

# Capital drilling equipment

Advanced, field-proven risers, diverters and connectors



# Capital drilling equipment

VetcoGray, a GE Oil & Gas business, has been building its reputation as a highly skilled and experienced supplier of drilling equipment to the oil and gas industry since 1906, when Regan Forge began manufacturing crown blocks and travelling blocks for the California exploration market. Today, we are one of the world's leading suppliers of marine drilling riser systems. Our legacy of technology development and innovative solutions puts us in the forefront of offshore drilling, especially for deepwater exploration. VetcoGray supplied the complete drilling riser system for the world's first, and to date, only, exploration well in water depths greater than 10,000 ft. We provide a complete line of capital drilling equipment for jackup and floating rig drilling applications.

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## Diverters for jackup and platform drilling units

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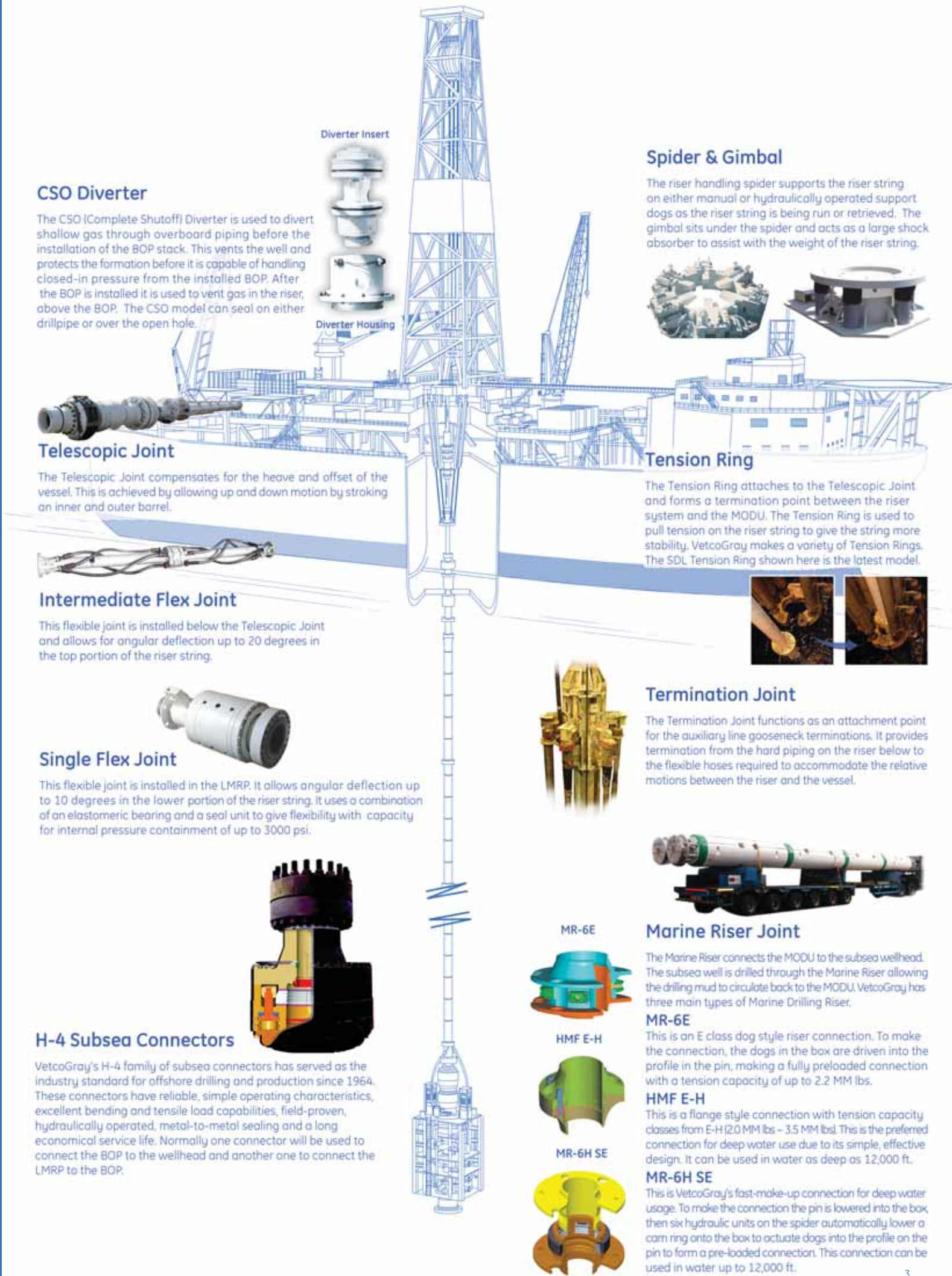
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KFDS diverter

VetcoGray is one of the market leaders for diverter systems in the offshore drilling market. We are a single-source supplier for complete systems including diverter assembly, controls and valves. An integrated package, engineered to specific requirements, provides maximum safety, efficiency and savings. For 25 years, VetcoGray has provided KFDS diverter technology with field-proven protection from shallow gas blowouts.

CSO diverter

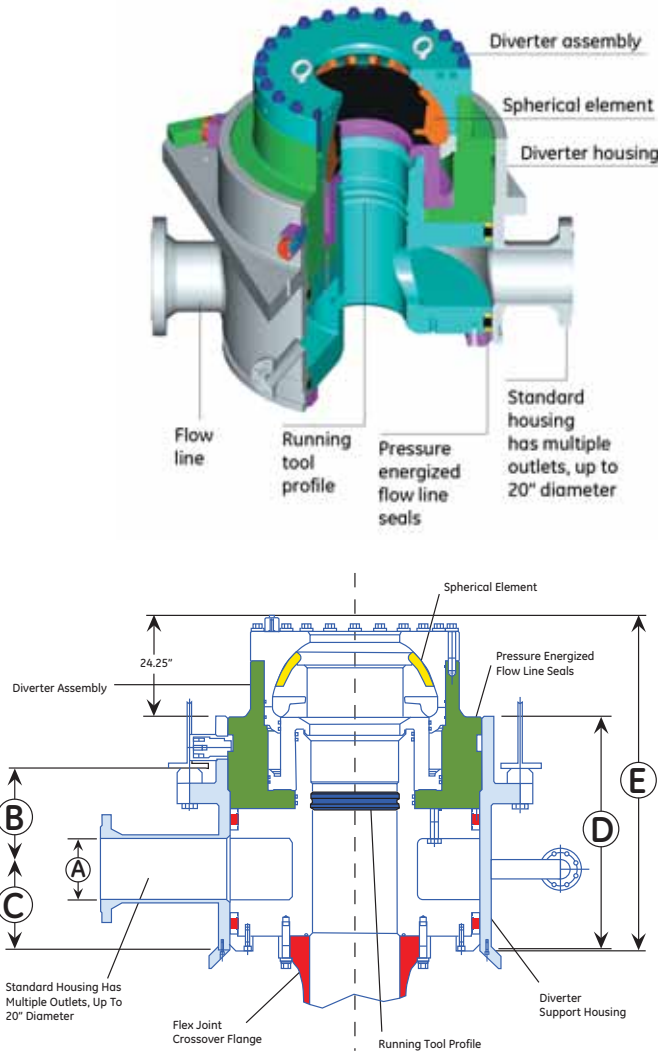
The CSO (Complete Shut-off) Diverter is used on floating drilling rigs to divert shallow gas overboard prior to installation of the BOP. Once the BOP has been installed the diverter is used to vent gas in the riser, above the BOP. The CSO model can seal on either drill pipe or an open hole.

Features and benefits

- Housing accommodates large diameter riser buoyancy modules
- Complete open-hole shut-off with 20" through-bore
- 15 - 10 second closure time on pipe or open hole
- 500 psi rated system
- Control system maximum operating pressure of 1,500 psi
- High capacity systems available for supporting the riser string from the diverter housing in emergency hangoff situations
- Connection block enables hydraulic operating functions to be quickly attached or disconnected
- Standard housing holds multiple outlets, up to 20" diameter

Features and benefits

- Diverter support housing, overboard lines and associated valving are permanently installed on the rig structure
- Diverter assembly is run and retrieved through the rotary table with the marine riser
- Variable outlet sizes and orientations can accommodate virtually any rig design
- Valving is external, allowing for rig design variation and valve/actuator preferences



Dimensional data: CSO diverter

Outlet nom. (in.)	A	B	C	D	E
12	11.38	16.38	15.38	43.75	71.50
14	12.50	17.00	16.00	45.00	72.75
16	14.31	18.00	17.00	47.00	74.75
18	16.50	19.00	18.00	49.00	76.75
20	18.38	20.00	19.00	51.00	78.75

All dimensions in inches. \* Number and size of outlets are optional.

