Bitte decken Sie die schraffierte Fläche mit einem Bild ab.

Dunlop Oil and Marine

2H Offshore Lunch & Learn
API 17K Production Hoses
Industrial Fluid Solutions

› Agriculture
› Chemical
› Construction industry
› Food industry
› Machines and plant equipment
› Mining industry
› Print industry
› Power industry
› Refueling
› Water management
› Oil & Gas Drilling & Production
High Pressure
Principal Locations

Brazil
Macaé

US
Houston

UK
Ashington
Grimsby

Hungary
Szeged

UAE
Dubai

Singapore
Szeged Facility

Full In-house Manufacturing
Hose Design
Modelling & Analysis
Research and Development
Prototype Testing
FAT Testing
Packing and Shipping
Bitte decken Sie die schraffierte Fläche mit einem Bild ab.

Please cover the shaded area with a picture.

(24,4 x 11,0 cm)

API 17K
Product Overview

ContiTech
Certified for all relevant API Standards

- **API 7K-0008**
- **API 16C-0004**
- **API 17K-0001**
# Current Hose Range

<table>
<thead>
<tr>
<th>Hose Type</th>
<th>Hose ID</th>
<th>Pressure Range (psi)</th>
<th>Maximum Available Length</th>
<th>Applicable Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotary Hose</td>
<td>2&quot; - 6&quot;</td>
<td>5,000 –7,500</td>
<td>60m</td>
<td>API 7K, FSL 1 / FSL 2 Taurus Design</td>
</tr>
<tr>
<td></td>
<td>5&quot;</td>
<td>10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement Hose</td>
<td>2&quot; - 4&quot;</td>
<td>5,000 –15,000</td>
<td>60m</td>
<td>API 7K, FSL 0 Taurus Design</td>
</tr>
<tr>
<td></td>
<td>3&quot;</td>
<td>20,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choke &amp; Kill Hose</td>
<td>2&quot; - 4&quot;</td>
<td>5,000 –15,000</td>
<td>60m</td>
<td>API 16C</td>
</tr>
<tr>
<td>Production Oil / Gas Hose</td>
<td>2&quot; - 14&quot;</td>
<td>218 (15 Bar) – 7,500</td>
<td>60m (2&quot; to 8&quot;)</td>
<td>API 17K</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30m (10&quot; to 14&quot;)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
API 7K 6\textsuperscript{th} Edition
Specification Levels and Temperature Ranges

› FSL 0  Cement hoses
› FSL 1  Rotary/Vibrator Mud Hoses – NON directional drilling systems
› FSL 2  Rotary/Vibrator Mud Hoses – FOR directional drilling systems

› Temperature range I:  -20 to +82°C
› Temperature range II:  -20 to +100°C (-25 to +100°C)
› Temperature range III:  -20 to +121°C (-30 to +121°C)

› TauroCool\textsuperscript{™} - New Product (-40 to + 82°C)
API 16C 2\textsuperscript{nd} Edition
Specification Levels and Temperature Ranges

› FSL 0  Includes all design, material and design validation test requirements
› FSL 1  Compulsory tests plus Fire rating
› FSL 2  Compulsory tests plus high temperature exposure test
› FSL 3  Compulsory test plus fire rating and high temperature exposure test

› Temperature range B: -20 to +100°C
› Temperature range U: -20 to +121°C (-20 to +130°C)

› Compulsory testing consists of Mechanical and Gas exposure testing
Applications

› Managed Pressure Drilling (MPD)
› Riser Tensioner
› Flare Boom
› Water Injection
› Topside Jumper / Gas Injection
› Subsea Production Jumper
› Natural Gas transfer hose (Ship to Shore)
› Crude and Gas transfer
Hose Construction

1: Stripwound tube, SS AISI 316L Interlock
2: Lining
3: Textile plies, Rubberised textile
4: Reinforcing plies (2 or 4 layers), Steel cables with high strength steel wire
5: Textile plies, Rubberised textile
6: Binding, Steel cable
7: Cover textile plies, Rubberised textile
8: Cover, Special elastomer compound
9: Stripwound tube, SS AISI 316L Interlock
Hose Production
ContiTech Bonded in Coupling

- Integral one-piece coupling
- No leak paths
- No threaded connections
- Short coupling length
- Fully bonded in the hose body for maximum strength
- Full flow capability through the hose
External Protection
Hose Analysis

› Calculate the appropriate hose length, check the hose curvature, end loads and any torsion induced in the hose based on the operational and the extreme 100 year environment data if applicable.

› Review the end connection hook up and subsequent bolting and support loads

› Check for clashing and subsequent loads, where clashing is present we will advise outer protection locations

› Fatigue analysis

› Survival analysis
Liners designed to suit application

Extra neck reinforcement

Location collars for buoyancy

Fire resistance: 700°C for 30min (Lloyds OD 1000/499)

Sour service: hoses and couplings meet NACE MR 01-75 requirements

Heat traced hoses for extreme cold conditions
Pre-Formed Hose Solutions

› ContiTech preformed production lines are used in tight spaces where a normal flexible hose will not reach the required small radius of curvature

› Can be used for hard pipe replacements: no hot work needed; no painting required; removable pigging loops etc

› Typical reduction of MBR by about 50%

› Can be made to suit an array of different configurations
Comparison of Bonded and Unbonded Flexible Hoses

- **Bonded hoses**
  - API 17K
  - Max single length is 60m (200 ft)
  - Reinforcing cables are embedded in rubber
  - Integral bend stiffeners
  - One piece coupling

