OCD Hobbs

AT5-16-199

Form 3160-3
(March 2012)

R-111-POTASH

~~SECRETARY'S POTASH~~

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

# APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. NMNM 78272, NMNM 149957/NMNM 67995/NMNM 67996

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

7. If Unit or CA Agreement, Name and No.

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone

8. Lease Name and Well No. (316227)
Rusty Anchor 7 Federal Com #4H

2. Name of Operator BC Operating, Inc. (160825)

9. API Well No.
30-025-43348

3a. Address
P.O. Box 50820
Midland, Texas 79710

3b. Phone No. *(include area code)*
432-684-9696

10. Field and Pool, or Exploratory
Gem; Bone Spring (27220)

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*

UNORTHODOX LOCATION

At surface 609' FNL & 2440' FEL of Unit Letter 'B', Section 18, T-20S, R-33E

At proposed prod. zone 240' FNL & 960' FEL of Unit Letter '1', Section 6, T-20S, R-33E

11. Sec., T. R. M. or Blk. and Survey or Area
Section 18, T-20S, R-33E
Section 6, T-20S, R-33E

14. Distance in miles and direction from nearest town or post office*
30 miles Southwest of Carlsbad

12. County or Parish
Lea

13. State
NM

HOBBS OCD

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)
240'

16. No. of acres in lease
1361.21

17. Spacing Unit dedicated to this well
320

JUL 5 2016

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.
75'

19. Proposed Depth
21,132' MD / 10,000' TVD

20. BLM/BIA Bond No. on file
NM2572

RECEIVED

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3528' GL

22. Approximate date work will start*
07/01/2016

23. Estimated duration
45 days

## 24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature Pam Stevens | Name *(Printed/Typed)* Pam Stevens | Date 09/15/2015

Title
Regulatory Analyst

Approved by *(Signature)* /s/George MacDonell | Name *(Printed/Typed)* | Date JUN 27 2016

Title FIELD MANAGER | Office CARLSBAD FIELD OFFICE

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section ... willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or

See attached NMOCD Conditions of Approval

(Continued on page 2)

*(Instructions on page 2)

Capitan Controlled Water Basin

KZ 02/05/16

SEE ATTACHED FOR CONDITIONS OF APPROVAL

Approval Subject to General Requirements & Special Stipulations Attached

KZ

## 1. Geologic Formations

See COA

| | | | |
|---|---|---|---|
| TVD of target | 10000 | Pilot hole depth | 10130 |
| MD at TD: | 21132 | Deepest expected fresh water: | 185 |

**Capitan**

| Formation | Depth (TVD) from KB | Water/Mineral Bearing/ Target Zone? | Hazards* |
|---|---|---|---|
| Quaternary Fill | Surface | Water | |
| Rustler | 1110 | | |
| Top Salt | 1250 | | |
| Base Salt | 2600 | | |
| Yates | 2780 | Oil | |
| Capitan | 3260 | | |
| Capitan Base | 3405 | | |
| Delaware (Cherry Canyon) Sand | 4820 | Oil | |
| Manzanita Marker | 5060 | | |
| Brushy Canyon | 5310 | Oil/Gas | |
| Bone Spring Lime | 8050 | Oil/Gas | |
| 1st Bone Spring Sand | 9120 | Oil/Gas | |
| 2nd Carbonate | 9420 | Oil/Gas | |
| 2nd Bone Spring Sand | 9730 | Horiz. Target 10000' | |
| 3rd Carbonate | 10080 | Oil/Gas | |
| TD Pilot Hole | 10130 | | |
| | | | |

*H2S, water flows, loss of circulation, abnormal pressures, etc.

## 2. Casing Program See COA

| Hole Size | Casing Interval From | Casing Interval To | Csg. Size | Weight (lbs) | Grade | Conn. | SF Collapse | SF Burst | SF Tension |
|---|---|---|---|---|---|---|---|---|---|
| 24" | 0 | ~~1135~~ 1228 | 20" | 133.0 | K55 | LTC | 2.86 | 1.84 | 9.63 |
| 16" | 0 | 3200 | 13.375" | 72 | N80 | STC | 1.61 | 2.45 | 4.51 |
| 12.25" | 0 | 4600 | 9.625" | 40 | L80 | LTC | 1.41 | 1.15 | 3.95 |
| 8.75" | 0 | ~~16601~~ 20,558 | 5.5" | 17 | P110 | Semi-Buttr. | 1.44 | 1.12 | 1.86 |
| | | | | BLM Minimum Safety Factor | | | 1.125 | 1 | 1.6 Dry 1.8 Wet |

per standard planning report.

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Must have table for contingency casing. See attached semi-premium buttress connection Specs.

| | Y or N |
|---|---|
| Is casing new? If used, attach certification as required in Onshore Order #1 | Y |
| Does casing meet API specifications? If no, attach casing specification sheet. | Y |
| Is premium or uncommon casing planned? If yes attach casing specification sheet. | Y |
| Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria). | Y |
| Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing? | Y |
| | |
| Is well located within Capitan Reef? | Y |
| If yes, does production casing cement tie back a minimum of 50' above the Reef? | Y |
| Is well within the designated 4 string boundary. | Y |
| | |
| Is well located in SOPA but not in R-111-P? | N |
| If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing? | |
| | |
| Is well located in R-111-P and SOPA? | Y |
| If yes, are the first three strings cemented to surface? | Y |
| Is 2nd string set 100' to 600' below the base of salt? | Y |
| | |
| Is well located in high Cave/Karst? | N |
| If yes, are there two strings cemented to surface? | |
| (For 2 string wells) If yes, is there a contingency casing if lost circulation occurs? | |
| | |
| Is well located in critical Cave/Karst? | N |
| If yes, are there three strings cemented to surface? | |