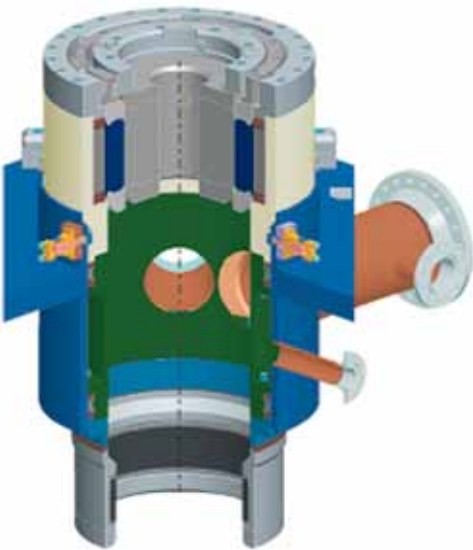
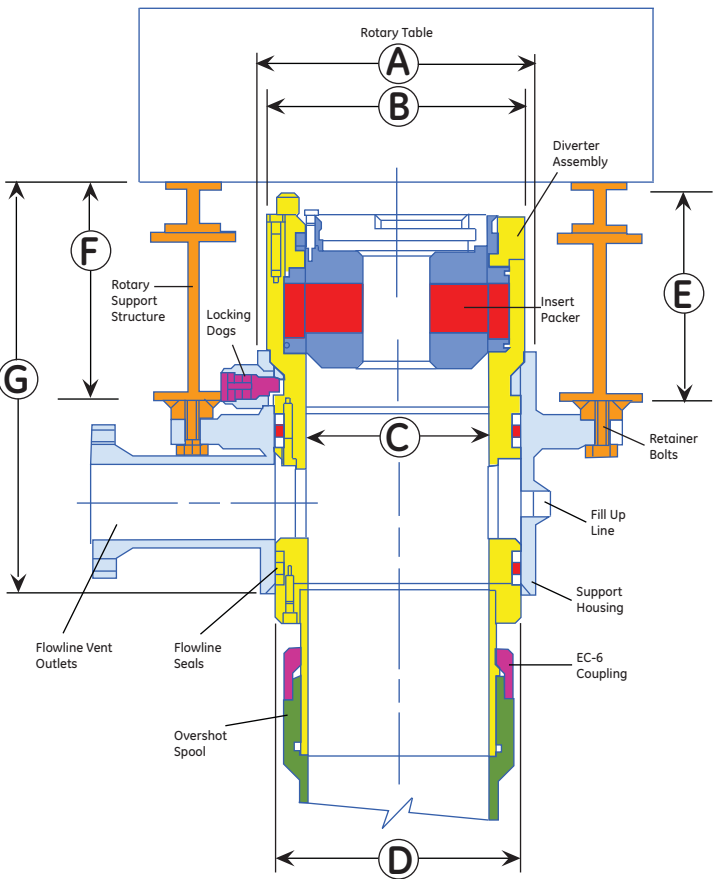
KFDJ diverter

The KFDJ diverter system is used on platforms and jack-up rigs to protect against shallow gas kicks during drilling operations. In the event of a shallow gas kick, the diverter is energized to seal around the drill pipe and divert the gas safely overboard.

Features and benefits

- Complete protection while running casing strings and drilling hole is provided by a full range of insert packer sizes, all of which use a "J" type running tool
- Available with a rotating insert which provides low pressure packoff on the kelly or drill pipe during drilling
- Fixed support housing, a proprietary feature, is securely bolted to the rotary beams and provides fixed outlets for flowline, fill-up line and vent lines

- Support housing allows installation of outlets up to 20" diameter to virtually any configuration
- Diverter, spacer spool and overshot packer assembly may be pulled or run without connecting or disconnecting the flowline, fill-up line and vent lines
- Mudline suspension hangers and bit sizes up to 27.41" for 37-1/2" rotaries or 36.41" for 49-1/2" rotaries can be run without removing the diverter assembly
- Diverter, spacer spool and overshot packer each fit through a 37-1/2" rotary table. Minimum bore through the standard support housing is 36-1/2" ID for the 37-1/2" in rotary installation. Optional 37-1/2" bore is available
- Overshot packer on the bottom of the diverter spacer spool assembly reduces the nipple-up time normally required to weld flanges or hubs to casing



KFDJ diverter

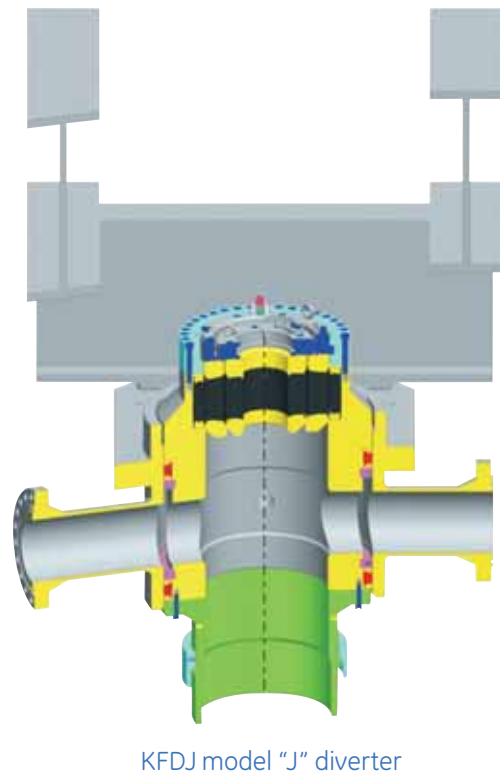
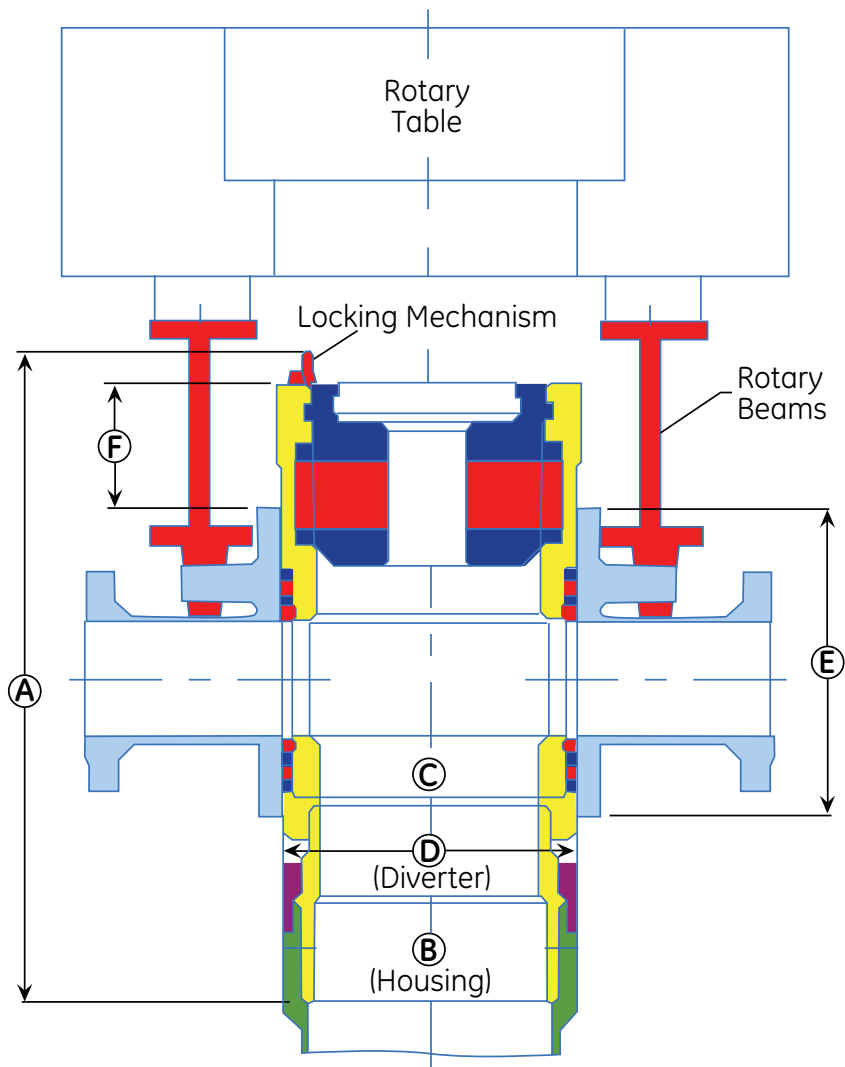
Dimensional data: CSO diverter standard hookup KFDJ

Rotary table	A	B	C	D	E	F	G
37.50	42.50	37.25	37.25	37.25	37.25	37.25	37.25
49.50	53.00	49.25	49.25	49.25	49.25	49.25	49.25

All dimensions in inches. \* Number and size of outlets are optional.

