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1.0 DRILLING RIG MAIN DATA

GENERAL DESCRIPTION

Fast moving, trailer mounted, Hydraulic Rotary Drilling Rig, Drillmec Model HH 300. Driven by AC motors and designed for drilling, workover and servicing of oil and gas wells. Capable to drill vertical up to 14,500 ft (4,400 mts) TD.

MAIN TECHNICAL DATA

Total rig unit power: 1,150 eKW (1,542 HP)
API 4F 3rd Ed. Static Hook Load Capacity: 272 Metric Tons (600,000 lbs)

DESIGN AND CONSTRUCTION CRITERIA

The rig is designed in accordance with API specifications and all constructions will be in accordance with API recommended standards governing fabrication, welding, coating, etc.

The HH-300 Drilling Rig is designed for fast moving operation.

The rig and its accessories are designed to operate in temperatures from 0 °C (32 °F) to + 45 °C (113 °F).

The electric equipment, devices and the drilling rig are designed to satisfy the requirements of API RP500 – Class 1 – Division 1 (3m/ 10 ft radius around center well). All electric systems of the drilling rig will use 60Hz.

QUALITY ASSURANCE

DRILLMEC Spa manufactures the drilling rigs and related equipment in accordance with oil industry recommended standards and client specific requirements.

DRILLMEC Spa is an API Q1 qualified and authorized manufacturer under API 4F, 6A, 7, 7K, 8C, and 16A and a ISO 9001 certified Company.

DRILLMEC Inc. is an API 4F certified company (Auth. # 0058).

PAINTING

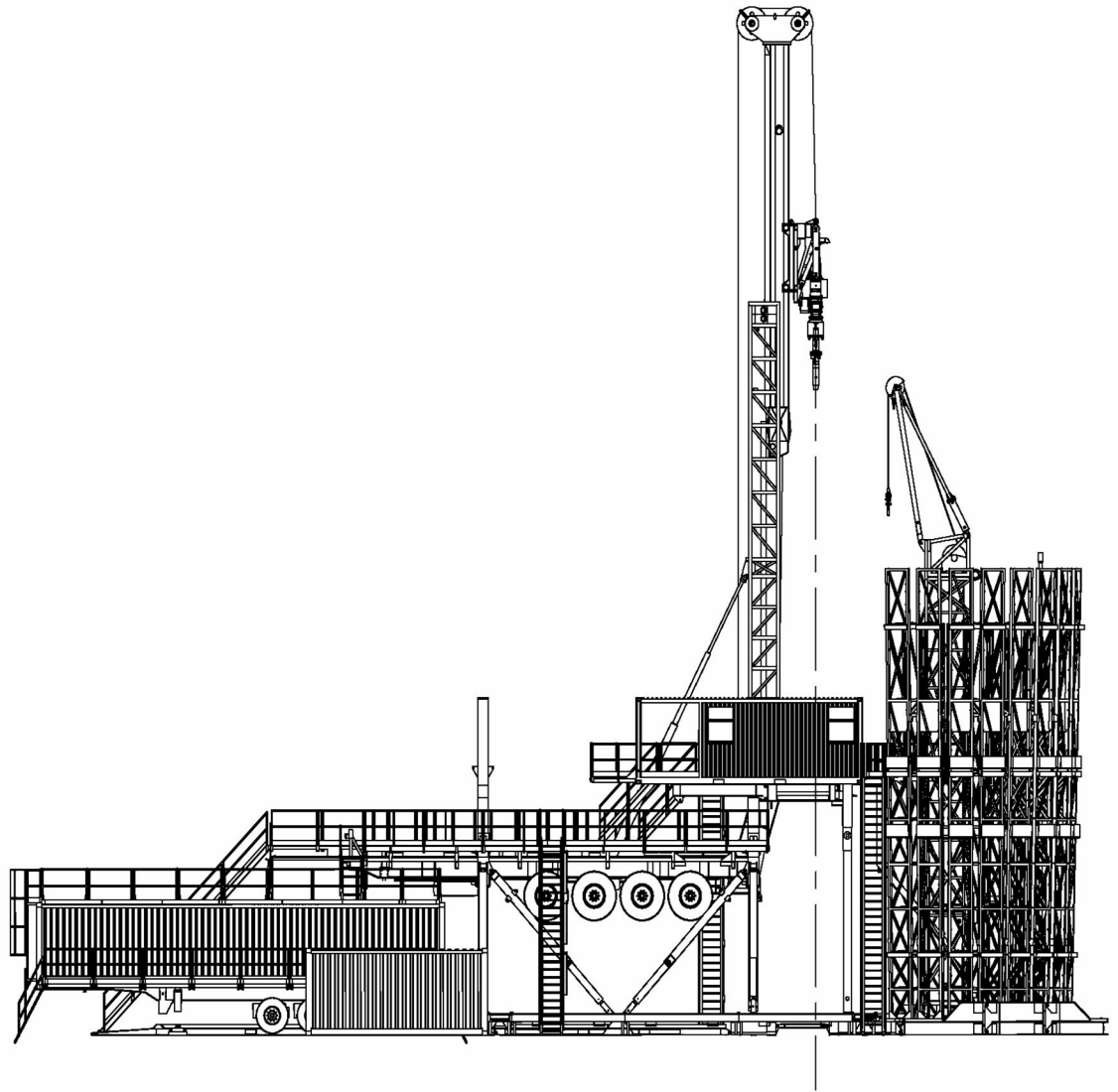
The rig will be painted as per DRILLMEC standards for tropical areas.

Mast, Substructure, HPU and Pipe Handler: WHITE

Crown, Top Drive, Power Tongs and Handrails: SAFETY YELLOW

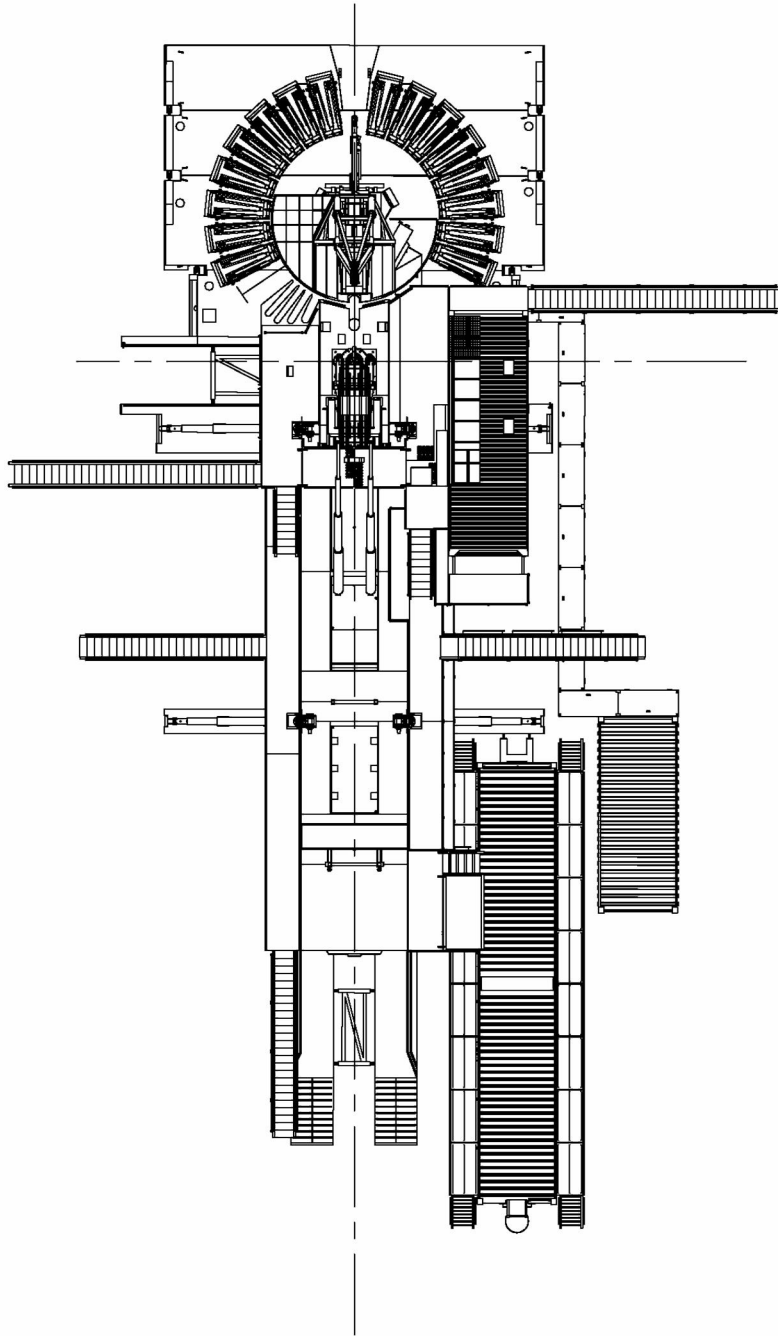


HH-300 Side View





HH-300 Top View





2.0 MAIN HYDRAULIC POWER UNIT (HPU)

Q.ty One (1) Independent HPU installed in a soundproof container mounted on trailer and located on the driller's side. It is equipped with one (1) oil tank with a capacity of 4,400 l (1,162 gal) and two (2) power units each one composed with the following items:

- One (1) electric Siemens AC motor 575 eKW (771 HP) 4 poles, 600V at 60hz
 - Nominal Power: 575 eKW
 - Nominal Speed: 1790 rpm
 - Voltage: 600 V
 - Frequency: 60hz
- Two (2) hydraulic piston pumps (one for hoisting/snubbing and the other for power swivel rotation);
- One (1) hydraulic piston pump for secondary services that can be used in parallel with main pump in order to achieve maximum force;
- One (1) vane pump to power the rotary table;
- One (1) vane pump for all servo-controlled devices;
- Two (2) screw pumps for filtration, cooling and replenishment;
- Two (2) air/oil coolers with an exchange capacity of 105Kw each;

NOTE: Both power units are connected to a "hydraulic compound system" that in case of damage to one unit will enable continuous operation of the rig at half speed rate by utilizing the other unit.

Main Technical Data

- Total HPU power: 1,150 eKW (1542 HP)
- Total oil tank capacity: 4,400 l (1,162 gal)
- Total oil cooler capacity: 420KW at 45°C (113°F) external temperature

The hydraulic power pack trailer is complete with 2 ½ king pin, 3 axles, pneumatic suspension, brakes, traffic lamps and four (4) stabilizers for jobsite positioning.



3.0 TELESCOPIC MAST

Q.ty One (1) HH-300 hoisting system operates with a telescopic mast, fabricated in accordance with API 4F, acting as a hydraulic hoist, to perform the function of a traditional drawworks. It is designed to allow handling of API Range 3 drill pipes and API Range 3 casings.

The telescopic mast is designed in two independent parts: the bottom section is fixed to the drill floor and the telescopic section for up/down movement. The telescopic mast is made of high tensile steel composed of the following two items:

1. Main base section housing the hydraulic jack and guides for the telescopic section;
2. Telescopic section operated by the hydraulic jack inside the main base section

Four (4) 1 5/8" drilling lines with minimum breaking strength of 165,730 daN (373,000 lbs.) each are pinned directly to the top drive cradle, bottom back side of the main base section with a special dead line anchor system for load equalizing. The mast is raised and lowered by two hydraulic jacks.

Main Technical Data:

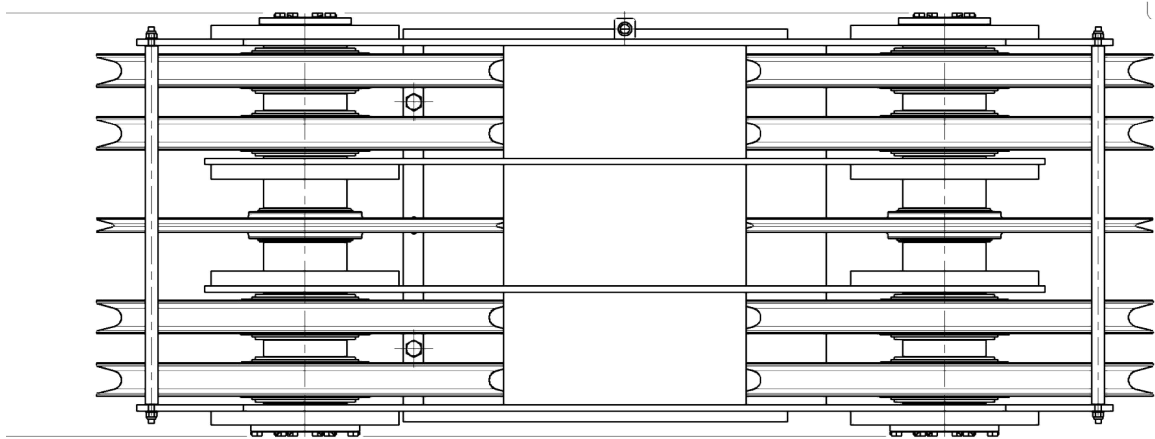
- API Static Hook Load Capacity: 272 mton (600,000 lbs)
- Snubbing capacity: 30 mton (66,000 lbs)
- Max. top drive speed: 1 m/sec (3 ft/sec)
- Working stroke: 16m (52.6 ft)
- Passage trough substructure: 1,200 mm (47 ¼ in.)
- Distance between mast and well center: 900 mm (35 ½ in.)
- Max casing length: 14.63 m (48 ft)
- Max clearance from links bottom to drill floor: 16 m (52.6 ft)



3.1 CROWN BLOCK

Q.ty One (1) crown block is fixed to the telescopic section of the mast and includes an assembly composed of eight sheaves with hardened grooves for 1 5/8" wire line, mounted on bearings.

The crown block is also equipped with two (2) additional sheaves for secondary 5/8" wire line services with hardened grooves mounted on bearings.



Crown Block-Top View

3.2 AUXILIARY JIB CRANE

Q.ty One (1) hydraulic jib crane is installed on the side of the mast base section and is operated from the drill floor; it is complete with a hydraulic winch (4 mton / 8,800 lbs.) to serve rig floor operations.

Main Technical Data

- Max. Lifting capacity: 4 mton (8,800 lbs.)



3.3 STAND PIPE AND GOOSENECK

Q.ty One (1) Stand Pipe with 4" nominal diameter pipe
End connections: hammer union 4" male Fig. 602 x 4" female Fig. 602
Pressure: 5,000 psi (345 bar) W.P. and 10,000 psi (690 bar) test pressure.

3.4 ROTARY HOSES

Q.ty One (1) Rotary hose 3"ID x 5,000psi (345bar) W.P., Grade "D" x 48 ft long with integral hammer unions 4" female Fig. 602 x 4" male Fig. 602 to connect the standpipe to the top drive.

Q.ty One (1) Rotary hose 3"ID x 5,000psi (345bar) W.P., Grade "D" x 12 ft long with integral hammer unions 4" female Fig. 602 x 4" male Fig. 602 to connect the standpipe to the rig floor manifold

3.5 RIG FLOOR MANIFOLD

Q.ty One (1) 5,000psi (345 bar) W.P. rig floor manifold attached to the driller's cabin frame.



4.0 TOP DRIVE HTD 300

Q.ty One (1) Top Drive System driven by 3 top head hydraulic motors installed on a heavy duty power swivel body and assembled on a special dolly sliding on mast guide.

The top drive has a special patented device that allows the driller from the control cabin to tilt out the complete top drive from well center to mouse hole. This device has been tested for many years and permits to save time and manpower with significant impact on safety of tripping operation for tubulars.

The top drive is equipped with an air static brake operated from main control panel and includes a shock absorber air operated system.

Main technical data

- Max. Torque: 5,325 kgf/m (38,521 ft/lbs) at 50 rpm with 100% efficiency
- Variable rotating speed: from 0 to 200 rpm
- Max power: 482 HP
- Max Hoisting Capacity: 272 metric ton (600,000 lbs)
- ID full passage: 76.2 mm (3")
- Stroke: 16 m (52ft 6in)
- Max working pressure: 345 bar (5,000 psi).
- Max Travelling Speed: 1 m/sec (3 ft/sec) with 100% efficiency

4.1 CIRCULATION SWIVEL

Q.ty One (1) Circulation Swivel suitable to drill with air, mud, water and foam. Wash pipe of 3" (76 mm) ID with a max. W.P. of 5,000 psi (345 bar). Packing and wash pipe especially designed with quick connections and ease maintenance operation also for non-skilled operators.

4.2 FLOATING AND ROTATING DOUBLE HOOK

Q.ty: One (1) Floating and rotating double hook installed on the bottom shaft with the following features:

- Static hoisting capacity: 272 metric ton (600,000 lbs)
- Made from hi-tensile forged heat treated steel;
- Suitable to use elevator links up to 350 ton (700,000 lbs);
- Equipped with special roller bearing;



- Equipped with special air system for thread soft landing system;
- Fabricated in compliance with API 8C.

