
Technical Specification for ZJ50BD (1500HP)
Modular Drilling Rig (60HZ)

16 AUGUST 2016

Technical Specification

A. Design References and Technical Standards

- API Spec Q1 Specification for Quality Programs for the Petroleum and Natural Gas Industry
- SY/T5609-1999 Types and Basic Specifications for Drilling Rig
- API Spec 4F Specification for Mast and base of Drilling and Work-over Rig
- API Spec 8A 8C Drilling and Production Hoisting Equipment
- API Spec 7 Specification for Rotary Equipment
- API Spec 7K Drilling Equipment
- API Spec D10 General procedures for the selection of drilling equipment
- API Spec 7F Drive roller chain of petroleum drilling rig
- API RP 500 Recommended Area Classification for Oil Electrical Devices
- IEC General Technical Condition for Explosive Gas and Electrical Equipment
- IEEE Electricity and Electrical Engineers Association Specification
- JB/T7845-1995 Electrical Equipment with Electrical Components for Land Drilling Rig
- API Spec 9A Wire Ropes
- API Spec 16C Specification for Choke and Kill Decives
- API 510 Pressure Vessels
- ASME SERIE B31 Stand pipe lines

Main Parameters

1. Rig Rated Depth: 5000m 4-1/2" D.P
4000m 5" D.P
2. Available height of derrick: 45.5m
3. Traveling system: 6x7
4. Diameter of drilling line: 1-3/8" (35mm)
5. Height of drilling floor: 30' (9m)
6. Opening diameter of rotary table: 37-1/2" (952mm)
7. Steps of rotary table: 1+1R, step-less change
8. Rated input power of drawworks: 1500HP (1100KW)
9. Steps of drawworks: 1+1R, step-less change
10. Capacity of mud pump: 1193kw (1600HP)x3

11. Power transfer type:
12. Drive model:

AC,VFD
one to one

B. Main Equipment

1. Power Supply System

Features:

- Consist of 3sets of main generators, 1 set of auxiliary generator, VFD system and MCC.
- Diesel engines are CAT3512B and generators are SR4B
- Auxiliary generator is C15 diesel engine generator
- Emergency shutdown switches for the complete power system are provided at both the driller's position and the power plant
- All engine's exhaust pipes are sound proof and equipped with exhaust sparks arresters, air inlet valve controlled at the power plant

1.1. Main Generators

QTY: 3 Sets, Model: CAT3512B

3512B LAND ELECTRIC SCR POWER MODULE

- Engine rating = 1476 bhp (1101 bkW) @ 1200 rpm w/o fan rating
- Generator rating = 1750Kva, 1225Kw 0.7PF, 60Hz, 600V, 3 phase including following attachment:

AIR INLET SYSTEM

- After-cooler core, corrosion resistant
- HEAVY DUTY AIR CLEANER, shipped loose

CONTROL SYSTEM

- Caterpillar ADEM II Electronic engine control, LH
- Requires 24V DC 10 Amp continuous, 20 AMP intermittent, clean electrical power.
- ENGINE GOVERNOR CONTROL CONVERSION
- (for use with 0-200mA External speed and load sharing control)

INSTRUMENTATION

- Electronic Instrument Panel, LH
- Analog gauges with digital display data for:

- Engine oil pressure gauge Engine water temperature gauge Fuel pressure gauge
- System DC Voltage gauge air inlet restriction gauge
- Exhaust temperature (prior to turbochargers) gauge
- Fuel filter differential pressure gauge
- Oil filter differential pressure gauge
- Service meter (digital display only)
- Tachometer (digital display only)
- Instantaneous fuel consumption (digital display only)
- Total fuel consumed (digital display only)
- Engine start-stop (off, auto start, manual start, cool-down timer)

1.2. Auxiliary generator set

QTY: 1 Set

Model: CAT-C15

Features:

- CATERPILLAR C15
- Rated power 480V,320EKW/FAN
- Rated speed 1800RPM
- Control Panel
- EMCP3 control panel including:
- Mounted inside rear facing power centre
- Emergency stop pushbutton
- Voltage adjustment potentiometer
- Digital speed adjustment via EMCP3 display

1.3. Generator houses

QTY: 4 Sets

Features:

- Include 3 main generator houses and an auxiliary generator house
- Lifting pad strength is enough for hoisting
- Complete with all binding posts and cables
- Complete with all oil and air lines for diesel engines
- 2 screw air compressors, dryer and air storage tank share in the house of auxiliary generator set

Features:

- Dimension of single house: 10600x2900x3100mm

2. VFD System

QTY: 1 Set

Digital Generator control unit

QTY: 3 Sets

Each unit will contain the following:

- The system adopts digital control model, close loop adjusting, system protection
- The system adopts WOODWARD 2301D digital speed regulator to ensure the power distribution among generators.
- The excitation system adopts PI regulator to ensure the stable voltage.

GENERATOR DIGITAL SYNCHRONIZING SYSTEM

- The generator synchronization (Sync) circuit is required to connect additional generators to the Main AC bus, after one (1) or more generators are already connected to the Main AC bus.
- The system adopts digital control through apply WOODWARD 2301 and BASLER products to complete this function
- The synchronous Circuit compares the frequency, phase and voltage of the main AC bus with that of the generator being brought on line, so that they can be matched before the new generator's circuit breaker is closed
- The Generator Synchronizing Circuit are included in each generator control unit

GROUND FAULT DETECTION SYSTEM

- The Ground fault system is designed to detect both AC ground faults via a set of wire connected grounding resistors.
- A ground test pushbutton is included for determining if a ground fault indication is actually a burned out lamp.
- 1 AC ground Ammeter scaled at 0-100%
- 480 VAC ground fault indication Lamps

- 600 VAC ground fault indication Lamps
- 1 Test Pushbutton

POWER LIMIT SYSTEM

- The power limit system is made up of digital controller and PLC, the digital controller will monitor the kW engine loading and the kVA generator loading of each engine/generator set and then transfer the desired parameters to PLC system via PROFIBUS field bus.
- If any of these parameters reach their limitations, the PLC will reduce the power being delivered to the loads so that the load on each generator is held as its limit until the loads on the variable-frequency drives are reduced (by other action) to a level below the generator limit.

VARIABLE-FREQUENCY-UNIT

- ACS800 multi-drive converter 6-pulse Diode supply unit (DSU), IGBT Inverter, Direct Torque Control (DTC) "one-to-one" mode.

CONFIGURATION OF VARIABLE-FREQUENCY-UNIT

No.	Items	Type Code	Qty.
1	6-Pulse Diode unit (DSU)	ACS 800-307-2720-7	2
2	Multi-drive inverter for MP1,MP2,MP3	ACS 800-107-1740-7	3
3	Multi-drive inverter for DW,RT	ACS 800-107-1160-7	3
4	Breaking unit	ACS 800-607-1200-7	2
5	Converter for automatic drilling (55KW)	ACS 800-01-0070-5	1
6	Communication module	RPBA-01	6
7	Pulse encoder interface module	RPAC-01	3
8	Output filter	ABB made	5

- Three (3) 1400 kw (3xR8i) Multi-drive inverter for three (3) mud pump motor (one 1200kw motor each mud pump)
- Two (2) 900 kw(2xR8i) multi-drive inverter for Drawworks (one 600kw motor each)
- One (1) 900kw(2xR8i) Multi-drive inverter for Rotary table (R.T) (one 800kw motor)
- One (1) 55kw converter for automatic drilling motor
- Basic description on Multi-drive inverter for MP1-2-3 (ACS800 1400kw(3xR8i))

Basic description on Multi-drive Inverter (ACS800 1400kw (3xR8i))

No.	Items	Parameters/specifications
1	Dimensions	800(width) x 600(Depth) x 2200 (height)
2	Main Component	Capacitor/ IGBT/DCU/ Interface modules
3	Usage	Drive and control for the Motors (MP,RT,DW,TD)
4	Rated input parameters	<ul style="list-style-type: none"> • Voltage: 3AC 525-690V • Frequency: 48-63Hz
5	Rated output parameters	<ul style="list-style-type: none"> • Rated power: 1400 KW • Rated current: 1414A • Maximum current: 2116A
6	Communication mode	<ul style="list-style-type: none"> • Field bus: PROFIBUS-DP • BPS: 6M/S
7	Cooling mode	<ul style="list-style-type: none"> • Forced ventilated air-cooled
8	Main Protection	<ul style="list-style-type: none"> • Over current • Over voltage • Over load • Fused protection • Maximum output current limitation • Wind failed • Lots protections and diagnosis for digital system

		<ul style="list-style-type: none"> • Mis-operations
--	--	--

Basic description on Multi-drive inverter (ACS800 900kw (3xR8i))

No.	Items	Parameters/specifications
1	Dimensions	600(width) x 600(Depth) x 2200 (height)
2	Main Component	Capacitor/ IGBT/DCU/ Interface modules
3	Usage	Drive and control for the Motors
4	Rated input parameters	<ul style="list-style-type: none"> • Voltage: 3AC 525-690V • Frequency: 48-63Hz
5	Rated output parameters	<ul style="list-style-type: none"> • Rated power: 900 KW • Rated current: 953A • Maximum current: 1425A
6	Communication mode	<ul style="list-style-type: none"> • Field bus: PROFIBUS-DP • BPS: 6M/S
7	Cooling mode	<ul style="list-style-type: none"> • Forced ventilated air-cooled
8	Main Protection	<ul style="list-style-type: none"> • Over current • Over voltage • Over load • Fused protection • Maximum output current limitation • Wind failed • Lots protections and diagnosis for digital system • Mis-operations

Basic description on Multi-drive inverter for automatic drilling motor (ACS800 55kw)

No.	Items	Parameters/specifications
1	Dimensions	400(width) x 600(Depth) x 2200 (height)
2	Main Component	Capacitor/ IGBT/DCU/ Interface modules
3	Usage	Drive and control for the Motors

4	Rated input parameters	<ul style="list-style-type: none"> • Voltage: 3AC 380-500V • Frequency: 48-63Hz
5	Rated output parameters	<ul style="list-style-type: none"> • Rated power: 55 KW
6	Communication mode	<ul style="list-style-type: none"> • Field bus: PROFIBUS-DP • BPS: 6M/S
7	Cooling mode	<ul style="list-style-type: none"> • Forced ventilated air-cooled
8	Main Protection	<ul style="list-style-type: none"> • Over current • Over voltage • Over load • Fused protection • Maximum output current limitation • Wind failed • Lots protections and diagnosis for digital system • Mis-operations

SURGE SUPPRESSION SYSTEM

- Surge suppression system used to clamp any transient high voltage spikes, which would be damaging to the converter devices
- The surge suppression system will consist of a set of fused metal oxide varistor (MOVs) and will include a “Surge suppression ON” lamp.

OUTPUT FILTER

- Output du/dt filter used to suppresses inverter output voltage spikes and rapid voltage changes that stress motor insulation. Additionally du/dt filtering reduce capacitive leakage currents and high frequency emission of the motor cable as well as high frequency losses and bearing currents in the motor.

