $\delta 16$ high density anti-firing plate with grey white batten. The floor is divided into two layers which the upper layer is made by $\delta 6$ checkered steel plate and the lower layer adopts $\delta 5$ to pack the bottom beam. The inner wall of the toolkit house adopts $\delta 3$ 1260mm height steel plate as the protection wallboard avoiding inner wall breakage.

3.2.2.5 Door, window & thermal isolation: the door is anti-fire security door and the window is plastic steel window. The thermal isolation material adopts 100mm rock wool.

3.2.2.6 Every room installs smoke alarm, emergency lamp, explosion proof air exchange fan and power leakage protection device. The dog house has a 1.5p explosion proof air conditioner.

3.3 1 set BOP Trail and Lift Tools

3.3.1 Main constitution and basic parameters

Handling System is designed to meet the requirement of installing and removing BOP stacks.

Technical Specifications:

Max. Lift Capacity	2×200=400KN
Max. Lift Height	3.2m
Max. Lift Speed	26.3mm/s
Max. Lowering Speed	55.8mm/s
Max. Horizontal Moving Speed	12m/min
Max. W.P. Hydraulic System	16Mpa
Max. Flow Hydraulic System	120L/min
Dia. of Wire Line	$\Phi 28$ mm

3.3.2 Structure and Features

DZ-400、BOP Handling System is designed to meet the requirement of installing and removing BOP stacks. The system adopts full-hydraulic control and can be used for large and medium drilling equipment. The main function of system is to lift and can be used for large BOP or BOP stacks. The system features with explosion-proof, easy operating, good reliability, and safety.

Controlled by hydraulic operating box, the two lift devices hung on two guide rails each below the drilling floor can achieve the movement of rise, lowering, move forward and backward synchronous, or move forward and backward asynchronously, rise and lowering with limited separation distance (less than 1m). It is convenient for installing and removing BOP stacks.

3.3.3 Others

BOP Handling System is powered by hydraulic station for floor mechanical tools of drilling rig

3.4 2set XJFH5/35windlass

Rated Force	50kN
Max. Speed	35m/min (115ft/min)

Rated Power	16kW (22hp)
Air pressure	0.8Mpa
Rated air consumption	12.7m ³ /min
Max. Length of Line	120m

3.5 2set Mouse and rat hole

Mouse Specifications	13 3/8"
Rat Specifications	10 3/4"

3.6 2set catwalk

The hight 1070mm,two parts.

3.7 8 piece Drill pipe rack

The hight 1070mm

3.8 1 set Cable tray

Include folding overhead cable tray and ground-based cable tray.

SECTION 4

Drawworks and Accessories

4.1 1 set Drawworks

4.1.1 Parameters of technical

Rated Input Power	735KW (1000 HP)
Dia. of Wire Line	φ32 mm
Max. Fast Line Pull	280 kN
Drawworks gears	4gears
Drum (Groove) Size (H×L)	φ660×1173 mm
Disc brake size	φ1520×40 mm
Max Brake Torque of Eaton brake	66611Nm

API SPEC 7K designed to <<regulate drilling equipment>>requirements and SY/T5532-2002 <<oil rig using winch>>norms

4.1.2 Driving principle

This drawworks mainly consists of DC motor, input shaft, intermediate shaft, roller shaft and Eaton brake etc.

Power is input by DC motor to input shaft. Two stages are provided via two chains between the input shaft and intermediate shaft (two engaging/disengaging mechanisms consisting of two chain wheels without sleeve on intermediate shaft and airbag push type plate clutch at both ends), and two stages are provided via two chains between intermediate shaft and roller shaft (two chain wheels without sleeve on roller shaft connected rigidly with the brake rub, and form two engaging/disengaging mechanisms together with high/low speed air tube clutch), forming 2×2 level grades in total together with various clutches.

4.1.3 Constitution and feature

Drawworks is designed as panel type three-shaft one. The driving chain is cooled and lubricated with forced lubricant, and circuiting water-cools the Eaton brake. The chain wheel without sleeve on intermediate shaft is connected with airbag push type plate clutch, controlling charging/discharging of airbag push type plate clutch cylinder via pneumatic valve, so as to transfer power via the intermediate shaft and providing various speeds; High/low speed air tube clutches are set at both ends of the roller shaft, controlling charging/discharging of air tube and providing various roller speeds. 236WCB2 Eaton pneumatic disc brake is employed for the auxiliary brake of drawworks, which is connected with the roller shaft via teeth clutch

4.1.4 Anti-collision crown block

Purpose of the anti-collision equipment: As the traveling/lifting system lifts to the limit, the limit device gives signal and the anti-collision valve works to discharge the air tube clutch on the roller shaft (high-speed or low-speed), shut off the power source for the roller shaft; At the same time, the hydraulic disc brake operates in emergency, the roller stops, so the traveling/lifting system stops lifting, avoiding collision to the crown block, ensuring safety of drilling rig. Two sets of anti-collision equipments are mounted for this drilling rig, one set is on upper part of the mast, a wire rope anti-collision equipment to limit lifting of traveling block, the other set is drawworks anti-collision ring valve

4.2 EATON 236WCB2

236WCB2 brake has four dynamic friction discs with water cooling and pneumatic compression. After air pressure is applied on this brake cylinder, it compresses four dynamic friction discs with water-cooling to produce braking force. Adjusting air pressure of brake can change brake moment that is proportional to the air pressure.

Brake Torque (under 0.55MPa):	66661 kN.m
Max. Pressure:	1.03 MPa
Initial Pressure:	0.041 MPa
Max. Idling Speed of Brake Disk:	700 RPM
Max .Running-in Speed of Brake Disk:	475 RPM
Max. Pressure of Cooling Water:	0.41 MPa
Flow rate of cooling water:	492L/min

4.3 1set Hydraulic disk brake

4.3.1 Technical requirement

4.3.1.1 The design and manufacture of the break disc conform to SY/T5609 ZJ40D Parameters of technical of drilling rig and requirement of drilling technique. Ambient temperature -25°C~+55°C, humidity: 90% (+20 °C)

4.3.1.2 Hydraulic disk brake system can meet 4000m drawworks'functions of service brake, emergency brake, parking brake and overwind protective brake.

4.3.1.3Hydraulic disk brake adopts compounding structure of four normally open working calipers and two normally closed safe calipers.

4.3.1.4 Hydraulic disk brake is complete with two air cooling brake disks fitted on the two sides of drawworks drum.

4.3.1.5 Brake disc of the working calipers and safe calipers which are high temperature proof and fray proof are interchangeable and adopt material without asbestos.

4.3.1.6 Hydraulic station has functions of dual oil source, dual circuit and multi protection to ensure work's liability.

4.3.1.7 Control system is hydraulic contol opration and the operation handle is mechanical brake handle

4.3.2 Parameters of technical

Nominal drilling depth	4000 m
Rated working pressure	6.5 Mpa
No. of open working calipers	4
No. of closed safety calipers	2
Dia. of brake disk	1570 mm
Cooling method	air cooling
Workings caliper Max. Normal positive pressure	65 kN
Safeties caliper Max. Normal positive pressure	75 kN
Hydraulic station:	
Single pump rated flow rate	15L/min
Oil tank volume	90 L
Motor power	2x2.2 kW
Capacity of the accumulator	4x6.3 L

Electric heater power	1 kW
Cool water flux	2 m ³ /h

4.3.3 Functions description

Service Brake: Through operating the handle of the brake valve, adjust the service caliper's normal pressure on the friction disc. So provide adjustable braking torque to the rigs to meet requirements in different working conditions, such as bit feeding, tripping etc

Emergency Brake: Under emergency condition, press the Red emergency brake button, the service calipers and safety calipers will all applied to realize emergency stop.

Parking Brake: When the drilling rig will stop working or the driller wants to leave the driller's station, pulling down the parking brake handle will realize safety calipers braking to prevent the hook from sliding.

Over-winding Protection When the hook is lifted to a certain height with load the service brake should be actuated but not did, due to the driller's failure in operation and some other reasons, the over winding or colliding prevention system will stop air supply of the disc brake control unit to realize emergency stop for preventing crown block accident.

4.4 1 set Fast line guide Manual

Technical parameter

Wire ropes diameter:	32mm
Max rope speed:	50m/min
Weight:	300kg

Fix it on the top of drawworks

4.5 2 set DC motor

4.5.1 Ambient condition

The Ambient condition temperature: -30℃~+45℃

Height: height above sea level ≤ 1200 m

Humidity: +20℃ Relative humidity ≤ 90%

4.5.2 DC motor Basic Data

Rated Power	800kW
Rated Voltage	750V
Rated Current	1150A
Rated Speed	970r/min
Rated Efficiency	92.7%
Max. Current	1600A
Max Speed	1500r/min
Excitation	Series
Duty	continuous
Insulation (Stator/Rotor)	H/H
Cooling method	air forced
Air blower	11kW、460V、60Hz

Other requirements

Each drawworks is complete with standard single shaft extension coupling, including 12 coupling bolts.

Positive pressure air explosive-proof line connection box with protective grade of IP54 and 20 core control cable and electric outlet/plug.

with space heater (220V、200W) ;
 With auxiliary switch (plus locking device)
 With wind compress switch

4.6 1 Set Explosion proof industry monitor

4.6.1 Main Specifications:

Rated voltage: 220v
 Rated frequency: 50HZ
 Operating condition: -30°C to +60°C

4.6.2 Parameters of technical

4.6.2.1 System component

Totally sealed in the explosive proof and dust proof protective cover, explosive proof grade is IP65.
 Explosive proof clouds terrace vertical turning angle is $\pm 45^\circ$ while horizon turning angle reach 0° - 345° .

4.6.2.2 LCD

To display video image and date

The product adopts high brightness LCD (with AV input) and explosive proof shell.

4.6.2.3 Controller

Vidicon, lens and clouds terrace is operated by control keyboard.

The center of the system mainly consist of central circuit board, screen division unit, central power, monitor power, camera power and pan/tilt unit power etc

4.6.2.4 All the cameras and platforms can be controlled by control panel, and such functions as pan/tilt and zoom/focus can also be adjusted through control panel

NAME		monkey board	pump house	drum	vibrating screen	total
front-end	WANDEOR	1set	1set	1set	1set	4set
	Ex-protective cover	1set	1set	1set	1set	4set
	tripod head			1set	1set	2set
	Ex-tripod head	1set	1set			2set
	Finished parts for buildings					1set
terminal	Ex-LCD monitors					1set
	control					1set
	composite cable	50m	60m	30m	50m	190m

4.7 1set Driller's control cabin

4.7.1 GENERAL DESCRIPTION

The design, manufacture and assembly of drilling machine managing and controlling room complies with relevant national and international criteria (ISO9001) and relevant criteria of petroleum corporations; capability of drilling machine managing and controlling room meets relevant HSE demands and regulations. It is highly explosion proof, sand proof, shockproof, damp proof, sound insulation, heat insulation and antiseptis. Electric devices are located in I class 1 area and meet the requirements of explosion proof standard.