4.3 INSIDE BOP VALVE

Q.ty One (1) Inside BOP Valve hydraulically operated from main control panel.
Designed for max working pressure: 690 bar (10,000 psi)

4.4 TORQUE WRENCH

Q.ty One (1) Hydraulic torque wrench to be used during tripping operation to fast make-up and breakout operations for DP tool joint size from 4 1/8" to 7 3/4" OD. The hydraulic wrench is mounted underneath the power swivel and is composed of:

- Rotating hydraulic top clamp (hydraulically operated by driller cabin);
- Lower fix hydraulic clamp;
- Suspension double hydraulic cylinders with 790 mm (2ft 7in) stroke.

Main Technical data

- Max make-up torque: 5,000 kgf/m (36,200 f t/lbs)
- Max break-out torque: 7,000 kgf/m (50,700 f t/lbs)
- Hydraulic cylinders stroke: 790 mm (2ft 7in)

5.0 CASING MAKE-UP DEVICE

Q.ty One (1) casing make-up device set to handle 13 3/8" + 9 5/8" + 7" casing sizes.

Q.ty One (1) casing make-up device set to handle 5" + 4 1/2" casing sizes

The device is located underneath the top drive double hook with a gripping patented tool, hydraulically operated from the main control panel, which allows the casing rotation with adjustable make-up torque, according to API specifications. This device is specially designed to allow fluid circulation during casing running in order to avoid block and tackle with the drilled hole wall.



6.0 ROTARY TABLE

Q.ty One (1) Back-up Type Rotary table with rectangular base and guard driven by two hydraulic motors, with a 27 1/2" full opening (698 mm) and complete with removable API master bushing. The rotary table can be easily and quickly removed to leave 47 1/4" free passage (1200 mm) trough the substructure. High capacity roller bearing. Top of rotary table and electric motor are covered with safety pan anti-slipping. Fabricated in compliance with API 7K Spec.

Main Technical data

Make: DRILLMEC

Code/Type: R275 - 01902135 – Dwg S0002649

- Max torque: 1,000 kgf/m (7,527 f t/lbs);
- Max speed: 60 rpm;
- Max full opening: 27 1/2" (698 mm);
- Gear ratio: 3.65;
- Static Load capacity: 500 ton (1,000,000 lbs);
- Lubrication Oil capacity: 15 gal (57 lt);
- Out put shaft diameter 125,42 mm

6.1 MASTER BUSHING

Master bushing solid body pin drive, for rotary table with opening dimension of 27.1/2" according to API 7K. Split insert bowls of various bore diameters will allow handling capability for 2.3/8" to 13.3/8" tubular products. Complete with bit breaker and lifting sling.

BOWL

Q.ty one (1) API Bowl N°31 for Master bushing SPB for 13.3/8" and 11.3/4" casing

AUTOMATIC POWER SLIPS

Q.ty one (1) Hydraulic operated Automatic Power Slips assembly utilizing conventional API DP slips. Slips are included



POWER TONGS

Operated from the main control panel to make-up and break-out DP and DC from 3 1/2" to 11" tubular OD, consisting of:

- Double hydraulic rotating clamps;
- Set of hydraulic cylinder to swing the power tongs out from well center to parking position;
- Vertical hydraulic cylinder to position properly the power tongs clamps.
The power tong is suspended to a vertical rod on which the clamp unit is pivoted, allowing floating vertical movement operated by an hydraulic cylinder.

Main Technical data

Max. torque: 16,300 kgf/m (118,080 ft/lbs)

Max. tubular diameter: 11"

Min. tubular diameter: 3 1/2"

BIT BREAKOUT AND CASING BACK-UP

Special device for bit breakout and casing back up composed of a manual tong, actuated by an hydraulic cylinder controlled from the main control panel, complete with a torque indicator and a manual torque regulator.

Main Technical data

Max. Torque: 9,170 kgf/m (66,20 ft/lbs)

SUBSTRUCTURE AND DRILL FLOOR

The substructure frame and drill floor are directly connected to a rig trailer.

Height from ground level: 7.6 m (25 ft)

Clearance underneath the rotary beams: 7 m (23 ft)

MOUSE HOLE HYDRAULIC CLAMP

Q.ty one (1) Mouse Hole Hydraulic Clamp located underneath the drill floor. The clamp is controlled from the main panel with adjustable clamping force.

Main Technical Data



Max. holding diameter: 311 mm (12 ¼")

HYDRAULIC OUTRIGGERS

Q.ty four (4) independent hydraulic stabilizers for trailer and substructure raising, with 50000 kg (110,000 lbs) lifting capacity each, provided with safety mechanical locking system and controlled by the side control panel.

TRAILER FRAME

The group includes hydraulic and pneumatic system with regulation and distribution components. The main frame is a special designed 4-axle trailer equipped with a complete set of walkways and servicing stairs composed of:

High tensile steel electrically welded frame according to DRILLMEC specification;

3 1/2" king pin with an adapter to fit 2 1/2" fifth wheel;

Front neck for 3 axle wheel tractor;

Single tires;

Hydraulic operated lifting device;

Braking system by means of double air circuit and additional parking brake;

Mechanical, leaf spring type, four-axle suspension for weight distribution;

Q.ty one (1) spare wheel installed in the trailer, complete with 30,000 kg (66,000 lbs) capacity hydraulic jack.

WALKWAYS, HANDRAILS, STAIRWAYS

Q.ty one (1) complete set of walkways, handrails and stairways. The V-door ramp is comes with the Pipe Handler.

AUTOMATIC DRILLER/ WOB CONTROLLER

Drilling conditions can change drastically while drilling, so it will be necessary to reach the best balance between max drilling speed and min wear on bits and tools. The hydraulic hoisting system solves this problem with a pressure balanced feeding device with "automatic driller / WOB controller", that "senses" the down-feed speed at any depth and, depending on the formation characteristic, adjust the feed automatically and instantly. The "automatic driller / WOB controller" function allows keeping constant the determined weight on bit while drilling.

During work-over operations it is frequently necessary to power the lifting line in order to "float" the weight. The "automatic driller / WOB controller" solves this problem acting as described for the drilling operations with a pressure balanced feed system that "senses" the weight at any depth and adjust feed automatically.



SERVICE HYDRAULIC POWER UNIT

Q.ty one (1) auxiliary hydraulic power-pack independently powered and installed on the rig trailer, complete with:

Q.ty one (1) AC electric motor 34,5 eKW (45HP);

Q.ty one (1) hydraulic piston pump;

Q.ty one (1) oil tank, 800 l (210 gal) capacity, with oil level alarm.

The auxiliary hydraulic powered pack is designed to operate the four stabilizers and the two mast raising cylinders. An additional hydraulic line is provided to operate the pipe handler tower raising and jib crane operations. This auxiliary HPU is supplied to allow rig-up operations without having the main hydraulic powered system trailer available and installed.

PNEUMATIC SYSTEM

Q.ty one (1) pneumatic system to service the rig air operated equipment (air compressor is not included)

DRILLER CONTROL CABIN

The driller control cabin is fabricated from heavy-duty steel, according to ergonomic high standard level. The cabin is installed on a support steel frame attached to the rotary beams.

The access platform to drill floor is flush without steps or stairs, and is designed in order to include:

Rig floor manifold;

Suitable to accept the choke remote control panel (not included);

Suitable to accept computerized system to allow the visualization of the controls management and rig operation (not included).



MAIN CONTROL PANEL

Main control panel mounted inside driller control cabin with all controls for drilling operation, motors, make-up and break-out automatic sequences, weight, indicator, etc. Visual instruments for: bit weight, top drive torque, top drive rpm, power tong clamp force, power tong torque, pull down, stand pipe pressure, rotary table torque, etc. Ergonomic horseshoe type design with adjustable driller's chair.



SIDE CONTROL PANEL

To control leveling jacks, raising/lowering of the mast and emergency stop

ELECTRIC SYSTEM

Q.ty one (1) electric system to service all electric and electronic rig equipment

BOP HANDLING SYSTEM



Q.ty (1) BOP Handling System made by two (2) hydraulic cylinders and operated by a remote control panel.

Q.ty one (1) Dolly for BOP external loading, complete of roller bearings and guide tracks.

Main Technical Data

Max. lifting capacity: 40 mton (88000 lbs)

TOP DRIVE DOLLY

Q.ty One (1) Dolly to allow tripping operation and with patented device to move the complete top drive back and forward from well center to mouse hole. Frame built of hi-tensile steel.

