

CEMENT: SURFACEStage Tool Depth: N/A**Lead:**Top MD of
Segment: 0Btm MD of
Segment: 1285.47Cmt Type: CCmt Additives: 4% Bentonite + 1% CaCl2Quantity (sks): 650Yield (cu/ft/sk): 1.73 Volume (cu/ft): 1124.5Density (lbs/gal): 13.5 Percent OH Excess: 25%**Tail:**Top MD of
Segment: 1285.47Btm MD of
Segment: 1700Cmt Type: CCmt Additives: 1% CaCl2Quantity (sks): 300Yield (cu/ft/sk): 1.33 Volume (cu/ft): 399Density (lbs/gal): 14.8 Percent OH Excess: 25%**CEMENT: INTERMEDIATE****Single Stage****Lead:**Top MD of
Segment: 0Btm MD of
Segment: 5144.38Cmt Type: CCmt Additives: 5% NaCl + 6% Bentonite + 2
lb/sk Kolseal + 0.125 lb/sk
Celloflake + 0.4% RetarderQuantity (sks): 1043Yield (cu/ft/sk): 1.885 Volume (cu/ft): 1966.06Density (lbs/gal): 12.9 Percent OH Excess: 25%

Tail:Top MD of
Segment: 5144.38Btm MD of
Segment: 5780Cmt Type: CCmt Additives: 0.2% RetarderQuantity (sks): 200Yield (cu/ft/sk): 1.34Density (lbs/gal): 14.8Volume (cu/ft): 268Percent OH Excess: 25%**2 Stage Cement Job**

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

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 9-5/8" csg & ECP may be placed below DVT
placed below DVT.

1st Stage**Lead:**Top MD of
Segment: 3500Btm MD of
Segment: 5144.38Cmt Type: CCmt Additives: 5% NaCl + 6% Bentonite + 2
lb/sk Kolseal + 0.125 lb/sk
Celloflake + 0.4% RetarderQuantity (sks): 345Yield (cu/ft/sk): 1.885Density (lbs/gal): 12.9Volume (cu/ft): 650.33Percent OH Excess: 25%**Tail:**Top MD of
Segment: 5144.38Btm MD of
Segment: 5780Cmt Type: CCmt Additives: 0.3% RetarderQuantity (sks): 200Yield (cu/ft/sk): 1.34Volume (cu/ft): 268

Density (lbs/gal): 14.8 Percent OH Excess: 25%

Stage Tool / ECP Depth: ± 3500'

2nd Stage

Lead:

Top MD of
Segment: 0

Btm MD of
Segment: 2815.44

Cmt Type: C

Cmt Additives: 5% NaCl + 6% Bentonite

Quantity (sks): 565

Yield (cu/ft/sk): 1.868 Volume (cu/ft): 1055.42

Density (lbs/gal): 12.9 Percent OH Excess: 25%

Tail:

Top MD of
Segment: 2815.44

Btm MD of
Segment: 3500

Cmt Type: C

Cmt Additives: 0.3% Retarder

Quantity (sks): 200

Yield (cu/ft/sk): 1.34 Volume (cu/ft): 268

Density (lbs/gal): 14.8 Percent OH Excess: 25%

CEMENT: PRODUCTION

Single Stage

Lead:

Top MD of
Segment: 3000

Btm MD of
Segment: 10473.05

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 926

Yield (cu/ft/sk): 2.32 Volume (cu/ft): 2148.32

Density (lbs/gal): 11.9 Percent OH Excess: 20%

Tail:

Top MD of
Segment: 10473.05

Btm MD of
Segment: 15739.36

Cmt Type: TXI Lite

Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks): 1115

Yield (cu/ft/sk): 1.44 Volume (cu/ft): 1605.6

Density (lbs/gal): 12.8 Percent OH Excess: 20%

2 Stage Cement Job

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

*If lost circulation is encountered, Apache may 2-stage Interim csg. A DVT may be used in the 7" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of
Segment: 5830

Btm MD of
Segment: 10473.05

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 607

Yield (cu/ft/sk): 2.32 Volume (cu/ft): 1408.24

Density (lbs/gal): 11.9 Percent OH Excess: 20%

Tail:

Top MD of
Segment: 10473.05

Btm MD of
Segment: 15739.36

Cmt Type: TXI Lite

Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks): 1115

Yield (cu/ft/sk): 1.44 Volume (cu/ft): 1605.6

Density (lbs/gal): 12.8 Percent OH Excess: 20%

Stage Tool / ECP Depth: ± 5830'

2nd Stage

Lead:

