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ZJ50D Electric Drilling Rig Price List

Item		Description	Qty.	Type	Total Price (USD)	Remarks
Section 1 Mast& Accessories	1	Mast	1	JJ315/45-K		
	2	Crown block	1	TC315		
	3	Fastline Stablizer	1			
	4	Anchor Assembly	1	JZG41		
	5	0.5T Air Winch	1	JQH-5*48		
	6	Buffer device				
	7	Falling preventer				
	8	Mast transportion device	1			
	9	Hoisting line	1			
	10	Casing stabbing board	1	YFZ20/5-2.7-C		
	11	Escape assembly	1			
Section 2 Substructure & Accessories	1	Substructure	1	DZ315/9-X		
	3	Dog House	1			
	4	Toolkit House	1			
	5	Tools Elevator	1			
	6	Pipe Rack	6			
	7	BOP Trail and Lifting Tools	1	DZ400		Hydraulic
	8	5T Air Winch	2	XJFH-5/35		
	9	Traveling block floor	1			
	10	Mouse & Rat hole	1 set			
	11	Catwalk	2			
Section 3 Drawworks & Accessries	1	Drawworks complete with single drum, 1000HP	1	JC50D		
	2	Disk brake	1	PS50		
	3	Driller control cabin	1			
	4	Auxiliary brake (EATON)	1	336WCB2		
	5	Water cooling system	1			
	6	DC motor	2			
	7	TV Monitor	4			
Section 4 Equipments	1	Traveling Block	1	YC315		
	2	Hook	1	DG315		
	3	Swivel with Drillpipe spinne	1	SL450		
	4	Drilling Wireline	1	35mm (1000m)		
	5	Electric drill line spooler	1	35mm (1000m)		
	6	Elevator Link	1	DH3150		
Section 5 Rotary Table & Accesories	1	Rotary Table	1	ZP375		
	2	Chain reducer	1	ZPX50		
	3	Cardan shaft	1			
	4	3 1/2" and 5 1/4" Roller Bushing for Hex. Kelly	1 set			
	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	DC motor	1			
Section 6 Power Generation,SCR Unit, Distribution System & Air supply system	**1**	Engine / Generator Units	3	CAT 3512C		
	2	Generator Master Skid	3			
	3	Generator house	3			
	4	Auxiliary Generator	1	400kW		
	5	SCR/MCC	1			
	6	Electric screw air compressor	2			
	7	Air dryer	1			
	8	Air tank	2			
	9	Air store house	1			

	10	Cold start engine drive air compressor	1			
Section 7 Well Site Lighting and Earthing System	1	AC Supply & Lighting/ Earthing System				
Section 8 Mud Pumps & Accesories	1	Mud Pumps	2	1600HP		
	2	Mounted Skid Mud Pumps Belt-driven Unit	2			
	3	DC motor	4			
Section 9 Stand pipes and rotary hose	1	Mud Manifold 4"*5000psi wp (double stand pipe)	1			
	2	Rotary Horse	2			
Section 10 Mud Circulating Solid Control Equipments	1	Desander	1	367.4m3		
	2	Degasser	1			
	3	Desilter	1			
	4	Sand Pumps	2			
	5	Mixing Pumps (75hp)	2			
	6	Charge Pumps (50hp)	3			
	7	Agitators (15hp)				as required
	8	Mud Tanks	5			
	9	Material House	1			
	10	Mud mixing device	1			
	11	Shale shaker	2			
	12	Mud-Gas Seperator	1			
Section 11 Fuel, Air & Water supply System	1	Diesel Tank	2	55M3+45M3		
	2	Water Tank	1	80M3		
Section 12 BOP Equipments	1	13-5/8"x5000 Annular BOP FH35-35	1 set	F35-70		
	2	13-5/8"x5000 Double Ram BOP 2FZ35				
	3	13-5/8"X5000 Single Ram BOP FZ35				
	4	Dilling Spool FS35-35				
	5	Choke manifold				
	6	Kill Manifold				
	7	Ajustable Jiont				
	8	Remote contral panel				
	9	Manifold				
Section 13 Drilling instruments	1	Drlling Instrumentation	1			
Section 14 Drill String	1	Hexagonal Kelly	2	75ft and 65ft		
Section 15 Hydraulic power tools	1	Power Tong	1	ZQ 203-100		
	2	Hydraulic power cathead	2	160KN		
	3	Hydraulic power station	1	YZ120		
Section 1 6 Assembling Parts and Other Tools	1	General assembly parts	1 set			
	2	Hydraulic wire line shearer	1			
	3	YQ- 30Jack	1			
	4	YQ- 50Jack	1			
	5	Movable grease unit				
	6	Complete set of standard tools				
	7	Complete set of wire line				
	8	Trays for cable (grasshopper), oil, water and air				
	9	Portable Camp	3			
	10	Loader	1			
Section 17 Rig-up, Cimmission, 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			
Section18 Spare parts	1	Spare parts	1			

Section 19 Freight	1	Freight	1			
Section 20 Documents	1	Documents along with Rig				
		Total			**$9,680,000.00**	**USD**

This is a preliminary brief offer, price subject to change.

1. The price is FOB plant
2. The price validity is 30 days

Technical Agreement of ZJ50/3150D Drilling Rig (1500 HP)

Contents

SECTION 1 GENERAL DESCRIPTION

1.GENERAL DESCRIPTION

1.1 USE AND feature

ZJ50D 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 5000m.

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 three 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-1600 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, three sets mud pumps can work harmoniously to reduce pulsation of pump pressure.