4.7.2 Overall dimension and structure of Driller's control cabin

The house is consisted with pentagonal walls. The base is 200mm in height and the framework is made up of 200 groove steel. The inner side of the base is equipped with interconnected cable tray.

When all the equipments are fixed, the upper plane of the base forms a sealed integrity. Stainless steel plates are spread on the floor and special slide proof mats are spread on plain plate.

The base is equipped with caging device and integral shock absorption device to ensure driller house not to move when the rig is working so that equipments will not be damaged because of shaking.

The front three walls are made of $\delta=20\text{mm}$ steel bulletproof glass. The front window is equipped a gas-driven scraper; when designing driller house, driller's vision is considered in respects of instruments display, etc. The exterior surface is made of 2.5mm stainless steel plate and the interior surface is made of 2mm stainless steel plate, and the middle is temperature preserving layer.

The house is equipped with a 1.5P split type explosion-proofing air conditioner. 22mm steel bulletproof glass is fixed on the top of the driller house. There are three windows on the top and above the windows, skylight is fixed. The right above glass is equipped with a gas-driven scraper.

4.7.3 Collocate in the house

Disk brake operation valve group (emergency brake, service brake, parking brake)

Cathead control valve group (electric control)\various pressure meters;

Various air control operation valve, industry monitoring operation keyboard, TV monitoring display screen.

Display screen of parameter meters, weight meter, adjustment button, utterance system (microphone, althorn);

Electric control system operation components and display (touch screen), with top drive control cupboard.

With armrest and backrest, Driller's swivel chair, the working height of which is adjustable can be automatically lifted and lowered and satisfy the escape demand of driller;

Other: air horn, 1.5P explosive proof air conditioner, 2×40W emergency explosive proof fluorometry, portable emergency light, 2 standard extinguishers of 2kg

Section 5 Hoisting System

5.1 1set (YC225) Traveling Block

5.1.1 TECHNICAL SPECIFICATIONS

Maximum load (12 line):	2250kN
Number of sheaves:	5
Diameter of sheave	1120mm
Diameter of sheave groove:	32mm

5.1.2 Structure

YC traveling blocks is designed and manufactured according to API Spec. 8A. They are composed of the cap, sheaves, shaft of sheaves, left plate assembly, right plate assembly, lower lifting bail, pin shaft and pin housing

The sheaves are supported on the shaft with double-row conical-roller bearings. Each bearing has its own lubrication channel and can individually lubricate with grease fittings located at the ends of the shaft. Dust seals at the ends of bearing are riveted on the sheaves hub. There are two sizes grooves for making customers' option. The sheave grooves are machined as per API 8A Spec and heat treated to minimize wearing

5.2 1 Set DG225 Hook

5.2.1 Technical parameter

Max. Hook load	2250 kN
Dia. of major hook	160 mm
Dia. of minor hook	100mm
Spring travel	180mm
Major hook opening	190mm
Body's radius of rotation	420mm

5.2.2 Structure

The body, bail, and bail support are welded by special alloy steel and the lower barrel and shank are forged by alloy steel. So they have higher load capacities.

Pins connect the bail and bail support. The lower barrel and body are connected by left-hand threads and locked with lock key. The body and barrel move up and down along the shank. Between the barrel and spring support is provided with bronze bushings to reduce wear of the shank.

Inside the barrel are mounted the inner & outer springs. When coming out of the hole, the stand will loosen and spring up. The bearings are thrust roller bearings.

5.3 1 Set SL225 Dual-purpose Swivels

5.3.1 TECHNICAL SPECIFICATIONS

Max. Static load	2250KN
Max. Speed	300rpm
Max. Working pressure	35MPa
I.D of the central tube	75mm
Coupling:	
Threads to the central tube (REG)	
To the Kelly (REG)	
Gooseneck thread API Std 5B	4 " -8
Model of air motor	FMS-20

Rated speed	2800 rpm
Power	14.7Kw
Rated pressure	0.6MPa
Air consumption	17m ³ /min
Inlet line	1 1/2 "
Rated spinning speed	92rpm
Max. Spinning moment	3000N•m

5.3.2 STRUCTURE & PRINCIPLE OF OPERATION

SL amphibious swivel consist of the rotary part, stationary part, supporting part, sealing part, and screwing part. The rotary part covers the stem and coupling. The stationary part includes the cover, lower/upper cover, and bottomor oil retainer, gooseneck, bail and bail pin. The supporting part is composed of the main bearing, upper centralizing bearing, and lower centralizing bearing. The sealing part covers the packing assembly, and upper & lower oil seals. And the screwing part contains the air motor, gear, and one-way air-controlled clutch.

The stem carries the total weight of drilling string and pressure of drilling fluid. The coupling threads to the stem and to the Kelly conform to thread sizes specified in API Spec 7.

Drive & Air control principle of the screwing part

The two pairs of gears (for two-step reduction) are driven with the air motor and torque is transmitted to the stem so as to reach the purpose of spinning.

The clockwise or counterclockwise of spinning is made by air control. The compressed air passes through the air filter, oil fogger, two-way tee air control valve and comes into the position selector. Operating air switch (in driller's house or air control console) will change the direction of the position selector valve and the rotation of air motor to serve the purpose of spinning.

5.4 1 set Electric drill spooler

Output speed	8-17rpm
Input Speed	720rpm
Max. Torque	10000N.m
Motor power	15kW
The average small rope line speed	13.4m/min
Capacity of rope	1200m

5.5 wire rope

Standards: API-9A

6×19S-IWRC refacing 1-1/4" (Φ32mm), 1000m

Level: EIPS class

The twist: Left interactive twist

5.6 1 pair DH250 Elevator Link

Basic parameters

Rated load:	2250KN
Nominal size:	2700 mm

The rings on the ear with the hook connecting the ears, ear rings and elevator connecting the ear, design, and manufacturing in line with API Spec 8A norms. Nameplate API to play marker.

SECTION 6 Rotary Table and Accessories

6.1 1 set ZP275 Rotary table

6.1.1 TECHNICAL SPECIFICATIONS

Opening size	698.5mm
Max. Static load	4500kN
Max working torque	27459N.M
Max speed	250rpm
Gear ratio	3.67

6.1.2 Structure

ZP375 rotary table is mainly composed of turntable, cast & weld housing, input shaft assembly, lock device, master bushing and cover. The housing is made of steel casting & welded structures and it can be used as the oil tank for the bevel gears and bearings.

6.2 1 set ZP-375 Rotary table Accessories

20" (for 20" casing)

11 3/4" -13 3/8" (for 13 3/8" casing)

9 5/8" -10 3/4" (for 9 5/8" casing)

2 3/8" -8 5/8" (for 7" casing)

2 3/8" -8 5/8" (for normal drilling process)

Master bushing

Elevator Links for master Bushing

Elevator Links for Bushing

5 1/4" Roller Bushing for hex. Kelly

3 1/2" Roller Bushing

6.3 1 set Rotary Table Transmission Box

6.3.1 Technical parameter

Rated Input Power	800kw
Speed	2 Speeds
Lubrication	Thin oil forced lubrication

6.3.2 Structure

The rotary table drive box is connected with rotary table beam by bolts. The output shaft of motor is connected to the input shaft of the rotary table drive box via barrel-type tooth coupling, and the output shaft of the rotary table drive box is connected to ring flange or rotary table input shaft via Rzeppa constant velocity cardan shaft to transmit the rotation speed and the torque. The rotary table mainly consists of integral jointing body, input shafts and output shafts

The rotary table drive box is assembled with an independent oil pump driven by an anti-explosion motor, forced lubricating sprocket, chains, shifting gear, input shaft main bearing and output shaft main bearing. There are instruments in the driller's house to display the oil pressure.

The axle center of the pneumatic tube clutch on the input shaft of the rotary table drive box and that of the output shaft of the DC motor are on the same straight line. The motor cannot run until the air clutch is cut off air.

The rotary table drive box adopts cylinder to shift which of the high speed is working shift and low speed shift is accident shift used when the rotary table needs large torque to deal with the accident.

6.4 1 set Cardan shaft

6.5 1 set DC motor

Parameter the same to 4.5

SECTION 7 Power Systems Electrical Equipment and Air Supply System

7.1 3 sets of main generators

Consist of 3 sets of main generators CAT3512C

Rated power:	1085Kw
Rated frequency:	60Hz
Rated rotary speed:	1200rpm
phase:	3phase
Rated voltage:	600V

7.2 1 set SCR/MCC control system

7.2.1 Overview

7.2.1.1 Features

The system and components adopt digital control, micro processor, integration and total distributed control. The electric control of drawworks, rotary table, mud pump and MCC, control and protection of generator sets adopt ideal protecting and inter-lock functions to ensure the optimum design and integrity of the system.

7.2.1.1 Standards

The design and manufacture of electric control system conform to international and domestic standard. The system meets the requirements of drilling process and transfer characteristic in 7000m, damp, sand, explosion, shock, fire and water proof. The system conforms to HSE standard.

NFPA 70

API RP 500	HAC Guidelines
IEC 60079	Electrical apparatus for explosive gas atmospheres
IEC 60529	Degrees of protection provided by enclosures
GB 50054-95	Design specification of low pressure switch board;
EN61800-00	Noise ENS
SY/T6283-97	《HSE managing system guide of oil/natural gas drilling》

SY/T5609-1999 《Type and basic parameters of petroleum drilling rig》

GB50058-92 《Design specification of electrical apparatus in explosion and fire environments》

GB3836.1-2000 《Requirements of electrical apparatus for explosive gas atmospheres》

Conform to EMC

7.2.1.3 Designed environment satisfy

Ambient temperature: $-30^{\circ}\text{C} \sim +55^{\circ}\text{C}$

Ambient temperature of electronic equipments: Upper limit: 55°C

Relative humidity: $+45^{\circ}\text{C}$, relative humidity $\leq 95\% \pm 3\%$,

Height above sea level: $\leq 1000\text{m}$; decrease when $> 1000\text{m}$

7.2.2 Engineering range

7.2.2.1 Controlled object

All alarm and display devices include generator sets, drawworks, rotary table, mud pumps and MCC; meet the requirements of HSE specification

7.2.2.2 Description of generator set

The control object of the control cabin are 3 CAT35112 generators with rated power 1085Kw、60Hz、1200rpm、3phase、600V.

7.2.2.3 Diesel generator control

Diesel generator control adopts WOODWARD digital speed regulator, synchronous controller, Basler digital voltage regulator and frequency, voltage, power indicators. The generator control cabinet adopts standard RS series communicating interface to transfer data to the whole system.

7.2.2.4 WOODWARD generator digital control module

The digital control module bases on the SCM, with generator protection, combine, display and other requisite functions. In case of any of the generator failure, its internal synchronous combine device won't disturb the functions of the whole system. The power management system will automatic combine or dis-aggregation quickly in accordance with the drilling rig load conditions, and send alarm to the driller; the control system can be set with automatic-manual or automatic combine or dis-aggregation.