KFDJ model “J” diverter

Designed with all the field proven features of the standard KFDJ diverter, but with fewer hydraulic connections, VetcoGray’s KFDJ model “J” diverter system has a “J” lock between the diverter and the support housing.

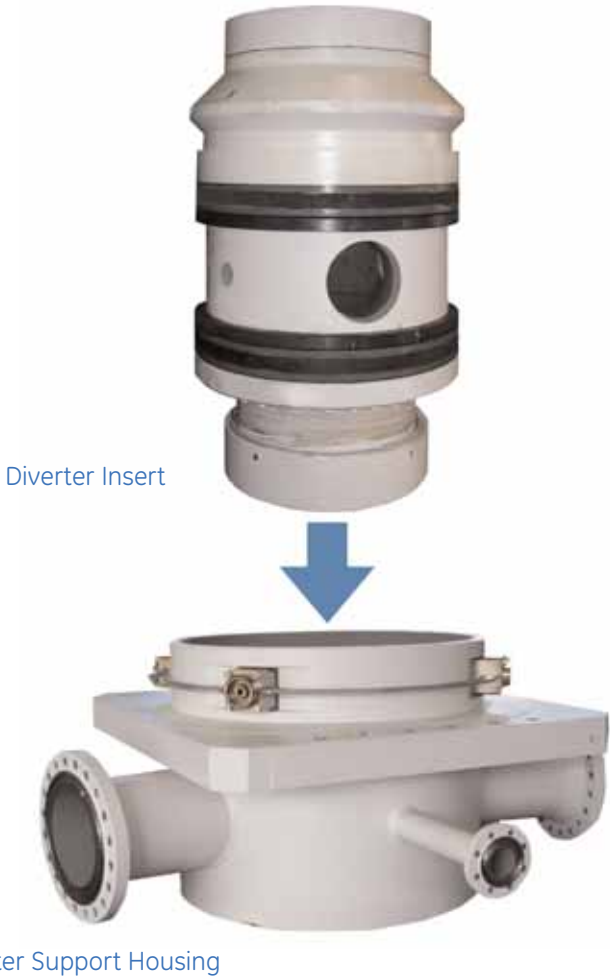


Dimensional data: standard hookup KDFJ “J” with 12” nominal outlets*						
Rotary table	A	B	C	D	E	F
37.50	78.50	36.50	27.50	36.25	35.25	15.62
49.50	73.25	47.00	27.50	46.75	35.25	10.40
49.50	96.50	47.00	36.50	46.75	35.25	29.40

All dimensions in inches. \* Number and size of outlets are optional.

Features and benefits

- Simplified design
- Only three hydraulic functions: energizing/venting the diverter packing, the flowline seals, and the overshoot packer
- “J” slots in the support housing align the diverter outlets with the housing outlets
- A mechanical latch secures the diverter in the housing and provides a visual indicator of lock engagement
- All components of the support housing and the diverter assembly area feature heavy wall construction for pressure containment and erosion protection during high velocity, multi-phase flow
- Insert packers are available in a full range of sizes
- Custom designed for specific applications



Newly installed KFDJ diverter



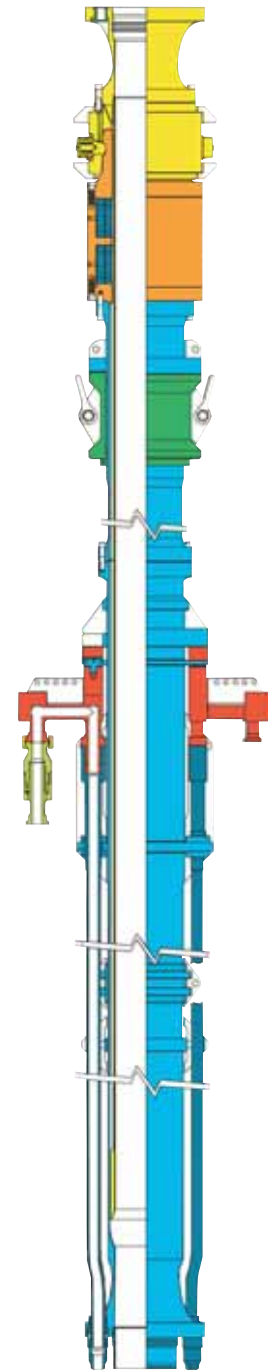


## Telescopic joint

The telescopic joint compensates for heave and offset of the vessel and is available for all riser systems. This movement is achieved through the stroking movement of the inner and outer barrel of the telescopic joint.

### Features and benefits

- Available for MR-6E, MR-6H SE, and HMF riser systems
- Maximum rated riser tensile load capacity in locked position
- Hydraulic latch release for inner and outer barrels available
- Dual split/solid packer elements
- Fixed or rotating integral tension rings
- Prepped for non-integral SDL, SDC and KT tension rings
- Fluid or roller bearing prep



Telescopic joint

## Tension rings

The tension ring attaches to the telescopic joint and forms a termination point between the riser system and the tensioning system on a floating rig. It is used to pull and support tension to give the riser string more stability. VetcoGray designs and manufactures a variety of tension rings.

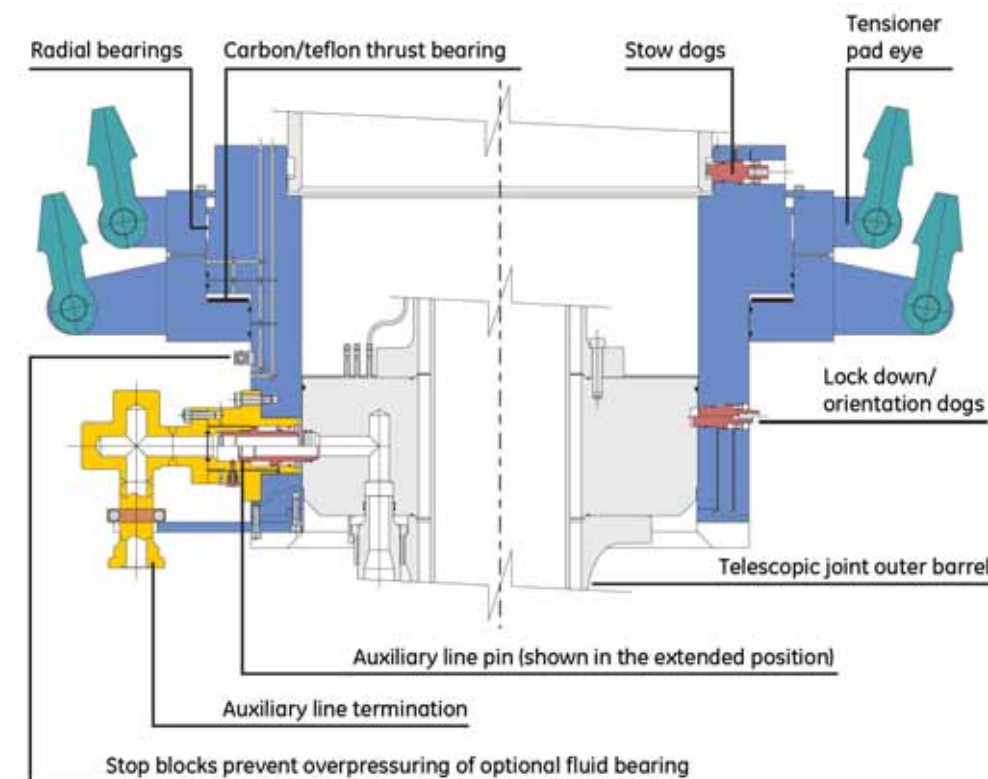
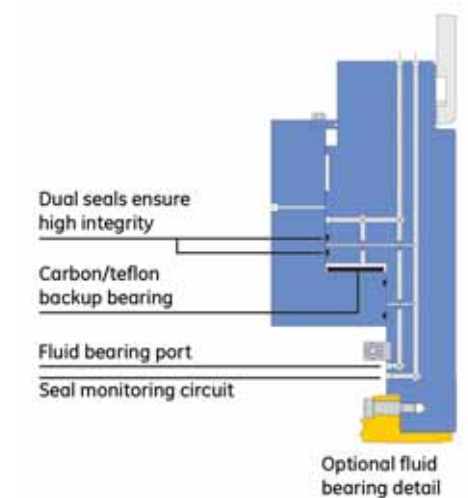
### KT tension ring