**3. Cementing Program**

| Casing | # Sks | Wt. lb/ gal | Yld ft3/ sack | $H_20$ gal/ sk | 500# Comp. Strength (hours) | Slurry Description |
|---|---|---|---|---|---|---|
| Surf. | 900 | 13.5 | 1.757 | 9.09 | 10 | Lead: ExtendaCem + 2 lbm Kol-Seal + 0.125 lbm Poly-E-Flake |
| | 770 | 14.8 | 1.345 | 6.23 | 8 | Tail: HalCem + 2 lbm Kol-Seal + 0.125 lbm Poly-E-Flake + 1% Calcium Chloride - flake |
| Inter. | 970 | 12.6 | 1.934 | 10.36 | 15 | Lead: EconoCem + 0.25 lbm Poly-E-Flake + 0.60% Halad®-9 + 3 lbm Kol-Seal |
| | 1540 | 14.8 | 1.339 | 6.13 | 11 | Tail: HalCem + 3 lbm Kol-Seal + 0.25 lbm Poly-E-Flake |
| | | | | | | |
| Int2. | 1250 | 13.5 | 1.757 | 9.09 | 10 | Lead: ExtendaCem + 2 lbm Kol-Seal + 0.125 lbm Poly-E-Flake |
| | 600 | 14.8 | 1.345 | 6.23 | 8 | Tail: HalCem + 2 lbm Kol-Seal + 0.125 lbm Poly-E-Flake + 1% Calcium Chloride - flake |

| | | | | | | |
|---|---|---|---|---|---|---|
| Prod. | 1360 | 11.9 | 2.303 | 13.19 | 24 | Lead: VersaCem + 10% Bentonite + 2 lbm Kol-Seal + 0.25 lbm D-Air 5000 + 0.50% HR-601 |
| | 1470 | 15 | 2.625 | 11.40 | 10 | Tail: SoluCem + 0.25 lbm D-Air 5000 + 0.80% HR-601 (Acid Soluble Cement) |

Optional DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Optional DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

| Casing String | TOC | % Excess |
|---|---|---|
| Surface | 0' | 100% |
| Intermediate and Inter. #2 | 0' | 100% |
| Production | 0' | 30% |

See COA

Include Pilot Hole Cementing specs: (Optional pilot on subsequent wells in section.)

**Pilot hole depth 10130**

**KOP 8732**

| Plug top | Plug Bottom | % Excess | No. Sacks | Wt. lb/gal | Yld ft3/sack | Water gal/sk | Slurry Description and Cement Type |
|---|---|---|---|---|---|---|---|
| 8632 | 8832 | 10 | 80 | 15.6 | 1.204 | 5.36 | PlugCem System |
| 9020 | 9470 | 10 | 170 | 15.6 | 1.204 | 5.36 | PlugCem System |
| 9630 | 10130 | 10 | 190 | 15.6 | 1.204 | 5.36 | PlugCem System |

See COA

## 4. Pressure Control Equipment

| | |
|---|---|
| | A variance is requested for the use of a 30" diverter on the surface casing. See attached for schematic. |

| BOP installed and tested before drilling which hole? | Size? | Min. Required WP | Type | ✓ | Tested to: |
|---|---|---|---|---|---|
| 16" | 20" | 2M | Annular | X | 50% of working pressure |
| | | | Blind Ram | | 2M |
| | | | Pipe Ram | | |
| | | | Double Ram | | |
| | | | Other* | | |
| 12-1/4" | 13-5/8" | 2M | Annular | X | 50% testing pressure |
| | | | Blind Ram | | 2M |
| | | | Pipe Ram | | |
| | | | Double Ram | | |
| | | | Other * | | |
| 8-3/4" | 11" | 3M | Annular | X | |
| | | | Blind Ram | X | 3M |
| | | | Pipe Ram | X | |
| | | | Double Ram | | |
| | | | Other * | | |

*Specify if additional ram is utilized.

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested. Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

| | |
|---|---|
| Y | Formation integrity test will be performed per Onshore Order #2.<br>On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i. |
| Y | A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart. |
| | Y — Are anchors required by manufacturer? |
| | A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.<br>• Provide description here: See attached schematic. |

See COA

**5. Mud Program**

| Depth | | Type | Weight (ppg) | Viscosity | Water Loss |
|---|---|---|---|---|---|
| From | To | | | | |
| 0 | Surf. shoe | FW Gel | 8.4-8.9 | 28-34 | N/C |
| Surf csg | Int shoe | Saturated Brine | 9.8-10.0 | 28-34 | N/C |
| Int shoe | Int2 shoe | Cut Brine | 8.4-9.2 | 30-36 | <12 |
| Int2 shoe | TD | CutBrine/FWgel | 8.4-8.9 | 30-36 | <12 |

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

| | |
|---|---|
| What will be used to monitor the loss or gain of fluid? | PVT/Pason/Visual Monitoring |

See COA

**6. Logging and Testing Procedures**

| Logging, Coring and Testing. | |
|---|---|
| Y | Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM. |
| | No Logs are planned based on well control or offset log information. |
| N | Drill stem test? If yes, explain |
| N | Coring? If yes, explain |

| Additional logs planned | | Interval |
|---|---|---|
| Y | Resistivity | Int. shoe to KOP |
| Y | Density | Int. shoe to KOP |
| Y | CBL (Optional) | Production casing |
| Y | Mud log | Intermediate shoe to TD |
| | PEX | |

See COA

**7. Drilling Conditions**

| Condition | Specify what type and where? |
|---|---|
| BH Pressure at deepest TVD | 4380 psi |
| Abnormal Temperature | No |

Mitigation measure for abnormal conditions. Describe. Lost circulation material/sweeps/mud scavengers.

| Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM. | |
|---|---|
| Y | H2S is present |
| Y | H2S Plan attached |

See COA

**8. Other facets of operation**

Is this a walking operation? No. If yes, describe.
Will be pre-setting casing? No. If yes, describe.