7.2.2.5 Technical data

Measuring voltage: 100-690 Vac, Max. Consumption per phase: 0.25 VA

Measuring frequency: 30-70 Hz

Measuring amp: from current transformer/5A, Max. Consumption per phase 0.3 VA

Security level: EN61010-1

EMC/CE standard: consult the EN-50081-1/2、EN-50082-1/2、SS4361503 (PL4) IEC 255-3

Technical parameter conform the following requirements:

Frequency:

Steady state adjustment rate: 0~5% (adjustable)

Transient state adjustment rate: $\pm 5\%$

Fluctuant rate: 0.5%

Settling time: 3s

Voltage:

Steady state adjustment rate: $\pm 2.5\%$ (adjustable)

Adjustable range: $\pm 20\%$

Fluctuant rate: 0.5%

Settling time: 1.5s

Response time: 20ms

After incorporating:

Degree of irregularity (active load): $\leq \pm 5\%$

Degree of irregularity (idle): $\leq \pm 5\%$

7.2.2.6 Generator protecting functions

★Over-voltage protection

o Response time : 50 ms

o Range of setting: 90%—o 120% of rated voltage

★Under-voltage protection

o Response time: 50 ms

o Range of setting: 50%—o 100% of rated voltage

★Over-frequency protection

o Response time:50 ms

- o Range of setting: 90%—o 120% of rated voltage

★Under-frequency protection

- o Response time: 50 ms
- o Range of setting: 80%—o 100% of rated voltage

★Reversing protection

- o Response time: 100-300 ms
- o Range of setting: 50%-0% of rated voltage

★ Generator excitation protection

7.2.2.7 Generator control functions

Provide RS485 communication interface (protocol PROFIBUS). Driller remote control/monitor, well site large load management and over loading control, Send sound/light alarm to the control cabin and driller when power limit or generator failure. Other function:

Frequency matching

Voltage inspection

Phase sequence inspection

Coupling control

Principal and subordinate setting

Switch action compensation

Fixed load running

Fixed frequency running

Automatic-manual / automatic load distribution

Generator load increase/reduce incline control

Diesel generator control and measurement

7.2.2.8 Generator calculating and measuring display

Electric parameter:

Generator voltage

Generator current

Generator active load

Generator idle lode

Generator power factor

Generator frequency

Generator total running time

Generator running date/time

Overload light

Engine running light

Breaker closed light

7.2.2.9 SCR DC motor transmission system

The transmission system makes the motors on drawworks, rotary table and mud pump output precise rotary speed and torque according to drilling process and safe operation.

The drawworks and rotary table adopt one on one transmission path and mud pumps adopt one on two. Every SCR DC speed regulating cabinet adopts 3 phase, forced pipeline cooling.

Each regulating loop of SCR DC speed regulating cabinet adopts American National oil well SCR control cabinet, PLC control, and the main loop adopts 6-pulsation rectifying project that built up

by modularized three phase control bridge.

With consummate and reliable protection functions, the SCR DC speed regulating cabinet will interlock with relative mechanical units (such as drawworks and hydraulic disk brake) when failure.

The drawworks adopt two SCR DC speed regulating devices to drive two DC motors, which operated by handwheel and foot throttle. The speed of drawworks is limited under the range of speed protection.

The rotary table adopts one SCR DC speed regulating device to drive one DC motor, which operated by handwheel. The torque of the motor can be regulated from 0 to 100%. The rotary table system can rotate and reverse.

The mud pumps adopt three SCR DC speed regulating devices to drive six DC motors, which operated by handwheel, with skidproof functions.

7.2.2.10 DC motors, SCR device technical data and control indicator

DC motor parameters:

Power: 800KW

Speed: 970RPM

Voltage: 750V

Amp.: 1150A

Qty: 7 ea (2 for drawworks, 1 for rotary table, 2 for mud pumps)

7.2.2.11 Dry type transformer

AC600V 60Hz power network (or emergency generator set 60Hz) provide AC480V 60Hz alternating current to MCC system by one set of dry type epoxy pouring transformer. The primary and secondary of transformer are provided with breaker, the primary adopts AC600V/1600A breaker and secondary AC480V/2000A. The coil in of emergency generator set adopts AC480V/600A breaker, the coil in breaker of emergency generator set and transformer secondary breaker adopt electric interlock (the two breaker can not be put through simultaneously). AC110V 60Hz adopts AC600/208V 60Hz dry type transformer.

The system provide 1200A breaker for top drive

7.2.2.12 MCC part

The MCC adopts standard drawer cabinet or switch cabinet, the elements adopt Schneider low pressure products.

7.2.2.13 Integration control cabinet

The hardware of control system mainly include one set of S7-300 PLC, PLC control cabinet of SCR cabin as the main station of the system, adopt PLC communication and breaker emergency mode as control project, which built up a field industry network with diesel generator digital control module, driller intelligent operating system through the field bus.

All input/output modules design to be with 20% hardware redundancy.

To ensure the control system working normally, adopt one set of UPS 110Vac 2kVA to SCR cabin and driller's cabin control power.

7.2.2.14 Power and control cable

The phase sequence of cables is differentiated by three-color pyrocondensation. Connector assembly adopts BAOJI YOUTAI product.

The outdoor cable of main power adopts American 535 shielding power cable. Other cables in SCR cabin adopt Shang hai cable, and the communication cables adopt SIEMENS private cable.

The control cable features of antiseptis, oil resistance, high temperature, low temperature, aging and damp resistance with durability marks on two ends of the cable.

7.2.2.15 AC over-voltage protection device

The device, which designed according to the AC600V 60Hz system and 1200V onstate voltage, can prevent the system from over-voltage and lightning strike effectively.

7.2.3 Driller's cabin

7.2.3.1 Intelligentized remote driller's console (stainless steel)

Independent driller explosion proof operating case.

Item	Description	Qty
1	Drawworks operating handwheel and foot throttle	1
2	Rotary table speed handwheel	1
3	Mud pump speed handwheel	3
4	Drawworks start/stop switch	1
5	Drawworks motor A/AB/B selecting switch	1
6	Rotary table rotate, reverse control switch	1
7	Rotary table start/stop switch	1
8	Mud pumps start/stop switch	3
9	SCR emergency brake button	1
10	Generator emergency brake button	1
11	Rotary table torque limit 0~100%	1
12	SCR "run/error" indicator light (displayed on HMI)	6
13	Generator "run" indicator light (displayed on HMI)	3
14	Motor fan condition indicator light (displayed on HMI)	9
15	Communicating cable, connection from PLC to driller's console	1
16	Driller's console connectors	1
17	Touch screen: MP370 (SIEMENS 15 inch)	1
18	1 Touch screen displays: 2 Operate the equipments in the network 3 Real time conditions of the equipments in the network. 4 Error alarm information. 5 operating prompt and help text	

7.2.3.2 System standard control software and interlock

PLC adopts SIEMENS S7-300 series products

The PLC system will accomplish control of the drilling rig and interlock of the system devices in accordance with drilling process.

The software of control system will protect and interlock the electric devices not only in the system, but also out of the system, as requirements of the safety operation.

Drawworks start condition: Fan is running, wind pressure is normal, lubricating pump is running.

Rotary table start condition: Fan is running, wind pressure is normal

Disk brake interlock control: Drawworks SCR cabinet failure, traveling block collision signal, emergency brake.

Inertial brake interlock control: Rotary table SCR cabinet failure, rotary table Inertial brake

manual operation signal.

7.2.3.3 Driller operation and monitor

All conditions are displayed on the HMI

Control and monitor of diesel generator

Control and monitor of drawworks electric

Control and monitor of rotary table electric

Control and monitor of mud pumps electric

The main/auxiliary generators and main motors running state are displayed on driller's console

Error alarm disposal, easy to diagnose technical or electrical failure.

Technical failure: such as wind pressure, belt slips, etc.

Electrical failure: such as communicating failure, electric failure, etc.

7.2.3.4 Electricity/gas/fluid control

The PLC program, through the data acquisition unit (field sensor, transmitter), controls the disk brake, inertial brake to accomplish the gas/fluid operation and protection

7.2.3.5 Traveling block anti-collision automatic control system

The system adopts PLC to acquire digital signal of drum coder, then work out the height of the traveling block. When the traveling block reaches the alarm position, the system controls the traveling block to decelerate; and when the traveling block reaches the parking positions, the system controls the traveling block SCR to stop outputting pulse and start disk brake to brake simultaneously.

7.2.4 SCR Cabin

7.2.4.1 Cabin dimension

The dimension of the SCR cabin is under 12.8m×3.0m×3.0m (L×W×H), with mounted skid and fire proof, sand proof, shock proof, water proof. Two TRANE air conditions are mounted in the cabin (60KW, ambient temperature 60⁰C) and satisfied the heating requirement at -30⁰ ambient temperature. Suitbal design air duct and easily maintainance; the indoor temperature can be controlled between 15⁰C and 27⁰C at any ambient temperatures. One automatic dehumidifier with condensation inspecting function is mounted in the cabin to keep the room dry; and the cabin also equipped with heater.

7.2.4.2 Structure

The skid, framework, external wall and hoisting device are welded as a whole with two doors. The thickness of the external wall is $\geq 80\text{mm}$ with enough stiffness. The floor board adopts insulated rubber sheet. The inlets and doors positions assort with generator cabin. The electric connector fixing bolts in electricity control cabin adopt reliable back-off prevent proposal. The body is painted white with Kansai paint, and the thickness of the surface paint is 240 μ .

7.2.4.3 Electric service

The room is equipped with enough fluorescent lamps, emergency lamps, 220V sockets, fire extinguishers (8Kg/room) and one smoke alarm. The outlet end door is locked. The connecting part of the SCR and generator cabin is equipped with cover board on the top and pedestrian plate

on the bottom. The room is also provided with UPS emergency lighting.

7.2.4.4 Earthling

The cabins have reliable earthling and earth leakage protection loop, the transformer is equipped with earthling inspecting device. The system adopt $\varnothing 30\text{mm}$, 1500mm long brass bar to connect the ground.

7.3 3 sets Generator House

Overall Dimension (L×W×H) 9m×2.9m×3.1m

The four generator houses could be constituted to one integral house. And every house could be closed individually with good rain-proof, dust-proof and drainage structure. The pillar, chassis and roof can be disassembled from each other. The generator house is sealed. The back end door can be disassembled to allow passing in and out of the operation personnel (aligning with SCR house's door). Water tank adopts doors facing towards each other for the sake of ventilation. Walls adopt sliding structure which is easily disassembled. Beside the fans of the engine there is a center latch door. The door of the two ends of 1# house should be sliding door with foot board at the front of the door.

There are two inlet pipe, one inlet/outlet oil pipe and one machine oil drain installed on every house base. Also it installs the oil and water pipe joints. All the tube should be connected correctly. The pipelines among the houses adopt rubber hose.

1# house which near the wellhead its door faces to the SCR house and its position should be considered the space for easy opening the door. The SCR house is vertical to the generator house. There is one tools box in the 3# house.

The chassis of the house adopt skid structure with height 450mm.

The pillar adopts cold stretch square tube.