SYSTEM HOST PLC

- ❖ Siemens S7-400 Modular PLC
- ❖ (Two sets PLC working in redundant mode)
- ❖ Hot backup

_PROFIBUS Communication system

-
- PROFIBUS communication system adopts digital communication technology
 - The driller's console, automatic drilling system, intelligent traveling block anti-collision protection system, integrative drilling instrumentation system, variable-speed drives system and –
 - It also can display the related data and states in the HMI
 - PROFIBUS communication system includes all necessary PROFIBUS-DP communication card, communication module and program.

INDUSTRIAL PC

- Two sets of industrial PC are used in this system, one in VFD house, one in supervisor's room
- Industrial PC collected all necessary data from PLC, display the necessary data and graphic state and diagnostic in the screen.
- All the necessary data will be stored in the hard-disk of IPC. If the hard-disk is full, the oldest data will be deleted automatically, new data will be stored. The necessary reports will be created automatically.
- IPC will display the following information:
 - Access of all AC drive in the network
 - Diagnostic of faulty component of each AC drive and warning
 - Testing and verifying possible fault causes
 - Tracing of faulty component
 - Performing step-by-step replacement procedure
 - Motor operation history/drive parameter record for last 30 days.
- ❖ One SET LAPTOP WITH ADJUSTING SOFTWARE
- ❖ Software would be English and Spanish version

INTEGRATIVE DRILLERS CONSOLE

- The throttle hand wheels will be of solid stainless steel
- Communication between PLC cabinet and the drillers console will be via special communication cables
- Cables enter the bottom of the console via plugs and receptacles
- Two sets of industrial touch screen computer are redundantly used in this console, in the normal situation, one MP370 is used for system control, one for parameters monitoring.
- The mud pump will be operated on the touch screen instead of hand throttles.
- The Drawworks will be operated with Drawworks joystick and when the handle failed to work, it also can be operated on the touch screen.

Item	QTY	Description
1	1	<ul style="list-style-type: none"> Type code: V61.1 Input Voltage: 24V Output voltage: $0 \pm 10V$

- One hand throttle, which installed on the driller's chair, will be used for operating rotary table

600 VOLT FEEDER CIRCUIT BREAKERS:

1000AF/1000AT, 600Volt, 3 pole, 65 kA IC, UL/CSA Rated

Item	QTY	Description
A	2	<ul style="list-style-type: none"> 1000 AF 1000AT, 600Volts, 3 pole Manually charged, manually closed

Transformer

600: 480 Volt transformer

- The secondary side of the transformers will be connected to the circuit breakers in Motor control Center.

Item	QTY	Description
A	2	<ul style="list-style-type: none"> 750kVA,600:480 VAC, 3Ph, 60 Hz Del: Wye Dry-type Cooper winding

480: 208/120 Volt transformer

- The secondary side of the transformers will be connected to the circuit breakers in Motor control Center.

Item	QTY	Description
A	2	<ul style="list-style-type: none"> 160kVA,480:208/120 VAC, 60 Hz Del: Wye Dry-type Cooper winding

480 Volt Secondary circuit Breaker

1200 AF/1200AT, 600Volt, 3 pole, 65 kA IC, UL/CSA Rated

Item	QTY	Description
A	2	Circuit breaker <ul style="list-style-type: none"> • 800AF-800AT • 42kA IC • Manually charged, Manually operated

480 Volt Auxiliary Generator Incomer

- Breaker – 800AF/800AT, 600Volt, 3 pole, 65 kA IC, UL/CSA Rated
- To prevent “back feeding” power to the main 600 Volt AC bus through the transformers, this circuit breakers will be electrically interlocked with the transformer secondary breaker so that only one 480V circuit breaker can be closed at the same time. So auxiliary power cannot be “back feed” to the main 600 volt AC bus.

Item	QTY	Description
A	1	Circuit breaker <ul style="list-style-type: none"> • 800AF-800AT • 42kA IC • Manually charged, Manually operated

480 Volt MCC Unit

- The MCC will be wired 480 Volt, 60 Hz, with individual breakers.

No.	Items	Specifications
1	Dimension	800 (width) x 800 (depth) x 2200 (height)
2	Main Component	Break/contactor/sensor/button/lamp etc.
3	Specifications	Rated voltage: AC480V/AC280V Rated Frequency: 60 Hz Rated current for horizontal Bus: ≥ 4000A Rated current for vertical Bus: ≥ 1000A

		Rated peak withstand current: 105 KA Rated short-time withstand current: 50KA
--	--	--

- The horizontal bus will be tin plated cooper and rated for 4000amps
- The vertical bus will be tin plated cooper and rated for 1000 amps
- The motor control center is manufactured to NEMA style cubicle
- Cooper ground bus will be run the full length of the MCC line up.
- Legend:
 - HOA = Hands-Off-Automatic Control
 - 2WRC = Two (2) wire remote control
 - PBSS = Pushbutton Stop/Start
 - 3WRC = Three (3) Wire remote control
 - AF/AT = Amp frame / Amp Trip
 - FVNR = Full voltage non-reversing

Remote Control power supply loops 9

Breaker 34

One 250A breaker loop for camp for drilling crew

Local control Power supply loops 26

The precise number and parameters of MCC can be confirmed afterwards.

208/120 Volt Lighting Panel

- The circuit panel will be a 208/120Volt, 3 phase, 4 wire, Light distribute panel feed from MCC. 27 Units.

The precise number and parameters of lighting panel can be confirmed afterwards.

POWER CONTROL HOUSE

- The two (2) power control house will be not more than 13000 mm long, 3000 mm wide and 3100mm high
- Seam welding leaving no sheet edge exposed
- The runners of the skid will be W12 x 45# beams, with integral cross members for a total skid height of 12.25 inches
- There are insulated layer in the roof.
- The inside surface of the walls not covered by equipment will be finished with aluminum panels.

-
- A rubber neoprene mat will run the full length of the interior isle of the house.
 - The door will open to the outside by pushing on a “panic bar”.
 - Two air conditioners will be supplied for VFD house, (recirculation system similar to PDV17)
 - The units will be split system type with the condenser unit (compressor and coil) will be located on an elevated rack of the porch on one end of the house.
 - The top of the condenser unit will be no higher than the top of the house roof.
 - The air handler unit (evaporator coil and fan) will be located within the interior portion of the house.
 - The hot air generated by the VFG & IGBT bridges will be discharged out the top of the cubicles and re-circulated to the air conditioners via the open space between the top of the equipment and the bottom of the roof.
 - Output to the variable-speed motor power connections will be made using single pin connectors in the AC/DC plug panel at one (1) end of the house.
 - Control wires in the VFD/generator cubicle are single conductor apparatus cable rated 600Volts or 2000Volts. AC, insulated a thermosetting (cross-linked) flame retardant polyolefin, for normal operation at 110 deg C.

Cable and Accessories

Whole set of power and control cables include:

- Control cable from master generator to VFD house.
- All power and control cables inside VFD house
- Power and control cables from outgoing board of VFD house to 5 set of frequency conversion motors
- Power and control cables, plugs/receptacles between VFD house and one of the generator power house
- Brake resistor’s power cables and motor cables
- Main power supply and main motor power adopts copper bus method to connect with the terminals of VFD house
- Power cables adopt Chinese made power cable specially designed for rig and ocean platform cable.
- One set dehumidity unit.
- The power and control cable between VFD and rig floor should meet 120m rig moving requirements. There are transfer cases to handle cables
- The receptacles of the encoder should be updated

- The program of PLC should be English and Chinese.

3. Air Supply System

Features:

- Equipped in auxiliary generator house, consisting of 2 screw air compressors, 1 cold start air compressor, 2 dryers, 1 set of 2.5+4 m³ air storage tank and air lines
- Screw air compressor can be automatically start and stop
- Driven by electric motor, its max. continuous power is 37KW
- Air supply system flow sheet:
- Air compressors – dryer – air tank- lines
- Total volume: described as follows
- Total weight: described as follows
- ❖ Air supply hose should meet 120m rig moving requirement, each pipe is 8 meter with valve on one side for convenient connection while rig moving

3.1. Screw air compressor

Model: LS-12-50HH

QTY: 2 Sets

Specifications:

- Rated power: 37kW
- Work Pressure: 1Mpa
- Air production: 5.6m³/min
- Noise: 74dB
- Dimension: 1500x1100x1410mm
- Weight: 850Kg

3.2. Cold Start air compressor

QTY: 1 Set

- Driven: R180 diesel engine
- Rated Power: 7 HP
- Air discharging pressure: 1 MPa
- Air production: 0.8m³/min
- Rotating speed: 1000 rpm

3.3. Dryer

QTY: 2 Sets

Specifications:

- Type: regenerative/desiccant
- Rated Power: 1.2 KW
- Work Pressure: 1MPa
- Capacity: 6m³/min

3.4. Air storage tank

Specifications:

- Volume: 2.5 +4m³
- Work Pressure: 1MPa

3.5. Main air lines

Specifications:

- Diameter: 2"
- Work Pressure: 1.2 MPa

4. Mast

QTY: 1 set

Features:

- The mast conforms to API 4F
- K-style, consist in four sections, eight parts which are connected as a whole with pin rolls.
- Equipped with casing stabbing board, resting board and racking platform.
- Complete with climb safety device and derrick escape line.
- Two 0.5T air winches on racking platform for aiding the racking of the drill collars.
- Counterbalance system for rotary tongs.
- Complete with anchor point to suspend upper logging sheave during stripping and anchor point to suspend block during stripping and cutting.
- Provide with chains on all fingers & safety grip walkway, belly belt rail C/W 2 eyes lines, racking board to be fitted with safety cage.
- Also provide with vapor light, fluorescent lighting system
- Add pressure meter for each buffer cylinder of the mast
- Enhancing the strength of the stalling base of the air winch

Specifications:

- Available height: 45.5 m
- Static hook load capacity: 4500kN(1,000,000LBS)
- Width of top (face/side): 2.5/2.2m
- Height of racking platform: 24.5, 25.5, 26.5m
- Anti-wind capacity:
 - No hook load, full of stands: 36m/s
 - No hook load, no stand: 47.8m/s
 - Lifting and lowering: 8.3m/s
- Racking platform capacity of 5" DP 4000m (13123ft)
- Racking platform capacity of 5" DP HWDP 280m (3136ft)
- Racking platform capacity of 6-1/2" DC 230m (754ft)
- Racking platform capacity of 9-1/2" DC 81m (266ft)
- Racking platform capacity of 8" DC 230m (754ft)
- The height of casing stabbing board 6m (25ft)

Casing Stabbing board

Features:

- Entirety frame is made of channel steel
- Lifted by electric motor capacity 1T, and a flexible tongue on the board
- Adjustable stroke: 6m (20ft)
- Board with safe stop and belly belt fixation point
- Total board can rotate 90 degree to the derrick when not used

5. Substructure

QTY: 1 Set

Features:

- Conforms to API 4F
- The substructure is low position installation
- 2 Units buffer tanks for substructure lifting and lowering
- Corrugated ramp, escape slide rail (two sections), 2 tong tail piles, 3 ladders which one is on right (face Drawworks) to #1 mud tank, one is on back floor, the other is on fore head (as a whole body with ramp) the width of ladder is 800mm.
- Add pressure meter for each buffer cylinder of the substructure
- Add one set eye wash basin
- There is a 40 Ton capacity handling and lifting equipment under the beam; one 4m³ storage tank

- Two 2m high Y drill protector uprights on ramp door, which are fixed by drill pipe joint, connected with 3 protector chains.
- Drill floor is flush mounted (includes rotary table and setback).
- With 150mm high kicking boards around drill floor, 3-5mm clearance from floor, Handrail adopts square steel plate; the entrances on ladders have safety chains.
- All hydraulic and air pipeline is mounted on dark with safety groove.
- With a skid to mount shale shaker tank and shale shaker, poor boy degasser, manifold, moving with substructure together.
- Cooling tank for hydraulic brake also installed on the substructure

Specifications

- Floor height: 9m
- Floor area: 12.8m x 12.3m
- Available height below R/Table beam: 7.6m
- Max. Capacity of R/Table beam: 4500kN (1,000,000lbs)
- Setback capacity (4-1/2" drilling pipe, 28m stand): 5000m
- Setback load: 2200kN (490,000lbs)
- Weight: 190000Kg
- The quality of the setback should better than before, could tolerant the weight of the drill pipes.