FULL AUTOMATIC PIPE HANDLING SYSTEM

The system includes the following main components:

n. 1 central pivoting mast on bearing slewing ring, complete with power unit and control panel;

n. 1 arm and clamp for drill pipe radial and vertical handling;

n. 1 arm for pipe stabilization in vertical position;

n. 1 hydraulic jib crane, inserted in the mast top head, complete with hydraulic winch for site service, 17 metric tons (37,400 lbs.) lifting capacity.

Q.ty seventeen (17) racking bins and racking fingers to vertically rack the following:

NOTE: (Additional pipe lengths can be stored in spare bins)

- 268 Lengths of 5" Drill Pipes (12, 060 ft/3,675 m approx)
- 20 Lengths of 6 3/4" Drill Collars
- 12 Lengths of 8" Drill Collars
- 20 Lengths of 5" HWDP

The proposed pipe handling system makes transport as well as the drilling operations and string extraction from well very easy, safe and fast, keeping the operator out of drill floor in a safe position.

Drill pipes and drill collars handling system:

By means of the pivoting mast the system automatically move the pipe from the vertical bin down in the mouse hole. Each pipe, which may have a length different from the standard range in use, is kept at the right height by means of a hydraulic clamp installed in the mouse hole.



The top drive scopes out from the well center (operation controlled from the driller's cabin) and positions itself on the mouse hole center. The driller descends the top drive to pick-up the pipe in the mouse hole and moves back to the well center in order to add it to the drilling string.

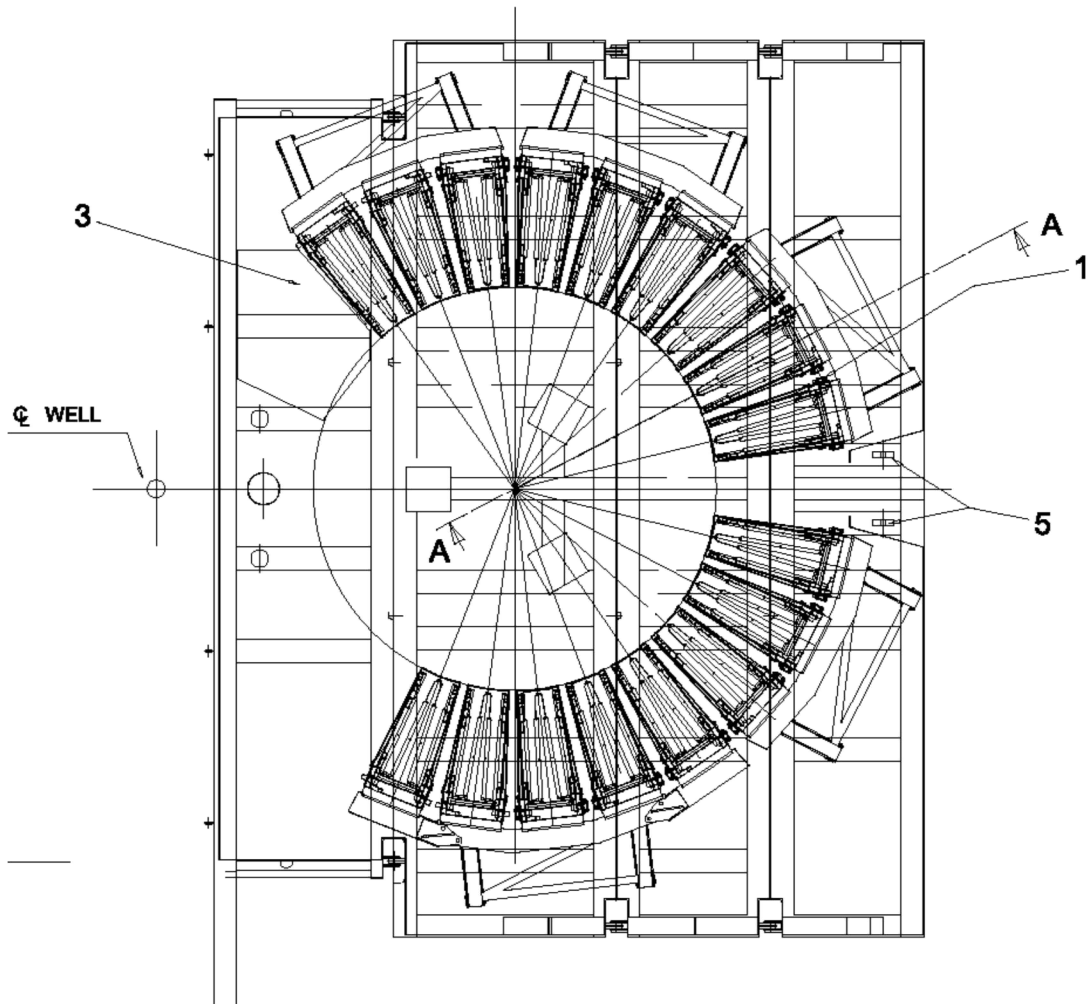
The automatic driller makes the operator free. The pipe handler, while the driller is working between the mouse hole and the center well, will prepare automatically another pipe in the mouse hole. This pipe is ready to be taken from the top drive as per sequence b.

For the tripping out the sequence will be backwards.

As concerns the casing running, by means of the jib the operator can take the casing from a special designed horizontal pipe rack and position it in the mouse hole.

The top drive scopes out from the well center (operation controlled from the driller's cabin) and positions itself on the mouse hole center. The driller descends the top drive to pick-up the casing with the casing elevator and moves back to the well center in order to add it to the casing string.

The system allows the utilization of standard lifting devices, such as links and tubular elevators.



CASING DOLLY

Q.ty One (1) Dolly for casing handling operation with related 15m (50 ft) long guide located at ground level.



DRILL STEM EQUIPMENT

DRILL PIPE

Q.ty 268 (12,060 ft/ 3,675 m) 5"OD, 19.50 lbs/ft, Range 3, Grade G-105, with internal external upset, Heat Treated to grade G-105, with NC50 (4 1/2" IF) box x pin tool joints 6.625" OD X 3.25"ID, 9" pin tong, 12" box tong, with pin markings as per API RP7G 16th Ed. Add.1, complete with HD poly thread protectors, 95% minimum wall thickness.

DRILL COLLARS

-Q.ty 20 Drill collars 6 3/4" Spiral, R2, with 4 1/2" connection X 2 13/16" ID (Stress/ relief groove, elevator & slip recess) complete with HD poly thread protectors.
-Q.ty 12 Drill collars 8" Spiral, R2, with 6 5/8" connection X 2 13/16" ID (Stress/ relief groove, elevator & slip recess) complete with HD poly thread protectors.

HEAVY WALL DRILL PIPE

-Q.ty 20 HDWP -5" 4 1/2" IF X 3" ID, R2.

STABILIZERS

Q.ty 3 X 17 1/2"OD

Q.ty 3 X 12 1/4"OD

Q.ty 3 X 8 1/2"OD



GENERATOR SETS

Make: Caterpillar
Model: 3512B
Q.ty: Three (3)

SOUND PROOF SHELTER WITH 65 dBA at 10ft (3 mts)

**1100 ekW 1476 BHP
60 Hz 1200 rpm 600 Volts**

Technical Specifications

SR4B Generator
Frame size: 697
Pitch: 0.7333
Number of poles: 4
Number of bearings: Single Bearing
Insulation: UL 1446 Recognized Class H with tropicalization and antiabrasion
IP rating: Drip Proof IP22
Alignment: Pilot Shaft
Over speed capability - % of rated: 150
Wave form: 003.00
Paralleling kit/Droop transformer: Standard
Voltage regulator: 3 Phase sensing with selectable volts/Hz
Voltage regulation: Less than +/- 1/2% (steady state) Less than +/- 1% (no load to full load)
Telephone Influence Factor: Less than 50
Harmonic distortion: Less than 5%

CAT DIESEL ENGINE

3512B TA, 4-stroke-cycle water-cooled diesel
Bore – mm: 170.00 mm (6.69 in)
Stroke – mm: 190.00 mm (7.48 in)
Displacement – L: 51.80 L (3161.03 in³)
Compression ratio: 14.0:1
Aspiration: TA
Fuel system: Electronic unit injection

CAT EMCP3 CONTROLS

- EMCP 3.1 (standard)