Two sets of electric screw air compressors, air tanks and external heat regeneration 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 eight 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	（Φ127mm (5″)Drill pipe）	2800m～4500m
	(114mm，4 1/2″Drill pipe)	3500m～5000m

Max. Hook Load	3150 KN
Lines Of Hoisting System	6×7（ Clockwise）
Dia. Of Drilling Line	1 3/8″（φ35mm）
Drawworks Rated Power	1100Kw(1500HP）
Drawworks gears	4gears,stepless
Main brake	Hydraulic Disk Brake（Water cooling）
Auxiliary Brake	336WCB2 EATON brake（Water cooling）
Rotary Table Opening Size	φ952.5mm （37 1/2″）
Rotary gears	2gears, stpless
Mud Pump Rated Power× NO.	1176 kW (1600HP)×2
Height of Mast	45m (148ft)
Mast Type	K Type
Capacity of Standpipe	7000m
(4 1/2″drill pipe，28m standpipe)	
Height of drill floor	9m
Area of Drilling Floor	13.3m×11.66m
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	Φ103mm (4”) 35MPa
Double Stand Pipe	
Mud tank	7
Effective Capacity	320m^3
Air Storage Tank	2＋2×2.5m^3
Air Source Pressure	1MPa
Diesel Tank	2 （45 m^3+55m^3）
Industry Water Tank	80m^3
Forced Cooling Water tank	40m^3

1.3 **General layout of drilling rig**

After drilling rig is assembled, it occupies about 120m×60m (not including camping housing area). 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-1600 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(winner)：-20℃，humidity：60%

Section 2 Mast and Accessories

2.1 1set JJ450/45-K4 mast

2.1.1 General description

The pins connect JJ450/45-K4 mast, 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 fllowing services like assembling crown block, hanging traveling system, hanging drilling tools for drilling pipe and casing job. The design comform the API Spec 4F and santisfied with assembling top drive.

2.1.2 technical parameter

Nominal Drilling Depth	(114mm，4 1/2″Drill pipe)	7000m
Max. Hook Load	4500 KN	
Type	K type	
Working height	45m(from frilling floor to the bottom of the crown block beam)	
Top span(front ×side)	2.2 m×2.2 m	
Bottom span (front ×side)	9.0 m×2.6 m	
Capacity of monkey board	7000 m (4 1/2″DP，28 m drill string)	

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

Wind load capacity

No setback no hook load wind speed 172 km/h(93Knots)

Full setback no hook load wind speed 130 km/h(70Knots)

Rig-up ＆ rig down wind speed 30 km/h(16Knots)

2.1.3 Main structure and working principle

2.1.3.1 The design of the mast is front open without guy lines, which consists of the main body, A frame, monkey board, ladders, standpipe console, raising devise and other accessories.

2.1.3.2 The main body of the mast is divided into four sections connecting with pins and auricular board.

2.1.3.3 the front/rear legs of A-bracket are placed on left/right front lower bases at bottom layer, forming a steady triangular structure. The mast is connected with the A-bracket via two φ100 pins, and the mast big leg is placed on base of A-bracket front leg. Height and position of the mast is adjusted via tools cylinder and pad, so as to align the hook block with well.

The mast shall be mounted at low-altitude and level, and raised & lowered integrally using the A-bracket on subconstitution surface. The mast is connected with the A-bracket using pins, and the mast shall be lifted before the base.

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

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

2.1.3.7 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 1set TC450 Crown block

2.2.1 General description

The crown block is a fixed part of drilling rig lifting system, designed for normal drilling, dismounting of drilling rods, poles and running casing, as well as handling of accidents together with the Drawworks and traveling part of lifting system

2.2.2、technical parameter

Max hook load	3150KN
Number of pulleys	7 sets
Pulley OD	Φ1270mm
Sand pulley OD and Q'ty	Φ610/14.5mm ＆1set
Dia. of wire rope	Φ35mm

2.2.3 Constitution and feature

TC450 crown block mainly consists of frame, pulley block assembly, fastline pulley assembly, auxiliary pulley, handrails, anti-collision equipment, sand pulley, hoist frame and guard etc.

2.2.3.1 Crown block frame

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 fastline guide pulley axle base via bolts. The crown block frame is connected with the mast via 2 Φ39 position pins, and fixed onto the mast via

12 M30 bolts.

2.2.3.2 Pulley block assembly

The pulley block assembly consists of main shafts, supports, 6 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.

2.2.3.3 Fast line pulley assembly

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

2.2.3.4 Auxiliary pulley

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.

2.2.3.5 Anti-collision equipment

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

2.2.3.6 **Hoist frame**

The cantilever-type hoist frame is used for maintenance of crown block. The capacity of truss type pulley hoist frame is 5T, sufficient for lifting of heaviest parts on the crown block.

2.2.3.7 Top driving eyebolt

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 (Crown-O-matic)

The anti-collision system of ZJ50/3150D 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-548 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

2.5 1set Hydraulic Casing Stabbing

Parameters of technical

Vertical range of operation:	5.0m
Range rise and fall of the major arm:	0-90°
Flex stroke of the major arm:	0-0.6m

Clip thimble range: 5"-20"

Parallel swing of the mechanical hands: ±12°（±250 ㎜）

Lode of the platform: 200kg

Rated displacement: 15 L/min

Rated pressure: 16MPa

Platform technical Parameters

a) Upper platform 400mm

b) Load of the platform 200kg

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.