Attachments
_X_ Directional Plan
_X_ Other, describe

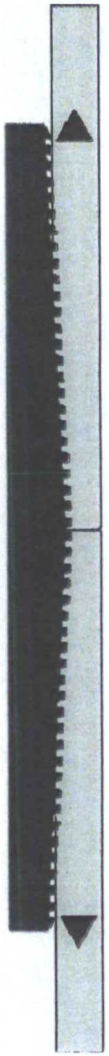
- Improved 5.5" casing thread design example
- 30" diverter
- 20" annular
- 13-5/8" annular
- 11" BOPE
- Flexible hose specs and test chart

GB tubulars
Casings & Connections

# GB Connection Performance Properties Sheet

Rev. 1 (02/05/2014)

ENGINEERING THE RIGHT CONNECTIONS™



| | | | |
|---|---|---|---|
| Casing: | **5.5 OD, 17 ppf** | Connection: | **GB CD Butt 6.050** |
| Grade: | **P-110** | Grade: | **API P-110** |

## PIPE BODY GEOMETRY

| | | | | | |
|---|---|---|---|---|---|
| Nominal OD (in.) | 5 1/2 | Wall Thickness (in.) | 0.304 | Drift Diameter (in.) | 4.767 |
| Nominal Weight (ppf) | 17.00 | Nominal ID (in.) | 4.892 | API Alternate Drift Dia. (in.) | N/A |
| Plain End Weight (ppf) | 16.89 | Plain End Area (in.$^2$) | 4.962 | | |

## PIPE BODY PERFORMANCE

| | | | | | |
|---|---|---|---|---|---|
| Material Specification | P-110 | Min. Yield Str. (psi) | 110,000 | Min. Ultimate Str. (psi) | 125,000 |
| **Collapse** | | **Tension** | | **Pressure** | |
| API (psi) | 7,480 | Pl. End Yield Str. (kips) | 546 | Min. Int. Yield Press. (psi) | 10,640 |
| High Collapse (psi) | 8,580 | **Torque** | | **Bending** | |
| | | Yield Torque (ft-lbs) | 64,680 | Build Rate to Yield (°/100 ft) | 91.7 |

## GB CD Butt 6.050 COUPLING GEOMETRY

| | | | |
|---|---|---|---|
| Coupling OD (in.) | 6.050 | Makeup Loss (in.) | 4.2500 |
| Coupling Length (in.) | 8.500 | Critical Cross-Sect. (in.$^2$) | 6.102 |

## GB CD Butt 6.050 CONNECTION PERFORMANCE RATINGS/EFFICIENCIES

| | | | | | |
|---|---|---|---|---|---|
| Material Specification | API P-110 | Min. Yield Str. (psi) | 110,000 | Min. Ultimate Str. (psi) | 125,000 |
| **Tension** | | **Efficiency** | | **Bending** | |
| Thread Str. (kips) | 568 | Internal Pressure (%) | 100% | Build Rate to Yield (°/100 ft) | 83.3 |
| Min. Tension Yield (kips) | 638 | External Pressure (%) | 100% | **Yield Torque** | |
| Min. Tension Ult. (kips) | 725 | Tension (%) | 100% | Yield Torque (ft-lbs) | 17,030 |
| Joint Str. (kips) | 568 | Compression (%) | 100% | | |
| | | Ratio of Areas (Cplg/Pipe) | 1.23 | | |

## MAKEUP TORQUE

| | | | | | |
|---|---|---|---|---|---|
| Min. MU Tq. (ft-lbs) | 6,470 | Max. MU Tq. (ft-lbs) | 12,940 | Running Tq. (ft-lbs) | See GBT RP |
| | | | | Max. Operating Tq. (ft-lbs)* | 16,180 |

Units: US Customary (lbm, in., °F, lbf)