#### Features and benefits

- Combines the functionality of a tension ring and the termination joint
- Simplifies running and retrieving the marine riser by eliminating makeup/breakout of tensioner lines and hydraulic hoses in the moon pool area
- Choke, kill and auxiliary line terminations are permanently connected
- Orientation pins engage slots in the telescopic joint line termination housing for easy makeup
- Permanently installed tensioner lines maintain proper orientation with rig drilling tensioners
- Riser tensioner lines remain attached to the KT ring
- Thrust and radial bearings permit rotation of the vessel relative to the riser string
- Optional fluid bearings minimize breakout torque
- Auxiliary line pins have differential seal areas to ensure fail-safe engagement



KT tension ring



KT tension ring

## SDL/SLS tension ring

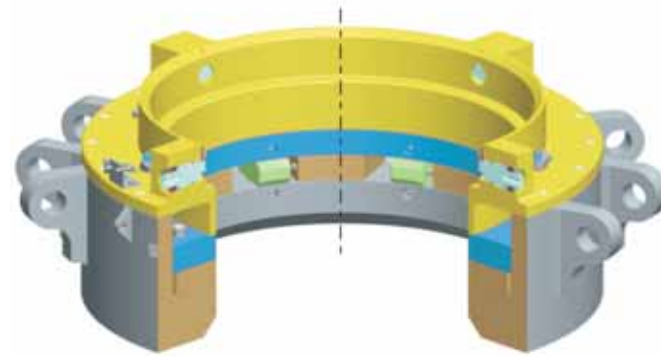
### Features and benefits

#### Similarities between SDL and SLS rings

- Riser tensioner lines remain attached to the SDL/SLS ring so riser tensioner lines are properly spaced at all times
- Both rings use pad eyes for connection with the tensioner lines
- When not in use, the rings lock and store to a mating profile on the bottom of the diverter support housing for convenient and orderly storage
- Telescopic joint is run and pulled through the rotary table without disconnecting the tensioner lines from the SDL/SLS ring
- Hydraulic piping for lockdown/storage dogs remains permanently connected

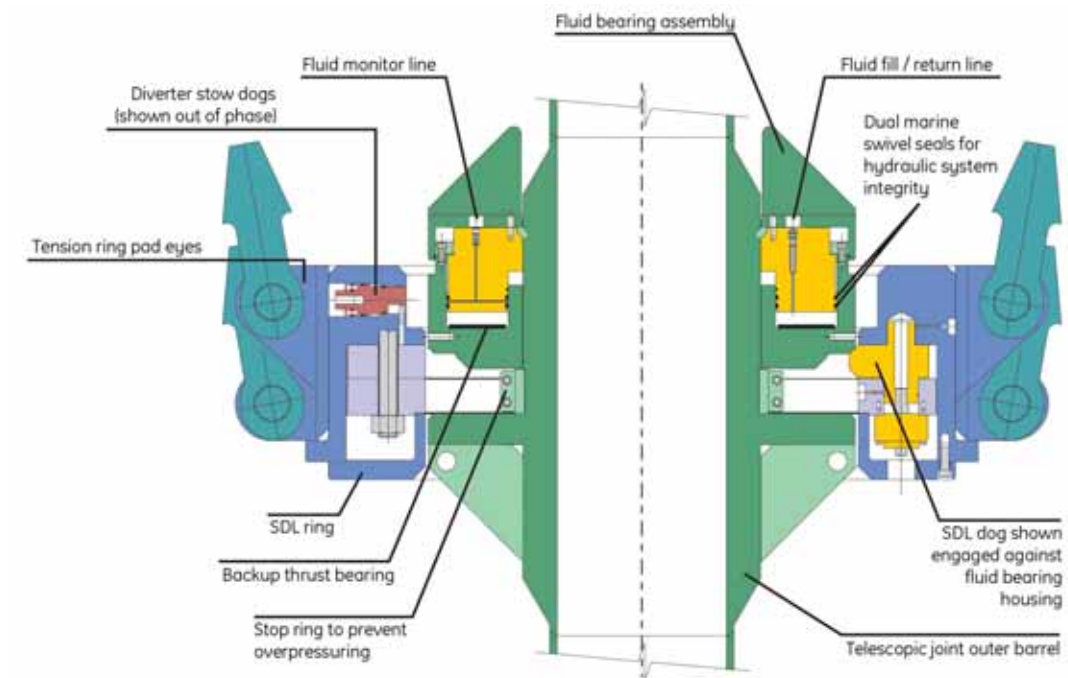
#### Differences between SDL and SLS rings

- SDL ring utilizes a gear-driven dog load interface with the telescopic joint
- SDL rings do not have a fluid bearing; it is integral with the telescopic joint for this configuration
- SLS rings utilize a load-shoulder interface with the telescopic joint
- SLS rings have an integral fluid bearing



SDL Tension Support Ring

VetcoGray's tension rings are proven to perform in the harsh environments of deepwater drilling



