Dril-Quip, Inc. is one of the world’s leading manufacturers of offshore drilling and production equipment that is well-suited for use in deep-water applications. The Company designs and manufactures subsea, surface and rig equipment for use by oil and gas companies in offshore areas throughout the world. Dril-Quip also provides installation and reconditioning services and rents running tools for use with its products.

Dril-Quip’s principal products consist of subsea and surface wellheads, subsea and surface production trees, mudline hanger systems, specialty connectors and associated pipe, drilling and production riser systems, wellhead connectors and diverters. The Company has developed its broad line of subsea, surface and offshore rig equipment exclusively through internal product development efforts. Dril-Quip has continually introduced new products and product enhancements since its founding in 1981.

Dril-Quip’s manufacturing operations are vertically integrated, with the Company performing essentially all of its forging, heat treating, machining, fabrication, inspection, assembly and testing at its own facilities.

The Company’s common stock is traded on the New York Stock Exchange under the symbol “DRQ.”

Facilities

Headquartered in Houston, Texas, Dril-Quip has manufacturing facilities in the United States, Scotland, Singapore and Brazil. The Company also has sales and service offices in numerous locations throughout the world.
**CAPABILITIES**

**PROJECT MANAGEMENT**

Project management capabilities have enabled Dril-Quip to better manage the design, manufacture and delivery of Dril-Quip products on large, integrated projects throughout the world.

The project management techniques utilize time-proven processes, which are defined at the start of a project via a formal Project Execution Plan (PEP). This formalized project management system has proven invaluable for successful management of the resources required to complete projects on time and to the customers’ requirements.

**ENGINEERING**

Dril-Quip’s technological leadership in the industry is the result of an ongoing commitment to a professional engineering staff with in-depth experience in the design of drilling and production equipment. This experience is supported by state-of-the-art computer systems networked to expedite and optimize the process of modeling, analyzing, modifying and testing each design. These capabilities enable Dril-Quip to consistently provide new and improved products to the oil and gas industry worldwide.

**MANUFACTURING**

Dril-Quip products are manufactured from selected high-grade forging material. Computer-controlled machine tools are used for dimensional accuracy, precision machining and consistent quality. Each product is inspected, assembled and tested prior to shipment. Computer tracking systems are used to schedule and monitor each customer’s order during the manufacturing process. This attention to detail ensures product quality and on-time delivery.

**SERVICE**

In order to ensure vital support to the offshore industry, Dril-Quip field service technicians are rigorously trained and tested in the proper use, handling and repair of Dril-Quip products. Only the most qualified and knowledgeable personnel are employed by Dril-Quip for field service. These technicians are then posted at strategically located Dril-Quip facilities throughout the world, readily available to our customers on a 24-hour basis.

**TRAINING**

The Dril-Quip Training Department offers to the industry training courses in the installation, operation and maintenance of offshore drilling and production equipment. These courses utilize computer-assisted training tools, models and actual equipment to enhance the participants’ knowledge of offshore operations. Dril-Quip’s Training Department offers custom courses tailored toward specific projects and customer requirements.
SPECIALTY CONNECTORS

QUIK-THREAD®/MULTI-THREAD® CONNECTORS

Quik-Thread Connectors provide fast make-up, reliable sealing and versatility to excel in a variety of drilling applications. Their rugged thread form and automatic self-aligning profiles allow for quick and easy installation in the field.

The Multi-Thread Connector maintains the field-proven performance of the Quik-Thread design with the advantage of making up in only ⅜ of a turn. Multi-Thread Connectors are ideally suited for running large-diameter casing because they do not require the use of power tongs.

QUIK-JAY® CONNECTORS

Dril-Quip’s Quik-Jay Connectors are ideal for jack-up drilling operations with mudline suspension equipment. Quik-Jay Connectors provide fast make-up, effective anti-rotation and remote disconnect. The Quik-Jay box accepts a standard Quik-Stab® pin for diverless, weight-set tie-back operations.

QUIK-STAB® CONNECTORS

Quik-Stab Connectors provide fast make-up and reliable weight-set connections for large-diameter tubulars. Their design allows for high-angle stabbing, self-aligning and automatic locking of pin and box. Quik-Stab Connectors are an excellent choice for applications that require fast make-up without rotation.