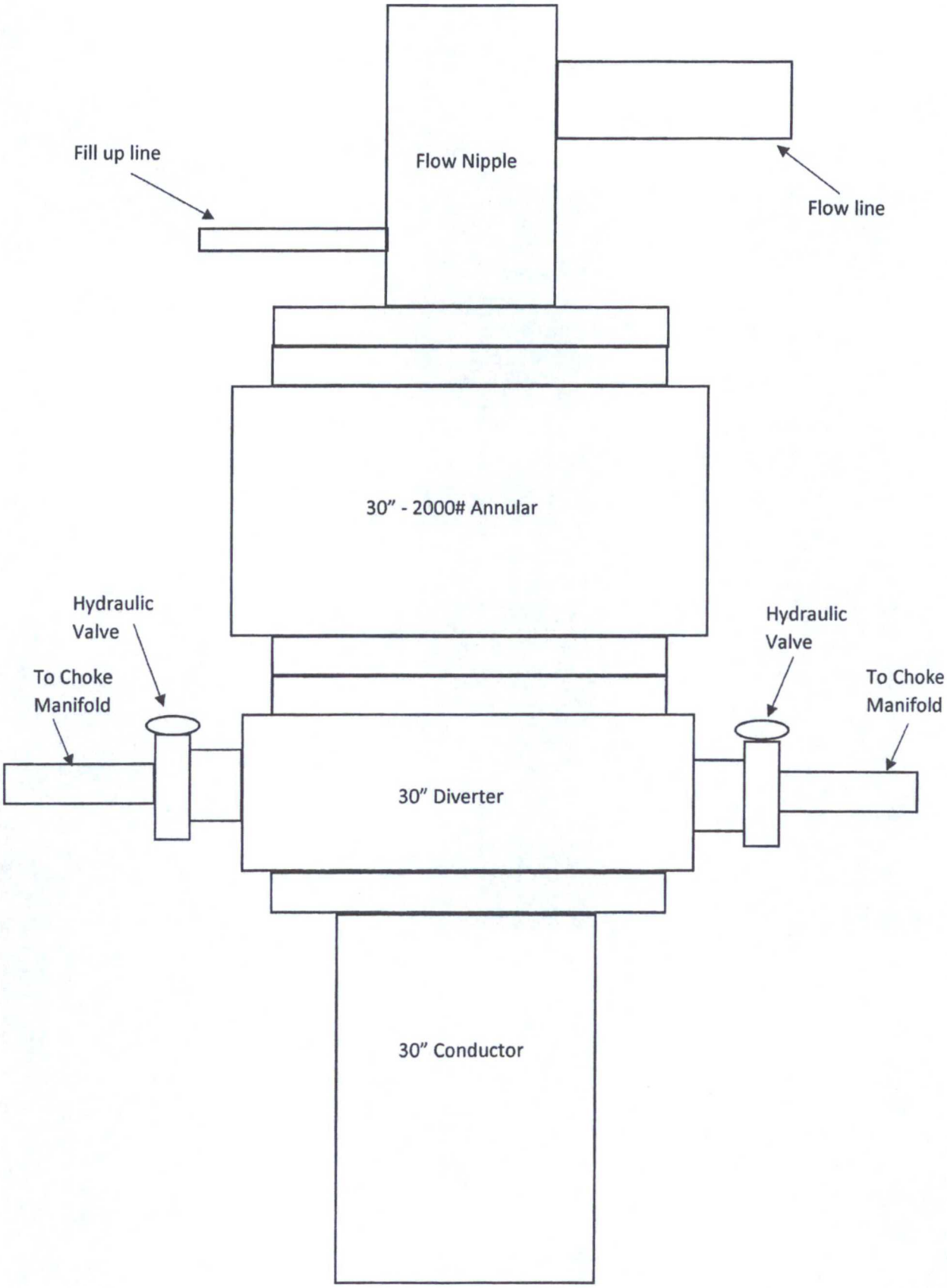
1 kip = 1,000 lbs

* See Running Procedure for description and limitations.

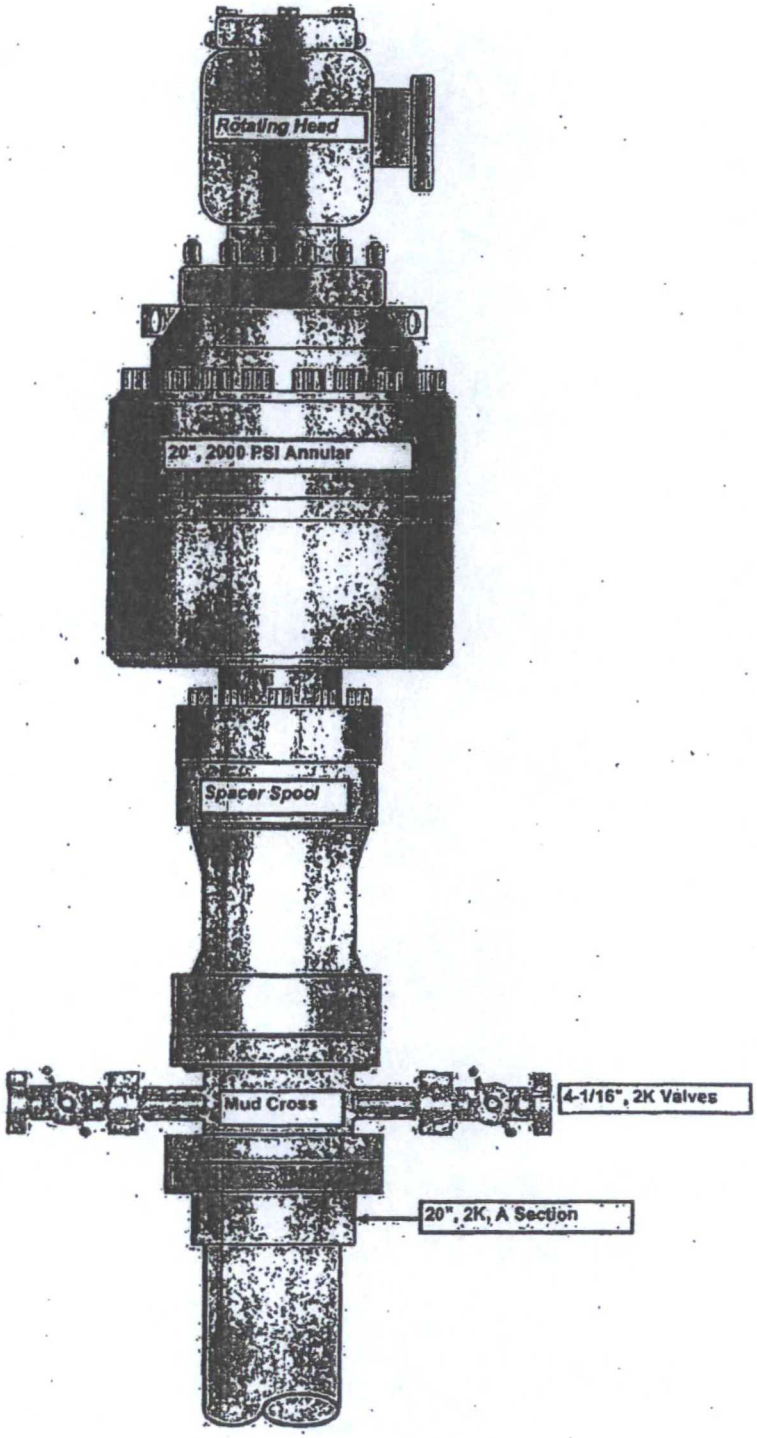
See attached: Notes for GB Connection Performance Properties.