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 1set 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	ф10mm
Length of the wireline	45m

2.7 Deadline anchor

Executive standard:	SY/T5320-2000
Anchor**:**	JZG41，1-3/8"（Φ35mm）
Weight indicator type:	JZ500A
Available wire line	12

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 1set Traveling block floor

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

SECTION 3 SUBSTRUCTURE & ACCESSORIES

3.1 1 set SUBSTRUCTURE **(DZ450/9-X)**

3.1.1 **Use**

This DZ450/9-X base is one of the important components of ZJ70D 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 stand and necessary drilling tools, and provide necessary platform for substructure works

3.1.2 **Usage and scope**

Nominal Drilling Depth （Φ127mm (5″)Drill pipe）	4500m
(114mm，4 1/2″Drill pipe)	5000m

3.1.3 Technical parameters

Height of substructure surface	9 m
Area of substructure	13.3 m ×11.66m
Clearance height under beam bottom surface of rotary table to ground	7.6m
Rotary table beam load	4500 kN（450 tf ）
Stand load accompanying rotary table load	2200 kN （220 tf ）
Matching mast lower span	9 m
Max static load of hook for matching mast	4500 kN（450 tf ）
Stand box volume 41/2″28 m stand	7000 m

The design and manufacture conform to API 4F

3.1.4 Main constitution

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. Low-altitude set of 2.95m high is required。

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.

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

Top layer mainly consisting of left/right upper base, stand box beam, rotary table beam, support beam, drawworks beam, rear support, airbag support, left/right beam, driller house support, handrails assembly, blowout preventer guide and plenty of farash cloth/floor plates.

Accessories mainly consisting of rotate oblique ladder, safe slide, ramp and tools ramp etc.

3.1.5 Principle

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.

3.1.5.2Remove 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

3.1.5.3 before lifting the base in place open the amortizing hydraulic cylinder (fixed on the A-bracket) 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.

3.1.6 Features

3.1.6.1 Drawworks rotary table and driver etc of the substructure can be mounted at low-altitude, convenient, reliable and quickly.

3.1.6.2 Mount the mast at low-altitude and lift it stand-up. Never mount/dismount the mast at high-altitude.

3.1.6.3 After mounting of the substructure and lifting of the mast, lift the whole substructure to work position by power from drilling rig main drawworks and via the traveling system in the mast as well as the rope for lifting of the mast. Replacement of lifting rope during lifting is unnecessary.

3.1.6.4 This base is equipped with a set of independent hydraulic system for raising & lowering of the base. The HP hose and hydraulic source shall be

taken back and kept well after usage.

3.1.6.5 The whole base is divided into several parts that are connected via pins, convenient for mounting/dismounting and easy for manufacture and transportation.

3.1.6.6 An air tank is mounted on the airbag support of this base for convenient air supply for the substructure, which can be delivered accompanying the airbag support without dismounting.

3.1.6.7 Two sets 25t blowout preventer handling devices are mounted under the substructure of base, convenient for mounting of well-head devices.

3.2 Dog House Toolkit House

3.2.1 Overall dimensions 10.5m×2.8m×2.8m

3.2.2 Substructure of house

3.2.2.1Bottom girder adopts 25# I beam，bridging beam adopts 12# channel beam, hanging bar and towing bar adopt φ114 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 three parts: the left part is industry elevator passage, the right part is installed hydraulic power source, the intermediate 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 δ16 high density anti-firing plate with grey white batten. The floor is devided into two layers, which the upper layer is made by δ6 checkered steel plate, and the lower layer adopts δ5 to pack the bottom beam. The inner wall of the toolkit house adopts δ3 1260mm height steel plate as the protection wallboard avoiding inner wall breakage.

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

3.2.2.6 every room installes smoke alarm, emergency lamp, explosion proof air exchange fan and power leakage protection device. The doghouse has a 1.5p explosion proof air conditioner.

3.3 1set TS-1.5B Hydraulic tools’elevator

Rated Load	1.5T (3307lb)
Speed load	0.2-0.38 m/s
Rated Flow Rate	35.5L/min
Rated Pressure	20MPa
Motor power	11 kW
Wireline	φ10

3.4 1 set DZ400 BOP Trail and Lift Tools

3.4.1 Main constitution and basic parameters

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

Max.Lift Capacity SWL(KN)	2×200=400KN
Max.Lift Heightm	3.2m
Max.Lift Speed	26.3mm/s
Max.Lowering Speed	55.8mm/s
Max.Horizont-al Moving Speed	12m/min
Max.W.P.Hydr. System	16Mpa
Max. Flow Hydraulic System	120L/min
Dia. of Wire Line	Φ28mm

3.4.2 Structure and Features

DZ-400BOP 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 sysfem is to lift and can be used for large BOP or BOP stacks .The system featuers 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,loweing,move forward and backward synchronous

-Sly, or move forward and backward saynchronously,rise and lowering with limited separation distance (less than lm).It is convenient for installing and removing BOP stacks.

3.4.3 Others

BOP Handling System is powered by hydraulic station for floor

mechanical tools of drilling rig

3.5 2 Sets XJFH5/35 Air Winch

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 (394ft)

3.6 2set Mouse and rat hole

Mouse Specifications	13 3/8″
rat Specifications	10 3/4″

3.7 2set catwalk

Overall dimensions: 18000×1800×1070mm , two parts

3.8 8set Drill pipe rack

3.9 cable tray

Including folded overhead cable tray and ground cable tray.

