ConcentricBore™
SUBSEA TREES

Low Cost Solutions with Dril-Quip Reliability
Innovative Well Control in a Flexible Light Weight Design Package

The Dril-Quip ConcentricBore subsea tree is a modular design that allows a quick turnaround engineered tree that meets your project specific production requirements. The tree has one of the smallest footprints and is one of the lightest trees in the industry making it easier to handle and install. It includes innovative field-proven technology backed with 30 years subsea tree experience and Dril-Quip’s unique performance reliability reputation. Dril-Quip’s ConcentricBore Tree will protect your investment with lower equipment costs, lower installation costs and lower life-cycle costs.

FEATURES

- Available in a 10,000 psi or 15,000 psi operating pressures.
- Large 14.5” ID vertical access through the tubing spool is available to pass drill-bits, coil tubing, and lower completion packages for maximum drilling and completion options.
- Provides a full 2” Annulus Access
- Standard API/ISO ROV interfaces ensure installation and maintenance accessibility.
- Tree design is easily adaptable to accommodate most third party components
- Can be configured for cross over upstream or downstream of the production wing valve.
- Passive tubing hanger orientation arrangement eliminates BOP orientation pins and extra orientation tools
- Accommodates 9 downhole hydraulic/chemical injection lines and 2 electrical lines including fiber optic.
- Metal-to-metal annulus sealing technology for reliable pressure containment
- Integral USV1 and USV2 valves in the master valve block

STANDARD CONCENTRICBORE TREES INCLUDE

- The ConcentricBore Vertical Tree and Dril-Quip’s HorizontalBore Tree share the same suite of running tools for increased rental availability.
- The Tree and Tubing Head Spool utilize Dri-Quip’s new DXe high fatigue resistant Connector. The Tree and tubing Spool connector can be configured to mate with industry standard wellhead locking profiles.
- Dril-Quip’s field proven DH Gate Valves and latest generation DA valve actuators.
- Offered with Dril-Quip’s workover control system and production control system.
DXe Connector Performance and Reliability
DriL-Quip’s DXe tubing spool and tree connector offers a unique proprietary locking profile that has high fatigue resistance and high load capacities. The DXe connector has no bolts in the load path and is not subject to bolt failure. The DXe connector and ring gasket has been successfully tested during worst-case survival load conditions on a 30” mandrel to 20,000 psi bore pressure with all assembly bolts removed. The connector offers superior performance validated with full-scale testing.

The connector exceeds API 16A 4th Edition PR2 and API 17TR7 requirements. DXe ring gaskets have been qualified to API 6A PR2 20,000 psi (with gas), 35° to 400° F and 11,000 ft. water depths. There are primary and secondary sealing surfaces and feature a self-aligning profile.

Large Selection of Gate Valve Options
DriL-Quip’s field-proven DH (high performance) gate valve and DA hydraulic actuators are engineered for reliable service in shallow and deepwater production applications. DriL-Quip gate valves are qualified to 10,000 foot water depth per current revisions of API 17D, 2nd Edition, and API 6A, 20th Edition. Wireline and coil tubing shear options are available. Actuators are fail-safe close or fail-safe open as specified and have a visual indicator rotary and/or linear override for ROV intervention.

Third Party Interfaces
DriL-Quip’s ConcentricBore Tree design is easily adaptable to accommodate all major industry 3rd party components such as chokes, jumper hubs, gas lift systems and chemical injection metering valves. Multiple interface options are available when integrating components from separate manufacturers. The tree can accommodate all industry standard subsea control systems.

Protect your investment with lower equipment costs, lower installation costs and lower life cycle costs.
Dril-Quip’s ConcentriBore Tree meets all applicable industry standards

- API 17D, 2nd Edition Qualified
- API 20E, BSL-2 Bolting Compliant
- ISO Certified 9001
- API Q1 and API Q2 Certified
- ISO 1705 Certified
Multi-Purpose Tool w/ Jet-Sub

5-1/8” x 2-1/16” 10,000 psi ConcentricBore Tree

BOP Test Tool Adapter for Sealing Wear Sleeve

Drill-Through Sealing Wear Sleeve

Tubing Hanger and Tubing Spool Jetting Sub

Tubing Hanger

Tubing Spool

Subsea Wellhead System

Debris Cap (Deep Water)

Tree Handling Tool

Handling Test Tool For Tubing Hanger Running Tool

Tubing Hanger Running Tool

Split Landing Bowl for Tubing Hanger Stand

ConcentricBore™ SUBSEA TREE
Dril-Quip’s control system takes advantage of over 15 years of experience using fiber optics in subsea communication applications. Dril-Quip designs and manufactures modular control systems for a range of applications from a one-off production well through a complex field development incorporating multiple production trees, production manifolds, distribution manifolds, High Integrity Pipeline Protection (HIPPS) manifolds, and subsea processing equipment. Dril-Quip’s Subsea Control System can be designed to support all tree and downhole functions for any Horizontal or Vertical Tree Subsea Completion System. These control systems can be direct hydraulic, electro-hydraulic, multiplex or any combination that meets or exceeds customers’ specifications.