GBT Running Procedure (GBT RP): www.gbtubulars.com/pdf/RP_GB_DWC_Connections.pdf

Blanking Dimensions: www.gbtubulars.com/pdf/GB_DWC_Blanking_Dimensions.pdf

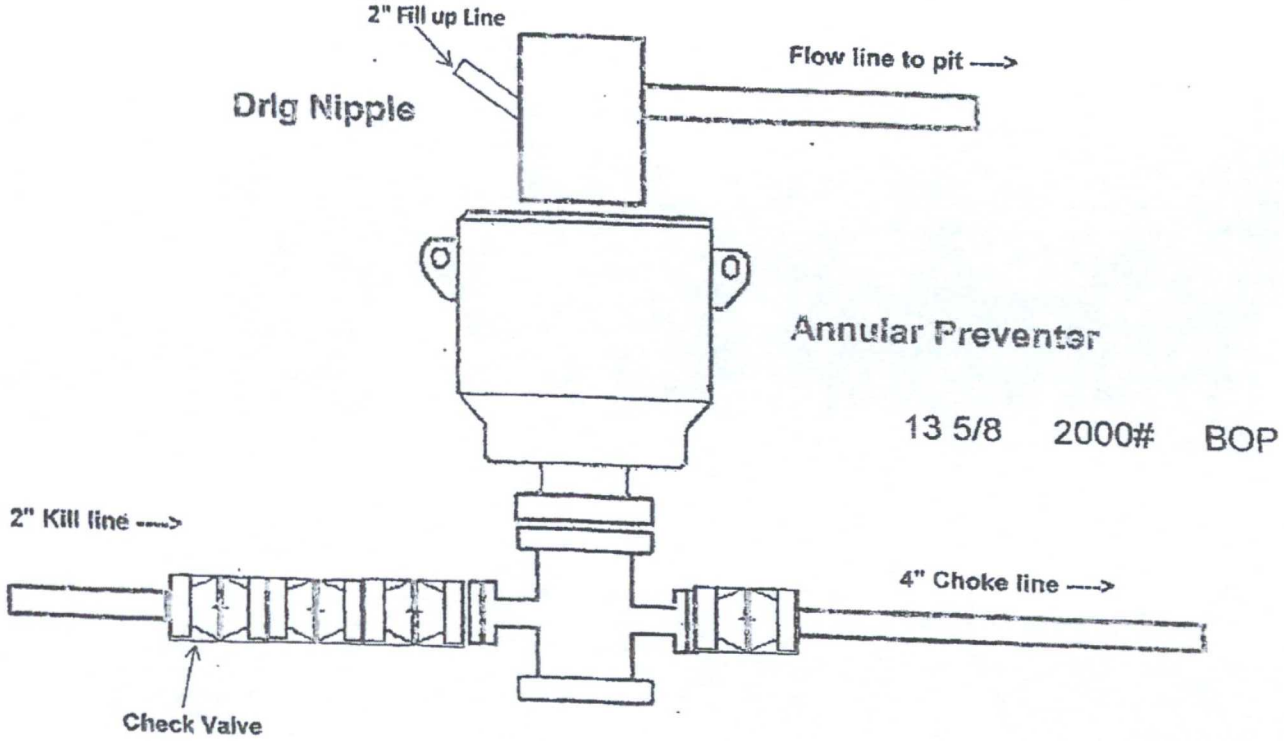

Fill up line
Flow Nipple
Flow line
30" - 2000# Annular
Hydraulic Valve
To Choke Manifold
Hydraulic Valve
To Choke Manifold
30" Diverter
30" Conductor