6. Hoisting Equipment

6.1. Crown Block

QTY: 1 Set

Features:

- Conform to API 4F/8A specification.
- Consist of frame, guide shaft assembly, main pulley block and rail, match rope roll with sheave.
- Equipped with one lifting rack of 50kN, one sand sheave, two sheave for air winches with 50kN and one cantilever sheave for hydraulic tong with 50kN. Fixed buffer wood for crown block frame.
- Winding wire line by clockwise model

Specifications:

- Max. Load: 4500kN (1,000,000lbs)
- No. of Sheave: 7

-
- Dia. of main sheave: 60" (1524mm)
 - Dia. of drill wire line: 35mm (1-3/8")
 - Dia. of sand line sheave: 762mm
 - Dia. of sand wire line: 14.5m (9/16")
 - Auxiliary pulley diameter: 400mm
 - Overall dimension: 3112x2783x2800mm
 - Weight: 8500Kg

6.2. Traveling Block

QTY: 1 Set

Features:

- Conforms to API 8A specification
- Consist of upper beam, shaves unit, left and right plate units, and keyway and down hoisting hoop.

Specifications:

- Max. Load: (6 x 7 line): 4500kN(1,000,000lbs)
- No. of sheaves: 6
- Dia. of sheaves: 60" (1524mm)
- Dia. of wireline: 35mm (1-3/8")
- Overall dimensions: 2680x1350x974mm
- Weight: 6842kg

6.3. Hook

QTY: 1 Set

Features:

- Conforms to API 8A specification
- Install inner and outer springs into the cylinder to make the standpipe ejected after break out
- Match with location restricted unit at the top of cylinder, preventing hook from freely rotating when lift empty load.
- A rotation lock unit is fix for the hook, locking the hook at any direction of eight symmetric directions.

Specifications:

- Max. Capacity: 4500kN(1,000,000lbs)

-
- Spring travel length: 200mm
 - Main hook open size: 220mm
 - Rotary radius: 465mm
 - Overall dimension: 2953x890x880mm
 - Weight: 3410kg

6.4. Combination Swivel

QTY: 1 Set

Features:

- Conforms to API 8A specification
- Rotary part includes the center pipe and its joints
- Fixed part includes body, upper and lower covers, gooseneck and hoist sub.
- Seal box consists of wash pipe assembly and upper and lower oil seals.
- Spinner includes air motor, gears and single direction air control friction clutch
- Complete with access fitting for wire-line entry on top of gooseneck

Specifications:

- Max. Static capacity: 4500kN (1,000,000lbs)
- Max. Speed: 300r/min
- Max. Working pressure: 35MPa (5000psi)
- ID of center pipe bore hole: 75mm (3")
- ID of Gooseneck and wash pipe: 75mm (3")
- Connections
 - For center pipe: 6-5/8" REG-LH
 - For Kelly: 6-5/8" REG-LH
 - For gooseneck: LP4"-8TPI
- Overall dimension: 3037x1090x1085mm
- Weight (including Kelly spinner): 3060kg

7. Drawworks

QTY: 1 Set

Features:

- VFD controlled AC Motor powered complete Drawworks package, mounted on heavy duty oilfield type skid with accessories suitable for drilling oil/gas wells of depth range 5000m with 4-1/2" drill pipe.
- The Drawworks is driven by two VFD controlled AC motors compound together, and the power is transferred to the main drum through one gear reducer and coupling.
- The drum body is casting welded with lebus groove to make the wire line (35mm) wound orderly.
- Pneumatic over roll anti-crush device.
- The driller's console is installed in the driller's house to operate Drawworks, Kelly spinner, main brake, hydraulic catheads, Crown-O-matic. It is also equipped with air horn, display gauges or air pressure, machine oil, hydraulic pressure.
- Instrument console is also centralized in this house.

Specifications:

- Rated horse power: 1500HP
- Drive motors: Two AC motor, each of 600kW explosion proof VFD motors.
- No. of Drum: Single
- Drum Size: 770 x 1310mm
- Grooving: Lebus Grooved for 1-3/8" drill line.
- Hoisting speed: 1+1R step-less change
- Transmission: Direct gear driven
- Brake: Water cooled hydraulic disk brake
- Auxiliary brake: Regenerative type breaking system
- Crown & floor saver system: Electronic system for preventing accidental hitting of crown block or rig floor by the traveling block
- Skid: Heavy duty oil field type skid
- Overall dimension: 6530x3192x2680mm
- Weight: 36000Kg

Drawworks brake cooling system

- Include a 30m³ rectangular steel tank with two no's of centrifugal pumps, directly connected to two no's of 30 H.P, 3P, 60Hz, 480 V, 1800RPM explosion proof electric motors
- Explosion proof push button control is located at driller's panel with cable & all accessories.
- System supply the cooling water to hydraulic disk brake.

Crown-O-Matic

- A two-position-three-way push over valve is mounted above the main drum, and the position of valve bar is pre-set.
- When the traveling block is lifting too close to crown block, the drill line rolled on main drum will touch the bar of valve, then the valve working, will disengage the clutch, and make the hydraulic disk brake working to stop the Drawworks.

Traveling Block Position Control (Crown and floor saver system):

- Crown & floor saver system: Electronic system for preventing accidental hitting of crown block or rig floor by traveling block
- The system is designed with direct drum shaft detector to detect the operating height of the traveling block.
- The traveling block position will be monitored by PLC that get the data from sensor mounting in drum shaft.
- When the traveling block moves to the preset alarming position, it will make audible and visual alarm automatically. When it moves to speed reducing position, it will speed down automatically.
- When it moves to the emergency position, the system will give braking signal automatically and start braking device to prevent the traveling block from collision.
- In the event of pre-set travel limits are exceeded, all disc brakes are set for an emergency stop.
- The driller should set the lower limit location from the driller's controls. The lower limit will vary due to the frequent changes in tools for drilling and tripping.

7.1. Hydraulic disc brake

Features:

- Consists of 4 working calipers and 2 safety calipers
- Working calipers are normally opened for controlling brake moments and adjusting bit feeding, weight on bit, and penetration rate.
- Safety calipers, are normally closed for emergency brake to realize crown block anti-crush and rotary table saving.
- As hydro is incompressible, we can realize a remote quick response control, so its control panel can be centralized in driller's house.
- Adopts electronic hydraulic brake, increasing accuracy of the brake

Specification

Hydraulic control system

- Rated working pressure: 8 MPa

-
- Working fluid: hydraulic oil
 - Rated output flow in single pump: 15L/min
 - Oil tank volume: 80L
 - AC motor power: 2.2Kw
 - Accumulator capacity: 4x6.3L
 - Cooling water flow: 2m³/h
 - Dimension: 1160x960x1220mm
 - Weight: 650kg

Working Caliper

- Single side max. positive pressure force: 75kN
- Piston effective working area: 12271.8mm²
- Dimension (Dia. x length): 165 x 390mm
- Weight: 210kg

Safety Caliper

- Single side max. positive pressure force: 90kN
- Braking pad max. working clearance: 1mm
- Piston effective working area: 12644.9mm²
- Dimension (Dia. x Length): 210 x 368mm
- Weight: 224kg

7.2. Driller's Cabin

QTY: 1 Set

Model: BD-2

- Hydraulic disc control handle, drill watch, air control panel, VFD control panel, TOP DRIVE panel etc are all centralized in this house and distribute reasonable.
- The driller can operate all the functions sit down on a swivel chair, and can have a good sight of rig floor, easy to monitor the monkey board and traveling block position.
- The power of the driller house air conditioner is individual loop, the power of the hydraulic brake has backup loop.
- Complete with microphone, rain wiper op top and front.
- **CCTV monitoring system**
MODEL:
 - Four cameras for monitoring
 - The screen should be 10" and sunlight readable
 - One for flow line
 - One for platform

-
- One for mud pump
 - One for Drawworks
 - Complete with explosion proof air conditioner to make driller work comfortable.

7.3. Auxiliary brake-regenerative braking system

- Consist of brake unit and resistor box.
- The rated power of the brake unit is ten units of 200KW. Electric energy is fed into converter when the motor of Drawworks is decelerated.
- In order to prevent overvoltage tripping, a braking resistor box is used to convert this energy into heat. This resistor box may be a part of the breaking unit or it is connected to it. The braking unit is connected to the DC bus terminals of the drive of Drawworks.
- When the DC bus voltage reaches a pre-defined limit, the braking unit automatically turns on and prevents the DC bus voltage from continuing increase.
- The braking unit operates autonomously.
- The power supply of the electronics is integrated in the unit.

7.4. Automatic Driller

- Automatic driller unit consist of variable-frequency drive controller, auxiliary Drawworks VFD controlled AC motor, encoder, pressure sensor, and industrial human machinery interface, etc.
- It will compare the main control circuit feedback signals, such as drilling pressure, drilling speed, and rotary table torque, with the set point of drilling pressure and speed, and control the auxiliary Drawworks VFD controlled AC motor variable frequency system by digital controller, to ensure the pressure and speed stability and accuracy of bit feeding.