**DRIL-QUIP’S CONTROL SYSTEM FEATURES:**
- All components meet or exceed ISO 13628-6 and API 17F standards for functionality, expand-ability and reliability.
- Open architecture using industry standard interfaces allows for control and monitoring of over fifty wells and the collection of all data within five seconds with fault tolerant redundancy.
- Fiber-optic-based communications in applications with over 50 mile offset and demonstrated reliable communications in tests of over 100 miles.
- Reliable noise-free communication provides high data rate based on Modbus over TCP/IP between the Master Control Station (MCS) and a Subsea Router Module (SRM).
- The SRM provides broadband transfer rates for large data volumes demanded by today’s Subsea Tree and downhole instrumentation.
- Dril-Quip can provide a Control System for use in shallow water (up to 1,500 feet) or deep water (up to 10,000 feet) applications.

**DRIL-QUIP’S SUBSEA PRODUCTION CONTROL SYSTEM INCLUDES THE FOLLOWING MAJOR COMPONENTS:**
- The Master Control Station (MCS) is a windows-based system with flexible open architecture and redundant systems for high reliability. This assures easy integration with other subsea functions and topsides production control systems.
  - Bump-less transfer between main and backup systems
  - Incorporates highly reliable Emerson Delta V hardware and software
  - Accepts Frequency Shift Key (FSK) Modems or fiber optic technology
  - Signal on power, signal and power, fiber optics communications, etc.
- Production Hydraulic Power Unit (HPU) is a self-contained package that provides hydraulic power to all production control modules
  - 5,000 psi to 15,000 psi high pressure and low pumps and accumulators.
- Topside Umbilical Termination Unit (TUTU) standard
- Subsea Umbilical Termination Assembly (SUTA)
- Subsea Distribution and Router Unit
- Hydraulic, Electric, and Optic Flying Leads (HFL, EFL, OFL)
- Shallow Water Subsea Control Module (SW SCM)
  - Economic modular design

**Shallow Water Subsea Control Module**

- 20 year design life
- Up to 30 functions
- ROV compatible retrievable design
- ROV latch, no running tool required
- Dual SEM unit available
- Dual LP/HP hydraulic supply available
- Up to 5,000 psi for LP supply
- Up to 15,000 psi for HP supply
- 4 electrical, fiber, or hybrid top connectors
- 6 electrical connectors through base plate
- Sensor interfaces designed for analog 4-20 MA, RS-485 Modbus, and ethernet with Modbus over TCP/IP
Dril-Quip provides full installation and commissioning services for Control Systems required for subsea application, including a team of qualified technicians who advise and assist with systems integration testing, installation, workover and commissioning.

**DESIGN PHASE CONTROL SYSTEM ANALYSIS PERFORMED:**
- Hydraulic analysis
- Electrical power analysis
- Communications analysis
- Failure Mode Effect and Criticality Analysis (FMECA)
- Reliability, availability, and maintainability analysis

**IN-HOUSE CONTROL SYSTEM COMPONENT TESTING:**

**Systems Integration Testing (SIT)**
- MCS and SCM, SRU, etc. supplied by Dril-Quip
- Flow meters, trees, etc. supplied by customer
- Subsea Electronic Modules (SEMs)
  - Printed circuit board function testing
  - Canister hydrostatic testing
  - Thermal and vibration Extended Stress Screening (ESS)
  - Function testing
- Subsea Control Modules (SCMs)
  - Hydraulic sub-assembly proof pressure testing
  - Hyperbaric chamber pressure testing to validate unit water depth rating
  - Electric and hydraulic factory acceptance testing

- Qualified up to 1,500 feet water depth
- 20 year design life
- Monitoring up to 7 downhole functions standard
- ROV compatible retrievable design

**Deep Water Subsea Control Module (DW SCM)**
- 10,000 feet water depth rated
- 20 year design life
- Up to 30 functions
- ROV compatible retrievable design
- ROV latch, no running tool required
- Dual SEM unit available
- Dual LP/HP hydraulic supply available
- Up to 5,000 psi for LP supply
- Up to 15,000 psi for HP supply
- 4 electrical, fiber, or hybrid top connectors
- 6 electrical connectors through base plate
- Sensor interfaces designed for analog 4-20 MA, RS-485 Modbus, and ethernet with Modbus over TCP/IP

**Hydraulic, Electric, and Optic Flying Leads (HFL, EFL, OFL)**