The frame of the roof adopts 100×100/Q235 cold stretch square tube with $\delta 3$ plate top cover and $\delta 2$ plate side cover. There is a smoke exhaust pipe and a muffler installed on the house roof. Furthermore one explosion-proof and shockproof fluorescent lamp and emergency lamp are installed in the house.

7.4 1 set Air Supply System

7.4.1 Air supply purification system parameters

7.4.1.1. Air compressor

Type	LS12-50HH screw compressor	2 sets
Capacity:	5.6m ³ /min	
pressure:	1MPa	
Cooling	Air cooling (AC)	
Motor	37Kw	

7.4.1.2. Dryer

Model	HDS-6NF Refrigeration dryer	1 set
Rated power:	2.35Kw	
Flow rate:	6.8Nm ³ /min	

7.4.1.3. Ambient temperature -40℃～50℃

7.4.1.4. Air tank 2×2.5m³ (stand)

7.4.1.5. Gas oil content of products $\leq 0.01\text{ppm}$

7.4.1.6 Dust volume of refined gas $\leq 0.01\mu\text{m}$

7.4.2 Air purifying house 1 ea

7.4.2.1 Overall dimension 9000 mm (L) ×2900 mm (W) ×2900 mm (H)

7.4.2.2 Wallboard

The two ends install center open door which could be fixed during opening. The two sides wallboard is stationary wall with one security door and four sash window. The wallboard is made of 2mm corrugated steel sheet with rock wool as the heating insulating material.

7.4.2.3 Chassis

The height of the chassis is 300mm with sufficient tensile strength and rigidity. The floor adopts chequered steel plate with removable access plate for equipment maintenance. We use the 6mm steel plate for the bottom surface of the chassis. Lay 6mm insulated rubber sheet on the walking way. The chassis is designed as skid type for easy haulage.

SECTION 8: Well Site Lightening, Motor Control and Earthling System

8.1 Technique Parameter

Rated voltage: Power system	460V
Lighting system	208v/120v
Rated frequency:	60HZ
Rated Ambient Humidity	<85%
Rated Ambient Temperature	-25℃～+55℃
Insulation is not less than 10 ΩM (cold state) for 1000VΩM meter.	
Explosion proof grade	Exd II BT4
Shell protection grade:	IP54

8.2 Design and manufacture standards

It shall be controlled on the spot for the electrical equipment under 30kw and all lightings in the system (The starter is located in the explosion-proof control box, each explosion-proof control box match one motor), and for the electrical equipments upper 30kw, if shall be started in step-down condition (this starting device located inside in SCR/MCC room). It adopts two control models-one is the centralized - control in SCR/MCC room and the other is the local-control.(start and stop button are located correct place)

8.2.2 The power cable, control cable and lighting cable use heavy rubber-cover soft cable, which is heavy-moving cable with antiseptis and resist-oil capability. All the cables are laid in the cable trays or protected by steel tube as soon as possible except the area that can not be protected.

8.2.3 According to the lay-out of well site equipment, using the separately power supply for drilling-floor section, solid control section (considering as 6 mud tank temporarily) , oil(water) tank section, driller's cabin section and pump house section, the original supply is from SCR/MCC room, and in each section the electrical equipment of each section to be powered by distribution box(Shandong boshan).

8.2.4 Connection of Power cable and control cable adopt explosive proof and insertable, plugs and electrical outlet adopt domestic products.(Baoji Youtai)

The floodlighting of well site lighting are made in USA.(Appleton productions),the quantity is not less than15 sets.

8.2.6 The other area lighting including the mast、 sold control area and the oil(water) tank are used explosion-proof fluorescents which are made in China。 At some especial area just like the monkey floor and the end of mud tank, emergency explosion-proof fluorescents are installed. The total are decided according to the quantity of mud tank

8.2.7 For the requirements of water-proof, the plugs and receptacles between lamps and power supply cable are used Mennekes productions which are made in China, but they are joint venture productions.

SECTION 9 Mud Pumps and Driving Unit

9.1 2 sets 1300HP mud pump

Triplex single acting pump, According to API 7K Spec.

9.1.1 Technical specifications:

Narrow V-type belt	4×5ZV25J
Narrow V-type belt length	7620mm
Transmission ratio	2.117 : 1
Smaller strap effective Dia.	470mm
Bigger strap effective Dia.	995mm
Pump type	Triplex single-acting pump
Rated power	956 kW (1300 HP)
Stroke length	305mm
Rated stroke	120stroke/min
Gear speed ratio	4.206
Inlet	12" Flange
Outlet	5 1/8" Flange
Motor	
Rated power	800Kw
Rated rotating speed	970r/min

9.1.2 Structure

Every pump is driven by two DC motor through belt transmission device which are mounted on the long skid. Every pump set consist of two DC motor, one 1600 pump, narrow V-belt transmission device, base, safety guard, electric spary pump, pressure release pipeline and so on. Tightness of joint narrow V-belt is adjusted by the lead screw of the fixture device.

Straight-through valve cage.

Shearing safety valve connect with the mud tank.

The centrifuge for the mud pump is mounted on the skid.

Using electric water pump cool the cylinder sleeve.

9.2 4 sets DC motor 800KW

Parameter the same to 5.5

SECTION 10 Mud Circulating Systems

10.1 1 set Mud manifold

10.1.1 General requirement

Secure the entire pipeline to prevent them jumping and wearing. All the connection part of the hose and rigid tube should install safety rope which is pressed rope sleeve with shackle. All the instruments adopt aseismatic pressure type with metric/imperial comparison. The drilling floor valving by-pass outlet face up or face down. Screw connection is forbidden to the pipeline which its diameter larger than 2".

The design and manufacture of the mud manifold conform SY/T5244-91 mud manifold and API.

10.1.2 Technical parameter

Nominal bore:	102mm
Max.nominal pressure:	35Mpa
Working temperture:	—29℃~121℃
Working medium:	water, crude、oil、fracturing fluid
Connection method:	union
Valve driven method:	hand driven
Standpipe:	double standpipe
Ground component:	twin pipeline
Mud pump:	2 sets 1600 mud pump
Circumfluence style:	single pump circumfluence

10.1.3 Configuration

Main pipele size $\varnothing 140 \times 19\text{mm}$ and the metallic seal valve with API mark. All the valve indicate the open /close direction. Pipes what include three-way, four-way, elbow and gooseneck, are dorging parts. Distance from upper gooseneck outlet of standpipe to the drilling floor is 21.5 m and 17.5m. Rotary hose is connecting with swivel by 4' union.

Drill floor valving consists of five 4in \times 35Mpa gate valves (one weld and foure 1003 union), two 2in \times 35Mpa gate valves with 2in1502 union, six 2in1502 unions (female fitting welds to the valving with 2LP male fitting and 2LP screwed plug) and two pressure gauges(flange connection,metric/imperial type). H-type valving installs on the mast with fixing clamp.

Standpipe adopting filter cleaner structure is used to blow off.

Ground manifold is dual pipeline and fixed on the rig substructure. 2#、3# pump manifold run through pump base.

1# pump has a three-inlet and two-outlet ground valving (three-inlet is the pump inlet and two-outlet is the ground connector). Three 4.3m hose are used for connecting the 1# pump and ground valving, others are tube connecting.

Outlet of the pump install a reducing tee which one end connects the ground valving pipeline and the other end installs a 2in \times 35MPa valve.

Return Mud flow is single pump return flow, pipe line adopts 2in \times 8Mpa intermediate pressure glue pipe, one side of which connect 2in valve of pump outlet and the other side connect suction tank.

10.2 2 Sets Rotary hose

Working pressure:	35 MPa (5000 psi)
ID:	3-1/2"

joint:	4" LP
Length:	23m, 19m respectively

SECTION 11 Solid Control Systems

11.1 Purpose and function

Solid control system is auxiliary associated equipment of ZJ40D drilling rig. The overall performance of system can meet technical requirements of 4000m drilling well. In drilling operation, the function of solid control system is to store and prepare drilling liquid, control solid content in drilling liquid, maintain excellent performance of drilling liquid, improve drilling efficiency and ensure safety under the well.

11.2 Solid control system Parameters

Mud tank volume	200m ³
The total effective volume:	180m ³
Mud tank No.	3
Max dimension of mud tank	6000mm×2400mm×2400mm

11.3 The description of drilling fluid tank

11.3.1 On the 1st Tank for the four positions, respectively supply warehouse, Grit Chamber warehouses, with the exception of gas Desanding warehouses and stores. The former warehouse for supplies warehouse; Grit Chamber positions on the installation of 2-shaker, Grit Chamber warehouses lower supply pump installed 11 KW each one. LP surface of the installation of vacuum degassing of 1 Desk, Desanding-1 units, 15 KW blender 2 units. Supplies warehouse, with the exception of gas Desanding Wharf and the installation of rotating positions mud rifle kits. In addition to the installation of base cans right side pump 1 set

11.3.2 On the 2nd Tank for the three positions, respectively, in addition to mud warehousing, storage and purification centrifuge inhalation positions. In addition to the installation of the 2nd surface soil, centrifuges and centrifuge pump for the 1 Taiwan and 15 KW horizontal blender three, slip the gun three sets. LP extreme left base install mud pump 1 set

11.3.3 On the 3rd tank divided into two positions, respectively, and increased drilling pump mixed inhalation warehouse stores. Inhalation Wharf installed 15 KW blender 2-rotary mud guns 2-add to the installation of 15 KW Wharf mixed agitator 1 Desk, rotary mud rifle Taiwan. Cans right side installed base of mixed pump 2 units. LP plane equipped with a 2.5 m³ drugs cans, install two sets of DI funnel, the testing of a slurry.

LP, respectively, in two drilling pump installed 37 KW base infusion pump 2 units.