VFD controlled AC motor

- Model: Siemens 1LG42234AA94Z
- Rated Power: 42.5Kw
- Rated voltage: 460V
- Rated current: 67A
- Rated rotary speed: 1775 rpm
- Max. rotary speed: 2800 rpm
- Rated frequency: 60 Hz
- Max. Frequency: 100 Hz
- Rated torque out: 229 N.m
- Protection class: IP54

Function

- Weight on bit limit to prevent the drill bit stuck
- Penetration rate limit to prevent the drill bit sliding
- Rotary table torque limit to prevent over torque
- Weight on bit accuracy: $\pm 5\text{kN}$

7.5. A.C. motor

QTY: 2 Sets

Specifications:

- Rated Power: 600KW
- Rated Voltage: 600V
- Rated current: 714A
- Rated speed: 661rpm
- Rated torque: 8684N.M
- Insulation class: 200
- Cooling: forced air
- Protection class: IP54
- Blower: 15HP (include air cleaner)
- Dimension: 1450 x 1080 x 1650mm
- Weight: 2650 kg

7.6. Cooling water tank

QTY: 1 Set

8. Rotary table

QTY: 1 Set

Features:

- Conforms to API 7K specification.
- Independently driven
- With master bushing for full range of inserts bowl for running 20", 13-3/8", 9-5/8", 7" and 5-1/2" casing
- Should consider the protection for the mud and fuel going into the motor from drilling floor

-
- Add one set of rotary table protecting mat

Specification

- Max. Opening: 952.5mm (37-1/2")
- Max. Static load: 5850kN (1,300,000lbs)
- Max. Output torque: 32362N.m
- Max. Rotary speed: 300 rpm
- Gear ratio: 3.56:1
- Overall dimension: 2468x1810x718mm
- Weight (exclude main bushing): about 7970kg

8.1. AC Motor

QTY: 1 Set

Specifications:

- Rated power: 800KW
- Rated voltage: 600V
- Rated current: 915A
- Rated Speed: 741rpm
- Rated torque: 10310N.M
- Insulation class: 200
- Cooling: Forced air
- Protection class: IP54
- Blower: 15HP (include air cleaner)
- Dimension: 1570x1080x1650mm
- Weight: 3100kg

8.2. Transfer case

- Consists of input shaft, output shaft, clutch, and brake
- Main drive skid
- Standard air inertia brake
- Transmission support feet
- Shafting
- Flexible couplings
- Coupling spacer between rotary table and transmission.

8.3. Bushings

QTY: 1 lot

-
- Complete range of bushings to run different sizes of casing with lifting sling and hooks.
 - One number of pin drive hinged master bushings for 37-1/2" rotary table.
 - Insert bowl No.1 for 13-3/8" and 11-3/4" casing
 - Insert bowl No.2 for 10-3/4" and 9-5/8" casing
 - Insert bowl No.3 for 2-3/8" – 8-5/8"
 - 20" insert bowl to run 20" casing
 - One set roller Kelly bushing for 5-1/4" hex Kelly complete with wrench.

8.4. Rotary table Anti-mat

QTY: 1 set

9. Drill floor equipment

9.1. Hydraulic cathead

QTY: 2 Set

Specifications:

- Rated working pressure: 16 MPa
- Rated flow: 120L/min
- Drawing length: 1500mm
- Drawing Strength: 160kN

9.2. Counterweights

- Two (2) counterweights for tongs and spinning wrench, complete with buckets, guides, blocks and galvanized wire line and clamps.

9.3. Mouse Hole

In order to use short drilling tools conveniently, should has movable pin on the mouse hole starting 10ft from the up of it, partition distance is 3ft.

9.4. Rat hole

- OD 9-5/8" x 15m
- About I.D – 8"

9.5. Air winch on racking board

QTY: 2 set

- Air pressure request: 0.5 ~ 0.9 MPa
- Rated load: 5kN
- Max. rope speed: 12m/min
- Rope diameter: 8mm
- Rope capacity: 300m
- Overall dimensions: 675x343x460mm
- Weight: 117kg

9.6. Air winch on rig floor

QTY: 2 sets

- Air pressure request: 0.5 ~ 0.9 MPa
- Rated load: 50kN
- Max. rope speed: 35m/min
- Rope diameter: 5/8"(15.875mm)
- Rope capacity: 120m
- Overall dimension: 1254x900x989mm
- Weight: 418kg

10. Rig pumps and others

10.1. Mud pumps

QTY: 3 Sets

Features:

- Each pump is driven independently by one 1200 KW VFD controlled AC motor through belt transmission device. It is located on long oilfield skid. AC motor is located on the rear skid.
- Advance structure, small volume, high reliability and easy for maintenance
- API #7 valves adopted, suction valves and discharge valves can be interchanged.
- The hydraulic cylinder is alloy steel forged.
- The 3 hydraulic cylinders of every pump can be interchanged.
- Cylinders are straight way type, namely a kind of valve-over-valve structural design, it has reduced the bulk volume of cylinders and has improved the internal volume efficiency.
- Pressure and splash lubrication.
- Complete with belt transmission components for pumps, including skid, motor seat with terminal strand, combined narrow V belt, sheave and guards.

-
- ❖ The connectors between the 12" pipes adopts union type
 - ❖ With three air balloon for spare parts.

Technical specifications:

- Type: triplex single acting piston type
- Maximum liner Dia. x stroke: 180x305mm
- Rated strokes: 120spm
- Nominal power rating for one 1193KW (1600HP)
- Lubrication: pressure & splash
- Valve pots: Valve over valve, API #7
- Valve cover: screw type
- Liner lock: Screw type, Metal to metal
- Liner available size: 5-1/2", 6", 6-1/2", 7"
- Maximum working pressure: 34.5MPa
- Maximum discharge capacity: 45.41 L/S
- ID of discharge: 130mm (5")
- ID of suction pipe: 305mm (12")
- Dimension: 4875x3262x2955mm
- Weight: about 27010kg

10.2. Rig Pump Driving Unit-AC motor

QTY: 3 Sets

❖ Blower should consider installing sand cleaner

- Rated Power: 1200KW
- Rated Voltage: 600V
- Rated Current: 1354A
- Rated Speed: 1000rpm
- Rated Torque: 10502 N.M
- Insulation Class: 200
- Cooling: forced air
- Protection Class: IP54
- Blower: 15HP (Include air cleaner)
- Dimension: 1750x1250x1650mm
- Weight: 3200Kg

10.3. Super charging pump

QTY: 3 sets

-
- Capacity: 200m³/h
 - Lift: 35m
 - AC motor power: 55KW, 60Hz

10.4. Double Standpipe

Features:

- 4" ID double standpipes with goosenecks connected to rotary hoses at upper ends and the lower ends connected to an H-type mud manifold
- All connections are quick couple union type.

Technical Specifications:

- Working pressure: 35 MPa
- OD/ID: 5" / 4"
- Working medium: Water, mud, mixture of fluid
- Height from the drilling floor to the union of gooseneck: 17.5m, 21.5m (for top drive)

10.4.1. Mud Manifold

Features:

- It consists of floor manifold, pressure gauges, ground high pressure pipelines and valves
- Pre-install interfaces and gates on the drilling floor for drilling instruments, logging instruments, kill manifold, fill-up lines, etc. and all to be vertically up mounted to meet the requirements of drilling, cementing, killing and other operations.
- Floor manifold forms H-type, completed with pressure gauges and sensors for instrumentation.
- Equipped double ground pipelines with valves from mud pump to floor manifold
- Equipped line for jet Cellar and line for killing
- With fill up outlet and two 2" outlets having FIG.1502 connections.
- High pressure pipes should meet 120m rig moving requirements

Technical Specifications:

- Working pressure: 35MPa
- Test Pressure: 56MPa
- OD/ID: 5" / 4"

- Working medium: Water, mud, mixture of fluid
- No. of 4" API gate valve DN100 union: 5
- No. of 2" API gate valve DN50 union: 2
- Ambient temperature: -29 ~ 80

10.4.2. 15' short hose

Technical Specifications:

- Working pressure: 35MPa (5000psi)
- Test pressure: 56MPa
- OD/ID: 5"/4"
- Pipe Connection: 4" LP
- Length: 15'

11. Mud System

- The system consists of 6 main mud tanks, 6 active tanks total volume is 314m³.
- Except shale shaker tank, other tank base is equipped on oil field base skid. Consist of different number of cylinder.
- All AC motors are explosion proof type
- Shale shaker tank is rectangular style, moving with the main rig while rig moving between wells, using two 55KW sand pump to transport mud to treating tank, the return mud pipes could extend to 120m
- The connecting pipes between cylinders should have valves.
- Add one set eye wash basin
- All agitators adapt ZJW series

11.1. Shale shaker tank

QTY: 1 set

- The tank consists of three compartments: sediment compartment and metering apartment and one transfer apartment.
- One 10HP (7.5KW) agitators and one 15HP agitator
- This tank is rectangular style
- Three shale shakers be installed
- Two 55KW mud transfer pumps

Item	Name	Volume
1	Sediment Compartment	18

2	Metering Compartment	10
3	Transfer Compartment	14
Total		14m ³

11.2. Treating tank

QTY: 1 Set

- The tank consists of four compartments (cylinders), one 15HP (11KW) agitator and five 7.5KW agitators.
- Three 55KW sand pumps to supply mud to de-sander, de-silter, degasser
- Installing de sander, de-silter, degasser and centrifuge

Item	Name	Volume
1	Degas Compartment	4
2	Sediment Compartment	4
3	De-sanding and de silting compartment	13
4	Centrifuge compartment	16
Total		44m ³

11.3. Intermediate tank

QTY: 1 set

- The tank consists of four compartments (cylinders), one 15HP (11KW) agitator in each compartment.

Item	Name	Volume
1	Suction compartment	16.5
2	Storing compartment	16.5
3	Centrifuge compartment	16.5

4	shearing compartment	14.5
Total		64m ³

11.4. Suction tank

QTY: 1 set

- The tank consists of four compartments (cylinders), one 15HP (11KW) agitator in each compartment.

Item	Name	Volume
1	Suction compartment	16
2	Suction compartment	16
3	Suction compartment	16
4	Suction compartment	16
Total		64m ³

11.5. Mix Tank

QTY: 1 set

- The tank consists of three compartments (Cylinders), one 15HP (11KW) agitator in each compartment

Item	Name	Volume
1	Circulate compartment	16
2	Circulate compartment	16
3	Circulate compartment	16
4	Circulate compartment	16
Total		64m ³

11.6. Reserve tank 1

- The tank consists of three reserve compartments (cylinders) with one 15HP (11KW) agitator in each compartment.

Item	Name	Volume
1	Reserve compartment	16
2	Reserve compartment	16
3	Reserve compartment	16
4	Reserve compartment	16
Total		64m ³

11.7. One set of skid mounted hopper with sand pumps

11.8. One set of rain shield

11.9. 100m³ Water tank

QTY: 1 set

Features:

- One set of 100m³ water supply system. It is completed with two tanks (one can be put into another when remove), two sets of electric cooling water pump (driven by explosion proof motor), lever meter, pipes and check valves, etc.
- The tank is made up of triangular groove armor plate with thickness 6mm. The height of the tank base is 320mm, and two main girders made of “I” form steel products. The top of the tank is spread with flower pattern steel plate.
- A sand discharge gate is fixed on one side of the tank.
- Dustproof breath valve and manhole are fixed on the top of the tank.
- The water tank has sand-proof pump room. 2 units ISG80-125 O centrifugal pumps (Handling capacity 60m³/h, raising head 18m, motor power 4KW) are contained in the pump room.
- The pump unit can supply water from tank truck to water tank or from the water tank to solids control system.
- The pipeline is connected by hammer tie-in with DN80
- An explosion proof control box (start – stop station), a head-lamp and a water level meter are fixed in the pump room.