SDL tension support ring with optional fluid or roller bearing

# Convenient and orderly storage



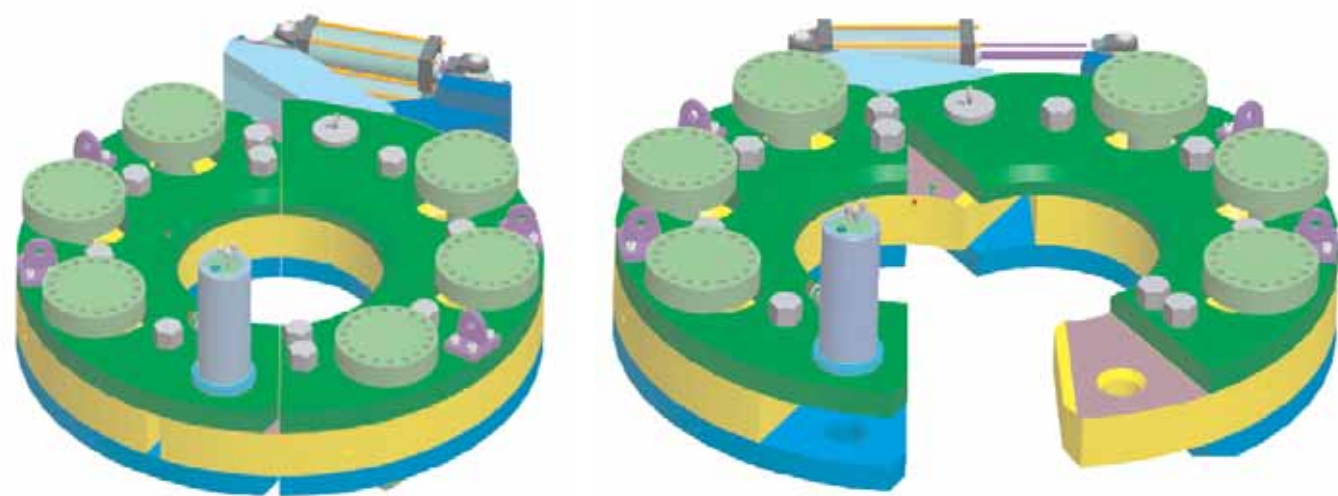


## SDC tension ring

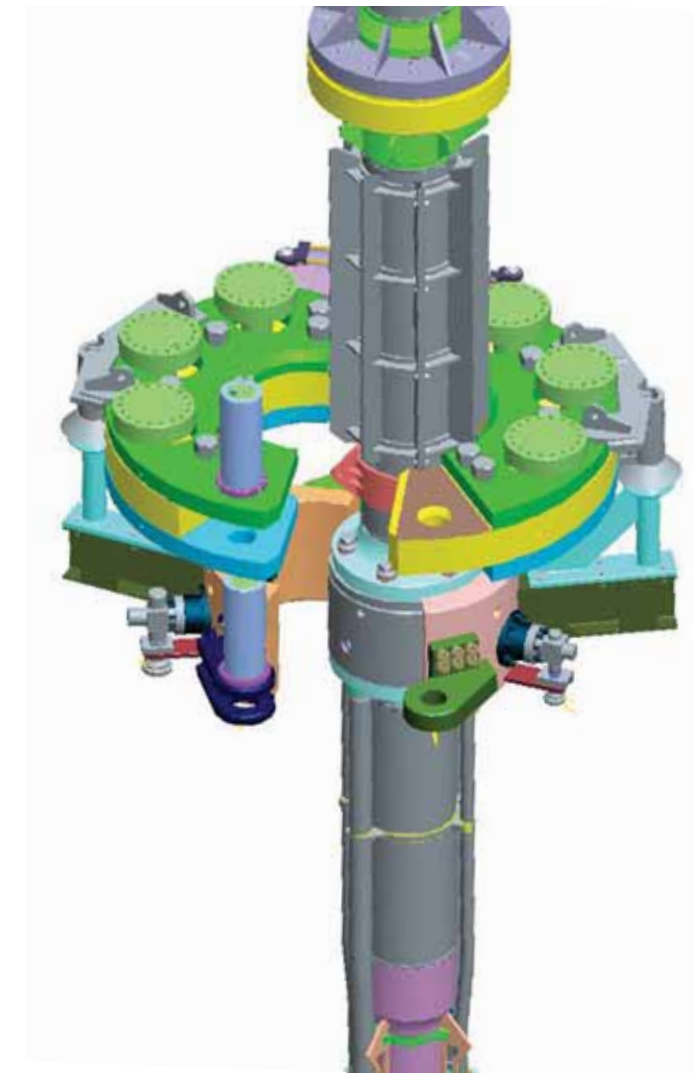
### Features and benefits

- SDC rings utilize a ball-joint connection with direct-line cylinder tensioners
- Direct-line cylinders are permanently attached to the SDC ring for fast and safe attachment to the telescopic joint
- A hinged split-ring design opens and closes around the telescopic joint
- Designed to be opened and moved out of the way for storage while the tensioning cylinders remain attached
- Optional KT-style termination ring can be utilized with the SDC tension ring

Quick, efficient  
make-up



SDC tension ring



SDC tension ring with KT style termination ring



SDC tension ring - open



SDC tension ring - closed

## Marine drilling riser

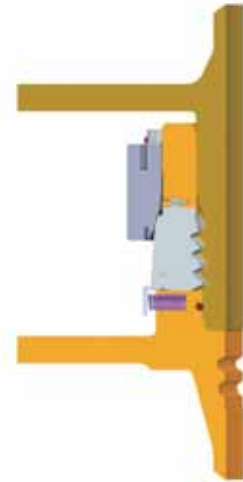
The marine drilling riser connects the floating rig to the subsea wellhead. The subsea well is drilled through the riser allowing the drilling mud to circulate back up to the rig. VetcoGray offers three main types of marine drilling riser.

### MR-6H SE riser

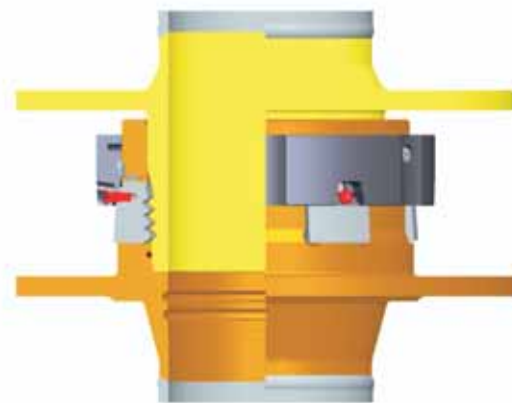
This fully-automated make-up, 3.5 million pound rated (API class 'H') is the latest offering from VetcoGray. The design is simple, with very few parts, utilizing field proven concepts and profiles which have provided many years of exemplary service. The highly preloaded coupling with efficient load path also provides the option for incorporation of a metal seal if required for higher-pressure conditions. The modularized, hydraulically operated handling spider provides all mechanisms required for make-up and break-out of the coupling which minimizes intervention of rig floor personnel. The spider design allows quick change out of key subassemblies during riser running operations.

#### Features and benefits

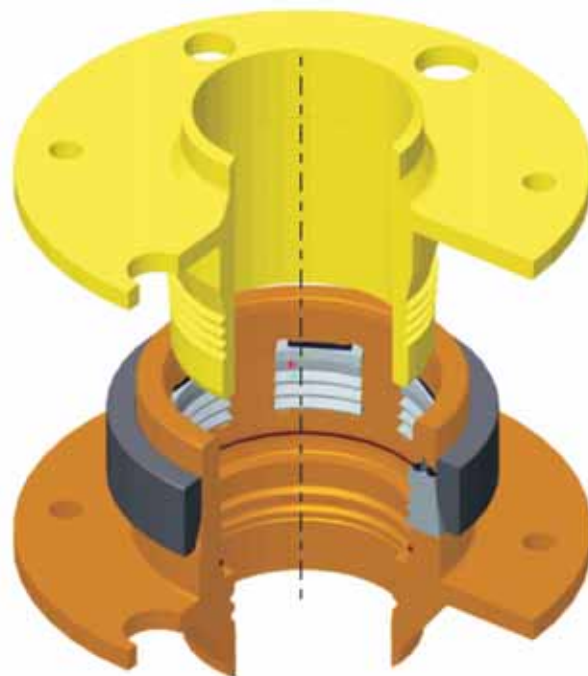
- Automated make-up with minimal personnel intervention
- Utilizes reliable, field proven concepts and profiles (H-4 & MR)
- High preload / efficient load path
- Easy to replace parts subject to wear
- Easy maintenance, service and inspection with all critical areas readily accessible
- External surfaces of pin and box can be fully "TSA protected"
- Handling spider modularized to allow quick change out of critical parts or subassemblies



MR-6H SE profile



MR-6H SE assembled



MR-6H SE exploded view

## MR-6H SE riser adapter

This new riser adapter was created using the same technology as the MR-6H SE riser coupling; however, it is self-contained and designed to be run without a spider. The adapter was created to improve safety during the operation of making-up the connection between the top of the LMRP and the first joint of riser. Current flange designs require personnel to be suspended over the stack and moon pool while making-up the connection. This is a potentially hazardous, time consuming process. In contrast, the new MR-6H SE riser adapter can be quickly connected and released from a safe distance.