11.4 Main equipment

11.4.1 1 set vacuum degasser

Model:	ZCQ360-180
Handling capacity:	360m ³ /h
Vacuum degree:	0.35~0.4Mpa
Transmission ratio:	1.67
Air displacement:	180m ³ /h
Applicable mud weight:	≤2g/cm ³
Degassing efficiency:	≥90%

11.4.2 1set Desander

Model	QZS250×3
Technical parameters of Shale Shaker:	
linear vibrating:	Linear vibrating
Excitation frequency:	30Hz

Excitation intensity:	7.1g
Double vibration amplitude:	6mm
Excitation force:	86KN
Specifications of the screen cloth:	700×1050×4 (200mesh)
Screen size:	700×1050×3 (200 mesh)
Screen type:	Soft hook edge screen
Screen area:	2.94m ²
Desander Cyclone parameter:	
Size:	Φ 250×3(10" ×3)
Working pressure:	0.2~0.35Mpa
Min.separation particle:	47~74μm
Handling capacity:	240~300m ³ /h
Sand pump power:	55kw

11.4.3 1 set Desilter

Model:	QZS100×10 Model
Sieve technical parameter	
Mode shape:	Linear vibration
Exciting frequency:	30Hz
Vibration intensity:	7.1g
Double vibration amplitude:	6mm
Excitation force:	86KN
Screen size:	700×1050×4 (250 mesh)
Screen type:	Soft hook edge screen
Screen area:	2.94m ²
Desilter Cyclone parameter:	
Size:	Φ 100×16(4" ×16)
Working pressure:	0.2~0.35Mpa
Min.separation particle:	15~47μm
Handling capacity:	180~240m ³ /h
Sand pump power:	55kw

11.4.4 1 set mid-speed centrifuge

Model:	LW450×1000-N
Rotary drum diameter:	450mm
Rotary drum length:	1000mm
Rotary drum speed:	1800rpm
Separating factor:	820
D ₅₀ separation point:	4~7μm
Max.handling capacity:	40m ³ /h
Slurry pump	
Model:	80YZ (S) 40-10
Motor parameter	
Model:	YB2132M-6
Motor power:	7.5kw
speed:	1152rpm

Ex-marker: Exd II BT4
Grading Protection: IP54

11.4.5 1 set Make-up pump

Model : 100SB50-20
Flow rate: 50m³
Lift : 20m
Inlet size: \varnothing 100mm(4")
Outlet size: \varnothing 80mm(3")
Speed: 1770rpm
Power: 11kw (460v/60Hz)

11.4.6 2 sets Sand pump

Type: 200SB240-40
Flow rate: 240m³/h
Lift: 40 m
Inlet Dia.: \varnothing 200mm (8")
Outlet Dia.: \varnothing 150mm (6")
Motor power: 55Kw
Speed: 1770rpm

11.4.7 3 set Charging pump

Model: 200SB270-28
Perfusion capacity: 270m³/h
Lift : 28 m
Inlet size: \varnothing 200mm (8")
Outlet size: \varnothing 150mm (6")
Motor power: 37Kw (460V/60Hz)
Speed: 1770rpm

11.4.8 Agitator

Model: WNJ-15 (WNJ-5.5)
Style : Horizontal type
Drive type: Worm gearing
Impeller type: Double deck
Motor power: 15kw (460V/60Hz) ,5.5kw (460V/60Hz)
Impeller rotary speed: 70 rpm
Reduction ratio: 1: 25
Motor power: 15KW 5.5KW
speed: 1730rpm
Ex-marker: Exd II BT4
Grading Protection: IP54

11.4.9 Mud gun

model: NJQ-50
ID: 2 "
Interface Dimensions: 3 " union
Work pressure: \leq 6.4 MPa

Nozzle No.: 4

11.4.10 3 set Direct injection hopper

Model : SLH150×50
Handling capacity: 240m³/h (1057GPM)
Lift : 40m
hopper specifications $\varnothing 900 \times \varnothing 150\text{mm}$
Inlet diameter: 150mm
Jet nozzle diameter: 50mm
Working pressure: $\geq 0.3 \sim 4 \text{ MPa}$
liquid density: $\leq 1.8\text{g/cm}^3$
Viscosity: $\leq 100\text{s}$
Matching sand pump: 200SB240-40
Work pressure: $\geq 0.3 \sim 0.4\text{MPa}$

11.4.11 3 sets Shale shaker

Model: QZS700×1050×4
mode shape: linear vibration
Exciting frequency: 30Hz
Vibration intensity: 7.1g
Double vibration amplitude: 6mm
Excitation force: 76KN
Screen size: 700×1050×4 (40~200 mesh)
Screen type: Soft hook edge screen
Screen area: 2.2m²
Handling capacity: 35L/S
Excitation motor model & quantity : MVE3800/15 2sets (Italy oli Excitation motor)
Excitation motor power: 2×1.92kw
Excitation force: 2×38KN

SECTION 12 Fuel & Water Supply System

12.1 2 Sets Diesel tank and the diesel storage tank

12.1.1 Specification:

Dimension: 11000mm (L) × 2800mm (W) × 2450mm (H)

Max. transport dimension: 11600mm (L) × 3000mm (W) × 2900mm (H)

The effective volume of Diesel tank 45 m³

The effective volume of Diesel storage tank 55 m³

Equipment name, type and quantity:

2 sets standpipe oil pump YG65-160I

Discharge head 32m

Flow rate 50m³/h

Power 7.5Kw

2 sets Float ball (stainless steel) UFZ-04-2000

2 sets Flow metre LC-65-A

3 sets Oil inlet, oil outlet

12.1.2 Structure and circuit

The tank is rectangle tank welded with 6mm corrugated steel plate. The 30# H-beam is used to be the main beam of the substructure with 8mm steel plate spreading on the bottom. There are soil depositional basin and DN50 discharge outlet inside of the tank. There are dustproof breather valve and manhole in the tank.

Two set of oil pump are equipped in the tank, the oil could be transported between the oil truck, oil tank, storage tank and diesel engines.

There are anti-explosion electric box and lights in the pump house.

12.2 1 set multi stage oil tank

11.2.1A pump cabin, other is divided into three parts for lube oil, gear oil and hydraulic oil;

Completed with 3 gear oil pumps, 3 liquid meter

Effective capacity 3×5 m³=15 m³

Overall dimension: 7390mm×2240mm×2640mm

12.2.2 Basic equipment

Oil truck can fill oil into multi stage oil tank; multi stage oil tank can fill oil into; multi stage oil tank fill oil into equipment

12.3 1 set Water tanks

12.3.1 Main parameters:

Specification:

Dimension: 12000mm×3000mm×2800mm (L×W×H)

Effective capacity: 80 m³

12.3.2、Main equipment:

2 sets YG80-200B pipe pump

Power 7.5kw

Discharge head 38m

Flow 43.5m³/h

1 set ISRZ65-40-200 fire pump

Discharge head 50m

Flow 25 m³/h

Power 7.5kW
1 set UFZ-04-2000 floating ball hydraulic meter
2.5" 100m Fire hydrant belt

12.3.3 Basic description:

The water tank body is made of 6mm steel plate compacted into corrugated plate by assembled welding. Top frame is made of 120 mm×120 mm×8 mm square steel tubes. The main beam of base uses 30# H-type steel. 8mm steel plate is laid at the bottom of tank. Wall ladder designed at the end of water tank can be through the tank deck or tank inside. There is a dust-proof pump house.

12.3.4 Function of the water tank:

There is one discharge tank which is used to storage the water from the truck then transport to water tank by the pump. Two pumps and double pipe circuits which could work together or separately are equipped in all of the four tank. One fire pump is equipped in No.1 tank. There is one outlet with 1" stainless steel ball valve in the tank for washing hands and other usage. The level gauge is located in the outside of the tank to show the water level.

12.4 1 set Cooling water tank

12.4.1 Basic parameters

The equipment is used for the cooling of drilling rig hydraulic disk brake and auxiliary brake

Magnetic driving pump type	80CQ-35B
Magnetic driving pump motor power	11KW
magnetic pump flow	850L/min
Capacity	20m ³
Dimension	8260×2680×2830

12.4.2 Basic structure

The circulating water-cooling system mainly consists of driving mechanism, box and accessories etc. The tank is of rectangular structure. Closed pump chamber is set at one end of tank, and the other end is storage cabinet. The base of tank is ship structure, and corrugated board is employed for tank wall; surge amortizing board is set inside the tank. 2 manholes are set at the top of tank. Two 32CQ-25 explosion-proof magnetic drive pumps and two 100CQ-32 explosion-proof magnetic drive pumps are mounted in pump chamber for water supply for cooling system

12.4.3 Function

Conduct following items as necessary:

Fill circulation tank from water tank:

Circulation tank supply water for disc brake:

Circulation tank supply water for Eaton brake:

Section 13 BOP and Control Device

13.1 F35-35 BOP Stack

Item	Description	Unit	Qty	Remarks
1	Annular BOP FZ35-35	Set	1	Casting, Studded top and flanged bottom,
2	Double ram BOP 2FZ35-35	Set	1	Casting, Flanged top and bottom; upper cavity 5" , lower cavity full sealed
3	Single ram BOP FZ35-35	Set	1	Casting, Flanged top and bottom; inner 5" ram
4	Drilling spool FS35-35	Set	1	Casting , side bore 3 1/16", pressure 70MPa, flanged.

13.1.1 Technical requirements

13.1.1.1 BOP manufacturing standards:

API Spec 16A Drilling equipment norms channel
SY/T 5053.1-2000 《BOP and BOP control equipments》

13.1.1.2 The working temperature grade of metallic materials: T-20 (-29°C~121°C)

13.1.1.3 The material of BOP bearing units is ZG25CrNiMo, and the chemistry ingredient of the material is controlled in the range of API Spec 16A or SY/T 5053.1-2000. After heat treatment, the mechanical property of bearing units is $\sigma_b \geq 655$ Mpa, $\sigma_s \geq 517$ Mpa, $\delta_5 \geq 17\%$, $\psi \geq 35\%$, which conforms to the mechanical property of API material code 75K in atmospheric temperature. And the bearing units conform to NACE MR-01-75 specification.

13.1.1.4 The body case, side door, rams of ram BOP; top cover, body case, pistons, mud ring of annular BOP, and drilling spool are all adopt 25CrNiMo material to ensure the bearing units that come in contact with drilling fluid have H₂S resistant. The rigidity of quenching and tempering: HRC \leq 22

13.1.1.5 All sealed gutters of gasket rings are welded with corrosion protection coat, and the stainless steel material of repair welding coat is A132.

13.1.1.6 The bores of ram and annular BOP, pressure grade, connecting size, materials, mechanical property and testing are all according to the SY/T 5053.1-2000 or API Spec 16A specification.

13.1.1.7 The rubber articles of BOP are supplied by professional manufacturer, adopt nitrile butadiene rubber, code NBR; the rigidity and physical characteristic of the rubber conform to SY/T5053.1-2000 specification.

13.1.1.8 The BOP stack includes tool box, repairing bag (except annular and ram rubber)

FH35-35 Annular BOP

Product specifications parameters	13 5/8" -5000psi Annular BOP	13 5/8" -5000psi Double ram BOP	13 5/8" -5000psi single ram BOP
Path	13 5/8"	13 5/8"	13 5/8"
Work pressure	5000psi (35MPa)	5000psi (35MPa)	5000psi (35MPa)

Top connectivity specifications	13 5/8" -5000psi 6BX BX160 studding	13 5/8" -5000psi 6BX BX160 Flange connections	13 5/8" -5000psi 6BX BX160 Flange connections
Specifications connected at the bottom	13 5/8" -5000psi 6BX BX160 Flange connections	13 5/8" -5000psi 6BXBX160 Flange connections	13 5/8" -5000psi 6BX BX160 Flange connections
Exports form lateral link	————	2 9/16× 5000Psi R27 studding	2 1/16×5000Psi R24 studding
Gaskets Central	————	BX160	BX160
Pressure hydraulic Control	8.4 ~ 10.5 MPa		
Detroit diameter	————	10"	10"
Ram locking mode	————	Manual Locking	Manual Locking
Hydraulic Control Link Specification	Z 1" (1" NPT)	Z 1" (1" NPT)	Z 1" (1" NPT)
Open oil (L)	71.3 (L)	4×7.4 (L)	2×7.4 (L)
close oil (L)	93.5L (L)	4×8.3 (L)	2×8.3 (L)

Product specifications parameters	13 5/8" -5000psi drilling spool	13 5/8" -5000psi × 11" -5000psi crossover flange	13 5/8" -5000psi pipe nipple
Path	13 5/8"	13 5/8" -11"	13 5/8"
Work pressure	5000psi (35MPa)	5000psi (35MPa)	5000psi (35MPa)
Top connectivity specifications	13 5/8" -5000psi 6BX BX160 studding	13 5/8" -5000psi 6BX BX160 Flange connections	13 5/8" -5000psi 6BX BX160 Flange connections
Specifications connected at the bottom	13 5/8" -5000psi 6BX BX160 Flange connections	13 5/8" -5000psi 6BXBX160 Flange connections	13 5/8" -5000psi 6BX BX160 Flange connections
Exports form lateral link	BX160	2 9/16× 5000Psi R27 studding	2 1/16×5000Psi R24 studding
Side flange specifications	4 1/16" -5000psi 6B R39 Flange connections	————	————

2.2 Structure Feature

2.2.1 FH35-35/70 annular BOP has the similar structure with America Shaffer product. The bonnet is semisphere, no stress concentration.