- EMCP 3.3 (optional)
- Integral to generator terminal box
- Single location for customer connection
- IP 23 enclosure
- 24 Volt DC Control
- UL/CSA/CE
- Electronically dead front
- Lockable hinged door (optional)
- Run/Auto/Stop/Control
- Voltage Adjust (Optional on 3.1)
- True RMS metering, 3-phase
- Digital indications for:
 - RPM
 - Operating hours
 - Oil pressure
 - Coolant temperature
 - System DC volts
 - L-L volts, L-N volts, Phase amps, Hz
 - ekW, kVA, kVAR, kWhr, %kW, PF(*)
- Shutdowns with indicating lights (with optional Annunciator)
 - Low oil pressure
 - High coolant temperature
 - Over speed
 - Emergency stop
 - Failure to start (over crank)
- Programmable protective relaying functions:(*)
 - Under and over voltage
 - Under and over frequency
 - Reverse power
 - Over current
- MODBUS isolated data link (RS-485 half-duplex)supports serial communication at data rate up to 1115.2 kbaud (*)

Package Performance

Genset Power rating with fan
Genset Power rating @ 0.8 pf
1100 ekW
1375 kVA



Fuel Consumption

100% load with fan
75% load with fan
50% load with fan
393.6 L/hr 104.0 Gal/hr
306.9 L/hr 81.1 Gal/hr
212.9 L/hr 56.2 Gal/hr

Cooling System

Ambient air temperature
Airflow restriction (system)
Air flow (max @ rated speed for radiator arrangement)
Engine coolant capacity
26 ° C 79 ° F
0.12 kPa 0.48 in. water
1643 m³/min 58022 cfm
156.8 L 41.4 gal

Exhaust System

Combustion air inlet flow rate
Exhaust stack gas temperature
Exhaust gas flow rate
Exhaust flange size (internal diameter)
Exhaust system backpressure (maximum allowable)
130.8 m³/min 4619.2 cfm
455.2 ° C 851.4 ° F
336.1 m³/min 11869.3 cfm
203.2 mm 8.0 in
6.7 kPa 26.9 in. water

Heat Rejection

Heat rejection to coolant (total)
Heat rejection to exhaust (total)
Heat rejection to after cooler
Heat rejection to atmosphere from engine
Heat rejection to atmosphere from generator
618 kW 35146 Btu/min
1477 kW 83997 Btu/min
355 kW 20189 Btu/min
131 kW 7450 Btu/min
64.1 kW 3645.4 Btu/min

Alternator

Motor starting capability @ 30% voltage dip
Frame



Temperature Rise

2670 skVA

697

125 ° C 257 ° F

Ambient capability at 300 m (984ft) above sea level. For ambient capability at other altitudes, consult your Caterpillar dealer.

UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40 degree C ambient per NEMA MG1-32.

Emissions data measurements are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. This engine's exhaust emissions are in compliance with the US EPA and California nonroad regulations as identified above. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb.

RATING DEFINITIONS AND CONDITIONS

Meets or Exceeds International Specifications: ABGSM

TM3, AS1359, AS2789, BS4999, BS5000, BS5514,
DIN6271, DIN6280, EGSA101P, IEC34/1, ISO3046/1,
ISO8528, JEM1359, NEMA MG 1-22, VDE0530,
89/392/EEC, 89/336/EEC

Standby - Output available with varying load for the duration of the interruption of the normal source power. Standby power in accordance with ISO8528. Fuel stop power in accordance with ISO3046/1, AS2789, DIN6271, and BS5514. Standby ambients shown indicate ambient temperature at 100 percent load, which results in a coolant top tank temperature just below the shutdown temperature.

Ratings are based on SAE J1995 standard conditions.

These ratings also apply at ISO3046/1, DIN6271, and BS5514 standard conditions.

Fuel Rates are based on fuel oil of 35° API (16° C or 60° F) gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.).



PCR-VFD

Make: DRILLMEC
Model: PCR-VFD-HH300
Q.ty One (1)

The Drive System will be provided to control and power the following loads:

- Three A/C Engine/Generator sets 600 Volt, 3PH, 1100 eKW, 1375 KVA
- Two 575 eKW Hydraulic Unit Motors (Softstart Starters @ 600V – 60 Hz)
- 2 x 1600 HP mud pumps, driven by 2 GE DC motors each.

The complete system will consist of the following equipment:

A. One (1) **VFD System** as follows:

- Model ABB ACS 800 AC Drive Cubicle(s)

1 - Interface/Service Cubicle for the VFD System

1 - Auxiliary Service Cubicle to support the VFD system motor starters (oilers, blowers, & etc.)

1 - Driller's Console

1 - Drillers Foot throttle

B. One (1) **I-DRIVE Engine/generator Power Control System** for 1100 eKW power units with 1375 KVA generators as follows:

4 - Generator Control Cubicle(s)

1 - AC Generator Synchronizing Cubicle

C. One (1) A/C Motor Control Center 460VAC, 3ph., 60 Hz with A/C motor control and feeder breakers.



- D. One (1) Low Voltage Distribution and Lighting Distribution Panel with 3 pole, 2 pole or 1-pole breakers as required.
- E. One (1) Power Control Room outdoor, weatherproof, insulated, mobile steel building with a self-supporting oil field skid. It will contain the above wired and tested equipment.

Mounted on the skid or on the outside of the control room, are the following:

Two (2) - Air Conditioning Units

Two (2) - Power Transformers

One (1) - Lighting Transformer

VFD system details :

n°4 variable frequency drives model ACS 800-07-1160-7 (make ABB) with the following characteristics :

- supply voltage : 600Vac 60Hz
- output voltage : 525-690Vac variable frequency
- 6 pulse
- Direct Torque Control.
- DU/DT filter
- Harmonic reduction integrated inductance
- Second ambient EMC filter
- Air cooled
- Power Limitation set for Mud Drilling pumps 1600 Hp.

Operating temperature range: 0 degree C to +50 degree C (32 degree F to +122 degree F)



MUD PUMPS

Make: Drillmec
Model: 12T1600
Quantity: Two (2)

Specifications:

- Rated Input HP @ 140 SPM.....1600
- Single-Acting Triplex, Rated SPM.....120
- Stroke, Inches.....12”
- Gear Ratio..... 3.171
- Hydrostatic Working Pressure (PSI).....5,000

Standard equipment includes:

- Precision-Machined Structural Steel Fabricated Main Frame with Access Covers over Crosshead Area and Inspection Doors on Each Side of Frame
- Precision-Machined Forged Steel/Fabricated Crank Shaft
- Individually Forged Steel, Two-Piece, “L” Shape, Interchangeable Modules with Quick-Change Valve Pot Covers (Designed Working Pressure: 5,000 psi)
- 6 ¾ ” Liners and Pistons (or Customer to Specify)
- Polyurethane Valves and Seats
- Metal to Metal Liner Retention
- Two-Piece Liner and Piston Rod Clamps
- Two-Piece Quick-Change Piston Rods
- Piston/Liner Lubrication System, including:
 - 1” X 1-1/2” Centrifugal Pump
 - 3 HP Motor, Class 1, Div. 1, 3PH, 230/460V, 60Hz, 182TC, 1735 RPM, TEXP
 - Suction and Discharge Lines for Liner Wash
- Double Helical Pinion Shaft and Bull Gear
- Suction Manifold with Suction Dampener
 - Three-Inlet Design
 - 10” ASA 150# R.J. Flange Connections
- Suction Line Pressure Relief Valve
- Four-Runner Oilfield Type Master Skid
- One Hydraulic Valve Seat Puller
- One Set of Hand Tools for Fluid End Maintenance
- Discharge Strainer Cross
 - 5” API 5,000# R.J. Discharge Flange Connections



- 4" API 5,000# R.J. Flange Top Connection for Pulsation Dampener
- Jib Crane with Trolley, to Assist in Installation/Removal of Fluid End Components
- Pressure Gauge
 - 0-6,000 psi
 - Type F
 - 2-1/16" RTJ Flanged R24 Bottom
 - Standard Service
- Relief Valve
 - 2,500 – 6,000 psi
 - 3" Type CH
- Pulsation Dampener
 - Hydril Model K20-5000 or equivalent
 - Maximum Service Pressure: 5,000 psi
 - Surge Capacity: 20 gallons
 - Connection: 4" API 5,000 RTJ
 - With Bottom Connection Kit & Charging Hose Assembly
- Rear Mount with Belt Drive (For Use with G.E. B22 AC Motors)
 - all steel fabricated guard
 - N° 12 8V type belts
 - sheaves: small sheave is supported by motor shaft
 - suitable tensioning system
- GE DC Drilling Motor (Qty. 2)
 - 6 Pole, stator consist of form-wound windings
 - Copper alloy rotor bars and end rings
 - Class H insulation, robotically taped
 - Single shaft extension with hub
 - Main terminal box rated IP56 with bus bar connections for main cables and terminals provider for RTD's, pressure sensor
 - RTD's, platinum embedded in stator slots
 - Pressure sensor to insure ventilation
 - Blower assembly, 11 kW, 460 V 60 Hz, providing 3000 cfm of ventilation air
 - Space heater
 - Motor enclosure is IP44
- Custom Equipment
 - Extended Pump Skid to House two (2) Super Charging Pumps (one for each pump)
 - Two (2) Super Charging Pumps 6 x 8 with 50 HP motor on skid (one for each pump)



- Manifold and connection between Super Charging Pumps and Mud Pump



MUD SYSTEM

Make: MI-SWACO
Code/Type: 1000BBL

A. Shaker Tank Skid

Design Specifications:

Tank Dimensions: 10' wide x 8'6" tall x 38' long.