Top MD of
Segment: 3000

Btm MD of
Segment: 4810.33

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 204

Yield (cu/ft/sk): 2.32 Volume (cu/ft): 473.28

Density (lbs/gal): 11.9 Percent OH Excess: 20%

Tail:

Top MD of
Segment: 4810.33

Btm MD of
Segment: 5830

Cmt Type: C

Cmt Additives: 0.3% Retarder

Quantity (sks): 200

Yield (cu/ft/sk): 1.34 Volume (cu/ft): 268

Density (lbs/gal): 14.8 Percent OH Excess: 20%

BLACK AND TAN 27 FED COM 301H - REVISED 3/15/17

String: SURFACE

Hole Size: 17.5

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>1700</u>	Btm setting depth (TVD):	<u>1700</u>
----------------------------	----------	-----------------------------------	----------	----------------------------	-------------	-----------------------------------	-------------

Size:	<u>13-3/8"</u>	Grade:	<u>J-55</u>	Weight (lbs/ft):	<u>54.5</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</u>
-------	----------------	--------	-------------	------------------	-------------	--	-----------------

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 2.15 Burst Design Safety Factor: 1.82

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.79

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 4.04

String: INTERMEDIATE

Hole Size: 12.25

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>900</u>	Btm setting depth (TVD):	<u>900</u>
----------------------------	----------	-----------------------------------	----------	----------------------------	------------	-----------------------------------	------------

Size:	<u>9-5/8"</u>	Grade:	<u>J-55</u>	Weight (lbs/ft):	<u>40</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</u>
-------	---------------	--------	-------------	------------------	-----------	--	-----------------

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 5.37 Burst Design Safety Factor: 1.7

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 1.96

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.24

Top Setting Depth (MD):	<u>900</u>	Top Setting Depth (TVD):	<u>900</u>	Btm setting depth (MD):	<u>5780</u>	Btm setting depth (TVD):	<u>5780</u>
Size:	<u>9-5/8"</u>	Grade:	<u>J-55</u>	Weight (lbs/ft):	<u>40</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>LTC</u>

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N
If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 1.54 Burst Design Safety Factor: 1.87

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.15

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 1.8

String: PRODUCTION

Hole Size: 8.75

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>15739.36</u>	Btm setting depth (TVD):	<u>11024</u>
----------------------------	----------	-----------------------------------	----------	----------------------------	-----------------	-----------------------------------	--------------

Size:	<u>5-1/2"</u>	Grade:	<u>P-110</u>	Weight (lbs/ft):	<u>17</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</u>
-------	---------------	--------	--------------	------------------	-----------	--	-----------------

Condition (New/Used): New Standard (API/Non-API): API

Safety Factors

Collapse Design Safety Factor: 1.35 Burst Design Safety Factor: 1.28

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 2.03

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 2.13

Tapered String (Y/N)?: N
If yes, need spec attachment

Black and Tan 27 Federal COM 301H Intermediate Casing Design Assumptions

Pore Pressure

Vertical Depth (ft)	Pore Pressure/EMW		Permeable Zones
Depth (ft)	(psi)	(ppg)	Zones
20	0	0	No
1700	748	8.47	No
3900	1621	8	No
5800	2552	8.47	No
8586	3970	8.9	No
11352	5661	9.6	No

Fracture Pressure

Vertical Depth (ft)	Fracture Pressure/EMW	
Depth (ft)	(psi)	(ppg)
20	9	9
1700	1189	13.46
3900	2026	10
5800	4055	13.46
8586	6004	13.46
11352	8551	14.5

Temperature Gradient

Ambient Temperature is 80° F

Temperature gradient of 0.75°/100' TVD

Analysis Options

- Single External Pressure Profile
- Temperature Deration
- Buckling

Intermediate Casing Loads

Burst Loads

Internal Profile

Drilling Loads

- Gas Kick Profile
 - Influx at 15,714.6' MD
 - 30 Bbl Kick Volume
 - 0.5 ppg Kick Intensity
 - Maximum Mud Weight of 9.5 ppg
 - Kick gas gravity of 0.7 ppg
 - No margin of error on frac gradient
 - 5" DP
 - 650' of 6.5" Drill Collars
- Lost Returns with Water
 - No margin of error on frac gradient
 - Mud/Water Interface at 5780'
 - Mud weight with losses at 9.5 ppg
- Pressure Test
 - 1500 psi casing pressure test with 8.33 ppg fresh water
- Green Cement Pressure Test
 - 2300 psi put on casing when bumping the plug with 8.33 ppg displacement fresh water

