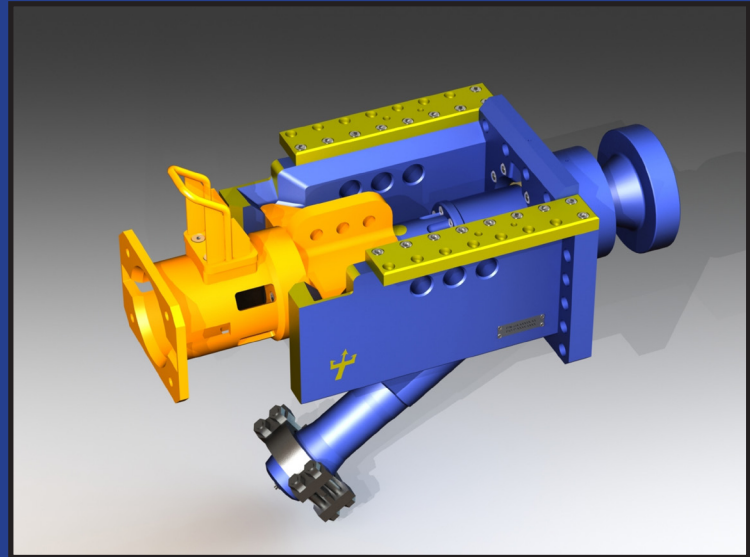


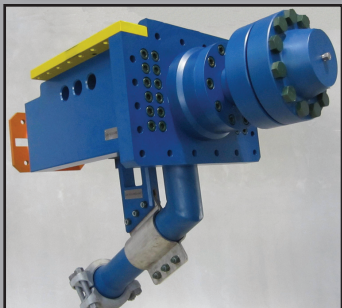


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TCH Horizontal Subsea Connection System



DESIGN BASIS

The TCH Subsea Connection System was designed based on the following main industry driving factors:

- Compact, safe and reliable design (30+ years design life), allowing simple 2-step installation (*Reliability and Installability*)
- Strong design, withstanding potential high loads through installation and production (*Robustness*)
- Design incorporating metal-to-metal sealing technology, allowing multiple makes and breaks without changing the sealing system - minimizing need to recover and guaranteeing a long service life (*Maintainability*)

TECHNICAL SPECIFICATION

- “True” through bore horizontal Subsea Connection System
 - TCH 52 - 2” (52 mm)
 - TCH 78 - 3” (78 mm)
 - TCH 104 - 4” (104 mm)
 - TCH 131 - 5” (131 mm)
- Designed, manufactured and tested in accordance with API 17D
 - 10,000 psi standard working pressure (& TCH 52-15K)
 - Material class EE, FF and HH
 - Temperature class P-U (-29 to 121 Degree C)
 - PSL 3G
 - PR2

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TECHNICAL SPECIFICATION (cont'd)

- Sealing System
 - Metal-to-metal sealing system, gas tested in excess of 20 makes and breaks
 - 2 elastomeric seals (backup)
 - Sealing verification subsea after installation (optional)
 - All seals on female-free connector (removable)
- Interface
 - API 17H class 4 (TCH 52 & 78) and API 17H class 6 (TCH 104 & 131) ROV torque tool interface (tool available)
 - API 17H single/dual hot stab (optional, sealing verification, pressure monitoring and injection)
 - Simple integration of electrical sensors (PT/Flow)
 - End-connections as per client requirement
- Installation
 - Simple vertical landing/parking (Step 1)
 - Reliable, horizontal make up through ROV torque tool (turn only - Step 2)
 - No push and turn
- Application
 - Production, injection and service lines
- Other Features
 - Erosion target
 - Secondary unlock
 - Easy attachment points for buoyancy elements or lifting lines
 - ROV grab handle
 - Heavy duty bracing to withstand potential high loads during installation and service
 - Tolerates flowline misalignment to ± 10 degrees
 - Simple diver installation
 - No threads on subsea fixed male portion
- Third Party Verification Statement in process and patent granted



TCH on TLP Capping Stack*



Integrated 17H Hot Stab Panel*

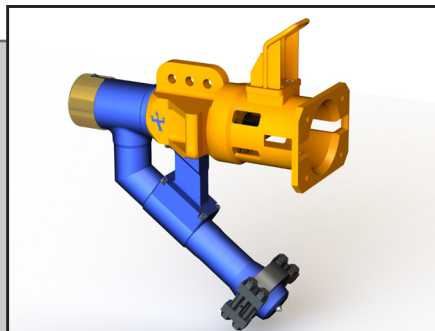


TCS-Offices:

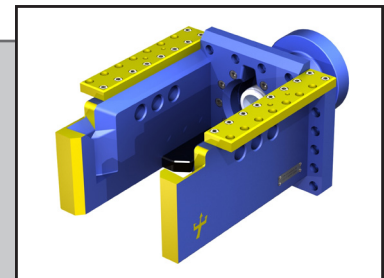
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Female (removable)



Male (fixed)

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