QUIK-LOK® CONNECTORS

Dril-Quip’s Quik-Lok Connectors incorporate all of the easy make-up and reliable sealing capabilities of Dril-Quip’s performance-proven Quik-Thread and Multi-Thread specialty connector product lines. The Quik-Lok Connectors incorporate a proprietary thread design that, when fully made up, delivers a high preload and a long fatigue life connection. This makes Quik-Lok Connectors ideally suited for platform applications. Quik-Lok Connectors rotate ⅜ turn to make up and, with pressure applied to the threads, are torqued to energize two metal-to-metal seals and achieve rated specifications.

HC-100™ CONNECTORS

Dril-Quip’s HC-100 Connectors provide high-strength and high-fatigue characteristics for deepwater drilling applications. The HC-100 is a ⅜-turn make-up connector that features easy, field-proven operations.
**MUDLINE EQUIPMENT**

**MS-15® MUDLINE SUSPENSION SYSTEM**

**Dril-Quip**’s field-proven MS-15 Mudline Suspension System offers easy handling and trouble-free operation with a stack-down configuration for centralization and full washout efficiency. The system is designed for high pressure and high load capacity. Positive backup of split ring hangers is provided and all hangers are automatically centralized when landed. For temporary abandonment, stab-in or threaded temporary abandonment caps are available.

The MS-15 Mudline Suspension System has reliable tie-back capabilities, with a metal-to-metal seal and resilient seals to contain internal pressure. The tie-back tools are available in stab-in type design and make up with right-hand rotation. The MS-15 Mudline Suspension System can accommodate most casing programs.

**MS-10® MUDLINE SUSPENSION SYSTEM**

**Dril-Quip**’s MS-10 Mudline Suspension System is a field-proven system of hangers that support the weight of each casing string at the mudline. The MS-10 is an economic alternative to the full-featured MS-15 Mudline Suspension System where anticipated well pressure does not exceed 10,000 psi.

**MUDLINE CONVERSION SYSTEM**

**Dril-Quip**’s Mudline Conversion System is a system of components that provides a field-proven, economical method of adapting a mudline suspension system to a subsea production tree.

The components include **Dril-Quip**’s Subsea Tubing Hanger System with metal-to-metal sealing, Tubing Head, Stab-In Tie-Back Tool, Bit Guide, Radial Bolt Tree Adapter and Subsea Tree (block valve or stack valve).

The mudline conversion system allows the subsea tubing hanger to be installed through the riser and BOP stack for complete BOP control. The tubing head provides a side outlet for annulus monitoring and the system is designed with an internal lockdown profile for positive lockdown of the tubing hanger. The radial bolt connection provides easy make-up and the system is ported for downhole safety valve and chemical injection.

**DRIL-THRU™ COMPLETION SYSTEM**

The Dril-Thru Completion System is a unique mudline suspension system designed to accept a subsea tubing hanger and subsea tree without the use of adapters. This system simplifies the operations when it is known in advance that the well will be completed with a subsea tree. The installation is simple and can be conducted through conventional BOP equipment. The hanger/housing can accommodate a production casing hanger and a tubing hanger, with an internal lockdown profile for positive lockdown of the tubing hanger. **Dril-Quip**’s field-proven system provides metal-to-metal sealing capability, and the subsea tree Quik-Clamp or radial bolt connection provides easy make-up.
SURFACE EQUIPMENT

SURFACE WELLHEAD SYSTEMS

SU-902™ UNITIZED WELLHEAD SYSTEM

The SU-902 Unitized Wellhead is a new-generation surface wellhead that incorporates subsea wellhead technology. This unique approach in surface wellhead design provides benefits that are not available in other current surface wellhead systems.

SYSTEM FEATURES

- Compact wellhead design saves space
- System flexibility allows adaptation to most casing programs
- Fewer connections reduce possible leak paths and save BOP nipple-up/nipple-down time
- Mandrel-type casing hangers simplify installation process with complete BOP control
- The 13 3/8” wellhead can be run through the 20 3/4” or 21 1/2” BOP stack
- Field-proven dual metal-to-metal sealing with backup resilient seals
- Available for standard or H2S/critical environment service
- Accessories allow for adjustment in height and tension
- Field proven for drilling and production applications

SU-902-FBD™ UNITIZED WELLHEAD AND HORIZONTAL PRODUCTION SYSTEM

The FBD System is a new-generation platform wellhead and horizontal production system that incorporates subsea technology and is designed for planned high-well intervention.