External Profile

- Mud and Cement Mix-Water
 - TOC at surface
 - Mud weight is 10.2 ppg
 - Cement Mix-Water Density is 8.33 ppg

Collapse Loads

Internal Profile

Drilling Loads

- Partial Evacuation
 - 50% evacuation. Top of mud level at 2890'.
 - Mud Weight is 10.2 ppg
- Lost Returns with Mud Drop

- Losses occurring at 5800' MD
- Pore Pressure at 8.33 ppg
- Current Mud Weight at 9.5 ppg
- Mud level drops to 714.3'
- Cementing
 - Lead Slurry Density at 12.9 ppg
 - Tail Slurry Density at 14.8 ppg
 - Tail Slurry Length of 500'
 - TOC at surface
 - Mud Weight at shoe 10.2 ppg
 - Displacement fluid density at 8.33 ppg

External Profile

- Fluid Gradients w/ Pore Pressure
 - Fluid Gradient Above TOC is 10.2 ppg
 - Fluid Gradient Below TOC is 10.2 ppg

Axial Loads

- Average Running in hole speed at 2.0 ft/s
- Overpull of 100,000 lbf
- 2300 psi Green Cement Pressure Test
- Service Loads from Burst and Collapse

Black and Tan 27 Federal COM 301H Surface Casing Design Assumptions

Pore Pressure

Vertical Depth (ft)	Pore Pressure/EMW		Permeable Zones
Depth (ft)	(psi)	(ppg)	Zones
20	0	0	No
1700	748	8.47	No
3900	1621	8	No
5800	2552	8.47	No
8586	3970	8.9	No
11352	5661	9.6	No

Fracture Pressure

Vertical Depth (ft)	Fracture Pressure/EMW	
Depth (ft)	(psi)	(ppg)
20	9	9
1700	1189	13.46
3900	2026	10
5800	4055	13.46
8586	6004	13.46
11352	8551	14.5

Temperature Gradient

Ambient Temperature is 80° F

Temperature gradient of 0.75°/100' TVD

Analysis Options

- Single External Pressure Profile
- Temperature Deration
- Buckling

Surface Casing Loads

Burst Loads

Internal Profile

Drilling Loads

- **Fracture @ Shoe w/ Gas Gradient Above**
 - No margin of error on frac gradient
 - Using a 0.7 ppg gas gradient
- **Lost Returns with Water**
 - No margin of error on frac gradient
 - Mud/Water Interface at 1700'
 - Mud weight with losses at 10.2 ppg
- **Pressure Test**
 - 1500 psi casing pressure test with 8.33 ppg fresh water
- **Green Cement Pressure Test**
 - 1200 psi put on casing when bumping the plug with 8.33 ppg displacement fresh water

External Profile

- **Mud and Cement Mix-Water**
 - TOC at surface
 - Mud weight is 8.6 ppg
 - Cement Mix-Water Density is 8.33 ppg

Collapse Loads

Internal Profile

Drilling Loads

- **Partial Evacuation**
 - 50% evacuation. Top of mud level at 850'.
 - Mud Weight is 8.6 ppg
- **Lost Returns with Mud Drop**
 - Losses occurring at 4000'
 - Pore Pressure at 8.00 ppg
 - Current Mud Weight at 10.2 ppg
 - Mud level drops to 863'
- **Cementing**
 - Lead slurry of 13.5 ppg with TOC at surface

- Tail slurry slurry at 14.8 ppg with length of 500'
- Mud weight at shoe 8.6 ppg
- Displacement fluid density at 8.33 ppg

External Profile

- Fluid Gradients w/ Pore Pressure
 - Fluid Gradient Above TOC is 8.6 ppg
 - Fluid Gradient Below TOC is 8.6 ppg

Axial Loads

- Average Running in hole speed at 2.0 ft/s
- Overpull of 100,000 lbf
- 1200 psi Green Cement Pressure Test
- Service Loads from Burst and Collapse

Black and Tan 27 Federal COM 301H Production Casing Design Assumptions

Pore Pressure

Vertical Depth (ft)	Pore Pressure/EMW		Permeable Zones
Depth (ft)	(psi)	(ppg)	Zones
20	0	0	No
1700	748	8.47	No
3900	1621	8	No
5800	2552	8.47	No
8586	3970	8.9	No
11352	5661	9.6	No

Fracture Pressure

Vertical Depth (ft)	Fracture Pressure/EMW	
Depth (ft)	(psi)	(ppg)
20	9	9
1700	1189	13.46
3900	2026	10
5800	4055	13.46
8586	6004	13.46
11352	8551	14.5