SECTION 4 Drawworks and Accessories

4.1 1set Drawworks (JC50D)

4.1.1 General Description

Drawworks is designed for dismounting of drill tools, mounting of sleeve, control of drilling pressure, accident handling, lifting of core barrel or oil test etc, as well as lift/lower of mast and base.

This drawworks is equipped with high automatic equipment such as hydraulic disc brake and auxiliary brake etc. The hydraulic disc brake features high braking torque, safe and reliable. The control system is set in driller control house, convenient for operation.

The design of JC-50D drawworks complies with API SPEC 7K “Drilling Equipment Specification”, SY/T 5609-1999 “The types and basic parameters for oil drilling rigs” and SY/T5532-2002 “Drawworks used for oil drilling rigs”.

4.1.2 Parameters of technical

Rated Input Power：		1100KW
Drilling Depth	4-1/2″DP	5000m
	5″DP	4500m
Max. Fast Line Pull：		340KN
Dia. of Wire Line：		35mm
Gears No.		4
Drum（Groove）Size（H×L）：		685mm×1138.243mm

Disc brake	φ1650×76 mm

4.1.3 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.

4.1.4 Constitution and feature

The JC-50D 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. 436WCB2 Eaton pneumatic disc brake is employed for the auxiliary brake of drawworks, which is connected with the roller shaft via teeth clutch

4.1.5 Lubricating system

The lubricating system for JC-50D drawworks consists of engine oil lubricating system and grease lubricating system. The driving chain of drawworks is forced (sprayed) lubricated with engine oil; various support bearing, Eaton brake assembly and bearings of chain wheel without sleeve are lubricated with grease

4.2 Eaton 336WCB2

336WCB2 brake has three 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):	99992 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:	738L/min

4.3 Hydraulic disk brake

4.3.1 Technical requirement

4.3.1.1 The design and manufacture of the break disc conform to SY/T5609 ZJ50D Parameters of technical of drilling rig and requirement of drilling technique,

4.3.1.2 Hydraulic disk brake system can meet 5000m drawworks'functions of service brake, emergency brake, parking brake and overwind protective brake.

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

4.3.1.4 Hydraulic disk brake is complete with two water cooling brake disks fitted on the two sides of drawworks rolling shaft. Brake disk is completely welded.

4.3.1.5 Working tong and safe brake which are high temperature proof and fray proof are interchangeable and adopt material without asbestos.

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

4.3.1.7 Control system is hydraulic control operation and the operation handle is mechanical brake handle.

4.3.1.8 The connection of brake system's parts should convenient and reliable. Ball valve is made of stainless steel.

4.3.2 Parameters of technical

Nominal drilling depth	5000 m
Rated working pressure	8 MPa
No. of open working calipers	4
No. of closed safety calipers	2
Dia. of brake disk	1650 mm
Cooling method	Water cooling

Working caliper：

Model：	PSZ75B
Max. Normal positive pressure	75 KN
Oil cylinder size	Φ165x320 mm
Oil cylinder effective acting area	12271.8 mm²
Weight	208 kg

Safety caliper：

Model：	PSZ75B
Max. Normal positive pressure	90 KN
Max. Clearance of the brake pad	1 mm
Oil cylinder size	Φ210x368 mm
Oil cylinder effective acting area	17671.5 mm²
Weight	224 kg

Hydraulic station：

Single pump rated flow rate	15L/min
Oil tank volume	80 L
Motor power	2x2.2 kW
Capacity of the accumulator	4x6.3 L
Electric heater power	1 kW
Flow rate of cooling water:	2 m^3/h

4.3.3 Functions description

This series of brake system has the following four functions:

4.3.3.1Service 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

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

4.3.3.3 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.

4.3.3.4 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	35mm
Max rope speed	50m/min
Weight	300kg

Fix it on the top of drawworks

4.5 2 set DC motor

4.5.1Ambient condition

The Ambient Condition Temperature -30℃～+45℃

Height	elevation≤1200 m
Humidity	relative humidity≤90%

4.5.2Basic Data

Rated Power	800kW
Rated Voltage	750V
Rated Current	1150A
Rated Speed	970r/min
Rated torque	8.034kN.m
Max. Current	1600A
Max Speed	1500r/min
Excitation	Series
Insulation (Stator/Rotor)	H/H
Ventilation	Forced
Parameter	11kW、460V、60Hz

4.5.3Other 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 Function:

Monitoring area: Monitor the pump area, tank area, well head and racking platform simultaneously.

Four cameras are controlled by control panel, their images are displayed on the LCD monitor，which is located on the drilling operation panel, in the form of single channel or four channels synchronously.

Control panel can control all the cameras and platforms, and such functions as pan/tilt and zoom/focus can also be adjusted through control panel

Operating condition-30°C到+60°C

4.6.2 System Component

Camera component 4set

Totally sealed in the explosive proof and dust proof protective cover, explosive proof grade is IP65. Explosive proof clouds terrace vertical turning angle is ±45° while horizon turning angle reach 0°-350°.

Controller 1set

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

LCD 1 Set

To display video image and date

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

Signal line 1Set

4.7 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

The house is consisted with pentagonal walls, and the walls and the top is made of ＝20mm glass. The transom window and front window are equipped a gas-driven scraper respectively; glass of the right front window and left window can be divided into two parts, the lower part (made of 5mmtoughened glass) is movable and equipped with locking equipment. The interior erective window is equipped with curtain and the exterior erective window is equipped with poles against collision.

Thickness of the walls is 50mm, 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.

All walls besides the rear wall is equipped with sliding door with the height of 650mm above pedestal surface, and the door is equipped with lock.