- All joint such as bolts are galvanized
- All valves are stainless steel ball valves
- The centrifugal pumps should adopt horizontal type

Specifications:

- Overall dimensions: 11800x3200x2900mm
- Capacity: 100m³

11.10. Solids control centrifugal pumps

QTY: 1 set

- Seven sand pumps, three hopper and one shearing pump are mounted on one skid complete with piping to connect with mixing tank.

11.10.1. Sand Pump

QTY: 4 Sets

- Capacity: 200m³/h
- Lift: 36m
- AC motor power: 55KW, 60Hz
- For weighting pump.

11.10.2. Weighting pump SB6"x8" ~ 13"

- Flow: 240m³/h
- Lift: 37m
- Power: 75KW
- Rotate speed: 1480rpm

11.10.3. Shearing pump WJQ5"x6" ~ 10"

- Flow: 155m³/h
- Lift: 32m
- Power: 55KW
- Rotate speed: 2280rpm

11.11. Poor boy degasser

QTY: 1 set

YQF-1200/1.5

- Diameter: 1200mm
- Max. Working pressure: 1.5MPa
- Max. handling capacity: 400 m³/h

- Outlet pipe ID: DN300mm
- Air release pipe ID: DN300mm
- Outside dimension: 9011x2300x2250mm
- Weight: 3000kg

12. Well control equipment

- According to the latest API 16A standard, NACE MR-01-75 and quality standard of ISO 9001
- Available to H2S Trim

12.1. Annular BOP

QTY: 1 set

Annular 21-1/4" x 2000psi

- Model: 21-1/4" - 2000psi
- Bore: 21-1/4in
- Working pressure: 14MPa/2000psi
- Strength test pressure: 21MPa/3000psi
- Hydraulic Pressure: ≤10.5MPa/1500psi
- Closing fluid volume: 25.2 gallon (94.5L)
- Opening Fluid volume: 25.4 gallon (95.3L)
- Hydraulic connection: NPT1"
- Top connection type: 21-1/4" -2000 6B R73 Studded
- Bottom connection type: 21-1/4" -2000 6B R73 Flanged
- Weight: 17022lbs (7660kg)
- Dimensions: 5x5x4.7ft (1512x1512x1437mm)

Annular 13-5/8" x 5000psi

- Bore: 13-5/8"
- Working pressure: 5000psi
- Top connection type: 13-5/8" -5000PSI 6BX BX160 Studded
- Bottom connection type: 13-5/8" – 5000PSI 6BX BX160 Flanged
- Net/Gross weight (Kg): 6415/6550
- Dimensions (mm): 1271x1271x1150 / 1400x1400x1400

12.2. Single ram preventer

QTY: 1 set

- Bore: 13-5/8"
- Working pressure: 5000psi (35MPa)

- Top connection type: 13-5/8" -5000PSI 6BX BX160 Flanged
- Bottom connection type: 13-5/8" – 5000PSI 6BX BX160 Flanged
- Net/Gross weight (Kg): 3570/3700
- Dimensions (mm): 2400x800x885 / 2500x900x1050

12.3. Double ram preventer

- Bore: 13-5/8"
- Working pressure: 5000psi (35MPa)
- Top connection type: 13-5/8" -5000PSI 6BX BX160 Flanged
- Bottom connection type: 13-5/8" – 5000PSI 6BX BX160 Flanged
- Side outlets: 1x4-1/16"- 5000PSI 6B R39 studded; 1x 2-9/16"-5000PSI 6B R27 Studded
- Net/Gross weight (Kg): 6150/6300
- Dimensions (mm):2400x920x1340 / 2500x1020x1500

12.4. Drilling Spool

QTY: 1 Set

Drilling spool working pressure 21-1/4" x 2000 psi

- Flanged top and bottom
- Two 4-1/16" flanged side outlets with valves

Drill spool working pressure 13-5/8" x 5000 psi

- Bore: 13-5/8"
- Working pressure: 5000psi (35MPa)
- Top connection type: 13-5/8" – 5000PSI 6BX BX160 Studded
- Bottom connection type: 13-5/8" – 5000PSI 6BX BX160 Flanged
- Side outlets: 1x4-1/16" – 5000PSI 6B R39 Flanged; 1x2-1/16" – 5000PSI 6B R27 flanged
- Net/gross weight (kg): 800/850
- Dimensions (mm): 950x678x650 / 1050x780x850

12.5. Pipe rams assembly

- 9-5/8" 1 Set
- 7" 1 Set
- 6-5/8" 1 Set
- 5" (2 Sets)
- 4-1/2" (2 Sets)
- 3-1/2" (2 Sets)

-
- 2-7/8" (2 Sets)
 - Blind ram (2 Sets)

12.6. Hydraulic choke valve

- Nominal diameter: 4-1/16", working pressure: 5000psi
- Outside connection: flanged, working temperature: P ~ U
- API6A, PSL2, PR1

12.7. Hydraulic kill valve

- Nominal diameter: 2-1/16", working pressure: 5000psi
- Outside connection: flanged, working temperature: P ~ U
- API6A, PSL2, PR1

12.8. Manual choke valve

- Nominal diameter: 4-1/16", working pressure: 5000psi
- Outside connection: flanged, working temperature: P ~ U
- API6A, PSL2, PR1

12.9. Manual kill valve

- Nominal diameter: 2-1/16", working pressure: 5000psi
- Outside connection: flanged, working temperature: P ~ U
- API6A, PSL2, PR1

12.10. Choke & kill manifold

- Nominal diameter: 4-1/16", working pressure: 5000psi
- Outside connection: flanged, working temperature: P ~ U
- API6C, PSL3, PR1

12.11. Swaco digital choke console

- The M-I Swaco digital super choke console provides drillers one of the most accurate and quick response choke control systems in the industry.
- The panel layout is ergonomically designed to provide operator control with user friendly placement of gauges. The console has both digital and standard 10,000psi (689bar) drill pipe and casing pressure gauges, a 3,000psi (207 bar) gauge to display hydraulic pressure for each system and a 200 psi (14 bar) gauge to display air supply pressure. The panel features a large choke position indicator gauge.
- High-speed bypass valve and two choke open/close speeds – "Regulated" and "Maximum"

12.12. BOP control system

QTY: 1 EA, Mode FKQ720-6

Features:

- FKQ720-6 model BOP control system will be a complete air/hydraulic system designed for the control and the operation of surface mounted BOP stack.
- Should consider about the power cable extending 120m

BOP Control System consisting of:

One (1) remote control panel include the following major components unitized and mounted on an oilfield skid of heavy duty welded steel construction:

- One (1) 1290 liter (340 gallon) oil tank, complete with 1" drain plug, 2" air vent, internal baffles electric low level switch, sight glass gauge and four (4) 4" large inspection port.
- Twelve (12) 60 liter (15 gallon) capacity 21MPa (3000psi) WP accumulators, which are arranged in both sides and equipped with ball valve in any bank, bladder type pre-charged with nitrogen gas. This vessel meets API requirements. Accumulators are provided with ASME U-1A certificates.
- One (1) electric motor driven triplex pump, completes with automatic pressure switch and relief valve. Pump flow rate 42liter/min. (11.4GPM) at 21MPa (3000psi) output pressure. Explosion proof motor 18.5KW, 3Ph, 460V/60Hz.
- Two (2) pneumatic pumps with capacity of 4.5 liter/min. (1.2 GPM) and 21MPa (3000psi) output pressure with a 0.53MPa air supply. The ratio of liquid/air is 60:1.
- One (1) control manifold consisting on the following major components:
 - a) Six (6) 1" manual/remote operated 3-pos/4-way control valves for the controlling of:

Annular preventer	(open/close)
Pipe ram preventer	(open/close)
Blind preventer	(open/close)
Pipe ram preventer	(open/close)
Choke valve	(open/close)
Kill valve	(open/close)
 - b) Three (3) 100mm OD pressure gauge for the following pressure indication:

Accumulator pressure: 0-40MPa (0 – 5800psi)
Manifold pressure: 0-40Mpa (0 – 5800psi)
Annular supply pressure: 0 – 25MPa (0 – 3570psi)
 - c) One (1) 1" hydraulic regulator assembly:

One (1) 1" manual/air remote regulator
One (1) air pressure regulator
One (1) 2-position, 3-way distribution valve
 - d) One (1) 1" hydraulic regulator assembly for the regulating of the manifold function pressure.

-
- e) One (1) 1" 2-position, 4-way manual/remote operated control valve for operation of the manifold pressure bypass function.
 - Three (3) air transmitter for the remote indications of the following pressure reading:

Accumulator pressure:	(0-5800psi)
Manifold pressure:	(0-5800psi)
Annular supply pressure:	(0-3570psi)

Driller panel:

One (1) driller's control panel suitable for control of the BOP stack, and consist of the following main components:

- Seven (7) of 3-position, 4-way air operate valve, for the remote operation of the following functions:
 - ❖ Annular preventer: (Open/closed)
 - ❖ Pipe ram preventer: (Open/closed)
 - ❖ Blind preventer: (Open/closed)
 - ❖ Pipe ram preventer: (Open/closed)
 - ❖ Choke valve: (Open/closed)
 - ❖ Kill valve: (Open/closed)
 - ❖ Manifold bypass valve: (Open/closed)
- One (1) set of air pressure regulator, for the remote operation of the following function:

Annular air pressure	(Increase/decrease)
----------------------	---------------------
- Four (4) 100mm OD pressure gauge for the indication of the following pressure readings:
 - ❖ Annular pressure: 0 – 25MPa
 - ❖ Accumulator pressure: 0 – 40MPa
 - ❖ Manifold pressure: 0 – 40MPa
 - ❖ Air supply pressure: 0 – 2.5MPa

Auxiliary panel:

One (1) graphic auxiliary drillers control panel suitable for control of the BOP stack. The panel will consist of the following main components (can't indicate the position of open/close):

- Seven (7) of 3-position, 4-way air operated valve, for the remote operation of the following functions:
 - ❖ Annular preventer (Open/close)
 - ❖ Pipe ram preventer (Open/close)
 - ❖ Blind rem preventer (Open/close)
 - ❖ Pipe ram preventer (Open/close)
 - ❖ Choke Valve (Open/close)
 - ❖ Backup Valve (Open/close)
 - ❖ Manifold bypass valve (Open/close)

- Four (4) 100mm OD pressure gauge for the indication of the following pressure readings:
 - ❖ Annular pressure: 0-25MPa
 - ❖ Accumulator Pressure: 0-40MPa
 - ❖ Manifold Pressure: 0-40MPa
 - ❖ Air supply pressure: 0-2.5MPa

Air cable:

- Two (2) air cables will be 50 meters

Pipe racks and hydraulic hose:

- Hydraulic hose 1", 10m
Twelve (12) of hydraulic hose, 1" 35MPa (5000psi) WP, 10 meter long, for the interconnection between pipe rack and universal self-seal pipe joint, fire shield to API 16D
- Pipe racks
Three (3) interconnecting pipe racks, 35MPa (5000psi) WP, 5 meter long each, with 12x1" 35MPa (5000psi) WP steel pipes with hammer unions at both end for connecting.
- Hydraulic hose 1", 5m
Twenty four (24) of hydraulic hose, 1" 35MPa (5000psi) WP, 5 meter long, for interconnection of control system and pipe racks, fire shielded to API 16D.
- Universal self-seal pipe joint
Twelve (12) universal self-seal joint, connecting BOP and hydraulic hose (10m).
- Hammer unions
Thirty six (36) hammer unions