# 20" 2K Annular



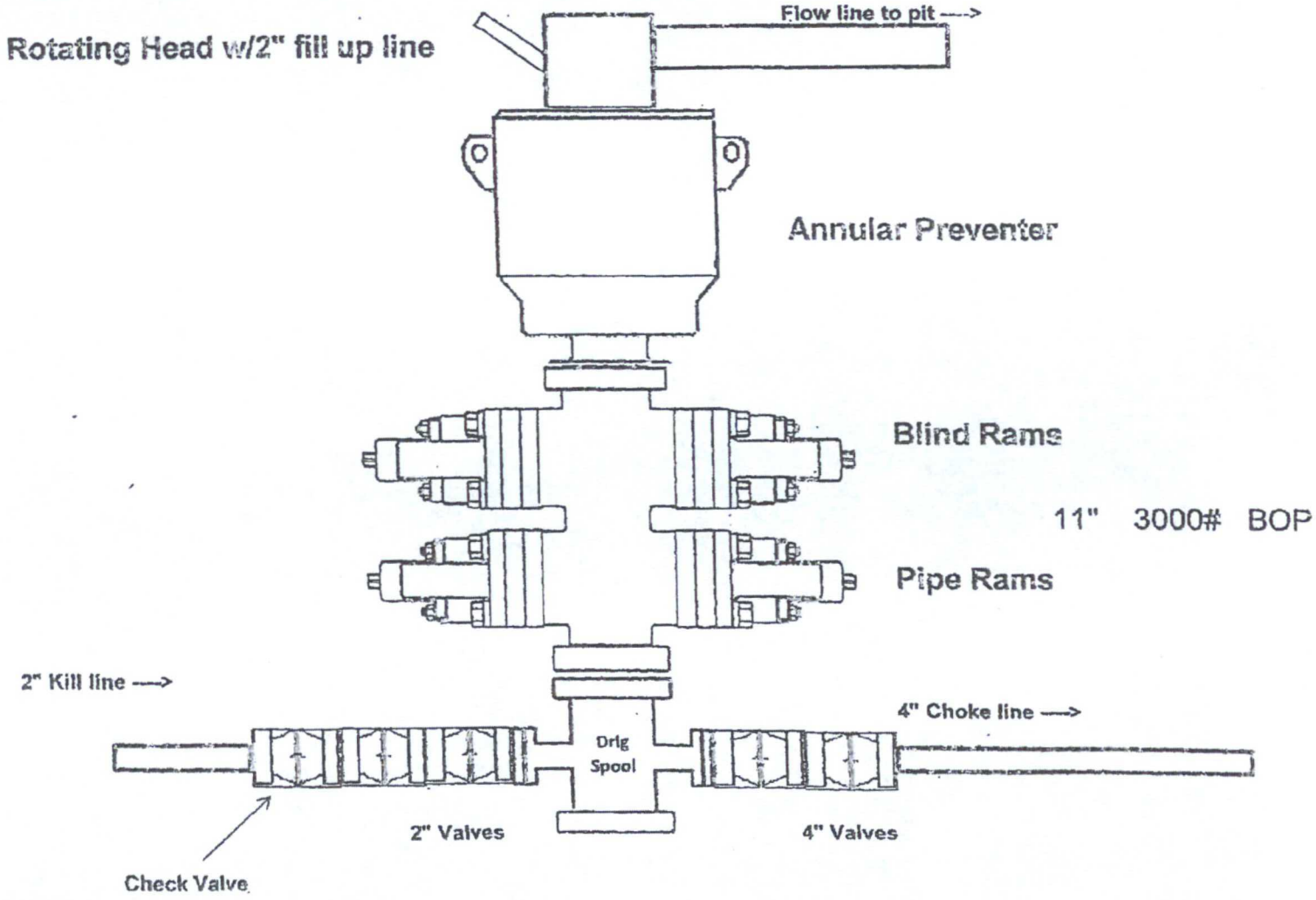
BC Operating, Inc.
Exhibit 1

# 2,000 psi BOP Schematic



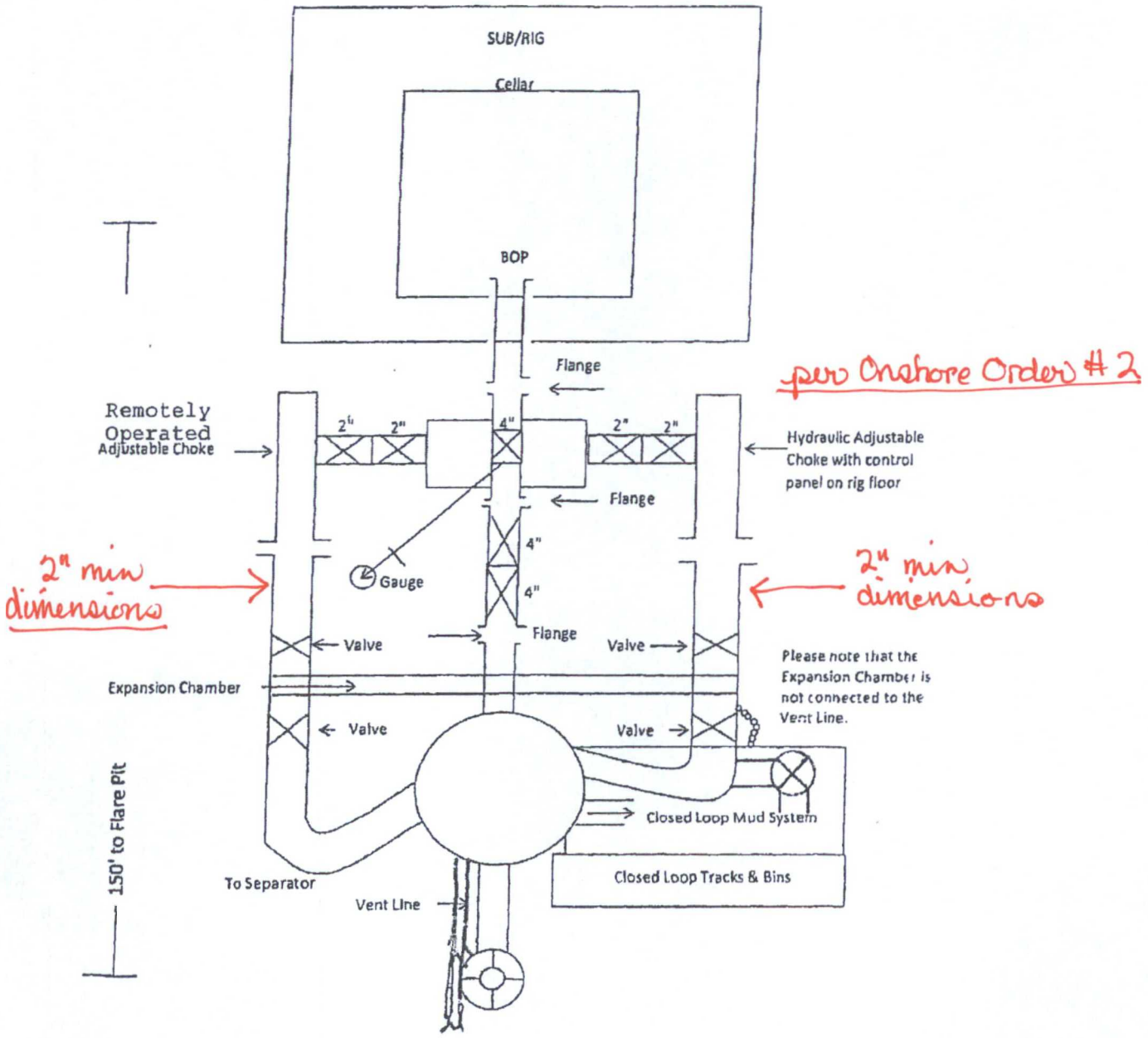
BC Operating, Inc.
Exhibit 3

# 3,000 psi BOP Schematic



BC Operating, Inc.
Exhibit 4

# 3M Choke Manifold Equipment



Continental CONTITECH

Fluid Technology

Quality Document

| QUALITY CONTROL | No.: QC-DB- 89 / 2011 |
|---|---|
| | Page : 1 / 54 |
| Hose No.:<br>60313, 60314, 60315, 60316 | Revision : 0 |
| | Date: 07. March 2011. |
| | Prepared by : |
| | Appr. by: |

# CHOKE AND KILL HOSES

**id.: 3" 68,9 MPa x ( 25 ft ) 7,62 m 1 pc**
**x ( 45 ft ) 13,72 m 3 pcs**

# DATA BOOK

Purchaser:

Purchaser Order No.:

ContiTech Rubber Order No.: 493934

ContiTech Beattie Co. Order No.: 004795

ASSET 66-0638, 66-0639, 66-0640, 66-0641

ContiTech Rubber Industrial Kft.
Budapesti út 10., Szeged H 6728
P.O.Box 152 Szeged H-6701
Hungary

Phone: +36 62 566 737
Fax: +36 62 566 738
e-mail: info@fluid.contitech.hu
Internet: www.contitech-rubber.hu

The Court of Csongrád County as Registry Court
Registry Court No: HU 06-09-002502
EU VAT No: HU11087209

Bank data
Commerzbank Zrt.
Budapest
14220108-26830003-00000000

Continental CONTITECH

Fluid Technology

Quality Document

# QUALITY CONTROL INSPECTION AND TEST CERTIFICATE

CERT. N°: 246

| | | | |
|---|---|---|---|
| PURCHASER: | ContiTech Beattie Co. | P.O. N°: | 004795 |