- **Unbonded hoses**
  - API 17J
  - Single length, flowlines
  - Armour not embedded
  - Requires additional equipment for annulus venting
  - More complex and expensive coupling

26 January 2018
Dunlop Oil & Marine Ltd
# Fluid Compatibility Chart

<table>
<thead>
<tr>
<th>Medium</th>
<th>Concentration</th>
<th>PA</th>
<th>HNBR</th>
<th>Tauroflon</th>
<th>Coflon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochloric acid</td>
<td>15%</td>
<td>25°C</td>
<td>50°C</td>
<td>30°C</td>
<td>60°C</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>37%</td>
<td>25°C</td>
<td>60°C</td>
<td>30°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>3%</td>
<td>66°C</td>
<td>100°C</td>
<td>30°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Methanol</td>
<td></td>
<td>50°C</td>
<td>90°C</td>
<td>25°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Glycol</td>
<td></td>
<td>70°C</td>
<td>70°C</td>
<td>130°C</td>
<td></td>
</tr>
<tr>
<td>Zinc bromide</td>
<td>Saturated</td>
<td>25°C</td>
<td>50°C</td>
<td>30°C</td>
<td>50°C</td>
</tr>
<tr>
<td>Calcium bromide</td>
<td>Saturated</td>
<td>50°C</td>
<td>90°C</td>
<td>90°C</td>
<td>130°C</td>
</tr>
<tr>
<td>Diesel</td>
<td></td>
<td>130°C</td>
<td>121°C</td>
<td>130°C</td>
<td></td>
</tr>
<tr>
<td>Crude oil</td>
<td></td>
<td>100°C</td>
<td>100°C</td>
<td>130°C</td>
<td></td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>20%</td>
<td>50°C</td>
<td>N/A</td>
<td></td>
<td>66°C</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrogen sulphide</td>
<td>(&lt;20%)</td>
<td>130°C</td>
<td>60°C</td>
<td>90°C</td>
<td>130°C</td>
</tr>
</tbody>
</table>

Max operating temperature for unlimited application

Max operating temperature for limited application

Not recommended

Satisfactory

Limited use

** Line must be vented
Third Party Certification

ABS-CDS 2017
(American Bureau of Shipping – Certified Drilling Systems)
› Witness Pressure Test
› Review Hose Data Book
› Release Note
› Design Review (Additional IRC for Choke & Kill / Mud Hoses)

DNVGL-OS-E101 2018 Cat 1
(Det Norsk Veritas)
› Witness End Fitting Attachment and Pressure Test
› Review Hose Data Book
› Release Note
› Design Review (followed by Product Certificate)
Research and Development

Previous API 17K hose design

Enhanced API 17K hose design
The West Brae field was originally developed in 1996 to form part of the existing Brae area infrastructure in the UK sector of the North Sea. The drill centre ties back to Brae Alpha platform approximately 8.5 km away. The complex subsea architecture consists of 2” and 4” gas lift jumpers. In 2014 a new well was planned for completion and the lack of available slots on the existing manifold required a new subsea manifold extension to be installed. For the new phase of the development 4” and 5” production and 2” gas lift flowlines were necessary.
Scapa Field

Operator: Talisman Energy (60%)

Connects:

› Wellhead to template
› Template to riser base

Water Depth: 118 m

Jumper ID Service and Length:

› 10” (production) – 170m
› 6” (test/utility) – 170m
› 4” (production) – 102 m
› 3” (gas lift) – 303 m
› 2” (gas lift) – 70m

Design Pressure: 2300 psi

Year Supplied:

› 1984 – initial
› 2011 – full replacement

Scapa is a subsea field development tied back to Claymore fixed platform offshore UK. The field was discovered in 1975 with the first oil being produced in 1984. The complex seabed layout consists of 36 flexible jumpers, which were replaced in 2011.
Located 37 miles northwest of Palawan Island in the Philippines. Discovered in 1981, the Galoc oil column was deemed commercially viable in 1997. Production commenced in 2008 with subsea wells tied to an FPSO. The first phase of development included two horizontal subsea trees, a short subsea pipeline and a single synthetic tether mooring line to which a bonded production riser is connected. In 2015 a steep wave configuration has been deployed to decrease the exposure of the riser to environmental effects.

**Operator:** Galoc Production Company (58%)

**Production Facility:** FPSO

**Water Depth:** 287m

**Jumper ID Service and Length:**

- 6” – 445 m

**Design pressure:** 3000 psi

**Year supplied:**

- Phase 1: Single tether moored (2007)
- Phase 2: Steep Wave (2015)
The Kikeh field is located 120 km northwest of the island Labuan, East Malaysia in 1350 m water depth. The Kikeh field comprises of a floating Production Storage and Offloading (FPSO) system and a Dry Tree Unit Spar Platform. Topside jumpers are used to transport produced hydrocarbons and gas between dry trees and topside piping.

**Operator:** Murphy Oil

**Connects:** Wellhead to piping

**Jumper ID and Length:**
- 2” (gas lift) – 39.5 ft

**Design pressure:** 5,000 psi

**Year Supplied:** 2017
Pan Udang

**Operator:** Bumi Hasta Mukti

**Connects:**

- Free Standing Riser to FPSO
- Free Standing Riser to Flowline termination
- Flowline termination to Subsea trees

**Water Depth:** 95 m

**Jumper ID Service and Length:**

- 4” (production) – 52.5m
- 4” (production) – 30m

**Design Pressure:** 1500 psi

**Year Supplied:** 2012

BHM is a subsea field development in Indonesia’s Natuna Sea. BHM contracted 2H offshore to design a flowline and riser system to link the three subsea wells to the FPSO.
Thank you for your attention!