**13. Drilling instrumentation
Technical Specifications**

- It monitors and alarms the parameters of hook load, weight of bit, rotary table RPM, rotary torque, tongue torque, pump SPM1,2,3 pump pressure, mud return flow, depth, ROP, mud pit/trip tank volume.
- The sensors are installed at the corresponding places of the rig. The data acquisition unit (DAQ) requires device net CAN bus (port for top drive RPM/torque is preserved) all sensors connect to the CAN bus and can be added as user needs.
- The monitor installed in driller controlling cabin require PC104 computer with TFT LCD and touching screen (-40-60), it can acquires and stores data independently, Data recording and storing system installs in the engineer's office.
- It displays curve, data and meter in pages. And it records, stores and printouts the real-time data changing in digital and curves. It also can recall and print the historical data and curve.
- The display is marked in English and Spanish. The meters utilize SI Metric/ANSI unit.
- The derived parameters of bit time, ROP, accumulated SPM, total SOM and kN.m are displayed on computer.
- **Operating software**

Specifications:

- Power supply: 110V AC +20%, 60 Hz + 10%
- Operating environment: - 40 to 60 (equipment in open area)
- Hook load: 0-5000KN, 10/12 line strung
- Rotary table RPM: 0-300RPM
- Rotary torque: 0-1000AMPS
- Tong torque: 0-100kN.m
- Pump SPM: 0-200 SPM
- Pump pressure: 0-40MPa
- Mud return flow: 0-100%
- Depth of hole: 0-9999.99m
- Level of mud pit: 0-5m
- System accuracy: display = \pm 2.5%, record = \pm 1%

Equipment supply

13.1. Sensors:

- 1x Weight load sensor
- 1x Depth sensor
- 3x Pump SPM sensor
- 1x RT RPM sensor

-
- 1x Pump pressure sensor
 - 1x Mud return flow sensor
 - 1x Rotary torque sensor (electrical)
 - 1x Tong torque sensor
 - 8+1x Ultra-sonic probe

13.2. Display system at driller's console

- TFT LCD with touching screen
 - Hook load
 - Weight on bit
 - Rotary table & top drive RPM
 - Rotary table & top drive torque
 - Tong torque
 - Pump SPM1,2,3
 - Pump pressure
 - Mud return flow
 - Well depth
 - Ton. Mile of drilling line
 - ROP (rate of penetration)
 - Mud pit/trip tank volume (gain/loss)
- Mechanical meters on driller's console:
 - 1 x Weight indicator
 - 1 x stand pipe pressure gauge
 - 1 x Tong torque meter
 - 1 x Rotary torque meter

13.3. Data acquisition System

- Device Net CAM BUS with CAN card

13.4. Recording system

- 1 x Industrial PC
- 1 x wide color printer
- 1 x software in English & Spanish
- 1 x Online UPS

13.5. Mounting Accessories

- 3 x Mounting parts of pump SPM sensor
- 1 x Mounting parts of rotary RPM sensor
- Mounting parts of mud return flow sensor
- Mounting parts of pump pressure sensor
- 10 x Mounting parts of ultra-sonic probe
- 1 x Mounting parts of Weight load sensor
- 1 x Mounting parts of depth sensor
- 1 x Mounting parts of rotary torque sensor (Electrical)
- 1 x Mounting parts of Tong torque sensor

13.6. Hydraulic hose, cables and fittings

- Weight indicator hose

- Pump pressure hose
- Tong torque hose, 15m
- 2* cable from pump SPM sensor 1,2,3 to signal barrier box, each
- 1* cable, from signal barrier box to CAN BUS
- Cable, rotary torque sensor to CAN BUS
- Cable, depth sensor to CAN BUS
- 9* cable, ultra-sonic probe to CAN BUS
- 1* cable, DAQ to LCD screen, 30m
- Co-axial cable, DAQ to recording unit
- Cable, rig site power supply control case to system power supply

14.Others

14.1. Cat Walk

QTY: 1 Set

- Two sections, 2 meters wide, 8 meters each section.

14.2. Pipe racks

QTY: 10 sets

- Length of pipe rack: 7m

14.3. Necessary parts

- Including cable channel, dead line stabilizer, fast line guide, assemble parts and tools, ladders with hand rail, and space slide, etc.

14.4. Dog house

- Equipped on support frames (driller's side), the walls are made of 2.5mm thickness corrugated steel sheets.
- Consist of two cabins, one is for hydraulic power station, another for driller's coffee break

14.5. Tool house:

- Equipped on support frames (off-driller's side), the walls are made of 2.5mm thickness corrugated steel sheets
- Consist on two cabins, one is for drilling tools (subs), another for handle tools.

14.6. 7000ft Drilling line

- Conforms to API 9A
- Model: 6x19S IWRC EIPS
- Diameter: 35mm (1-3/8")
- Complete with support frame for drum/cover, and has drilling line drum power driver

14.7. Drilling line spooler

- Used for spooling, pulling out and storing drill line

- Rated work pressure: 16MPa
- Capacity of the spooler could wind 7000' wire line

14.8. BOP Trolley unit

- BOP trolley unit and hoisting equipment are mounted under the structure
- C/w rail and hydraulic hoists to move BOP, two 200kN job crane.

14.9. DH350 Forged elevator links

QTY: 1 Set

- Comply with API SPEC 8A
- Max static load: 3150kN
- OD: 2-3/4"
- Length: 3300mm(130")

14.10. DH500 Forged elevator links

QTY: 1 Set

- Comply with API SPEC 8A
- Max static load: 4500kN
- OD: 3-1/2"
- Length: 3660mm(144")

14.11. Dead line anchor

QTY: 1 set

Features:

- According to the standards API 8A
- Equipped at the bottom of derrick opposite to driller's position
- Completed with a tension type weight sensor
- Complete with an operating plate (1.5m height, handrails on three sides) for spooling dead line
- Complete with jumper bars to prevent wire from jumping off the anchor

Specifications:

- Suitable wire diameter: 35mm (1-3/8")
- Max load: 340KN
- Weight: 700kg

14.12. Hexagonal Kelly

QTY: 2 nos

Specifications:

- Size: 5-1/4" & 3-1/2"
- Length: 12.2m
- Upper connection: 6-5/8" REG. Box (L.H)
- Lower connection: 4-1/2" IF & 3-1/2" IF, pin (R.H)

- Complete with boot and subs

14.13. Rotary hose

QTY: 2 nos

Technical specifications:

- Working pressure: 35MPa (5000psi)
- Test pressure: 56MPa
- OD/ID: 4"
- Pipe connection: 4"LP
- Length: one is 19m, the other is 23m
- Adopt height quality of the rubber

14.14. Cellar pump

Model: LSB100

QTY: 1 Set

Specification:

- Power: 45kW
- Flow rate: 220m³/h

15. Electric circuit system

15.1. Electricity circuit system on well site

Technical proposal

- ❖ Rated Voltage: 480/120V (3phase, 4 wire)
- ❖ Rated frequency: 60Hz

System includes: Solid control district, drilling floor district, pump district, water supply district, well site control district, houses of well site, etc. electric equipment, illumination lamp of districts above buildup power supply system by explosion-proof plugs and receptacles, heavy rubber cover soft cables, pipe covering of cable, explosion-proof flexible pipe, cable groove, explosion-proof function box, and also the grounding system for the drilling rig.

15.1.1. Solid control tank district

- The alternating current dynamo more than 30kW are controlled in MCC house and self-power supply, start in two different place
- The alternating current dynamo less than 30kW adopt separate area power supply of separate area, in the side of motor only setup control button, the button can carry out mechanical lock out.
- All area illuminate and power electrical source are lead to from MCC house

15.1.2. Drilling floor district

Drilling floor can supply power own, dog houses of it is mounted one multistage explosion-proof style illumination control box for controlling equipment and illumination.

One trip pump can be long-distance controlled, the button is introduced into the drilling worker control house.

15.2. Lighting system for main rig

- Explosion proof heavy duty 2 x 40W fluorescent and 400 watt. Explosion-proof lamp lighting system designed for use with land rig mast, substructure, mud tank system and other drilling equipment and its surrounding area. Rig lighting system should be 208/120 V A/C, 60Hz. All cables, plugs, sockets, junction boxes used in this rig lighting system should be explosion proof.
- We use explosion-proof junction box and steel pipes for derrick and the explosion-proof junction box is fixed. The connection of lamps and each section derrick use connector assembly. Derrick illumination is introduced and controlled from two sides of derrick. There are about 14 sets 40w double-pipe explosion-proof lamps. Amount of them, 2 sets 40w double-pipe explosion-proof lamps are mounted on the derrick distance 3m about from drilling floor. One set 40w double-pipe explosion-proof lamps lash-up is mounted on the monkey board. It should be consider the reliability of falling-proof unit when installing lamps.

15.3. Emergency lighting

- Portable emergency lighting system with battery backup at important locations like rig floor, stairs, VFD and generator house etc. should be considered.
- Backup time: 2 hours
- 2 no. 40watt (min) fluorescent bulb/tube with high quality reflector.
- Charging system: Self-contained automatic charger 208/120 volt, 60Hz

15.4. Rig area/ camp area lighting

4 Sets 400W floodlights for the well site explosion-proof lighting in other regions

No.	Product name	Use of the site	Quantity	Remarks
1	Explosion-proof fluorescent lamp	Well field	51	
2	Explosion-proof emergency fluorescent	Well field	11	
3	Explosion-proof floodlight	Well field	26	Appleton
4	Explosion Aviation Light	Crown	2	

15.5. Rig ground system

The whole electrical installation of the rig shall be earthed by inline quick disconnect type adequate rating cooper wires and rods according to accepted international standards.