| CONTITECH ORDER N°: | 493934 | HOSE TYPE: 3" ID | Choke and Kill Hose |
| HOSE SERIAL N°: | 60313 | NOMINAL / ACTUAL LENGTH: | 7,62 m / 7,63 m |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| W.P. | 68,9 | MPa | 10000 | psi | T.P. | 103,4 | MPa | 15000 | psi |

Duration: 60 min.

Pressure test with water at ambient temperature

See attachment. ( 1 page )

↑ 10 mm = 10 Min.

→ 10 mm = 20 MPa

| COUPLINGS Type | Serial N° | | Quality | Heat N° |
|---|---|---|---|---|
| 3" coupling with | 324 | 320 | AISI 4130 | H0434 |
| 4 1/16" Swivel Flange end | | | AISI 4130 | 31742 |
| Hub | | | AISI 4130 | B2297A |

**ASSET NO.: 66-0638**

**API Spec 16 C**
**Temperature rate:"B"**

All metal parts are flawless

**WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.**

STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements.

COUNTRY OF ORIGIN HUNGARY/EU

| Date: | Inspector | Quality Control |
|---|---|---|
| 01. March 2011. | | ContiTech Rubber Industrial Kft. Quality Control Dept. (1) |

ContiTech Rubber Industrial Kft.
Budapesti út 10., Szeged H 6728
P.O.Box 152 Szeged H-6701
Hungary

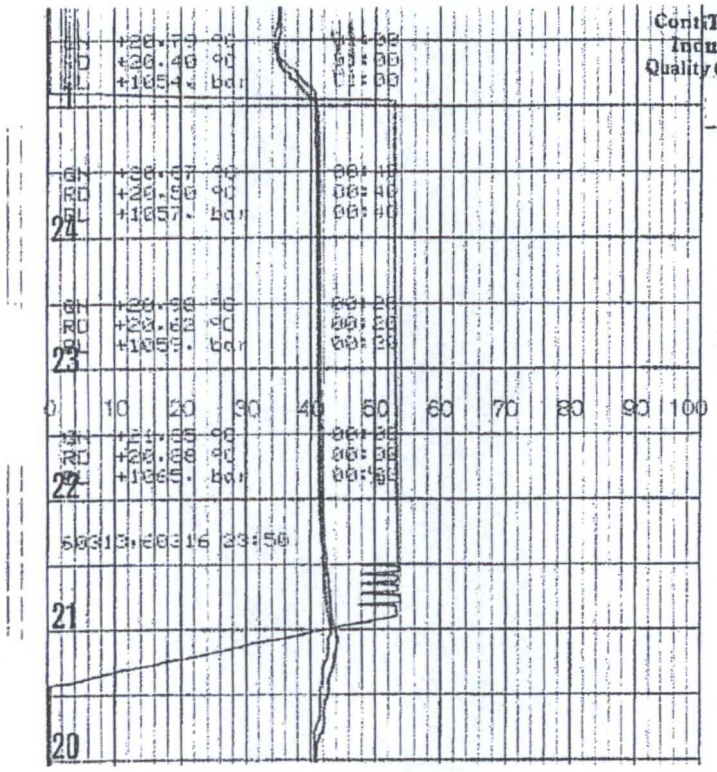
Phone: +36 62 556 737
Fax: +36 62 556 736
e-mail: info@fluid.contitech.hu
Internet: www.contitech-rubber.hu

The Court of Csongrád County as Registry Court
Registry Court No: HU 06-09-002502
EU VAT No: HU11087209