SYSTEM FEATURES

- Horizontal tree design allows pulling tubing without disturbing tree for easy workover
- System flexibility allows adaptation to most casing programs
- Mandrel-type casing hangers simplify installation process with complete BOP control
- Available for standard or H2S/critical environment service
- Accessories allow for adjustment in height and tension
- Available with slip-type hangers for stuck casing situations

SC-90™ CONVENTIONAL WELLHEAD SYSTEM AND VERTICAL PRODUCTION SYSTEM

The SC-90 Conventional Wellhead System is a cost-effective wellhead system designed for land, jack-up or platform drilling and completion applications. A wide range of sizes and pressure ratings is available to accommodate most casing programs.

SYSTEM FEATURES

- Range of pressure and sizes available to accommodate most casing programs
- Weight-set slip hanger with weight-set seal; optional mechanical-set seal
- Hangers designed to run through full opening blowout preventers
- Multiple-bore tubing hangers available
- Available for standard or H2S service
- Designed and tested to comply with API product specification levels and performance requirements
- Complete drilling and production system packages available
- Field-proven performance
**Surface Production Systems**

**Stacked Valve Production Tree**
Dril-Quip offers surface production trees utilizing a stacked valve configuration for land or platform completion systems. The systems are designed and assembled to meet customer specifications. Both valves and components are manufactured to meet API specifications.

**Solid Block Valve Production Tree**
Dril-Quip’s solid block valves are a popular choice for offshore platform completions where conserving space and minimizing leak paths are important. Dril-Quip block valves are manufactured to API specifications.

**System Features**
- Offered in a wide range of sizes, pressure ratings and trims
- Production tree-to-wellhead connection available with flange, clamp hub, Dril-Quip Quik-Clamp® or Radial Bolt Connector
- Production system components offered with standard API connections or customer-specified connections
- Component selection consistent with well service specifications

**Series DH, DHS and DL Gate Valves**
The Dril-Quip Series DH, DHS and DL Gate Valves are bidirectional sealing gate valves designed to offer maximum reliability and provide extended service in the field. This has been accomplished by incorporating field-proven gate-to-seat and seat-to-body, metal-to-metal sealing technology and a non-elastomeric stem packing design. The gate valves are available with the following end connections: clamp, flanged and threaded. All Dril-Quip gate valves comply with API specifications 6A, 14D and 17D, and are licensed with the API monogram.

**DHF Series Fire-Resistant Gate Valves API 6FC Design**
This gate valve is made so the stem-to-bonnet, metal-to-metal backseat will engage in a fire. This is done to eliminate the possibility of the packing burning out and creating a new fuel source for the fire. All other components are made to withstand the half-hour burn and cooldown without leaking. After the valve cools down, the stem packing is replaced and the valve stroked. The pressurized valve must not show any significant leakage during the test. The metal-to-metal DX Bonnet Seal is pressure-energized and will not leak due to high temperatures. A nut shroud is added to protect the bonnet bolting from direct flame.

**API 6FA Design**
Components of the pressurized valve can withstand a half-hour burn and cooldown and one-time operation without significant leakage. The stem packing is made up of a high-temperature *Teflon®* and metal backup ring that can withstand the heat of a half-hour burn.

*Teflon is a registered trademark of DuPont*
Subsea Wellhead Systems

Dril-Quip’s SS Series Subsea Wellhead Systems are 10,000 and 15,000 psi systems that feature weight-set metal-to-metal annulus seals. Subsea wellhead system components include the guide base, conductor wellhead, primary 18 ⅕” wellhead, primary casing programs designed to fit your application, supplemental casing programs (optional), all associated seal assemblies, wear bushings, bore protectors and running tools.

General Features

- Simple, reliable, trouble-free operation
- Fewer trips required
- Weight-set seal assemblies provide true dual metal-to-metal seals with elastomeric backup
- Same seal assembly fits all hangers 14” and smaller
- Seal assemblies are locked down to hangers
- Seal assemblies are retrieved by vertical pull, with no rotation required
- One running tool runs all casing hangers with seal assemblies
- All casing hangers are automatically centralized in the wellhead
- Large flow-by areas around casing hangers
- 18 ⅕” and 16” seal assembly outer lock ring locks seal assembly and casing hanger down
- High-pressure and high-load carrying capacity due to a unique landing shoulder at the bottom of the 18 ⅕” wellhead housing
- High-bending load capacity between the 30” and 18 ⅕” housing (on SS-15 Systems)
- BOP stack can be tested with wear bushings installed
- Tubing hanger profile standard on all wellheads
- Subsea tie-back profile standard on all casing hangers that land in the wellhead

Standard configurations of the Dril-Quip line of SS Series Subsea Wellhead Systems include the following (the system may be configured to meet customer requirements):

SS-10™/SS-10C® Subsea Wellhead System

SS-10/SS-10C Subsea Wellhead Systems are 10,000 psi systems with weight-set metal-to-metal seals. The SS-10 Subsea Wellhead System utilizes the SS-15 guidance equipment for higher bending capacity.