2.2.2 The flanged stud and cap nut is used for the connection between the bonnet and shell to prevent the rusting between stud and nut. It is easy to assemble and disassemble.

2.2.3 The “Z” shape cross-section of piston has the features of short stroke and low height. There are two wear rings between the piston O.D. and shell, also a wearing ring between the piston I.D. and shell to avoid the direct contact between the piston and shell during movement of piston for protecting shell and piston.

2.2.4 There are four holes along with four screw offs on the top cap of the annular BOP

2.2.5 According to the requirements of the customer, hydraulic connection on the body case can be made into Z1 " inner screw which is complete with Z 1 1/2 " - Z1 " conversion connection so as to prevent the oil mouth connection from damaged.

、 2FZ35-70A double ram BOP

3.1 Main technical parameter:

Bore:	346.1mm (13 ⁵ / ₈ ")
Rated working pressure:	70MPa (10000Psi)
Hydraulic pressure:	8.4~10.5 MPa
Piston diameter:	355mm 14 "
Cylinder open volume: Double ram BOP	4×19.9L
Cylinder closed volume: Double ram BOP:	4×20L
Lock on: Manual	
Connection: Top	3 ⁵ / ₈ " ×10000 Psi flanged BX159
Bottom	13 ⁵ / ₈ " ×10000 Psi flanged BX159
Side outlet connection:	4 ¹ / ₁₆ " ×10000Psi studded BX155
Hydraulic control connection:	Z 1 " (1 " NPT)

Size: Double ram BOP 3274mm×1238mm×1732mm

Single ram BOP 3274mm×1238mm×1275mm

Packing size: Double ram BOP

Single ram BOP

3.2 Performance and structure:

3.2.1 Body and side door are cast with high-quality alloy structural steel having the similar structure with America Shaffer 13 ⁵/₈ " - 5000 Psi. There are high supporting ribs and oblique plane for settling which slopes to the well bore at the bottom of the ram chamber of the shell, de-sanding automatically when opening and closing the ram to prevent blocking and reduce the friction of the ram. It is also helpful for well pressure assisting ram seal.

3.2.2 Using floating ram scaling can reduce the resistance force of opening & closing the ram and wearing of ram packer, prolong the service life of ram to prevent rusting between shell and ram and easy to disassemble.

3.2.3 The BOP using the inner flow to avoid damaging the pipe during installing, transporting and operating

3.2.4 Ram shaft is sealed bidirectionally and there are two sealing devices at the sealing place.

3.3 There is a manual control device. If the control system of BOP is out of control, you can use the manual one to close the ram. If you want to seal well for a long time, then you can use manual control system to lock ram for that

(四) 1 set FS35-70 spool

Parameters:

Bore: 346.1mm 13 ⁵/₈ "

Rated pressure: 70MPa 10000Psi
 Top, bottom flange: 13⁵/₈" - 10000Psi 6BX flange
 Side flange: 4¹/₁₆" -10000Psi flange
 Overall dimension: 700×1180 (H×W)

五) 1set KQ8007 BOP remote control system

No.	Name	unit	Quantity	remark
1	FKQ640-6 remote control	set	1	Gas-bearing sources of cable and cable (each 50 meters), the toolbox, seals
2	FKQ640-6 house	set	1	
3	FKQ640-6 driller's	set	1	
4	Auxiliary Secretary drilling units	set	1	
5	Gas control 23 6*1 、 50M	set	2	
6	Automatic Alarm Device	set	1	

5.1、standard

API Spec 16D Drilling Control Equipment Control System
 API Spec 16E Recommended Well Control Equipment Control System Design
 SY / T5053.2-2001 Ground BOP and Control System
 SY / T5443-2001 Ground BOP and Control Device Special Hydraulic Air Element

5.2、Technical features

5.2.1 FKQ800-7 Main technical parameters:

Object: 7
 Accumulator volume: 800L 40L×20
 Oil tank effective volume: 1800L
 System nomina pressure: 21Mpa 3000Psi
 System range of regulation: 0~14Mpa 0~2000Psi
 Output pressure: Manifold output pressure 10.5MPa(21MPa when side valve open)
 Accumulator nitrogen charge pressure: 7±0.7Mpa 1000±100Psi
 pressure cobtroller range: 18.9~21Mpa 2700~3000Psi
 Hydraulic/gas switch range: 17.5--21 MPa
 Air source pressure: 0.65—0.8 MPa
 Control method: Pneumatic guide remote control
 Explosion proof motor power: 18.5KW
 Charge time Less than 14min (from 0 to 21MPa)
 Power supply: 460V /60HZ

5.2.2 Technical features and requirements

- 5.2.2.1、The remote control device complete with electric/pneumatic double power source.
- 5.2.2.2、The power source is equipped with auto control device to make the operations easy safe and reliable
- 5.2.2.3、The accumulator bottles are arranged on the both sides, and each accumulator is equipped

with check valve

5.2.2.4、The annular pressure adopt manual/pneumatic relief valve, and the oil pressure can be controlled on driller's console

5.2.2.5、The operating handle complete with mis-operation shield.

5.2.2.6、The pump running display and three- way alarm device (low air source pressure, low fluid level and accumulator pressure). Alarm can be released at anywhere of remote control station and driller's control panel,

5.2.2.7、The hydraulic pipe fitting, overflow valves, relief valves, check valve, 2-position 3-way valve, 3-position 4-way valve, triplex crankshaft plunger pump, pneumatic pump, magnetic starter and pressure controller on the remote control device conform to the required standards.

5.2.2.8、The bearing and welding fittings are designed, manufactured and inspected by the related specification.

5.2.2.9 The system passes the 31.5MPa test

5.2.2.10、All the electric apparatus, switches and motors are explosion proof

5.2.2.11、supplied by professional manufacturer, conform to the national standard

5.2.2.12、The remote control device complete with a container house, which adopt 2mm steel plate, with doors around and a skylight for hoisting accumulator on the top. The four angles of the roof are equipped with hoisting buckles for easy transportation. The doors and windows of the container house are sealed by rubber. The container house can full meet the requirements of working in cold area.

5.2.2.13、All pressure metres are explosion proof, metre plate with metric and imperial system. Nameplate and label is the English and Chinese type.

5.3、Configuration

Item	Name	Type	quantity	unit	remark
1	BOP Control System(including control house, driller control panel and air pipe line)	FKQ800-7	1	set	

(六)、1 set High Pressure Fire-tight with screen Hose

6.1 General Equipment:

Item	Name	Type	Unit	Quantity
1	GNG High Pressure Fire-tight with screen Hose	Φ25×35MPa×12m	pcs	42
2	High pressure self seal union connector	Φ25×35MPa	set	42
3	Universal self seal connector	Φ25×35MPa	set	14
4	High pressure self seal quick coupling	Φ25×35MPa	set	14

6.2、technical requirement

6.2.1 GNG High pressure fire tight hose has excellent fire resistance, it could keep the working pressure burning under 750 °C for 15 minutes, or burning under 1100 °C for 5 minutes,

conforming the technical requirements of well head control.

6.2.2 The hose assembly has oil resistance, there is no any change soaking in the hydraulic oil with -40℃-100℃ temperature for 24 hours

6.2.3 The hose assembly has acid and alkalescence resistance, there is no any change soaking in the solution with 4% HCL and 4% NaOH for 24 hours

6.2.4 The hose assembly has pressure resistance, the working pressure of $\phi 19\text{mm}$ hose is 35MPa, the test pressure is 1.5 times of rating pressure, collapse pressure is 105MPa, the min. bend radius is less than 630mm

6.2.5 Quick connecter with dia. of 25.4mm , rated working pressure 35MPa, rated flow 80L/s.

七、Killing choke manifold

Item	Description	Unit	Quantity	Remarks
1	Choke manifold JG-SY-70-00B	set	1	Diameter 4 1/16" , double wing
2	Kill manifold YG-70-00B	set	1	Single wing
3	PF70/103 flat valve	Piece	2	
4	PF70/103 hydro flat valve	piece	1	

7.1、Technical standard

API SPEC 16C manifold equipment specification

API SPEC 6A High pressure valve specification

7.2、Basic parameters

7.2.1 Choke manifold

Working pressure: 10000Psi

Temperature class: U(-18℃~+121℃)

Material: Mud containing H₂S, CO₂ oil (air)

Nominal bore: Main bore 4-1/16" (103mm) , Side bore: 3-1/16" (77.8mm)

Material grade: DD(valve and pipe)

Manufacturig grade: PSL-2、PSL-3

Performance grade: PR1

7.2.2 Kill manifold Performance grade

Working pressure: 10000Psi

Temperature class: U(-18℃~+121℃)

Material: Mud containing H₂S, CO₂ oil (air)

Main bore: 3-1/16" (77.8mm) ,Side bore: 4-1/16" (103mm)

Material grade: DD(valve and pipe)

Manufacturig grade: PSL-2、PSL-3

Performance grade: PR1

八、FH54-14 BOP

8.1、Configuration:

Item	Specification	Unit	Quantity	Remarks
1	Annular BOP FH54-14	set	1	flanged Top
2	Drill Spooler FS54-14	set	1	10" Side bore

3	Hydraulic Ball valve 10"	set	2	

8.2、Technical requirements:

8.2.1 Technical parameters

Annular BOP

Type: FH54-14

Nominal bore: $\Phi 539.7\text{mm}$ (21-1/4")

Rated pressure: 14MPa (2000psi)

Top connection: 539.7mm \times 14 MPa (21-1/4" \times 2000psi) R73 Studded

Bottom connection: 539.7mm \times 14 MPa (21-1/4" \times 2000psi) R73 Flanged

Open oil quantity: 84.9L

Closed oil quantity: 136.51L

overall dimension: $\Phi 1437 \times 1512\text{mm}$

Drilling spooler

Type: FS35-105

Nominal bore: $\Phi 539.7\text{mm}$ (21-1/4")

Rated pressure: 14MPa (2000psi)

Top connection: 539.7mm \times 14 MPa (21-1/4" \times 2000psi) R73 Flanged

Bottom connection: 539.7mm \times 14 MPa (21-1/4" \times 2000psi) R73 法兰式 Flanged

Side connection: 254 \times 21MPa (10" \times 3000psi) R53 Flanged, symmetry

overall dimension: 1310mm \times 812mm \times 900mm

Hydraulic ball valve

Side connection: 10" \times 900 cls

SECTION 14 Drilling Instruments

14.1 1 set Drilling instrument

The system consists of drilling floor touch screen monitor, remote workstation, DAQ, server and client software, sensors, stable power supply, UPS, hoses, cable with UL explosion-proof certification and installation assemblies

Drilling floor touch screen monitor is located on the floor (also it can be installed on the drilling console supplied by rig provider), and remote workstation, DAQ, printer, sensors stable power supply, UPS, are located in the special instrument house.