Bank data
Commerzbank Zrt
Budapest
14220108-26830003-00000000

*ATTACHMENT OF QUALITY CONTROL INSPECTION AND TEST CERTIFICATE* *No: 246, 249*



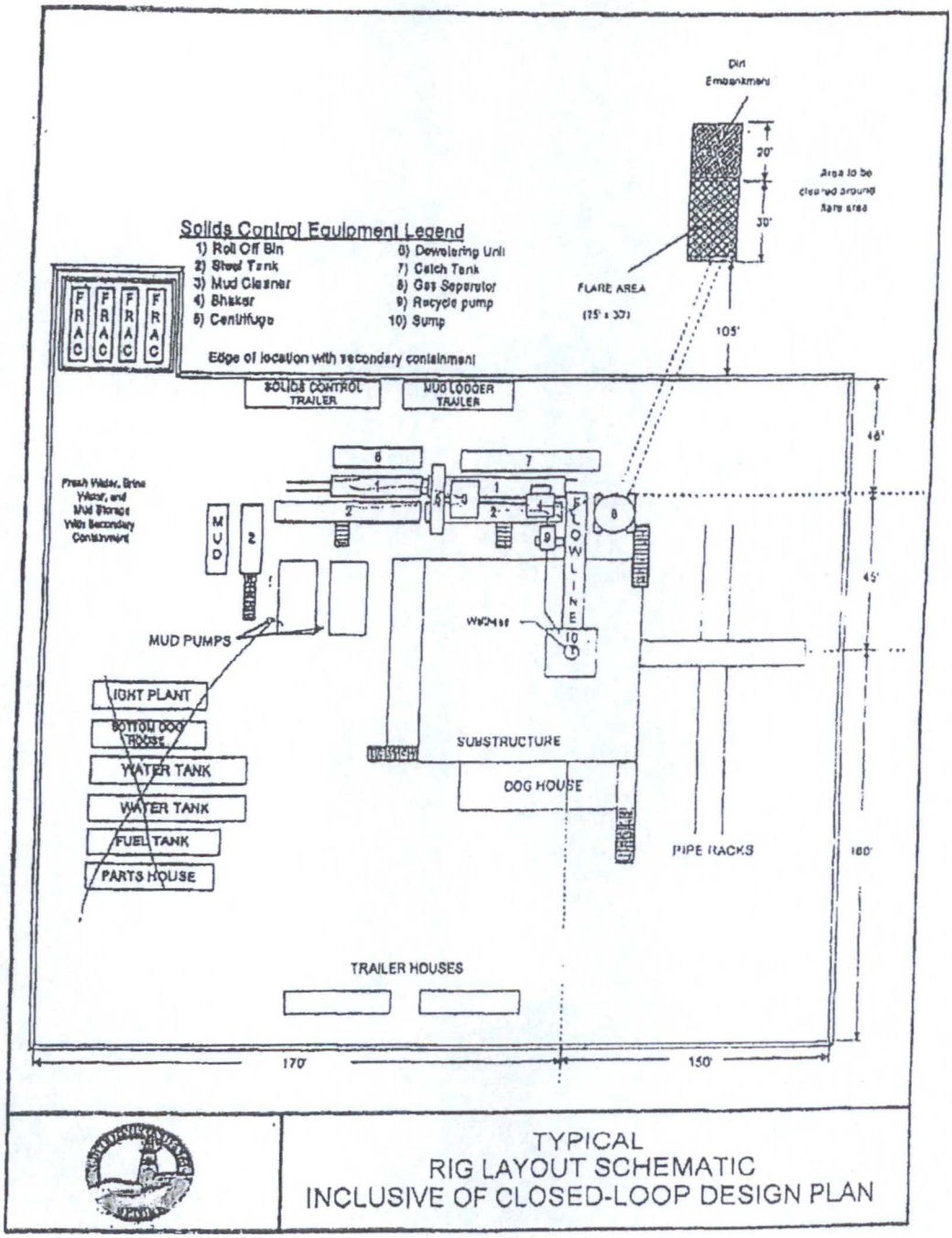



ContiTech Rubber
Industrial Kft.
Quality Control Dept.
(3)

Continental CONTITECH

## Hose Data Sheet

| | |
|---|---|
| CRI Order No. | 493934 |
| Customer | ContiTech Beattie Co. |
| Customer Order No | PO4795, PBC10685 |
| Item No. | 3 |
| Hose Type | Flexible Hose |
| **Standard** | **API SPEC 16 C** |
| Inside dia in inches | 3 |
| Length | 25 ft |
| Type of coupling one end | FLANGE 4.1/16" 10KPSI API SPEC 17D SV SWIVEL FLANGEC/W BX155 ST/ST INLAID RING GR |
| Type of coupling other end | FLANGE 4.1/16" 10KPSI API SPEC 17D SV SWIVEL FLANGE C/W BX155 ST/ST INLAID RING GR |
| H2S service NACE MR0175 | Yes |
| Working Pressure | 10 000 psi |
| Design Pressure | 10 000 psi |
| Test Pressure | 15 000 psi |
| Safety Factor | 2,25 |
| Marking | USUAL PHOENIX |
| Cover | NOT FIRE RESISTANT |
| Outside protection | St.steel outer wrap |
| Internal stripwound tube | No |
| Lining | OIL RESISTANT |
| Safety clamp | Yes |
| Lifting collar | Yes |
| Element C | Yes |
| Safety chain | No |
| Safety wire rope | Yes |
| Max.design temperature [°C] | 100 |
| Min.design temperature [°C] | -20 |
| MBR operating [m] | 1,60 |
| MBR storage [m] | 1,40 |
| Type of packing | WOODEN CRATE ISPM-15 |




TYPICAL
RIG LAYOUT SCHEMATIC
INCLUSIVE OF CLOSED-LOOP DESIGN PLAN