16.Communication system (Canada):

QTY: 1 Set

- This system is a network which ensures easy communication, either individual or general.
- Between different posts in different places on a drilling rig (about 200x200) meters area including hazardous and non-hazardous locations
- 24 hours supervisor (non-hazardous locations)
 - Driller (explosion proof)
 - Mud tanks (explosion proof)
 - Racking platform (explosion proof)
 - VFD house (explosion proof)
 - Company man
 - Toolpusher

And other (non-hazardous locations)

The system must include the following

- Outdoor communication stations must include speaker amplifier and visual alarms (compacting system for evacuations)
 - Cables for system interconnection if applicable (Rig up kit)
 - Accessories:
 - Battery back-up system
 - Operating conditions:
 - Every station of the system must comply with its emplacement on the site, either hazardous (explosion proof) or non-hazardous location. The offices communication stations (handsets) should include speakers amplifier and visual alarm
- Power supply: 85-265 VAC, 50-70Hz

17.Top drive 500 Ton

QTY: 1 Set

- ❖ The power cables could be extend within 120m, and with transfer receptacles
- ❖ VFD house equip with one set humidity device

Description	Metric	English
Hoisting capacity	4500kN	500 ton
Zero speed rotation torque (continuous)	100%	

Zero speed rotation overload capacity (1min)	150%
RPM Range	0 ~ 220 r/min
Ambient temperature	-20°C < t < 55 °C
Altitude	≤1200m

18.Solid control equipment (Swaco)

Specification:

18.1. Shale shaker

QTY: 3 Sets

Mongoose Dual-motion shaker Specifications:

Dimensions

- Mongoose with header box
- Length: 120in (3,048mm)
- Width: 65in (1651mm)
- Weir Height: 31in (787mm)
- Height: 51in (1295mm)
- Weight: 3800lb (1724kg)

Screen data and Screens

- Screen area: 29.4ft²
- Deck angle: Adjustable from -3° to +3°
- Screen Type: Pre-tensioned 4ft x 2ft
- Four screen panels per shaker

Motor Specifications:

- Two (2) 2Hp (460V) or 1.75hp (380V) vibrator motors
- One (1) 0.6hp (460V) or 0.5hp (380V) vibrator motor
- 460V/60Hz/1800rpm or 380V/50Hz/1500rpm
- Explosion proof
- Class I, Group C and D
- AL, CSA

Features:

- Dual motion, linear and balanced elliptical, can be changed with flip of a switch, linear 7gs, BEM 5gs
- Control box allows for changing the motion with the flick of a switch
- The balanced basket is designed to provide perfect motion both for linear and balanced elliptical motion whether dry, lightly loaded, or heavily loaded
- The reinforced basket has cross-braced structural steel frame that has been stress relieved.
- The distribution box replaces the typical flow-line trap (or possum belly) and includes the quarter pipe
- The bed angle adjustment is a conveniently located at the front of the shaker.

Capacity could meet the following requirements:

- PHASE 17-1/2" (16"), 650 GPM, 9.5 PPG, 20CP PASTIC VISCOSITY, 100 MESH OR MORE
- PHASE 12-1/4", 500GPM, 10PPG, 20CP, 160 MESH OR MORE
- PHASE 8-1/2", 400GPM, 9.5PPG, 15CP, 230 MESH OR MORE
- PHASE 6-1/8", 200GPM, 9.5PPG, 15CP, 320 MESH OR MORE

18.2. Mud Cleaner

QTY: 1 EA

2-12 D-Sander

- The 1000 GPM model 2-12 D-sander includes two 12" diameter polyurethane hydroclone that is either vertically or slant mounted on a heavy duty skid.

Operating data:

- | | |
|--|---------------------------------------|
| • No. of clones per unit | 2 |
| • Diameter | 12 inches (304.8mm) |
| • Feed volume | 1000 gpm |
| • Feed manifold diameter | 8 inches |
| • Overflow Manifold diameter | 10 inches (254mm) |
| • Processing rate | 1000 gpm at 75 feet of head |
| • Apex valve size | Fixed at 1-1/2" standard, 1" optional |
| • De-sander clone median separation | D-50 separation at 40 |
| microns, D-90 separation at 74 microns | |

8T4 D-Silter

- The 1200 gpm model 8T4 D-silter includes sixteen 4" diameter polyurethane hydro-clones

Physical data

- Length 80.3in (2040mm)
- Width 30in (762mm)
- Height 56.1in (1425mm)
- Weight 925lb (420kg)

Operating Data

- No. of clones per unit 16
- Diameter 4in (101.6mm)
- Feed volume 1200gpm
- Feed manifold diameter 6 inches (152.4mm)
- Overflow Manifold diameter 8 inches (203.2mm)
- Processing rate 1200 gpm at 91 feet of head
- Desilter clone median separation separation at 40 microns D-50 separation at 25 microns, D-90 separation at 40 microns

Shale shaker

- Same as above

18.3. Degasser

QTY: 1 set

SWACO Compact Vacuum D-GASSER™ (1 set), the compact vacuum D-Gasser is designed to remove virtually all entrained gases, including H₂S and corrosive oxygen

- Length: 101 in. (2565mm)
- Width: 68.25in (1734mm)
- Height: 79in (2007mm)
- Weight: 2600lbs (1170kg)
- Simplifies spotting and installation
- The unit consists of a cylindrical vacuum tank with internal baffle system, vacuum pump, jet nozzle and three-way float valve
- Unique design allows venting to the flare line during H₂S service
- Gas-cut mud is drawn into the tank through a vacuum created by the discharge jet and the pump. The mud is dispersed in a thin layer over
- The full-length baffle and, as the entrained gas is freed, it is recovered by the vacuum pump
- The D-Gasser features only three moving parts: the float inside the vacuum vessel, the vacuum breaker valve, and the vacuum pump. The float ensures that the system maintains the desired mud-fill level within the vessel during operation.

18.4. Centrifuges

Model: MI Swaco – 518

QTY: 1 Set

Specification

- Length 3617.5mm (142.4in)
- Width 2000mm (78.7in)
- Height 805mm (71in) with the electrical control panel bracket
810mm (31.9in) without
- Weight 3600kg (7937lbs)
- Power required 380 VAC 50Hz 3 Phase; 50kW
- 460 VAC 60Hz 3 Phase
- Motors: Electrical motor-30Kw, 4 poles, 440Volts, 60Hz, Explosion proof (Euro)
- Main drive hydraulic variator – 3000rpm maximum continuous speed
- Back drive hydraulic variator – fixed-displacement axial piston
- Bowl: Dimensions – 14” diameter by 56” long (356mm by 1422mm)
- Material: Stainless steel
- Conveyor: Pitch – 4.33” (110mm)
- Material: Stainless steel
- Gearbox: Type-Planetary
- Ratio: 57:1
- Max. Torque: 350 KPM (Kilopounds meter)
- Bowl Speed
 - High speed: 3600 rpm
 - Standard speed: 2500rpm
 - High volume: 1900 rpm

Recommended flow rate:

- High speed: 100 GPM
- Standard speed: 150 GPM
- High volume: 250 GPM

18.5. Screw propeller

QTY: 1 set

Length: 14m

19. Drill pipes

QTY: 1 Set

Specification:

No	Tubulars	
----	----------	--

1	Drill pipe: 12000ft 5", 19.5 #/ft S-135, 4-1/2" IF drill pipe (Hardbanding internal plastic coating)	12000
2	Drill pipe: 4000ft 3-1/2, 15.5 #/ft S-135, 3-1/2" IF drill pipe (Hardbanding internal plastic coating)	4000
3	Heavy-weight DP: 125 jts 5" 4-1/2" IF	125
4	Drill collars: 8" w/6-5/8" REG connections	12
5	Drill collars: 6-1/2" w/4-1/2" IF connections	21
6	Drill collars: 4-3/4" w/3-1/2" IF connections	9
7	Heavy-Weight DP: 21 jts 3-1/2" x 3-1/2" IF	21

20. Rig Tools

20.1. Down hole tools and handling equipment

20.1.1. Slips

- 5" OD Drill pipe; SDXL 5/350T (Equivalent to Varco SDXL) 2 units
- 3-1/2" OD drill pipe: SDML 3-1/2/125T (Equivalent to Varco SDML) 2 units
- For 9-1/2" DC, DCS-L 8" - 9-1/2" 2 units
- For 8" DC, DCS-L 6-3/4" - 8-1/4" 2 units
- For 6-1/2" DC, DCS-R 5-1/2" - 7" 2 units

20.1.2. Elevators

- 5" OD drill pipe; 350 ton, DDZ133/3150 2 units
- 3-1/2" OD drill pipe; 250 ton, DDZ101/2250 2 units
- For 9-1/2" DC, CD8/200T 2 units
- For 8" DC, CD8/200T 2 units
- For 6-1/4" DC, CD6-1/2/200T 2 units

20.1.3. DP and DC rotary tongs

Range from 4" to 12"

QTY: 2 units

- With latch lug jaws 5a for 3-3/8" - 5-1/4" pipe size
- Max torque: 55 KN.M
- With latch lug jaws 5b for 4-1/4" - 6-3/4" pipe size
- Max torque: 75 KN.M
- With latch lug jaws 5b- 1 for 5" - 8" pipe size
- Max torque: 75 KN.M

- With latch lug jaws 5c for 6-5/8" – 8-5/8" pipe size
- Max torque: 75 KN.M
- With latch lug jaws 5d for 8-1/2" – 10-3/4" pipe size
- Max torque: 55 KN.M
- With latch lug jaws 5e for 11-3/4" – 12-3/4" pipe size
- Max torque: 55 KN.M
- Equivalent Varco BJ B type manual tong

Range from 3-1/2" to 13-3/8"

QTY: 2 units

- With latch lug jaws 1# for 3-1/2" – 8-1/4" pipe size
- Max. Torque: 90 KN.M
- With latch lug jaws 2# for 8"- 11-1/4" pipe size
- Max. Torque: 90 KN.M
- With latch lug jaws 3# for 11-3/4"- 14-3/8" pipe size
- Max. Torque: 55 KN.M

20.1.4. Upper Kelly cock

QTY: 2 nos

- Suitable for Hex. Kelly (5-1/4", 3-1/2")
- Working pressure: 70MPa (10000psi)
- Min ID: 3"
- Connection: 6-5/8" (LH) REG

20.1.5. Lower Kelly cock

QTY: 2 nos

- Suitable for Hex Kelly 3-1/2"
- Working pressure: 70MPa (10000 psi)
- Max. OD 4-3/4"
- Min. ID 2-1/4"
- Connection NC38 (3-1/2" IF)

QTY: 2 nos

- Suitable for Hex. Kelly 5-1/4"
- Working pressure: 70MPa (10000psi)
- Max. OD 6-5/8"
- Max. ID 2-1/4"

-
- Connection: NC50 (4-1/2"IF)

20.2. Casing and cementing equipment

20.2.1. Side door casing elevator

- 13-3/8" x 350 ton 2 units
- 9-5/8" x 350 ton 2 units
- 7" x 150 ton 2 units
- 5" x 150 ton 2 units

20.2.2. Casing elevator/spider

QTY: 1 set

- Model: QD450
- One as an elevator, slip type
- One as a spider, slip type
- Slips: 4-1/2", 5", 7", 7-5/8", 9-5/8", 13-3/8", one for each size
- Capacity: 4500KN
- Overall dimension: 1380x1135x920mm

20.2.3. Casing slip for Rotary table

- For 13-3/8" casing, type CMS-XL 13-3/8" casing, type CMS-XL 13-3/8/2250
1 unit
- For 9-5/8" casing, type CMS-XL 9-5-8/2250
1 unit
- For 7" casing, type CMS-XL7/2250
1 unit

20.2.4. Single joint casing elevator

- 13-3/8" 1 unit
- 9-5/8" 1 unit
- 7" 1 unit

20.2.5. Manual casing tong

QTY: 1 set

- With latch lug jaws 1# for 3-1/2" – 8-1/4" pipe size
- Max torque: 90KN.M
- With latch lug jaws 2# for 8" – 11-1/4" pipe size
- Max torque: 90KN.M
- With latch lug jaws 3# for 11-3/4" – 14-3/8" pipe size
- Max torque: 55KN.M