Capacity: 350 bbl and sets on a 50' skid.

Compartments: (4)

Sand Trap Approximately 50 bbl @ 45° Sloped Bottom

Degasser / Dsander 100 bbl

Dsilter 100 bbl

Clean fluid compartment 100 bbl

Compartments have either overflow cutouts or equalizer valves connecting

Equipment Components:

(2) Two Mongoose PT Dual Motion Adjustable Shaker – 3 motors

One Mud Cleaner 312/10T4 Mongoose PT – 3 motors

Three each 12" Dsander cones at 500 gpm each (1500 gpm total)

Twenty each 4" Dsilter cones at 75 gpm each (1500 gpm total)

One Vacuum Compact Degasser, W/Suction & Discharge Piping

Two 10 HP Agitator, Max 2000

Three Low Pressure Mud Gun

Two Centrifugal Pump, 8x6x14 – 100 HP

B. Intermediate Tank

Design Specifications:

Tank Dimensions: 10' wide x 8'6" tall x 38' long.

Capacity: 350 bbl and sets on a 50' skid.

Compartments: (2)

180 bbl reserve @ active mud

Equipment Components:

(4) Four 10 HP Agitator, Max 2000

(4) Four Low Pressure Mud Gun

C. Suction Tank



Design Specifications:

Tank Dimensions: 10' wide x 8'6" tall x 38' long.

Capacity: 350 bbl and sets on a 50' skid.

Compartments: (2)

Pill compartment 87 bbl

Suction compartment 263 bbl

Equipment Components:

(3) Three 10 HP Agitator, Max 2000

(3) Three Low Pressure Mud Gun

(2) Two Centrifugal Pump, 8x6x14 – 100 HP

D. Mixing Hopper Skid

Design Specifications:

Dimensions: 10' wide x 9'6" tall x 14' long with double doors on one end and open on the other end nearest the Suction Tank (on a 17' long skid).

Storage area: 10' wide x 10' long x 8' high is reinforced to hold two pallets of bagged barite.

Mud Mixing table with Ventura positioned at the end of skid closest to the Suction Tank.

The skid is a two runners W12" x 35#; 10' wide x 17' long with 6" sch#80 lift pipe each end with W6x12 and 3x3x3/8 angle cross members; 1/4" checker plate floor; walls are 1/4" plate with vertical crimps on 24" center.

E. Shaker, Suction and Intermediate Tank and Skid Materials

Skid is 10' x 50' and has three (3) runners W12" x 50#; 6" sch#80 lift pipe each end, 19 cross beams W6x12, extensions each side of 3/8" plate and 4x4x3/8 angle

Walls and Partitions are 1/4 PL x 8' with vertical crimps on 24" centers

Floor is 3/8" PL on a 4" slope over the 10' width; 3/8" PL ribs at each cross beam

Porch is covered with 1/4" checkered plate on the floor and roof

Handrails 1 1/2" square tubing x 3/16" wt with 1/4" x 4" toe rail

Stairway (Removable); one on each Shaker and Suction Tank of C8"x11.5#

Walkways; Hinge down type with C6"x8.2# and 2" square tube bracing

Grating; 1 1/4" x 3/16" serrated bar

Top Rail; Square tubing 6" x 3/8" wt (water and mud lines)

F. Equipment Component Descriptions

M□I SWACO TRIPLE SHAKER SYSTEM WITH 312/10T4/MONGOOSE MUD

CLEANER: Three (3) M□I SWACO Mongoose PT Dual Motion Adjustable

Shakers. Each with wedge lock tensioners, two (2) 2 HP vibrator motors and one



(1) 0.6 HP vibrator motor, 60 hz, 460 volt, 3 phase, explosion proof electric; Pretensioned Screen Bed, linear and balanced elliptical motion switchable while running (shutdown not required). Linear motion for high solids loading and conveyance, balanced elliptical motion for drying cuttings and providing longer screen life; enclosed distribution box addresses HSE considerations concerning excess fumes from mud; unique distribution trough evens mud flow to shaker screen area while reducing velocity of fluids, which helps to prevent premature wear on primary (back) screen surface. A 312 D□Sander, capable of processing 1,500 GPM, and a 10T4 D□Silter capable of processing 1,500 GPM to be mounted over one (1) shaker. Mounted on common lifting skid with one lift point and one common possum belly.

Compact Vacuum Degasser, complete with 5 hp explosion proof motor, Ingersoll□Rand vacuum pump, 460 volt, 60 Hz, explosion proof starter, float assembly, processing tank (gas removal) vacuum gauge, discharge and suction piping. Rated for 1000 GPM.

BAKER SPD Centrifugal pump package 8X6X14 100HP 230/460 V 60HZ, 1750 RPM, explosion proof motor, with out starter.



WELL CONTROL

BOP

13-5/8" 5M Bolted Spherical BOP Assembly

Q.ty 1 Ea.

Church type 13-5/8" 5,000 psi WP Bolted Spherical Blowout Preventer. Internal H2S trim.

Manufactured in accordance with API Specification 16A, Third Edition, June 2004 and NACE MR0175 per API Specification 16A.

Temperature (T20 for Body), Standard Packing Element - Nitrile Element (40°F to 170°F)”

Lifting Shackles will be added.

Summary of Selected Options:

Bottom Connection: 5,000 psi WP BX160, flanged

Top Connection: 5,000 psi WP BX-160 studded top

Stainless Steel Inlay, Top Connection: Yes

Stainless Steel Inlay, Bottom Connection: Yes

Inconel Inlay, Bottom Connection: No

Inconel Inlay, Top Connection: No

Element installed: Nitrile

Accumulator Assembly, 13 5/8"3,000/13 5/8"5,000/20 3/4" 3,000 /21 1/4' 2,000 psi
WP Bolted Cover Spherical BOP.

13 5/8" 5M Double BOP Assembly

Qty 1 Ea.

Church type Hydraulic Operated Double Blowout Preventer. 13-5/8" vertical bore. 13-5/8" 5,000 psi WP, internal H2S trim. Door assemblies have positive door sealing accomplished through a floating cartridge seal. Enhanced sealing provided with well bore pressure.

Manufactured in accordance with API Specification 16A, Third Edition, June 2004 and NACE MR0175 per API Specification 16A, Temperature T20

Summary of Selected Options:

Top Connection: Studded, 13-5/8" 5,000 psi WP

Bottom Connection: Flanged, 13-5/8" 5,000 psi WP

Side Outlets: Flanged, 4-1/16" 5,000 psi WP

Q.ty: 4

Stainless Steel Inlay, Top Connection: Yes

Stainless Steel Inlay, Bottom Connection: Yes

Stainless Steel Inlay, Side Outlets: Yes



Inconel Inlay Top Connection: No
Inconel Inlay Bottom Connection: No
Inconel Inlay Side Outlets: No
Door Locking System Upper Cavity: Manual
Door Locking System Lower Cavity: Manual
Replaceable Cavities: Yes

13-5/8" 5M Single BOP Assembly

Q.ty 1 Ea.

Church type Hydraulic Operated Single Blowout Preventer. 13-5/8" vertical bore. 13-5/8" 5,000 psi WP, internal H2S trim. Door assemblies have positive door sealing accomplished through a floating cartridge seal. Enhanced sealing provided with well bore pressure.

Manufactured in accordance with API Specification 16A, Third Edition, June 2004 and NACE MR0175 per API Specification 16A, Temperature T20

Summary of Selected Options:

Top Connection: Studded, 13-5/8" 5,000 psi WP

Bottom Connection: Flanged, 13-5/8" 5,000 psi WP

Side Outlets: Flanged, 4-1/16" 5,000 psi WP

Q.ty: 2

Stainless Steel Inlay, Top Connection: Yes

Stainless Steel Inlay, Bottom Connection: Yes

Stainless Steel Inlay, Side Outlets: Yes

Q.ty: 2

Top Connection Inconel Inlay: No

Bottom Connection Inconel Inlay: No

Side Outlet Inconel Inlay: no

Door Locking System: Manual

Replaceable Cavities: Yes

Drilling Spool 13 5/8" 5,000 psi WP

Qty 1 Ea.