SS-15™ Subsea Wellhead System

SS-15 Subsea Wellhead Systems can include options such as multiple conductor strings, rigid lockdown, annulus shutoff and multiple supplemental casing hanger systems. Seal assemblies and hangers of the SS-15 systems are designed for 15,000 psi H₂S service.

SS-15ES™ Subsea Wellhead System

This version of the SS-15 Subsea Wellhead System is specially designed for deepwater use where higher bending and tensile capacities are required.

SS-15 TLP/Spar Subsea Wellhead System

These systems are adapted to meet stringent strength requirements imposed on a subsea wellhead system when it is tied back to a TLP or Spar.

SS-15 BigBore II™ Subsea Wellhead System

The BigBore II Wellhead Systems accommodate drilling and running large-bore diameter casing string through pressurized water sands with complete BOP control and with all returns back to the drilling vessel.
**Subsea Production Systems**

**SingleBore™ Production System**

Dril-Quip’s SingleBore Production System is a field-proven and economical alternative to traditional completion system design. The workover riser system and surface tree associated with the SingleBore system are simpler and less expensive than systems required for traditional dual bore trees. The SingleBore Tree and Tree Cap Running and Retrieving Tool can incorporate a shear gate valve.

Flow through the tree to and from the annulus occurs in a series of connected bores and a 1” OD high-pressure line run with the workover control umbilical.

The SingleBore Tree body incorporates integral production master and production swab valves and an annulus master valve. The SingleBore Tree is available for through-tree pigging.

The SingleBore Production System eliminates the need to run and retrieve a wireline plug to open and close the annulus.

Dril-Quip’s annulus ball valve design replaces any requirement to set a wireline plug. The tubing hanger is available for standard or H2S service. Tubing sizes up to 7” can be accommodated while maintaining a full 2” annulus access.

**Dual Bore Production System**

Dril-Quip’s field-proven Dual Bore Production System is designed to provide direct overhead access (via completion riser) to the production and annulus bores. This allows the setting of wireline plugs in the tubing hanger to secure the well prior to removing the BOP stack. The Dual Bore System is available in pressure ratings of up to 15,000 psi. Metal-to-metal sealing, high-performance gate valves and subsea actuators are utilized. Dril-Quip’s integral field-proven DX® Wellhead Connector is standard. Dril-Quip’s Dual Bore System is easily adapted to accommodate most production tubing programs and is adaptable to a variety of flowline and control system connections.

The system accommodates tubing sizes up to 5” with 2” annulus access, with weight-set metal-to-metal seals, and standard industry tools and procedures are used for orienting the tubing hanger during installation. The tubing hanger easily accommodates electrical, hydraulic and chemical injection downhole functions. An Orientation Pin and Orientation Elevation Check Tool are included to confirm proper installation.
DX® WELLHEAD CONNECTORS

Dril-Quip’s DX Subsea Connectors ensure a reliable, pressure-tight connection between the completion tree and the subsea wellhead. DX Connectors are designed for deep water, high wellhead pressure, deep wells and long drilling times. They are available in a variety of designs and configurations and can be modified to meet specific customer requirements. The DX-10 Connector is pressure rated to 10,000 psi, and the DX-15 Connector is pressure rated to 15,000 psi. The DX-DW Connector, also rated to 15,000 psi, has a higher bending capacity. Dril-Quip’s latest addition to its Connector line, the SDX-DW (rated for 15,000 psi) is designed to provide the greatest fatigue life possible.

FEATURES

- High bending and tension capacity
- High load capacity before hub separation
- Top connection can be a clamp, flange or studded connection
- Tight load path through the upper body, latch segments and wellhead
- Annular piston/cam ring design maximizes locking force within a smaller dimensional envelope
- Special seal design and stainless steel surfaces extend seal life
- Self-locking taper on latch segments offer greater locking reliability
- Quick unlatching time; meets all international regulatory requirements
- Latching segments are automatically retracted on disconnect
- Design includes primary metal-to-metal seal profile with backup metal-to-metal profile for emergency use
- Design is compatible with existing blowout preventer hydraulic control systems
- Performance is field proven

TIE-BACK SYSTEM

Because of the dynamic forces imparted to a subsea wellhead from a production vessel that is constantly in motion, the pressure integrity and fatigue life of the well equipment are crucial factors in the selection process. To address this issue, the Dril-Quip Tie-Back System incorporates the following:

FEATURES

- DX Wellhead Connectors for high preloaded wellhead connection
- Easy stab and make-up at high misalignment angles
- High-bending and tension load capacity
- High-pressure capacity
- All metal-to-metal seals with resilient backup
- Easily adapted to accommodate most production riser programs
- Available with mechanical or hydraulic locking systems
- Tie-back can be pressure tested
- Stab seal is field replaceable
- DX Wellhead Gasket can be preinstalled by ROV prior to tie-back for rig time savings
- Dual metal-to-metal sealing profile on Tie-Back Connector Gasket
- Computer analyzed and gas tested
- Field-proven performance
**Control Systems**

**Installation and Workover Control Systems**

Dril-Quip’s Installation and Work-over Control System (IWOCS) provides control over the tubing hanger, tree and tree cap during installation or retrieval. Dril-Quip also provides the operator with the ability to test or simply work over the well. Dril-Quip’s IWOCS includes control stations, power units, the umbilical and reel, and sheaves. Dril-Quip has available for sale or rental IWOCS for almost any application.

**Production Control Systems**

Dril-Quip offers control systems for remotely controlling the operations of subsea production equipment such as subsea trees and/or manifolds. Dril-Quip’s flagship control system is fiber-optic based and is most suitable for deepwater operations and long offsets of the controlled equipment. Dril-Quip offers a variety of Multiplex/Fiber-Optic, Multiplex/Copper and/or hydraulic-based production control system configurations.

Dril-Quip’s fiber-optic based Multiplex Control System supplies real-time access for control and monitoring of over 50 wells. A single control module can operate 36 functions and monitor 32 sensors. MODBUS protocol allows operators to easily link to the platform control system. A flexible design allows Dril-Quip engineers to create a system for an operator’s application employing standard equipment modules. Dril-Quip can package this system for shallow or deepwater applications up to 10,000-ft depths.
VERTICAL FLOWLINE CONNECTIONS

DQ-VC™ FLOWLINE CONNECTOR

The DQ-VC is a field-proven vertical flowline connector designed to exacting standards for reliable, cost-effective performance. The DQ-VC is available with integral or non-integral hydraulic functioning, and with a rigid or flexible pipe configuration for maximum adaptability to customer requirements.

DQ-VC with Integral Hydraulics

- 5,000 psi pressure rating
- Metal-to-metal sealing
- Hydraulic unlock, lock, seal release and seal test functions
- Secondary mechanical unlock provided

The DQ-VC is available as a piggable connector with up to 12 hydraulic couplers, a piggable loop with metal-sealing swivel arms and pigging isolation valve provided.

DQ-VC with Non-integral Hydraulics

To minimize connector cost, the DQ-VC can be configured with all hydraulic functions actuated through the DQ-VC Running Tool so that no hydraulics are left subsea. With this design, multiple pipe sizes are provided using the same connector and running tool. The DQ-VC, with non-integral hydraulics, is rated to 10,000 feet of water depth.

SUBSEA MANIFOLDS

Subsea manifolds are an integral part of many subsea development projects. Dril-Quip supplies manifolds for deepwater developments and harsh deepwater service. Dril-Quip’s manifolds are engineered to offer solutions to the flow-control challenges presented by today’s subsea production environments. Manifold designs are geared toward optimizing flow paths and minimizing leak paths to increase reliability and performance. A finite element analysis is performed, components are sized to nominal pipe diameters and quality material selection makes Dril-Quip’s manifolds “best in class.” Hydrodynamic analyses are performed and installation methods are evaluated. Dril-Quip’s manifolds are designed to operate for up to 25 years in water depths of up to 10,000 feet, in working pressures to 10,000 psi and temperatures up to 250°F.

APPLICATIONS

- Oil production
- Gas lift injection
- Gas production
- Water injection

MANIFOLD FEATURES

- Skirt, monopile or suction anchor foundations
- Accommodates flowline ranges 2” through 6”
- Options available for leveling
- Available with Dril-Quip’s high-performance gate valves
- Available with Dril-Quip’s fiber-optic based control system
- Accommodates retrievable choke modules
- Manifolds are available with flow-through pigging or removable loops to allow roundtrip pigging
RISER SYSTEMS

SPAR PRODUCTION AND DRILLING RISER SYSTEM

Dril-Quip’s PR-80™ and FRC™ Production Riser Connectors, along with the Company’s Subsea Wellhead System, Wellhead Tie-Back Connector and Surface Production Tree product lines, have enabled Dril-Quip to offer the entire production riser string for Spar production vessels.