The two side walls have 1900700mm outward-opening doors which are equipped with closing device and fireproofing lock and the edges is equipped with air-proofing mat.

There is rain-proofing edge on the top of inspecting door and outward-opening door.

The rear is equipped with a 1.5P split type explosion-proofing air conditioner (Nanyang Yitong).

The lower part of the rear is the place to install indoor electrically controlled case, gas controlled case, industry inspecting host computer and recording apparatus.

SECTION 5 HOISTING SYSTEM

5.1 1Set YC315 Traveling Block

5.1.1 Technical Specifications

Maximum load: 3150kN

Number of sheaves: 6

Diameter of sheave. 1270mm

Diameter of sheave groove: 35mm

5.1.2 Structure Description

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 1Set DG315 Hook

5.2.1 Technical parameter

Max. Hook load	3150 KN
Dia. of major hook	180 mm
Dia. of minor hook	120mm
Spring travel	200mm
Major hook opening	220mm
Body's radius of rotation	465mm

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 1Set SL450 Dual-purpose Swivels

5.3.1 Technical Specifications

Max. Dead load KN	4500Kn
Max. Speed rpm	300rpm
Max. Working pressure Mpa	35MPa
I.D of the stem Dmm	75mm
Coupling：	
to the stem(REG)	$7^5/_8$ "
To the Kelly(REG)	$6^5/_8$ "
Gooseneck thread API Std 5B	4 " -8
Model of air motor	FMS-20
Rated speed rpm	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 bottom or 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.

3 Drive & Air control principle of the screwing part

3.1 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.

3.2 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 1set Electric drill spooler

Output speed	8-17rpm
Input Speed	720rpm
Max. Torque	10000N.m
Motor power	15kW

The average line speed of small scale of wire rope working 13.4m/min

The wire rope length	1200m

5.5 1 coil Drilling Line

Standard：	Conform to API 9A
Model	6×19S-IWRC Mill Finish，1-3/8"（Φ35mm）,1000m
Length：	1200m (3,281ft)
Class：	EIPS
Twisting Direction：	Left

5.6 1 Pair DH350 Elevator Link

Rated load	3150KN
Nominal size	3300 mm

SECTION 6 ROTARY TABLE AND ACCESSORIES

6.1 1 Set Rotary table conform to API - 7K, ZP-375

6.1.1 Technical Specifications

Opening size	952.5mm
Max. Static load	5850kN
Max working torque	32362N.m
Max speed	300r/min
Gear ratio	3.56

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

Bit breaker adapter plate

5 1/4″ Roller Bushing for hex. Kelly

6.3 1 set ZPX50D 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 droved 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 need large torque to deal the accident.

6.4 Cardan shaft

6.5 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： 3 phases

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 intergrity 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 5000m, 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℃～＋55℃

Ambient temperature of electronic equipments： Upper limit: 55℃

Relative humidity： ＋45℃，relative humidity≤95％ ±3%，

Height above sea level： ≤1000m; decrease when>1000m

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 carbine are three 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, Basle 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：±5%

Fluctuant rate： 0.5%

Settling time: 3s

Voltage：

Steady state adjustment rate：±2.5%（adjustable）

Adjustable range： ±20%

Fluctuant rate： 0.5%

Settling time: 1.5s

Response time: 20ms

After incorporating：

Degree of irregularity (active load): ≤±5%

Degree of irregularity (idle): ≤±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 phases, 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 hand wheel 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 hand wheel. 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 hand wheel, with skid proof 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：9 ea（2 for drawworks, 1 for rotary table, 3 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 breakers 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 production.

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 antisepsis, 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 Intelligent zed remote driller’s console (stainless steel)

Independent driller explosion proof operating case possess the fllowing function but does not limited to these function.

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.

7.2.3.4 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.

7.2.3.5 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

7.2.3.6 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

The dimension of the SCR cabin is under 13.8m×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 60^0C) and santisfed the heating requirement at -30^0ambient temperature. Suitbal design air duct and easily maintaince; the indoor temperature can be controlled between 15^0C and 27^0C 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 ≥80mm 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 240μ.

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.

7.2.4.4Earthing

The cabins have reliable earthing and earth leakage protection loop, the transformer is equipped with earthing inspecting device. The system adopt ¢ 30mm, 1500mm long brass bar to connect the ground.

7.3 4 sets Diesel generator cabin

Dimension

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 withδ3 plate top cover andδ2 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.

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/ 110V / 60Hz	
Flow rate：	6.8Nm^3/min	

7.4.1.3. Ambient temperature -40℃～50℃

7.4.1.4. Air tank 2×2.5m^3（stand）

7.4.1.5. 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 on security door and four-sash window. The wallboard is made of 2mm corrugated steel sheet with rack wool as the heating insulating material.

7.4.2.3 Chassis

The height of the chassis is 300mm with sufficient tensely and rigidity. The floor adopts checered 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 deigned as skid type for easy haulage.

SECTION 8: Well site lightening, motor control and earthing 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

API.RP500， SY/T5957-94. SY5225-94, GB3836, GB1497, GB4942 and IEC60079

8.2.1It 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 antisepsis 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 Adopt explosion-proof insert-connection model for power cable, and control cable, plugs and receptacles of power section are made in China. USA.(Appleton productions)

8.2.5 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 1600HP mud pump

Triplex single acting, according to API 7 K 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	1176 kW (1600 HP)
Stroke lenghth	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 spray pump, pressure release pipeline and so on. The lead screw of the fixture device adjusts tightness of joint narrow V-belt.