#### Features and benefits

##### Safety

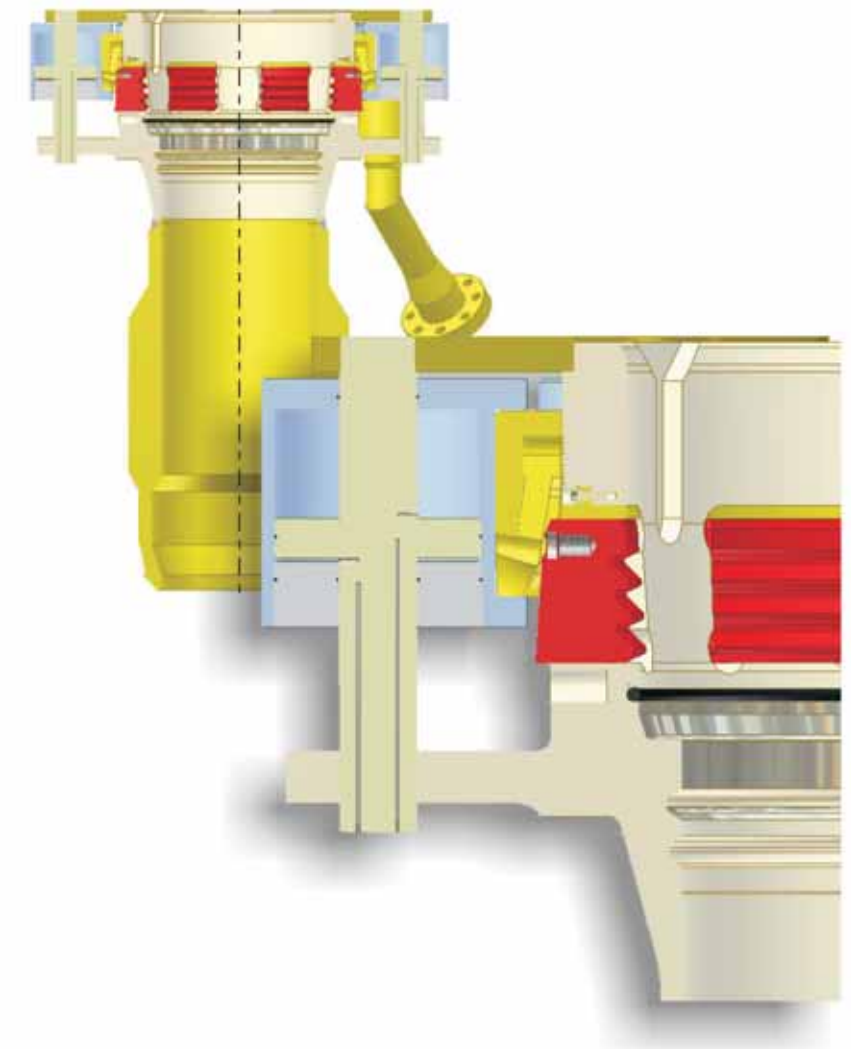
- Eliminates the potential hazards of riser adapter make-up and break out
- Eliminates the need to lower heavy tools, bolts and equipment to personnel
- Reduces need for multiple rig personnel to make this connection
- Existing rig designs have limited clearance to make up the riser adapter. With the MR-6H SE riser adapter, this clearance restriction is no longer an issue

##### Efficiency

- Significantly reduces the time to make/break the connection.
- Utilizes field proven technology (H-4 connector and dog style riser)



View of MR-6H SE riser adapter





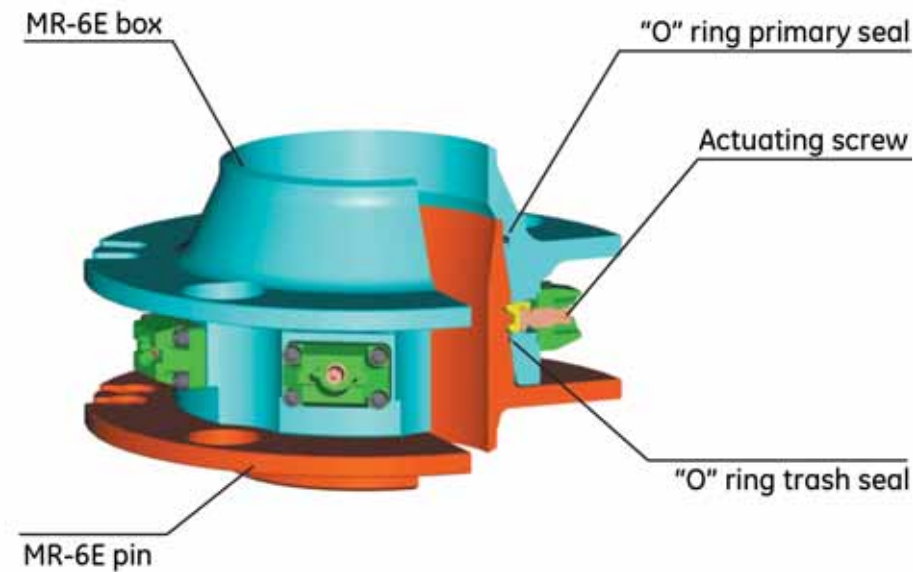
## MR-6E riser

The MR-6E is a dog style riser connection. To make the connection, the dogs in the box are driven into the profile in the pin, making a fully preloaded connection.

The design provides an improved and increased resistance to high tensile loads and large bending moments, conditions common with today's deepwater drilling operations. The MR-6E is lightweight, simple to operate and fast to run.

### Features and benefits

- 2 million lb. rating per API 16R Class E
- Low make-up torque, 950 ft - lbs
- Simple, light weight design
- MR-6E couplings can be used interchangeably with MR-6D couplings



### MR-6E riser coupling specifications 5" C & K, 4-1/2" Boost, & 2-7/8" Hydraulic stab subs

O.D. (1)	I.D. (2)	Length	Weight (3)	No. of activating screws	Torque
41.125"	19.75"	23.125"	2,510 lbs	6	950 ft.-lbs.

(1) Does not include buoyancy material (2) I.D. based on 0.625" wall thickness of principal tube (3) Includes weight of auxiliary line stab subs

## HMF riser

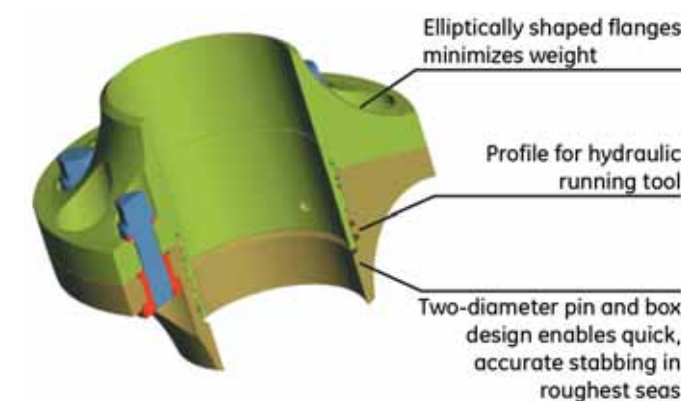
One of the most reliable and advanced marine riser systems in today's market is VetcoGray's HMF™ system. Developed through extensive design analysis and test programs of bending, tension, internal pressure and functional evaluations, this coupling is ideal for deep water applications where high load operating conditions exist. The HMF riser coupling has been field proven through many years of worldwide use, including drilling the current water depth well record of 10,011 feet in the Gulf of Mexico.

### Features and benefits

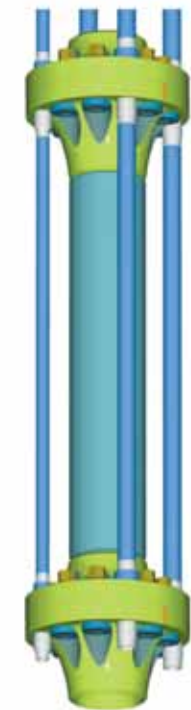
- Meets API 16R, class D, E, F, G, H and J
- Stepped diameter design of pin and box simplifies engagement, even with severe vessel movement
- Ideal for deep water applications where high load operating conditions exist
- No loose parts, all bolts and inserts stay in the pin/box flanges preventing bolt loss and potential thread damage
- Field removable and replaceable nose ring
- Locking bolts preloaded above the rated coupling loads, which extends the fatigue life of the riser coupling
- Hydraulic running/test tool facilitates quicker riser running times
- Field replaceable choke and kill line stab subs



View of Class F, HMF riser flange pin



View of Class F, HMF riser flange pin



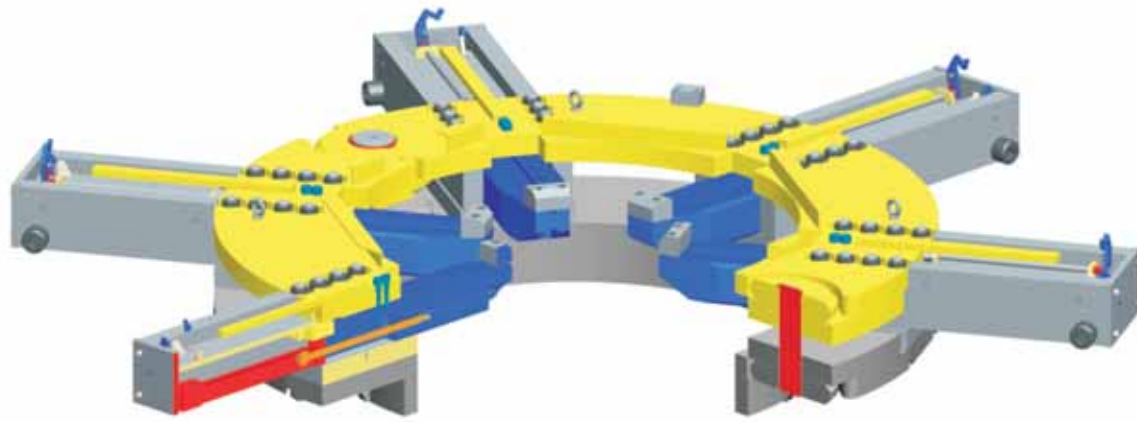
Class F, HMF flange riser

## Marine riser handling spider

The spider is used to support the riser string while the connections are being made or broken while the riser string is being run or retrieved. VetcoGray makes a variety of styles, each compatible with specific types of riser connections.