13 5/8" vertical bore. 13 5/8" 5,000 psi WP flanged top x 13 5/8" 5,000 psi WP flanged bottom, with two (2) 4 1/16" 5,000 psi flanged side outlets, Stainless steel lined ring grooves, 29 1/4" high. Manufactured in accordance with API Specification 16A, Third Edition, June 2004 and NACE MR0175 per API

Specification 16A. Temperature T20.

Blind flange, API-6A, 4-1/16" 5,000 psi WP

Qty 6 Ea.

Blind flange, API-6A, 4-1/16" 5,000 psi WP, 4-1/16" 5,000 psi WP, with stainless steel ring



grooves, Manufactured to API Specification 6A, Nineteenth Edition, July 2004 and NACE MR0175 per API Specification 6A. temp class P, PSL 3.

Ring Gasket R 39, 316 SS for 4-1/16" 5,000 psi WP Flange

Qty 13 Ea.

Ring Gasket, BX160 316 SS for 13-5/8" 5,000 psi WP Flange

Qty 5 Ea.

Stud & Nut Kit for a 4-1/16" 5,000 psi WP Flange, T-20

Qty 13 Ea.

Assembly consisting of one stud and two nuts for a 4- 1/16" 5,000 psi WP flanged connection (Q.ty 8 per kit), cadmium plated. API Temperature Class T-20

Stud & Nut Kit for 13-5/8" 5,000 psi WP Flange, T-20

Qty 1 Ea.

Assembly consisting of one stud and two nuts cadmium plated for a 13-5/8" 5,000 psi WP

Choke Valves , 4 1/16" 5,000 psi,

Qty 1 Ea.

Consisting of:

One (1) Gate Valve, Handwheel Operated, API-6A, 4-1/16" 5,000 psi WP

Type "B", 4-1/16" bore, 4-1/16" 5,000 psi WP flanged ends, with stainless steel lined ring grooves, Manufactured to API Specification 6A, Nineteenth Edition, July 2004 and NACE MR0175 per API Specification 6A. Material class DD, temp class P, PSL 3, complete with handwheel, PR-2.

One (1) Gate Valve, Hydraulic Operated, API-6A, 4-1/16" 5,000 psi WP Type "DB", with manual override, 4-1/16" bore, 4-1/16" 5,000 psi WP flanged ends, with stainless steel lined ring grooves, Manufactured to API Specification 6A, Nineteenth Edition, July 2004 and NACE MR0175 per API Specification 6A. Material class DD, temp class P, PSL 3. complete with handwheel, PR-2, Studs and nuts, Ring gaskets, cadmium plated.

Kill Valves , 4 1/16" 5,000 psi,

Qty 1 Ea.

Consisting of:

One (1) Gate Valve, Handwheel Operated, API-6A, 4-1/16" 5,000 psi WP Type "B", 4-1/16" bore, 4-1/16" 5,000 psi WP flanged ends, with stainless steel lined ring grooves, Manufactured to API Specification 6A, Nineteenth Edition, July 2004 and NACE MR0175 per API Specification 6A. Material class DD, temp class P, PSL 3, complete with handwheel, PR-2.

One (1) Gate Valve, Hydraulic Operated, API-6A, 4-1/16" 5,000 psi WP Type "DB", with manual override, 4-1/16" bore, 4-1/16" 5,000 psi WP flanged ends, with stainless steel lined ring



grooves, Manufactured to API Specification 6A, Nineteenth Edition, July 2004 and NACE MR0175 per API Specification 6A. Material class DD, temp class P, PSL 3. complete with handwheel, PR-2, One (1) Check Valve 4-1/16" 5,000 psi WP, flange x flange, H2S trim, with stainless steel lined ring grooves, API 6A-17th; PSL-3; DD; PR-1 Studs and nuts, Ring gaskets, cadmium plated

Remote Choke Control Panel

Qty 1 Ea.

System Description- the Remote Choke Control System is design to operate the single drilling choke located on the Choke Manifold. An electrical actuator is mounted on the drilling choke and is powered from the from the rig generators. The system utilizes a Casing Pressure Transducer, located on the choke manifold and a Drill Pipe Pressure Transducer and the two (2) Mud Pump Stroke Counters. The Drill Pipe Pressure and the Mud Pump Stroke Counters are supplied as a component of the rig instrumentation package by others. A local Junction Box is provided to forward the control signals to the Choke Control Panel. The choke will operate from the full open to close position in approximately 30 seconds. The system requires two part numbers for proper configuration: A Remote Choke Control Panel and a Choke Control Accessory Kit.

The Remote Choke Control Panel is located in the Drillers Cabin and is a single touch screen monitor with the necessary graphics and software for the operator to adjust the percentage open/close of the drilling choke from the comfort of the drillers cabin. The screen is controlled though a PLC and will display the Casing and Drill Pipe Pressure. The Mud pump information will display the Stroke Rate in Strokes per Minute (SPM) as well as the individual and total stroke counts from each pump. A reset function allows the operator to reset the number of strokes to zero. The panel is rated for a safe area operation.

The Choke Control Accessory Kit consists of the field mounted J-Box, the Casing Pressure Transducer, and the electrical choke actuator. The electrical choke actuator is a self-contained unit operating from 480 VAC, 3 Phase power and is equipped with a manual override lever and an operating wheel. Remote control of the actuator is from the Remote Choke Control Panel. The actuator is rated for a Class 1, Div 1 location.

Control System

Qty 1 Ea.

Hydraulic Power Unit (HPU) is rated for 3,000 psi working pressure and designed to meet the sizing requirements of API 16D 2nd edition. System is based on operation of One (1) 13 5/8" 5,000 psi WP Spherical BOP, One (1) 13 5/8" 5,000 psi WP SL Double and One (1) Single Ram BOP with 15 1/4" doors and Two (2) hydraulic Choke/Kill valves.

CONSISTING OF:

Blowout Preventer Control Unit is a 3,000 psi working pressure accumulator system consisting of:



Sixteen (16) - Eleven 11 gallon 3,000 psi working pressure bladder type, bottom loading, separator accumulators. The separator type accumulator shell has no welds, seams or joints. It is manufactured from a single piece of chrome molybdenum steel and has a four to one (4:1) safety margin above maximum working pressure (actually tested to 4,500 psi). This accumulator cannot be disassembled under pressure. This bottle will be ASME coded unless otherwise specified. The Koomey bladder type separator accumulator can be repaired by rig personnel without destroying its ASME stamp of approval

Four (4) Accumulator manifolds, machined from mechanical tubing, each are drilled and tapped with five (5) ports for mounting a total of twenty (20) accumulator bottles. Manifolds are sized to meet API requirements; such that the loss of one individual accumulator and/or bank will not result in more than twenty-five (25%) percent loss of the total accumulator system capacity.

Four (4) Accumulator manifold isolation valves, one mounted on each manifold.

Four (4) Accumulator manifold bleeder valves, one (1) mounted on each manifold with stainless steel return line tubed into the main reservoir.

Four (4) Accumulator manifold gauges, for indication of individual accumulator manifold pressure, 0-6000 PSI, stainless steel, glycerin-filled, 4" O.D. face.

One (1) electrical powered pump package sized per API 16D with a 3 phase, 60 Hz, 460 Volt, Class 1, Div 2 electrical motor through a belt drive encased guard, complete with Class 1, Div 2 local starter and automatic pressure switches.

Check valves will be installed on the discharge of each pump to allow for service of pump with unit in operation.

One (1) fluid reservoir sized per API 16D complete with 4" inspection ports, and drains.

One (1) alternate source valve for introduction of hydraulic pressure from an alternate power source.

Unit is mounted on a heavy-duty oilfield steel skid.

One (1) Air Pump Package sized per API 16D, complete with air manifold, air filter, automatic air shut-off valves, air gauge, suction filter with fluid strainer and, shut-off valve.

Manifold, unit mounted, consisting of:

Six (6) Four-way water service control valves, selector type for Spherical (Annular) and three (3) Ram Blowout Preventers and One (1) each Choke and Kill valves.

Valves are mounted in an extra heavy duty machined manifold made from mechanical tubing with no seams or joints welded.

One (1) Blind Ram guard mounted on the four-way valve to prevent accidental operation of the shear rams.

One (1) 1" remote controlled pressure reducing and regulating valve for controlling the Annular BOP operating pressure, air motor driven, fail-safe, stay-put design.

One (1) 1" size manual controlled pressure reducing and regulating valve for controlling the manifold valve functions. High pressure strainers are piped ahead of each of the pressure reducing and regulating valves to insure long life.