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 astigmatic pressure type with metric/imperial comparison. The drilling floor valuing 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 temperature：	－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 ¢140×19mm and the metallic seal valve with API mark. The entire valve indicates the open /close direction. Pipes what include three-way, four-way, elbow and gooseneck, are dodging 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×35Mpa gate valves (one weld and foure 1003 union), two 2in×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, otheres 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×35MPa valve.

Return Mud flow is single pump return flow, pipe line adopts 2in×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 ZJ50D drilling rig. The overall performance of system can meet technical requirements of 5000m 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 No. 7

The total effective volume： 320m^3

The dimension of mud tank 12000mm×3040mm×2400mm

11.3 Process flow and principle of solid control system

Process flow design of the whole system meets requirements of solid control of drilling liquid, weighting mud and adjusting performance of drilling liquid by adding chemical agent.

11.4 Purification process flow of system

Drilling liquid returned from the well casing enters into liquid-gas separator through overflow pipe. In liquid-gas separator, drilling liquid is carried out

separation of liquid phase and gas phase. After separation, drilling liquid enters into shale shaker where major solid particles are screened out. In turn, screened mud flows into degassing bin (when gas cut is occurring in mud, start up degasser to carry out degassing treatment of aerating mud in degassing bin. After treatment, dump mud into de-sanding bin.), de-sanding bin of where de-sanding cleaner removes more than 60 m solid particles of mud in de-sanding bin under the cooperation of sand pump. After purification treatment, mud is dumped into de-silting bin where de-silting cleaner removes more than 40 m solid particles of mud in de-silting bin under the cooperation of sand pump. After purification treatment, mud is dumped into suction bin of centrifugal machine (if solid particles need be separated further, centrifugal machine at intermediate speed will remove solid particles of mud in de-silting bin under the cooperation of submerged slurry pumps. After purification treatment, mud is dumped into suction bin of centrifugal machine of 3# tank where centrifugal machine at high speed removes solid particles of mud in de-silting bin under the cooperation of submerged slurry pumps. After purification treatment, mud is dumped into purification bin). Grade V purification process of dumping mud under the well is finished. Then three sets drilling pumps transports mud into well casing to finish the whole working cycle.

11.5 Dosing and weighting process flow of system

Dosing and mixing mud system is designed on one end of 4# tank. Shear pump sucks mud in chemical bin of 4# tank and shears & mixes mud repeatedly by direct injection funnel. Sheared & mixed drug is transported into 2.5m^3 chemical tank on the 3# tank by delivery lines. Drug in chemica tank is added into dosing mud in any bin of 2#, 3#, 4#, 5#, 6#, 7# and 8# tanks (except for shear chemical bin of 4# tank) through mud ditches. Weighting and preparing mud system with double suction double dump weighting manifold is designed in 5# tank. After weighted by direct injection funnel, mud sucked into any bin of 3#, 4#, 5#, 6#, 7# and 8# tanks (except for shear chemical bin of 4# tank) by electrical sand pump is respectively poured into any bin of 3#, 4#, 5#, 6#, 7# and 8# tanks (except for shear chemical bin of 4# tank) through pipelines under the control of butterfly valves. Two sets weighting pumps can be as back up each other, i.e. one weighting pump is failure. The other weighting pump can work alternately by exchanging suction valve and output valve.

11.6 Workflow of mud gun

The mud gun of system is composed of 3” pipelines connected by unions. Intermediate pressure mud pipelines lead to any bin of 1#, 2#, 3#, 4#, 5#, 6#, 7# and 8# tanks (except for sand-settled bin and shear pharmaceutical bin) and connected with small circulation pipelines of mud pump as hydraulic source of intermediate pressure mud gun. Therefore, if only start up the mud

pump, mud gun can work. Sand pump of 5# tank is connected with pipelines of mud gun though pipelines as hydraulic source of intermediate pressure mud gun, which can make mud gun work. Intermediate pressure mud pipelines between tanks can be connected with of 6.4Mpa intermediate pressure hose lines.

11.7 Flow of supplying mud

One trip tank is designed on one side of 1# tank (inside of well field). One charging pump is set on the trip tank to supply wellhead with mud. Mud can be sucked into trip tank and supply bin of 1# tank by two suction pipelines of charging pump. Mud can be transported to the wellhead by charging pump of 1# tank through one output pipeline of charging pump through the wellhead. When mud is needed by supply bin and trip tank, it can be added through intermediate pressure mud pipelines.

11.8Perfusion flow

Three sets 55KW perfusion sand pumps are respectively installed on the base at the left end of three sets mud pumps (seen from the direction of wellhead). 1# perfusion pump is to perfuse 1# mud pump and 2# perfusion pump is to perfuse 2# mud pump and 3# perfusion pump is to perfuse 3# mud pump. Three sets perfusion pumps can control mud for perfusion by suction manifold of sand pump.

11.9 Flow of supplying water to the system

Supply water pipelines of system are composed of square pipes on one side of top frame on the tank body and rubber hoses connected by unions. Water flow mouthpiece of system is designed at the front end of 5# tank and connected with water tank by hoses. 2" clean water valve and cleaning equipment outlet and rinsing hoses are designed for 1#, 2#, 3#, 4#, 5# and 6# tanks.

11.10 Structure and features

The substructure of mud tank adopts 30# H-shaped steel as main and is made into oilfield the same size

Base plate of mud tank is inclined toward spigot opening side.