### MR-6E hydraulic spider

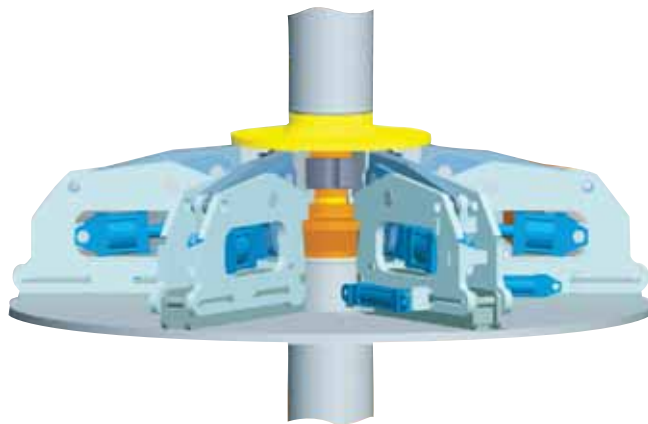
This spider is used to support the MR-6E riser system. The hydraulic support dogs extend to support the lower flange of the coupling while the connection is either made or broken.



MR-6E hydraulic spider

### MR-6H SE spider

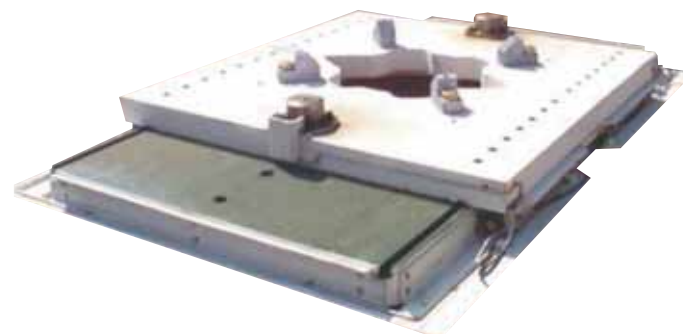
The MR-6H SE riser handling spider supports the riser string on hydraulic sliding dogs. Six hydraulic units move the cam ring up and down to make or break the connector.



MR-6H SE coupling with spider

### HMF spider

The HMF hydraulic-gate riser handling spider is used when running or retrieving HMF riser joints through the rotary table. Split gates, operated by hydraulic cylinders, support the riser string when the gates are in the closed and locked position.



HMF spider

### Gimbal

The gimbal sits under the spider and acts as a shock absorber to assist with the weight of the riser string. It can also compensate for up to 6 degrees of offset while running or retrieving the riser string.



## Single flex joint

The single flex joint is installed in the Lower Marine Riser Package (LMRP). It allows angular deflection up to 10 degrees in the lower portion of the riser string. The combination of an elastomeric bearing and a seal unit give it flexibility and the capacity for internal pressure containment of up to 3,000 psi.

### Features and benefits

- Installed in the LMRP below the riser/BOP stack interface
- Uses a combination elastomeric bearing and seal unit to eliminate the need for a pressure balanced ball and socket interface with seals
- Up to 2 million lb tensile load capacity
- Rated for H<sub>2</sub>S service and oil-based drilling mud
- Angular deflection to 10 degrees on either side of its axial center while subjected to tensile loading and internal pressures up to 3,000 psi
- Pressure balance and lubrication systems not required



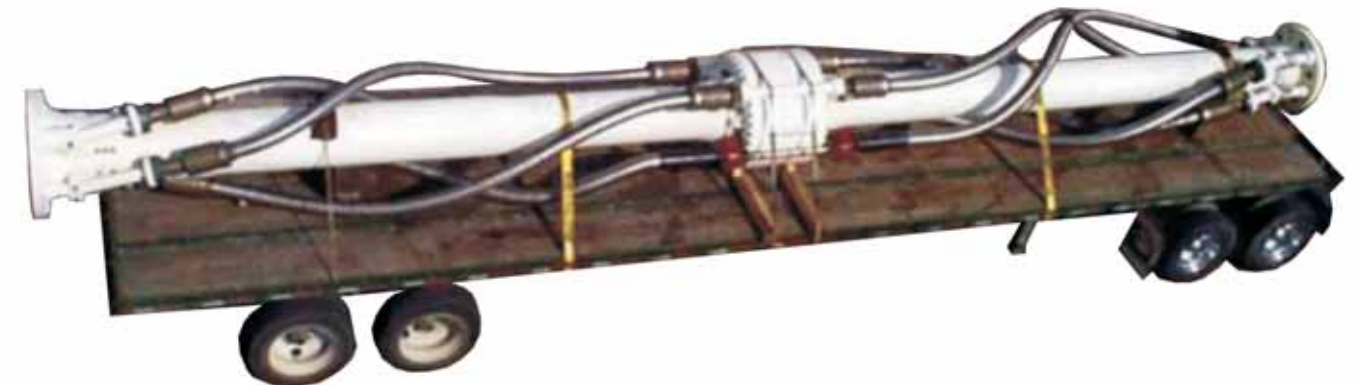
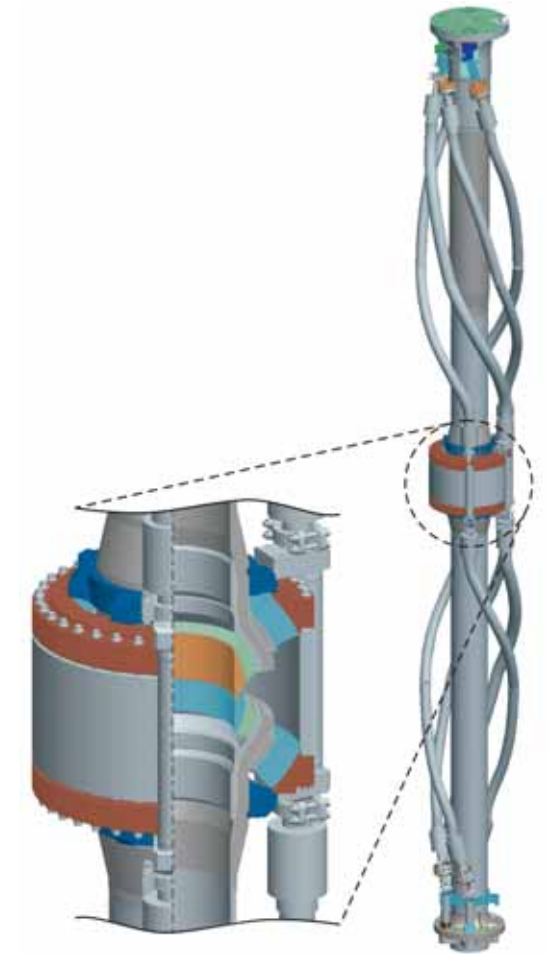
Single flex joint

## Intermediate flex joint

The intermediate flex joint is installed below the telescopic joint and allows for angular deflection up to 20 degrees in the top portion of the riser string.

### Features and benefits

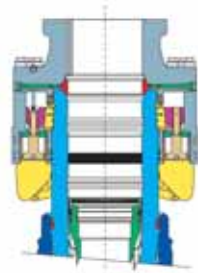
- Installed below the telescopic joint
- Up to 2.5 million lb tensile load capacity
- Angular deflection to 20 degrees on either side of its axial center while subjected to tensile loading and internal pressure of 1,500 psi



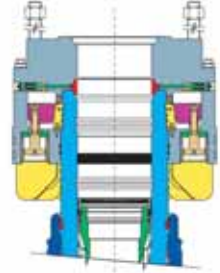
Intermediate flex joint leaving VetcoGray's facility



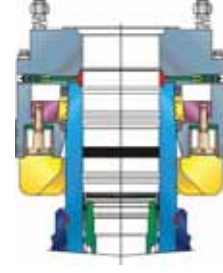
## H-4® hydraulic subsea connector family



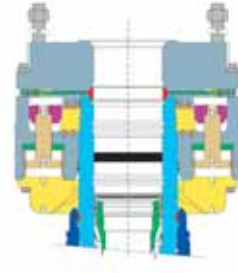
E H-4 connector



E x F H-4 connector



E x F HAR H-4 connector



DW HD H-4 connector

The H-4 family of subsea connectors, introduced in 1964, are in use in every major producing region of the world and in every type of offshore environment. The VetcoGray family of H-4 connectors are field proven, hydraulically operated, metal-to-metal sealing connectors that are widely used for:

- BOP stack to wellhead
- LMRP to BOP stack
- Completion tree to wellhead
- TLP/subsea template tieback
- Production riser assembly to subsea manifold
- Single point mooring to anchor base
- Caisson completions and artificial island drilling
- Specially adapted applications

Ideal for deepwater use, the H-4 line of connectors has reliable, simple operating characteristics; excellent bending and tensile load capabilities; and a long, economical service life.