Temperature Gradient

Ambient Temperature is 80° F

Temperature gradient of 0.75°/100' TVD

Analysis Options

- Single External Pressure Profile
- Temperature Deration
- Buckling

Production Casing Loads

Burst Loads

Internal Profile

Drilling Loads

- Pressure Test
 - 8000 psi with 8.33 ppg fresh water
- Green Cement Pressure Test
 - 3800 psi put on casing when bumping the plug with 8.33 ppg displacement

Production Loads

- Tubing Leak
 - Packer Fluid Density at 8.6 ppg
 - Packer Depth of 10423'
 - Perf Depth at 15739.4' MD
 - Gas/Oil Gradient 0.35 psi/ft
 - Reservoir pressure at 5154.08 psi
- Injection Down Casing
 - Injection pressure of 8000 psi
 - Injection density of 9.4 ppg

External Profile

- Fluid Gradients w/ Pore Pressure
 - 9.5 ppg mud weight above TOC
 - 8.33 ppg below TOC
 - Pore pressure applied in the openhole

Collapse Loads

Internal Profile

Drilling Loads

- Cementing
 - Mud weight at shoe is 9.5 ppg
 - TOC at surface
 - Lead Slurry Density is 11.9 ppg
 - Tail Slurry Density is 12.8 ppg
 - Tail Slurry Length at 5766.3'.
 - Displacement fluid density is 8.33 ppg

Production Loads

- Full Evacuation
- Above/Below Packer
 - Reservoir pressure at 4883.12 psi
 - Density Above Packer at 8.6 ppg
 - Density Below Packer at 6.0 ppg
 - Assuming a fluid drop above the packer

External Profile

- Fluid Gradients w/ Pore Pressure
 - Fluid Gradient Above TOC is 9.5 ppg
 - Fluid Gradient Below TOC is 9.5 ppg

Axial Loads

- Average Running in hole speed at 2.0 ft/s
- Overpull of 100,000 lbf
- 3800 psi Green Cement Pressure Test
- Service Loads from Burst and Collapse

Black and Tan 27 Federal COM 301H Intermediate Casing Design Assumptions

Pore Pressure

Vertical Depth (ft)	Pore Pressure/EMW		Permeable Zones
Depth (ft)	(psi)	(ppg)	Zones
20	0	0	No
1700	748	8.47	No
3900	1621	8	No
5800	2552	8.47	No
8586	3970	8.9	No
11352	5661	9.6	No

Fracture Pressure

Vertical Depth (ft)	Fracture Pressure/EMW	
Depth (ft)	(psi)	(ppg)
20	9	9
1700	1189	13.46
3900	2026	10
5800	4055	13.46
8586	6004	13.46
11352	8551	14.5

Temperature Gradient

Ambient Temperature is 80° F

Temperature gradient of 0.75°/100' TVD

Analysis Options

- Single External Pressure Profile
- Temperature Deration
- Buckling

Intermediate Casing Loads

Burst Loads

Internal Profile

Drilling Loads

- Gas Kick Profile
 - Influx at 15,714.6' MD
 - 30 Bbl Kick Volume
 - 0.5 ppg Kick Intensity
 - Maximum Mud Weight of 9.5 ppg
 - Kick gas gravity of 0.7 ppg
 - No margin of error on frac gradient
 - 5" DP
 - 650' of 6.5" Drill Collars
- Lost Returns with Water
 - No margin of error on frac gradient
 - Mud/Water Interface at 5780'
 - Mud weight with losses at 9.5 ppg
- Pressure Test
 - 1500 psi casing pressure test with 8.33 ppg fresh water
- Green Cement Pressure Test
 - 2300 psi put on casing when bumping the plug with 8.33 ppg displacement fresh water

External Profile

- Mud and Cement Mix-Water
 - TOC at surface
 - Mud weight is 10.2 ppg
 - Cement Mix-Water Density is 8.33 ppg

Collapse Loads

Internal Profile

Drilling Loads

- Partial Evacuation
 - 50% evacuation. Top of mud level at 2890'.
 - Mud Weight is 10.2 ppg
- Lost Returns with Mud Drop

- Losses occurring at 5800' MD
- Pore Pressure at 8.33 ppg
- Current Mud Weight at 9.5 ppg
- Mud level drops to 714.3'
- Cementing
 - Lead Slurry Density at 12.9 ppg
 - Tail Slurry Density at 14.8 ppg
 - Tail Slurry Length of 500'
 - TOC at surface
 - Mud Weight at shoe 10.2 ppg
 - Displacement fluid density at 8.33 ppg