21. Auxiliary equipment

21.1. Mechanical equipment

21.1.1. Hydraulic power station

QTY: 1 set

Specifications:

- Rated flow: 120L/min
- Rated working pressure: 16.6MPa
- Max. working pressure: 20.0MPa
- Sufficient Vol: 587L
- Motor power: 37Kw
- Overall dimensions: 1650x1100x1190mm
- Weight: 1100kg

21.1.2. Power Tongs

QTY: 1 ZQ203-125II

Specifications:

- Drill pipe range: 3-1/2" – 8"
- Max. Torque: 125kN.m
- Head speed: 40rpm (high), 2.73rpm (low)
- Hydraulic rated pressure: 20MPa
- Hydraulic rated flow: 114L/min
- Pneumatic working pressure: 0.5 – 1MPa
- Head traveling length: 1.5m
- Overall dimensions: 1720x1050x1750mm
- Weight: 2600kg

21.1.3. Hydraulic lifter

QTY: 1 set

Specifications:

- Rated power of motor: 11KW
- Rated speed of motor: 1460rpm
- Rated flow: 35.5L/min
- Work pressure: 20MPa
- Rated load: 15kN
- Lifting height: 9.8m
- Lifting speed: 0.2 – 0.38m/s
- Dia. of wireline: 12mm
- Overall dimensions: 1360x1860x12000mm
- Weight: 2500kg

21.1.4. Power casing tongs

QTY: 1 set

- Model: TQ340-35Y
- Casing range: 5-1/2" – 13-3/8"
- Max. working pressure: 18MPa

- Flow range: 110-160L/min
- Max torque:
 - High speed: 2.5 – 3 kN.m
 - Low speed: 32 – 40kN.m
- Head speed:
 - High speed: 60 – 86rpm
 - Low speed: 3.6 – 5.3rpm
- Overall dimensions: 1540x892x860mm
- Weight: 780kg

21.2. Fuel supply system

21.2.1. Fuel tank

QTY: 1 set

Features:

- Natural suction by diesel engine
- There is a pump cabin at one end, equipped with two DN80 centrifugal oil pump
- Complete with 1 UFZ-04-2000 level meter, an explosion proof electric control box, lifting pipe, 1 LC-50 flow meter and 2 filters
- The centrifugal pumps adopt horizontal model
- The two fuel filters of the fuel pumps could be backup with valves for convenient changing filter

Specifications:

- Dimension: 10600x2800x2400mm
- Effective capacity: 45m³

2 Sets DN80 centrifugal oil pump

- Lift: 18m
- Discharge: 60m³

21.2.2. Daily fuel tank

QTY: 1 Set

Features:

- The centrifugal pumps adopt horizontal model
- There is a pump cabin, and an inlet, outlet
- Equipped with an UFZ-04-2000 level meter

Specifications:

- Dimensions: 10600x2800x2400mm
- Effective capacity: 35m³

22. Barite tank

QTY: 1 Set

Features:

- There is two 25m³ tank complete with air compressor, piping, etc.

Specifications:

- Capacity: 50m³
- Weight: 4750kg

23. Wooden mat

Suitable for substructure

- 19 nos 5000x2000x210mm
- 1 no 4000x2000x210mm

Suitable for mud pump

- 10 nos 4000x2000x190mm

Suitable for mud tanks

- 12 nos 4000x2000x190mm

Suitable for generator and VFD house

- 10 nos 4000x2000x190mm

Spare

- 10 nos for substructure
- 20 nos for mud pump, mud tanks generator and VFD house

24. Fishing Tools

- a) Series 150 Bowen type releasing and circulating over-shots
Overshot 12-3/4" for 17-1/2" hole

QTY: 1 Set

- 12-3/4" x 60 extension 1
- 12-3/4" x 15-1/2" over side guide 1

▪ 12-3/4" x 21" over side guide	1	
▪ 12-3/4" Standard wall hook		1
▪ 12-3/4" x 15-1/2" x 48" Wall hook		1
▪ Spiral grapple 11-1/4"	1	
▪ Spiral grapple 11"	1	
▪ Spiral grapple 10-7/8"	1	
▪ Spiral grapple 10-3/4"	1	
▪ Spiral grapple 10-5/8"	1	
▪ Basket grapple 10-1/2"	1	
▪ Basket grapple 10-1/4"	1	
▪ Basket grapple 10"		1
▪ Basket grapple 9-3/4"	1	
▪ Basket grapple 9-1/2"	1	
▪ Basket grapple 9-1/4"	1	
▪ Basket grapple 9"	1	
▪ Basket grapple 8-3/4"	1	
▪ Basket grapple 8-1/2"	1	
▪ Basket grapple 8-1/4"	1	
▪ Basket grapple 8"	1	
▪ Basket grapple 7-3/4"	1	
▪ Basket grapple 7-1/2"	1	
▪ Basket grapple 6-1/2"	1	
▪ Basket grapple 6-3/8"	1	
▪ Basket grapple 6-1/4"	1	
▪ Basket grapple 6"	1	
▪ Basket grapple 5"	1	
▪ Spiral grapple Control packer		1
▪ Mill control packer		1

Overshot 10-1/8" for 12-1/4" hole

QTY: 1 set

▪ Overshot 10-1/8" Series 150Fs	1	
▪ 10 1/8" X 36 Extension	1	
▪ 10 1/8" X 42 Extension	1	
▪ 10 1/8" X 60 Extension	1	
▪ Standard guide	1	
▪ 10 1/8", 12" Over size guide		1
▪ 10 1/8" x 48 Standard wall hook		1
▪ Spiral Grapple 8-1/2"	1	
▪ Spiral Grapple 8-3/8"	1	
▪ Spiral Grapple 8-1/4"	1	

▪ Spiral Grapple 8-1/8"	1
▪ Spiral Grapple 8"	1
▪ Spiral Grapple 7-7/8"	1
▪ Basket Grapple 7-3/4"	1
▪ Basket Grapple 7-1/2"	1
▪ Basket Grapple 7-1/4"	1
▪ Basket Grapple 7"	1
▪ Basket Grapple 6-3/4"	1
▪ Basket Grapple 6-1/2"	1
▪ Basket Grapple 6-3/8"	1
▪ Basket Grapple 6-1/4"	1
▪ Basket Grapple 6"	1
▪ Basket Grapple 5"	1
▪ Basket Grapple 5-1/8"	1
▪ Basket Grapple 5-1/16"	1
▪ Basket Grapple 5-1/4"	1
▪ Basket Grapple 4-7/8"	1
▪ Spiral grapple control – Packer	1
▪ Mill Control Packer	1

Overshot 7-5/8" for 8-1/2" hole

QTY: 1 set

▪ Over shot 7-5/8" series 150Sfs	1
▪ 7-5/8" x 36 Extension	1
▪ 7-5/8" x 42 Extension	1
▪ 7-5/8" x 60 Extension	1
▪ 7-5/8" x 48 Wall hook	1
▪ Spiral grapple 6-1/4"	1
▪ Spiral grapple 6-1/8"	1
▪ Spiral grapple 6"	1
▪ Spiral grapple 5-7/8"	1
▪ Spiral grapple 5-3/4"	1
▪ Spiral grapple 5-5/8"	1
▪ Basket grapple 5-9/16"	1
▪ Basket grapple 5-1/2"	1
▪ Basket grapple 5-3/8"	1
▪ Basket grapple 5-1/4"	1
▪ Basket grapple 5-1/8"	1
▪ Basket grapple 5"	1
▪ Basket grapple 4-15/16"	1
▪ Basket grapple 4-7/8"	1
▪ Basket grapple 4-3/4"	1

-
- Basket grapple 4-5/8" 1
 - Basket grapple 4-1/2" 1
 - Basket grapple 4-3/8" 1
 - Basket grapple 4-1/4" 1
 - Basket grapple 4" 1
 - Spiral grapple control 1
 - Mill control packer 1
- b) Drilling jar, size 6-1/2" OD
 QTY: 1 Set, Model: YJ165A
- OD: 6-1/2"
 - ID: 2-1/4"
 - Length: 20.3ft
 - Thread: 4 IF
 - Max. Tensile load: 337.500 lbs
 - Max. Torsion load: 10.332 lbs-ft
 - Up Preset Release force: 146.250lbs
 - Down Preset release force: 67.500 lbs
 - Up Max. Release force: 168.750 lbs
 - Down Max. Release Force: 78.750 lbs
- c) Fishing Jar, 6-1/2" OD 1 Set
- d) Bumper sub, 6-1/2" OD 1 Set
- e) 12-1/4" hole junk sub 1 Set
- 6-5/8" REG/Box connection
 - Range 9-5/8" to 10-5/8" OD
- f) 8-1/2" hole junk sub 1 Set
- 4-1/2" IF REG/box connection
 - Range 7-1/2" to 8-1/4" OD
- g) Reverse circulation junk basket 1 Set
- Size 10-1/4" to 11-5/8" OD
 - C/with 6-5/8" REG pin connection
- h) Reverse circulation junk basket 1 Set
- Size 7-1/2" to 8-1/4" OD
 - With 4-1/2" IF REG pin connection
- i) Fishing Magnet 1 Set
- 10-3/4" to 11-5/8" OD with 6-5/8" REG pin connection
- j) Fishing Magnet 1 Set
- 7-1/2" to 8-1/4" OD with 4-1/2" REG pin connection
- k) Taper tap 6-3/8" OD 2 Pieces
- l) Junk mill tools
- Size 12" with 6-5/8" REG pin connection 1 pc
 - Size 8-1/4" with 4-1/2" IF pin connection 1 pc
- m) Flat mill for 8-1/2" hole 1 pc
- n) Impression blocks

- OD Tool: 11-3/4" 1pc
- OD Tool: 8" 1pc

25. Explosion proof fixed gas detection system:

NO	Name	Specification	Unit	QTY
1.1	8 Channels main unit	System 57	Set	1
1.2	Combustible gas sensor	SPSTAXF1	Pcs	4
1.3	H2S Gas sensor	SPSTAXC2	Pcs	4
1.4	Audio & Visual alarm Device		Pcs	1
1.5	CH4 Calibration Gas	4L 50%LEL CH4	Btl	1
1.6	H2S Calibration Gas	4L 20ppm H2S	Btl	1
1.7	Cable		m	500

26. Racks and hydraulic cylinder moving system

QTY: 1 set

- Pawl type track, using hydraulic cylinder to push the rig package moving forward
- Pin connection between hydraulic cylinder and rig structure, also between hydraulic cylinder and pawl type track
- When rig skidding, lock the hydraulic cylinder with track and another end of cylinder with rig substructure, then extend the cylinder to push the sig substructure forward, each step 0.5m
- Height of track: 436mm
- Total length of track: 32mx2
- Length of single track: 4m
- After moved 4m, move the last track to the next step
- Max. weight moved: 580t
- Max. moving speed: 0.3m/min
- Step distance: 0.5m

Hydraulic System:

- Cylinder type: dual direction
- Qty of cylinder: 2
- Max. working pressure: 26MPa
- Wind speed permitted when rig skidding: 8m/s

Others:

- Mud extend system
- Cable box and extend cable