SYSTEM FEATURES
- Complete drilling and production risers available
- Available with universal riser spider to run all production riser, sales riser and drilling riser joints

DRILLING RISER FEATURES
- Easy operation
- Includes syntactic foam buoyancy for lighter riser string
- Includes telescopic joint and diverter joint
- Field-proven performance
- Available with Dril-Quip’s FRC Riser Connectors

PRODUCTION RISER FEATURES
- Field-proven performance
- Incorporates “air can” buoyancy modules to tension the production riser string
- Air cans can be integral to, or independent of, the production riser
- Uses Dril-Quip’s high-strength DX® Tie-Back Connector and tapered stress joint
- Unique keel joint and transition joints to accommodate point loading at Spar keel
- Incorporates a tension monitoring joint
- Uses Dril-Quip’s high fatigue life PR-80 Riser Connector and Dril-Quip’s FRC Flanged Riser Connector

MARINE DRILLING RISER SYSTEM

Dril-Quip offers a complete line of riser systems, the components of which meet or exceed the new demands of deeper water drilling, such as stronger connections, additional auxiliary lines, automatic fill-up valves and greater tensioning capacity. These components include Riser Spider and Gimbal, Diverter System, Flex Joints, Telescopic Joint with Diverter Ring, Termination Joint (auxiliary lines) and Riser Fill-Up Valves.

DIVERTER SYSTEM FEATURES
- Diverter systems are offered in up to 60” diameter with a variety of outlets and fill-up lines in accordance with customer specifications
- Packer elements are hydraulically activated and lock down mechanically; flowline seals are self-energized lip seals
- Diverter Handling Tool runs diverter assembly and can be used to install and remove insert packers

TELESCOPIC JOINT/SPLIT SUPPORT RING FEATURES
- Dual hydraulically operated packers have split polyurethane sleeves for long life
- Split support ring design includes integral fluid bearing to facilitate rotation of inner barrel relative to outer barrel
- Unique cable connectors allow easy adjustment of riser tensioning cable without cutting

TERMINATION SPOOL AND TERMINATION RING FEATURES
- Simple trouble-free installation of the termination ring halves using hydraulic latch pins
- Auxiliary lines remain connected to termination ring halves while in storage

SPIDER AND GIMBAL FEATURES
- Shock-absorbing gimbal assures equal load distribution while absorbing large mass energy transfer
- Gimbal is air-operated (100 psi) and supports in excess of 500,000 lbs as load is applied
- Gimbal downstroke-resisting force increases to 2 million lbs
- Unique gimbal design allows full motion at all times
- Support forces and stroke can be customized to meet rig requirements
SYSTEM FEATURES

The LS-15™ Liner Hanger System features field-proven technology that incorporates the following:

- High-strength, high-pressure and high-load-carrying capacity
- Metal-to-metal packer seal for high-pressure service
- Positive backup of one-piece C-ring slip assures trouble-free performance
- Set with the running tool, not with hydraulic or mechanical devices, on the hanger body
- Large slip area and controlled friction minimizes stress in the supporting casing
- All hangers are automatically centralized when set
- Bypass flow area is the same after setting the liner hanger slip as in the running-in position
- Maximizes circulating flow-by areas for efficient cementing operations
- The LS-15 Liner Hanger System can be sized and configured to customer specifications

SYSTEM FEATURES OF THE RUNNING TOOL

- The hydraulics to set the liner hanger are built into the running tool, not as part of the hanger system, eliminating the need for a hydraulic port through the body of the liner hanger
- The running tool is hydraulically released from the liner hanger and also incorporates a unique right-hand mechanical secondary release
- The running tool incorporates a port isolation system that eliminates the possibility of prematurely setting, or releasing from, the hanger and/or packer while running into the hole
- The system incorporates high-torque capacity for drill-down, wash-down applications and rotation during cementing operations

SYSTEM FEATURES OF THE LS-15 PACKER SEAL

- Integral, one-trip metal-to-metal sealing design
- Anti-swab design for faster running speeds and higher circulating rates; resists mechanical damage while running
- Standard service for many sizes is 10,000 psi at 350°F. Higher pressures are achievable and are only limited by the capacity of the packer mandrel and casing
# Product/Rig Compatibility

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<th>Exploration</th>
<th>Jack-Up Drilling Rig</th>
<th>Semi-Submersible Drilling Vessel</th>
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Products used for these applications