Side plate of mud tank is corrugated structure.

150×150×7 seamless cold drawn square pipe is used on the top frame of mud tank as edge. And water pipelines of system are designed

11.11 Main equipment

11.11.1 1 set Desander

Model: QZS250×3 Models

Sieve technical parameter

Mode shape:	linear vibrating
Exciting frequency：	30Hz Excitation frequency
Vibration intensity：	7.1g Excitation intensity
Double vibration amplitude：	6mm
Excitation force：	76KN
Screen size：	700×1050×3（200 mesh ）
Screen type：	soft hook edge screen
Screen area：	2.2m^2
Desander Cyclone parameter：	
Size：	¢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
11.11.2 1set Desilter	
Model：	QZS100×16 Model
Sieve technical parameter	
Mode shape：	linear vibration
Exciting frequency：	30Hz
Vibration intensity：	7.1g
Double vibration amplitude：	6mm
Excitation force：	76KN
Screen size：	700×1050×3（250 mesh ）
Screen type：	soft hook edge screen
Screen area：	2.2m^2
Desilter Cyclone parameter：	
Size：	¢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

11.11.3 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％

Weight： 2500kg

Main motor power： 37KW

Vacuum pump motor power： 5.5KW

11.11.4 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

Main motor power： 30KW

Auxiliary motor power： 7.5KW

Slurry pump

Model： 80YZ（S）40-10

Motor power: 7.5kw

Flow rate： 40m^3/h

Lift： 10m

11.11.5 1 set High speed centrifuge

Centrifuge parameter

Model： LWG450×1000-N

Rotary drum diameter： 450mm

Rotary drum length： 1000mm

Rotary drum speed： 2200rpm

Separation factor： 1200

D_{50}separation point： 2～5μm

Max handling capacity： 40m^3/h

Main motor power： 30KW

Auxiliary motor power： 7.5KW

Slurry pump parameter

Model ： 80YZ（S）40-10

Motor power: 7.5kw

Flow rate： 40m^3/h

Lift ： 10m

11.11.6 1 set Make-up pump

Model ： 100SB50-20

Flow rate： 50m^3

Lift ： 20m

Inlet size： ¢100mm(4″)

Outlet size： ¢80mm(3″)

11.11.7 2 sets Sand pump

Type: 200SB240-40

Flow rate： 240m^3/h

Lift： 40 m

Inlet Dia.： ¢200mm （8″）

Outlet Dia.： ¢150mm （6″）

Motor power： 55Kw

11.11.8 3 set Charging pump

Model: 200SB270-28

Perfusion capacity： 270m^3/h

Lift ： 28 m

Inlet size： ¢200mm (8″)

Outlet size： ¢150mm (6″)

Motor power： 55Kw(460V/60Hz)

11.11.9 1 set Shearing pump

Model: JQB6545

Flow rate： 120m^3/h

Lift ： 45 m

Inlet diameter ： ¢150mm (6″)

Outlet diameter： ¢125mm (5″)

Motor power： 55Kw(460V/60Hz)

11.11.10 Agitator

Model : WNJ-15 WNJ-5.5

Style ： horizontal type

Drive type： worm gearing

Impeller type： double deck

Motor power： 15kw

5.5k

Impeller rotary speed： 70 rpm

Reduction ratio： 1：25

Motor power： 15KW 5.5KW

11.11.11 3 set Direct injection hopper

Model ： SLH150×50

Handling capacity： 240m^3/h（1057GPM）

Lift ： 40m

Inlet diameter： 150mm

Jet nozzle diameter： 50mm

Working pressure： ≥0.3～4 MPa

11.11.12 2 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：	2.2m^2
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 2set Diesel tank and the diesel storage tank

12.1.1Specification：

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

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

The effective volume of Diesel tank 45 m^3

The effective volume of Diesel storage tank 55 m^3

Equipment name, type and quantity

Standpipe oil pump	YG65-160I	
Discharge head	32m	
Flow rate	50m3/h	
Power	7.5Kw	
Float ball	UFZ-04-2000	2SET
Flow metre	LC-65-A	2SET
Oil inlet, oil outlet		3SET

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

12.2.1

A 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 $3\times5\ m^3=15\ m^3$

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 1SET Water tanks

Specification：

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

Effective capacity： 80 m^3

12.3.2、Main equipment：

2 sets YG80-200B pipe pump

Power 7.5kw

Pump lift 38m

Flow 43.5m^3/h

1 set ISRZ65-40-200 fire pump

Pump lift 50m

Flow 25 m^3/h

Power 7.5kW

1 set UFZ-04-2000 floating ball level meter

2.5″ 100m fire hose

12.3.3 Basic description：

The water tank body is made ofδ6mm 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	32CQ-25 and 100CQ-32
Magnetic driving pump motor power	1.1KW and 15KW
magnetic pump flow	110L/min和1000L/min
Capacity	40m^3

12.4.2Basic structure

The circuiting 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

（一）

13.1 F35-70 BOP Stack

Item	Description	Unit	Qty	Remarks
1	Annular BOP FH35-35/70	Set	1	Casting，Studded top and flanged bottom，
2	Double ram BOP 2FZ35-70	Set	1	Casting，Flanged top and bottom；upper cavity 5″，lower cavity full sealed
3	Single ram BOP FZ35-70	Set	1	Casting，Flanged top and bottom；inner 5″ ram
4	Drilling spool FS35-70	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

SY/T 5053.1-2000 《BOP and BOP control equipments》

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

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

H_2S resistant. The rigidity of quenching and tempering: HRC≤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)

（二）、FH35-35/70 Annular BOP

Parameters FH35-35/70 Annular BOP

Bore:	346.1mm (13 5/8 ")
Rated pressure:	35MPa (5000Psi)
Hydraulic pressure:	≤10.5 MPa
Open oil volume:	71.3L
Closed oil volume:	93.5L
Sealed range:	0 ~ 346.1
Hydraulic control connection:	Z 1 " (1 " NPT)
Top connection:	13 5/8 " ×5000 Psi BX160 studded
Bottom connection:	13 5/8 " ×10000Psi BX159 flanged
Overall dimension:	φ1270mm×1227mm
Package dimension:	1620 mm×1380 mm×1700 mm
Net weight: 6834Kg	grosses weight: 7138Kg

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.