External Profile

- Fluid Gradients w/ Pore Pressure
 - Fluid Gradient Above TOC is 10.2 ppg
 - Fluid Gradient Below TOC is 10.2 ppg

Axial Loads

- Average Running in hole speed at 2.0 ft/s
- Overpull of 100,000 lbf
- 2300 psi Green Cement Pressure Test
- Service Loads from Burst and Collapse




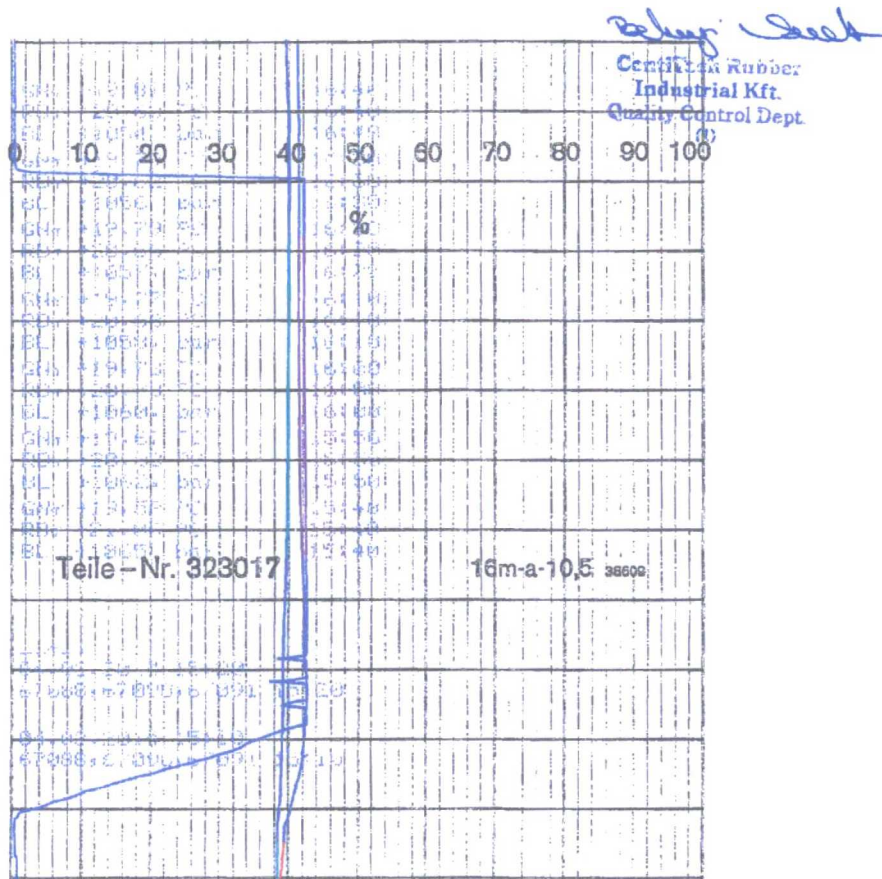
ContiTech

CONTITECH RUBBER
Industrial Kft.

No:QC-DB- 157/ 2014

Page: 17 / 131

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE				CERT. N°: 373	
PURCHASER: ContiTech Oil & Marine Corp.				P.O. N°: 4500398355	
CONTITECH RUBBER order N°: 538079		HOSE TYPE: 3" ID Choke and Kill Hose			
HOSE SERIAL N°: 67090		NOMINAL / ACTUAL LENGTH: 10,67 m / 10,73 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 = 25 MPa					
COUPLINGS Type		Serial N°		Quality	
3" coupling with		1252 8901		AISI 4130	
4 1/16" 10K API b.w. Flange end				AISI 4130	
				Heat N°	
				A0709N A1126U	
				035285	
NOT DESIGNED FOR WELL TESTING				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	
05. March 2014.				 ContiTech Rubber Industrial Kft. Quality Control Dept.	





Hose Data Sheet

CRI Order No.	538079
Customer	ContiTech Oil & Marine Corp.
Customer Order No	4500398355
Item No.	1
Hose Type	Flexible Hose
Standard	API SPEC 16 C
Inside dia in inches	3
Length	35 ft
Type of coupling one end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 R.GR.SOUR
Type of coupling other end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 R.GR.SOUR
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 + GAS RESISTANT SOUR
Safety clamp	No
Lifting collar	No
Element C	No
Safety chain	No
Safety wire rope	No
Max.design temperature [°C]	100
Min.design temperature [°C]	-20
Min. Bend Radius operating [m]	0,90
Min. Bend Radius storage [m]	0,90
Electrical continuity	The Hose is electrically continuous
Type of packing	WOODEN CRATE ISPM-15