14.2 1 set The drilling floor touch screen monitor displays the following drilling parameters (DATALOG)

Hook load;

Well depth

Rotary table rpm

Rotary table torque

Tong torque

Return mud flow

Two pump spm

Standpipe pressure

Mud tank volume;

Weight on bit, ROP,

Hook position;

Total mud volume

14.3 1 Set Alarm Function

Up to the normal point, the monitoring instruments will alarm by sound;

Data monitored shall be stored in DAQ and copied to another media (hard disks, cd-rom, etc.), or printed on diagram paper immediately or on the located time.

14.4 1 Set sensor

Hook load sensor

Fast sheave code device

Pump stroke sensor (1, 2)

Rotary speed sensor

Rotary torque sensor

Tong torque sensor

Standpipe pressure sensor

Return flow sensor

(8) Mud level sensor

Features

The system records and sensors operate as effectively in hot humid climate as they do in cold dry climate

All sensors are anti-explosive

14.5 1 set Data Acquisition unit (DAQ)

Including DAQ unit, PC104 stack, timing machine, analog and digital unit, signal safety change unit

The functions are:

Supply power to sensors;

Receive handle and communicate the signal to display floor,

Receive and handle the signal from display floor;

Communicate the signal to workstation and print immediately or on located lime;

14.6 1Set Workstation (Shengli Highfield)

It consists of PC workstation, 17" color monitor(LCD), network device, color desk jet printer, client software, voltage regulator, uninterrupt power system.

The functions are as follows:

Set and display the print data immediately or on locating lime on color monitor.

Compared whether all channels are on set alarm range or not.

All cable connectors adopt quick connectors and explosion proof.

14.7 1 set instruction house

The special instrument house is made up of two parts: one is main work area, the other is storage area. The details are the followings.

1set	1KVA Voltage regulator
1 set	UPS
1 set	air-conditioner
1 set	Computer desk and chaire
1 set	Book shelf
2 set	File shelve
1 set	Emergency light
1 set	Fire extinguisher
1 set	Emergency door

SECTION 15 Drilling Strings

15.1 2 Sets Hexagonal Kelly

Specification	5-1/4" Hexagonal Kelly
Total length	14.02m (46 feet)
Nozzel Dia.	Φ71.4mm
Upper connection:	
OD	Φ196.9mm
Length	406.4mm
Model	6-5/8" REG (L.H)
Lower connection:	
OD	Φ161.9mm
Length	508mm
Model	NC50 (4½IF)
Complete with preventer	

15.2 2 Sets Up going Plug Valve

type	ball type
OD	5¼"
Working pressure	35MPA

15.3 2 Sets Down going Plug Valve

Type	Ball type
OD	5¼"
Working pressure	35MPA

SECTION 16 Wellhead Equipment and Tools

16.1 1 Set drilling pipe power tong

16.1.1 Parametres

Rated flow	114 L/min
High working pressure	16.6 MPa
Working pressure	0.5-1 MPa
Maximum rotary speed of tong head:	top grade: 40.4 r/min, Low grade: 2.73 r/min
Maximum torque of tong head	top grade: 10 kN.m, Low grade: 100 kN.m
Applicable pipe Dia.range	φ127-φ203mm。
Dimension of five specifications:	
φ203 (8" drill collar)	
φ178 (5 1/2" drilling pipe joint)	
φ162 (5" drilling pipe joint)	
φ146 (4 1/2" drilling pipe joint)	
φ127(3 1/2" drilling pipe joint)	
Allowable fraying degree of every joint is 20mm. allowable side fraying is 5mm.	
The total length of connection should not be less than 420mm.	
Moving distance	≤1500mm (59 in)

16.2 Two sets YM-10 Hydraulic Cathead

16.2.1 Main parametres

Rated working pressure	16MPa
Rated flow	120L/min
Rated traction force	100kN
Wire line nominal pulling distance	1650mm

Applicable pipe Dia.: used with tong and strain and ease oil pipe, drilling pipe, drill collar and casing. Under different pressure, wire line will be pulled.

16.2.2 Working Principle

Cathead wire line is covered on the end handle of tong, the pressure oil of hydraulic source drive cathead oil tank piston to move upward and downward. travelling and crown blocks will make wire line to draw the tong turn for a certain angle to finish the straining and easing, after which, piston pole will withdraw and line spooler will reposit the wire line so as to carry through next straining and easing. The upward and downward movement of piston pole is realized by direction changing valve on the driller control panel.

16.3 1 Set YZBS-120LD-4 Hydraulic power station

Rated working pressure	16.6MPa
Maximum flow rate	120 l/min
Driving power	37kW
Effective capacity	900 L
Electric heater power	3kW×2
Oil charge pump motor power	3kW
Water cooling equipment	radiating area: 10 m ²
Water pipe connection v2-G1-1/4(intra-screw)	

Oil charge pump motor	Power: 3kW
Water cooling machine type	2GLC3-10
Effective cooling area	10m ²
Explosive proof electric heater type	SJB2-3
Explosive proof grade : d II BT4	power 3kW X2

16.4 1 Set Slip

- 1Set SDXL applied in 5”drilling pipe

- 1Set SDXL applied in 3-1/2"drilling pipe

- 1 Set CMS-XL applied in 20" casing

- 1 Set CMS-XL applied in 13-3/8" casing

- 1 Set CMS-XL applied in 9-5/8" casing

- 1 Set CMS-XL applied in 7" casing

- 1 Set CMS-XL applied in 5" casing

16.5 1 Set Elevator

- 1Set DDZ applied in 5"drilling pipe 350t

- 1 Set DDZ applied in 3-1/2"drilling pipe 350t

- 1 Set SLX applied in 20" casing 250t

- 1 Set SLX applied in 13-3/8" casing 250t

- 1 Set SLX applied in 9-5/8" casing 250t

- 1 Set SLX applied in 7" casing 250t

- 1 Set SLX applied in 5"drilling casing 250t

16.6 2 Sets B-typed tong

Q86-324 type tong, 5a, 5b, 5c, 5d locking tong, each type one set

16.7	1 Set	Tools along with rig
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DRILLING TOOLS with rig

16.8	1 Set	Crane rope
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Crane rope list

SECTION 17 (VARCO) Top Drive

17.1 1 set NOV ATO-TDS-11SA top drive

Type	ATO - TDS-11SA
Main motors	2 sets AC motors
Power	2×400HP
API lifting capacity	500ton
Tube processor	PH-75(75,000ft.lb)
Supporting range	3-1/2"~5"
Height	18ft (5.4m)
Output torque	
Continueing torque	37,500
Intercurrent torque	55,000
Maximun speed of full power	228rpm

SECTION 18 Rig-up, Testing and Training

18.1 Rig-up, testing and training in the factory

According to the detailed testing scheme of drilling rig items, equipment factory provides or customer provides will be all rig-up and tested in the factory

18.1.1 Rig-up, testing of diesel generators (if providing)

18.1.2 Rig-up, testing of electric control system (SCR system, MCC system, well site lightening system, earthing system),(if providing)

18.1.3 Rig-up, testing of solid control system

18.1.4 Rig-up, testing and correcting of mast

18.1.5 Rig-up, raising of substructure

18.1.6 Rig-up, testing of drawworks, rotary table

18.1.7 Rig-up, testing of mud pumps, ground manifold and stand pipe

18.1.8 Rig-up, testing of air supply system, fuel supply system, hydraulic system(disk brake and well head hydraulic tool) and water cooling system, etc

18.1.9 Rig-up, testing of Bop and bop control, kill manifold.

18.1.10 Rig-up, testing of other equipment, such as pneumatic winch, wire line spooler, etc.

18.2 Rig-up, test operation and training of drilling rig on well site.

18.2.1 The factory will send engineers and technicians to the site to service rig-up and testing, as requested

18.2.2 Please refer to section 18.1 for rig-up and testing

SECTION 19 Spare Parts

The factory shall provide detailed spare parts list within one month after the signing of contract (about 5% of the contract value) for customer's choice. Spare parts can be transported along with the rig or separately.

SECTION 20 Painting and Packing

21.1 The painting color and material will be finalized by both parties later. The factory will paint the rig as the regular color according to factory standard if the buyer could not provide their color requirements three months before the rig shipped from the factory