2.2.2The 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.

2.2.4There 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 11/2 " - Z1 " conversion connection so as to prevent the oil mouth connection from damaged.

3 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 diametre: 355mm 14 "

Hydraulic cylinder open volume:

Double ram BOP 4×19.9L

Single ram BOP 2×19.9 L

Hydraulic cylinder closed volume:

Double ram BOP 4×20L

Single ram BOP 2×20 L

Lock on: Manual

Connection: Top 3 5 5/8 " ×10000 Psi flanged BX159

Bottom 13 5 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 Shaffer13 $^{5}/_{8}$ " - 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 bidirectional 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:	$13^{5}/_{8}''$ - 10000Psi	6BX flange
Side flange:	$4^{1}/_{16}''$-10000Psi	flange

Overall dimension: 700×1180（H×W）

五）1set KQ8007 BOP remote control system

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 controller 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 contol station ang 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 lable 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

6.1General 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 connecter	Φ25×35MPa	set	42
3	Universal self seal connecter	Φ25×35MPa	set	14

4	High pressure self seal quick coupling	Φ25×35MPa	set	14

6.2、Technical requirement

6.2.1GNG High pressure fire tight hose has excellent fire resistance, it could keep the working pressure burning under 750℃ for 15 minutes, or burning under 1100℃ 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 alkalescency 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 φ19mm 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 H_2S, CO_2 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 H_2S, CO_2 oil (air)

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

Material grade： DD(valve and pipe)

Manufacturing 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： Φ539.7mm（21-1/4"）

Rated pressure： 14MPa（2000psi）

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

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

Open oil quantity： 84.9L

Closed oil quantity： 136.51L

overall dimention： Φ1437×1512mm

Drilling spooler

Type： FS35-105

Nominal bore： Φ539.7mm（21-1/4"）

Rated pressure： 14MPa（2000psi））

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

Bottom connection： 539.7mm×14 MPa（21-1/4"×2000psi）R73Flanged

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

overall dimention： 1310mm×812mm×900mm

Hydraulic ball valve

Side connection： 10"× 900 cls

SECTION 14: Drilling instrument

14.1 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 Drilling floor touch screen monitor displays the following drilling parameters

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)

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, uninterrupted 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 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.

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

SECTION 15 Drilling Strings

15.1 Hexagonal Kelly

Specification 5-1/4″Hexagonal Kelly

Total length 14.02m（46ft）

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 upper Kelly cock

Type ball type

OD $5^{1}/_{4}$″

Working pressure 35MPA

15.3 2 lower Kelly cock

Type Ball type

OD $5^{1}/_{4}$″

Working pressure 35MPA

SECTION 16 Wellhead equipment and tools

16.1 1 Set ZQ203-100 drilling pipe power tong

16.1 Parameters

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

Appliable pipe Diameter range: φ127-φ203mm。

Dimension of five specifications

φ203 drill collar

φ178 drilling string joint

φ162 drilling string joint

φ146 drilling string joint

φ127 drilling string 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 parameters

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

Applicable pipe Dia.: coordinate with tong to apine and screw offthe oil pipe, drilling pipe, drill collar and casing. Under different pressure, wire line get traction force.

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, afer which, piston pole will withdraw and line spooler will reposite the wire line so as to carry through next straing and easing. The upward and downward movement of piston pole is realized by direction changing valve on the driller control panel.

16.3 1set 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 10 m²

Water pipe connectionvv2-G1-1/4(intra-screw)

Oil charge pump motor 3kW

Water cooling machine type 2GLC3-10

Effective cooling area $10m^2$

Explosive proof electric heater type SJB2-3

Explosive proof grade : dⅡBT4 power 3kWX2

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

DRILLING TOOLS with rig

16.8 1 Set Crane rope

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

18.1.1Rig-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, rising 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 air 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 should 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

SECTION 22 Documents Along With Rig

The following drawings and documents will be provided to the customer in English along with the equipment as per contract,

- Operation, maintenance manual and rig parts list for main rig component.
- Operating manual of major components furnished by Manufacturer
- General arrangement drawings for the rig and its components

- Electrical schematic including grounding scheme and foundation layout.

-Factory certification of quality (both Chinese and English version)

Attachment 1 Tools for drilling rig

Tools for ZJ50/3150Ddrilling rig

Items	Type	Description	Quantity	Remark
1		Grease station	1	

2		Crowbar L=1000	2	
3		Crowbar L=1500	2	
4		Lengthen pipe Φ21×1000	2	
5		Lengthen pipe Φ21×1500	2	
6		Lengthen pipe Φ34×1000	2	
7		Lengthen pipe Φ34×1500	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	2each	

		（3,6,5.4kg）		
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）300mm	1 each	
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	