The pressure reducing and regulating valve for the ram type preventer is equipped with a 1" size 3,000 psi working pressure bypass valve to allow emergency fluid pressure to be applied to the



preventers as required by the preventer manufacturer.

The manifold is complete with one (1) 10,000 psi hydraulic bleeder valve

Three (3) heavy duty gauges,

1. One (1) 0-3,000 psi for annular regulated pressure,
2. One (1) 0-6,000 psi for accumulator pressure
3. One (1) 0-6,000 psi for the manifold pressure.

Alarm System, HPU mounted, for indication of PLC communication error. The system has remote alarm indication signals for the Driller's remote panel. The alarm light, pushbutton and high power horn will be mounted in the Driller's panel. One (1) pushbutton assembly is provided for alarm acknowledgement. Activation of this button will silence the horn, however, the alarm light will continue to illuminate until the problem is corrected.

One (1) pushbutton assembly is provided for lamp testing.

Electro-Pneumatic, PLC Based Remote Control HPU-Mounted Interface Module to provide remote control of HPU functions from Driller's Panel. 24 volt DC operating voltage. NEMA 4X - rated for safe area non-explosion proof design stainless steel junction box assembly to enclose all necessary electro pneumatic solenoid valves, and wiring. Pressure switches, transducers are mounted on the skid assy. Air cylinders are mounted on each 4-way control valve and bypass valve functions.

An Electrical Receptacle is installed in the junction box and a mating plug is provided for connecting the field cabling from the Battery Back-up / Battery Charger Unit. A Fiber Optic Receptacle is installed for connection of the field cabling from the Drillers Control Panel.

Electrically Operated Driller's Control Panel for control of BOP Stack functions, consisting of:

A. Touch-Screen Control Panel consisting of:

1. Graphics that indicate the current status and allow remote functioning of the following BOP Controls:

- Six (6) BOP Functions: Annular, Upper Ram, Middle Ram, Lower Ram, Choke Valve, Kill Valve.

- Annular Pressure Regulation

- Bypass function

2. Graphics that indicate the following statuses:

- Regulated Annular Pressure

- Manifold Pressure

- Accumulator Pressure

- Rig Air Pressure.

- Pump Running

B. Alarm light for indication of PLC Communication error, complete with high decibel electric horn and alarm acknowledge button.

C. Emergency Battery Back-Up System, 120 volt, AC input power, 24 Volt DC output, to provide emergency operating power for the remote control panels and HPU remote control interface module complete with charging system and batteries.

Unit is designed to operate from a "clean" power source such as the rig supplied UPS system.



Manufactured for "Safe-Area" operation only.

Electrically Operated Tool-pushers Control Panel

Electrically Operated Tool-pushers Control Panel for control of BOP Stack functions, consisting of:

A. Touch-Screen Control Panel consisting of:

1. Graphics that indicate the current status and allow remote functioning of the following BOP Controls:

- Six (6) BOP Functions: Annular, Upper Ram, Middle Ram, Lower Ram, Choke Valve, Kill Valve.
- Annular Pressure Regulation
- Bypass function
- Regulated Annular Pressure
- Manifold Pressure
- Accumulator Pressure
- Rig Air Pressure.
- Pump Running

B. Alarm light for indication of PLC Communication error, complete with high decibel electric horn and alarm acknowledge button.

Manufactured for "Safe-Area" operation only.

1" ID x 50 feet BOP Control Hose,

Qty 12 Ea.

1" ID x 50 feet BOP Control Hose, stainless steel armored, fire resistant coupled with 316 stainless steel swivel male connections each end, 5,000 psi WP and 7,500 psi Test pressure.

Physical Characteristics of the hoses: 2.42" OD, 5.43 lbs/ft, 2.09 FT working MBR.

Operating Temperatures- -40° to 2,000° F (-40° to 1093° C)

Quick Disconnect/installation kit for BOP Connection hoses

Qty 1 Ea.

Consist of :

12- Fire rated quick disconnects with mating dust cap and plugs.

Includes piping of the components for connection of the BOP connection hoses to the BOP stack.

RIG UP

MECHANICAL RIG-UP

The following system has been planned for assembling and testing a land rig having one rig with its hydraulic unit and pipe handling system, an PCR System, four Generator Sets, three Mud Pumps, a three tanks mud system, Kooomey unit, BOP system, choke and kill lines.



The rig-up will include time and material as necessary to fabricate and install all the piping, electric cables cases, and hydraulic hoses to connect all the above equipment.

In the rig-up is included the rig air compressor unit, one water tank and one diesel tank.

The main skids, housing and roof to assemble the generator sets is included.

The final test of all the components is included.

ELECTRICAL RIG-UP

Electrical Rig-Up, AC Power Wiring and Lighting

The following system has been planned for use with a land rig having an PCR System to control four (4) AC drilling motors (2 on each of the two Mud Pumps) and two (2) 575KW Hydraulic unit AC motors. Three generators to be rated at 1100 eKW, 1375KVA 600 V, 3 phase 60 Hz., each with .8 power factor.

Generator Power and Control Cables

AC Power and Control Cables to connect 3- 1100KW, 600 V, 3 phase at 60Hz. generators to PCR House consisting of the following:

- Power cables to connect generators to PCR house.
- Cable tray, galvanized, from generator to PCR house.
- Control cables for generators.
- Shielding pair cables for magnetic pick-ups and throttles.
- Plastic plates to prevent excessive heat caused by electrical fields where power cables enter generators.
- Lugs for attaching power cables to generator bus stabs.
- Miscellaneous tapes, ty-wraps, etc., for insulation.

AC Motor Power and Control Cables

AC Power and control cables to connect the following GEB22 AC motors and driller's console to PCR House as follows:

1. Power cables to connect four (4) AC motors to PCR House
 - a. 2 x1600 HP Mud Pumps
2. Power cables to connect 2 600V AC motors to PCR House



- a. 2 x 575KW Hydraulic Units @ 600VAC, with control to be wired to soft start panel
3. Control cables to connect AC motor controls, 10HP AC blower motors, 3HP liner wash, 3 HP chain oilers, heaters, etc., to PCR House.
4. Control cables to connect driller's console to PCR House.
5. Miscellaneous tapes, ty-wraps, etc., for installation.

Lighting System

Heavy duty vapor tight, weather proof fluorescent and Metal Halide lighting system. Each fixture to have a plug and receptacle disconnect to allow safe and easy removal of any fixture for service movement to another location day or night without interruption of any power of illumination.

Camp Distribution System Consisting of:

- 1- 112.5 KVA, Nema 3R outdoor, rain tight enclosed, transformer, 480V primary, 120/208V secondary. Transformer is furnished complete with Myers hubs & cord grips, adequately sized for 1-#1/0-4c- primary cable & 2-#1/0-4c secondary cables.
 - 300;-# 1/0-4c Cable to feed the Camp Distribution Transformer from the PCR house.
- 2- Distribution Panel board, Nema 4, 24Ckt, 120/208V 3 phase 4 wire, 400A MLO, with receptacle & Mating plugs mounted on sidewalls of panel. Panel board is to be shop assembled, tested and complete with nameplates.
- 3- Distribution Panel is to be mounted on a skid base. Panel to consist of the following not winterized:
 - 1-100A/3p C/B
 - 6- 100A/2P CB's
 - 4-20A/1P CB's
 - 9-Single Pole Spaces for Future additions
- 4- Lot lugs for terminating primary & secondary cables at transformer.
- 5- 1- EEXD11B Hazardous Area fluorescent fixtures complete with lead

Emergency Generator panel:

- a. 1 Emergency generator panel to include a Main C/B for 170KW generator set
- b. Air compressor B, 50At
- c. 112Kva Transformer 480-120/208
- d. 1-24ckt Lighting Panel
- e. 4-100at 2P C/ @ 208V
- f. 4-20at 1p C/B for exterior lighting
- g. 1-100at 3Ø 208V C/B for Change house with receptacle
- h. 1-100at 3Ø 480V C/B for HYD unit



- i. 1-30atat 3Ø 480V C/B for spare

Misc. Equipment

- a. 208V 3Ø indoor lighting panel
- b. 100' 2/4c cable
- c. 8 FSK102V Receptacles w/Black boxes
- d. 4-Mar800 lighting fixtures
- e. 4-EFS2023 w/plugs
- f. 15KW 208V 3Ø Heater w/thermostat
- g. 50' 6/4c Cable
- h. 300' 12/3c Cable
- i. 1 EFS2023 220V plug and receptacle
- j. 1-Lot misc. fittings, straps, tags., etc..