21.2 The factory will supply packing meeting the standard of bulk shipping.

SECTION 21 Shipping

21.1 SHIPPING TO QINGDAO PORT from factory

Attachment 1 Tools for drilling rig

Tools for ZJ40/2250Ddrilling rig

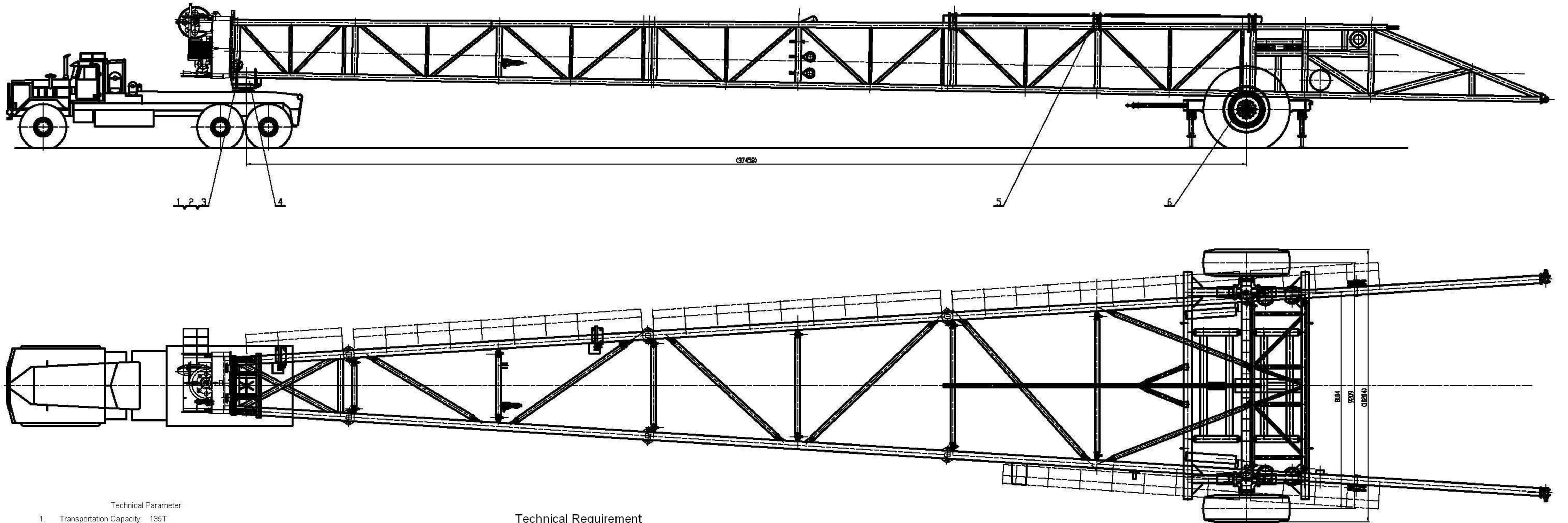
Items	Type	Description	Quantity	Remark
1		Grease station	1	
2		Crowbar L=1000	2	
3		Crowbar L=1500	2	
4		Lengthen pipe $\Phi 21 \times 1000$	2	
5		Lengthen pipe $\Phi 21 \times 1500$	2	
6		Lengthen pipe $\Phi 34 \times 1000$	2	
7		Lengthen pipe $\Phi 34 \times 1500$	2	
9	GB1164-99	Grease gun 400 (with A/B nipple)	2	
9	GB1109-91	Hack-saw (adjustable) 300mm	1	
10	SG10-90	Hacksaw blade (1.0 1.9) 300mm	50 each	
11	GB1063-99	slot type screwdriver 100,150,200,300mm	1 each	
12	GB1064-99	Philip's type screwdriver 100,150,200mm	1 each	
13	GB6295.1-96	Wire cutter 160,200mm	1each	
14	GB9406-97	Pipe wrench 300,450,900mm	2each	
15	GB4953-95	Joint pilers160,200mm	2each	
16	GB4440-94	Monkey wrench 200,300,450mm	2each	
17		26 pieces of sleeve	1 box	
19	GB4399-94	double ended wrench (10 pieces)	1 set	
19	GB4399-94	box wrench (10 pieces)	1 set	
20	GB5356-95	Allen wrench (13 件)	1 set	
21	GB255-92	blacksmith's hammer (3,6,5.4kg)	2each	
22		fitter's hammer (with wooden handle) 0.5,1kg	2 each	
23	GB5190-96	flat file (1#、4#) 300mm	1 each	
24	GB5190-96	Cuspidal flat file (with wooden handle) 300mm	1 each	
25	GB5190-96	Square file (2#、3# wood handle)	1 each	

		300mm		
26	GB5190-96	Triangle file (2#, 4# with wood handle) 300mm	1 each	
27	GB5190-96	pitsaw file (1#, 3# with wood handle) 300mm	1 each	
29	GB5190-96	Rounded file (1#, 3# with wood handle) 300mm	1 each	

Attachment 2 Crane rope list

ZJ40/2250D Crane rope list

Items	Size	Description	Quantity	Remarks
1	Φ13×4m	Packaged crane rope assembly	4	
2	Φ13×9m	Packaged crane rope assembly	4	
3	Φ13×3m	2-ring hook crane rope assembly	4	
4	Φ20×5m	2-ring hook crane rope assembly	4	
5	Φ16×4m	4-ring hook crane rope assembly	4	
6	Φ29×6m	Endless crane rope assembly	4	
7	Φ13×6m	Endless crane rope assembly	4	
9	Φ16×9m	Endless crane rope assembly	4	
9	Φ26×10m	Endless crane rope assembly	4	
10	Φ29×12m	Endless crane rope assembly	4	
11	Φ35×12m	Endless crane rope assembly	4	
12	Φ39×12m	Endless crane rope assembly	4	



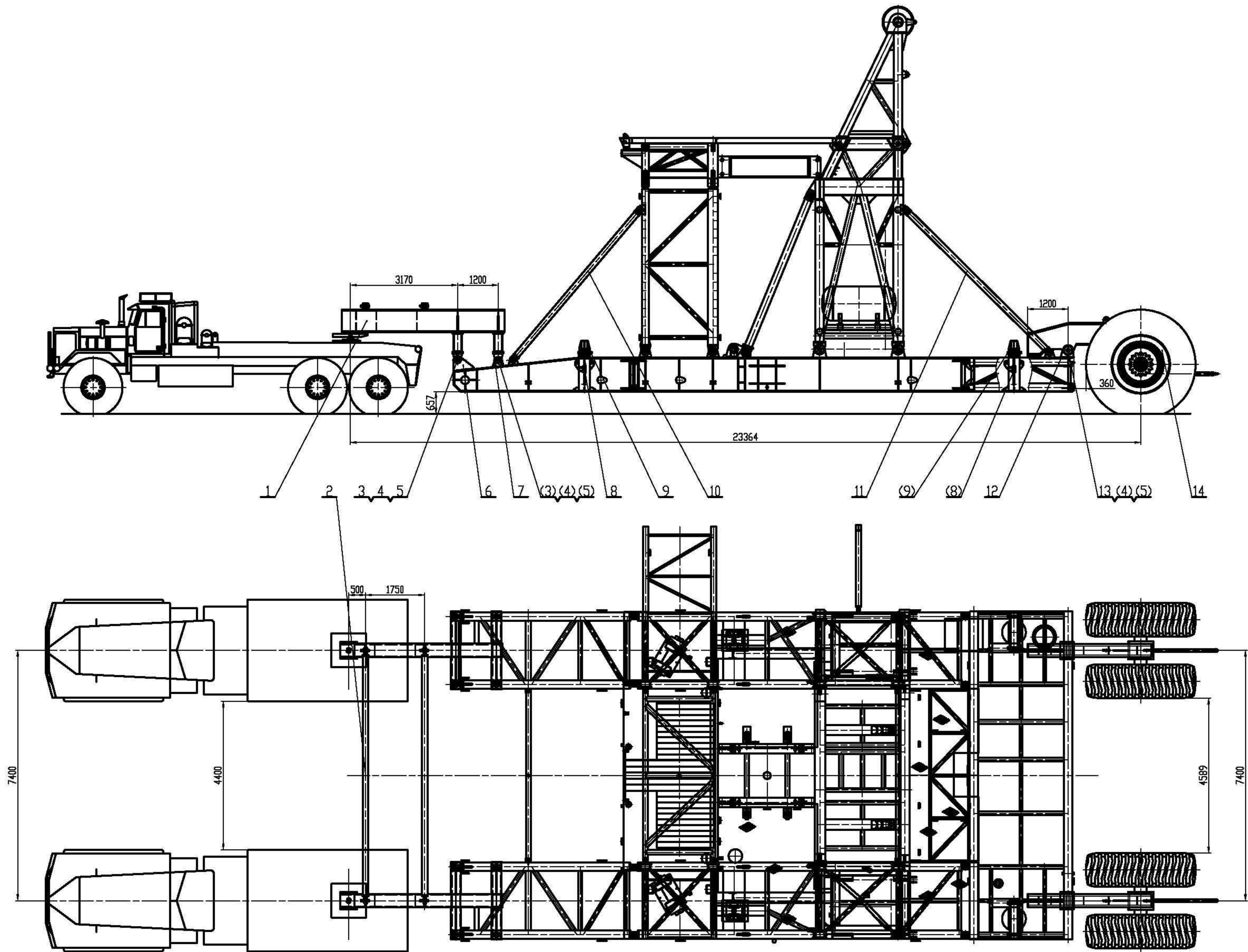
Technical Parameter

- 1. Transportation Capacity: 135T
- 2. Wheel gauge: 362.20 Inches
- 3. Tire outer edge width: 401.72 Inches
- 4. Max. Speed: 9.32 Mile/h
- 5. Max. none stop distance: 9.32 Mile
- 6. Working temperature: 5F – 131°F
- 7. Working road surface: Desert or hard soil road

Technical Requirement

- 1. Before use, check all parts assembly, assemble axle, truck mount, truck wheels, tires and park in front of the substructure of the rig.
- 2. Place the derrick horizontally, check oil/ stain on the surface of tire and sharp item on the ground. Clean them. And check the tire pressure and make sure it is 0.6Mpa
- 3. Place wood cross-tie under the mechanical assembly, screw off the mechanical support, make sure the distance between support and cross-tie is 0.787 inch
- 4. After the derrick was placed horizontally, put off the second floor, and check if there are any seams, flaws and if all the joints are firm
- 5. Connect the derrick to the truck mount, screw mechanical support, start the draw truck, run at low speed (<10km/h). Run at normal speed if everything is with the derrick .

6		Draw truck of derrick	1	
5	C0.234.02.02	Traveling hook suspension	1	
4	C0.234.02.01	Front derrick support	1	
3	GB/T6170-2000	Screw M36	32	Level 8
2	C0.234.02.02	Front support board	8	SteelB-30/Q345
1	C0.234.02.01	Double head screw bolt	8	Steel strip36/45



Technical Requirement

1. Part 2 and part 1 welded, part 6, part 7, part 10 and 1 should be welded onsite
2. Before use, check all parts. Connect the draw bolt to the derrick substructure firmly and install the hydraulic support cylinder
3. Check all parts of the rig substructure, connect all the bolt of the substructure firmly.
4. Assemble the load bridge of the rig substructure, wheels and tires. Check oil/ stain on the surface of tire and sharp item on the ground. Clean them. And check the tire pressure and make sure it is 0.6Mpa
5. Lift the substructure through hydraulic method and make sure the distance is larger than 29.53 inches. Then install the load bridge on the derrick substructure, and connect the draw bridge on the draw bolt.
6. Make sure the two draw trucks are firmly connected on the draw bolt, and unload the hydraulic cylinder. Make the whole system look like the diagram above.
7. Run the two draw truck at low speed (<3.11 Mile/h). Run at normal speed if found everything of the system is OK

14.		Rig substructure load bridge	2		Universal
13.	C0 204A.01.09-01	Wedge pin bolt	2	35CrMo	Rent
12.	C0 204A.01.09.01	Suspension feet	2		Rent
11.		Rear pole support installation	4		With rig
10.		Front pole support installation	4		With rig
9.	C0 237.01.03	Heavy beam	4		
8.		Hydraulic cylinder	4		Universal
7.	C0 237.01.02	Small lifting lug	4		
6.	C0 237.01.01	Large lifting lug	4		
5.	C0 173.01-05	4#brooch	20	steel wire	Rent
4.	C0 173.1-04	20# shearing resistance	20	steel strip	Rent
3.	C0 204.01.09-01	Wedge pin	8	35CrMo	Rent
2.	C0 204.01.06	Connecting rod	1		Rent
1.	C0 204A.01.05	Rig substructure draw bolt	2		Rent