### Features and benefits

#### Field proven reliability

- In service since 1964

#### High strength connection

- 355 degrees circumferential dog ring contact to the four locking grooves of the wellhead/mandrel profile distributes bending and tensile loads uniformly

#### Primary and secondary hydraulic circuits

- The dual hydraulic operating system generates 25% more releasing force than locking force

#### Passive mechanical release

- Dog profile design (45 degrees) assures passive retraction of locking dog segments with overpull

#### Visual position indicator rod

- Indicator rod provides positive, visual indication of locked and unlocked position as well as cam ring travel
- Rig serviceable hydraulic systems

#### VX/VT back-up seal profile

- All current H-4 connector designs have the VX/VT seal profile, and have Inconel inlay for corrosion and damage protection

### Easy primary seal replacement

- Primary VX/VT seal is ROV replaceable and retrievable

### Hydrate protection

- Hydrate seals between the connector and the high pressure wellhead housing are standard

### Flush ports

- In the event that hydrates form in the H-4 connector, hydrate flushing ports located in the upper body will facilitate their removal

### Seal ring protection

- Connector to wellhead/mandrel interface is self-aligning, which assures that the gasket will not be damaged during makeup

### Safety

- Replacement of seal ring does not require personnel to be under connector/BOP

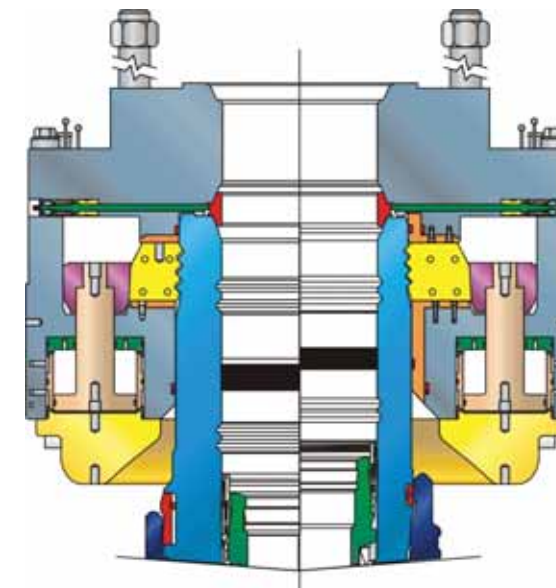
### Pressure-tight self-energizing seal

- Positive compression loading of the seal ring into the corrosion and damage resistant seal surface profile provides reliable sealing integrity
- Optional upper body configurations available
- Individual hydraulic pistons provide multiple circuits



## SHD H-4 hydraulic subsea connector

The SHD H-4 connector (Super Heavy Duty) is the latest member of the H-4 family. This connector, designed for use with the MS 700 and SMS 700 wellheads, has exceptional bending load capacities and fatigue life characteristics. It is ideal for deepwater, critical service where high bending loads are anticipated.

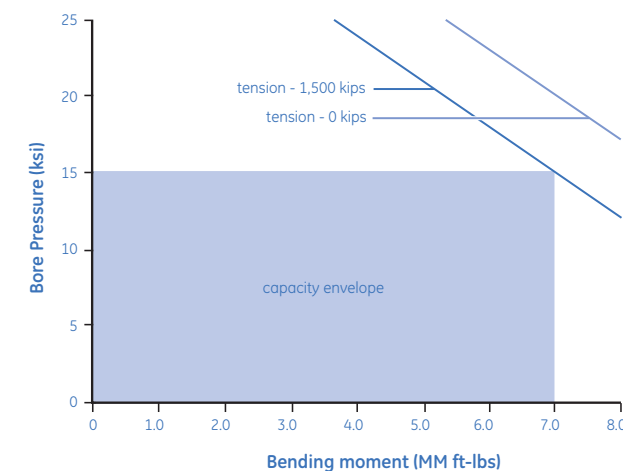


SHD H-4 connector

### 18-3/4" SHD H-4 load capacity envelope

Load capacity at 2/3 yield

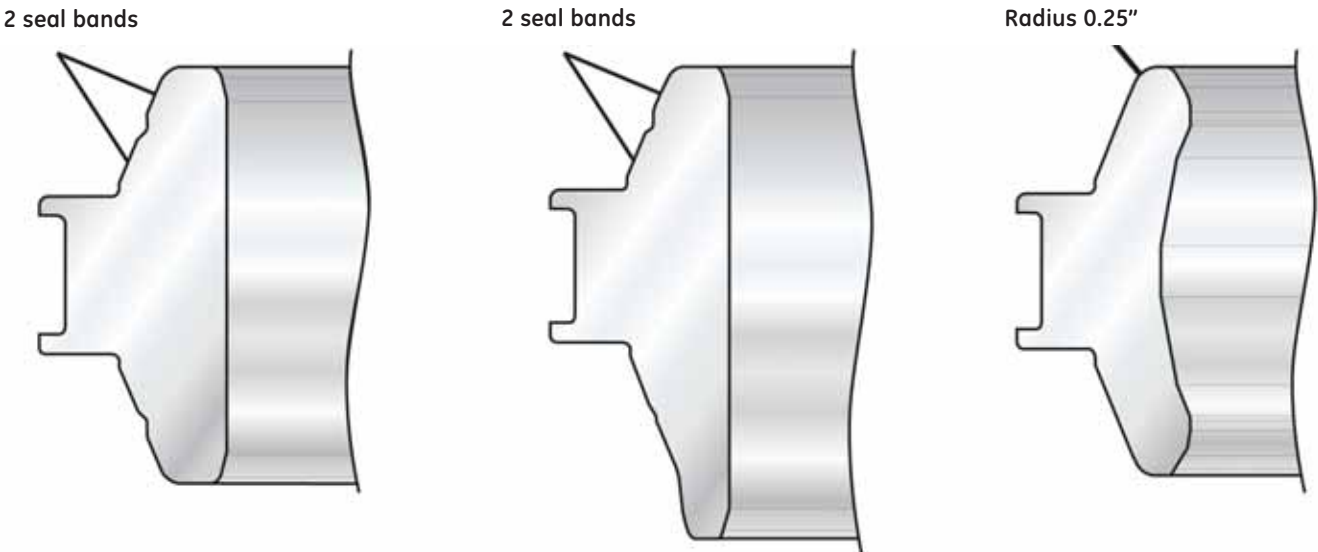
Note: Tension values at the wellhead for 3,000 psi connector locking pressure.



### SHD H-4 connector specifications

Maximum service pressure	15,000 psi
Number of hydraulic cylinders total	10
Number of hydraulic cylinders primary	5
Number of hydraulic cylinders secondary	5
Cylinder lock area	626.35 sq in
Cylinder unlock area	785.4 sq in
Lock fluid volume total	12.10 US Gal
Unlock fluid volume total	12.10 US Gal
Maximum hydraulic operational pressure	15.10 US Gal
Maximum hydraulic testing pressure	3,000 psi
SHD H-4 connector specifications	5,000 psi
<b>Connector wellhead preload</b>	
1,500 psi Lock	$3.75 \times 10^6$ lb
3,000 psi Lock	$7.50 \times 10^6$ lb
Maximum OD	66 in
Weight based on studded top	28,600 lbs
Swallow	32.25 in

VX-2®, VGX-2® and VT-2® gaskets



VX-2, VGX-2 and VT-2 gaskets are designed to seal internal pressure in H-4 connectors

The stainless steel VX-2 gasket is the standard gasket for drilling and production; it is rated for 15,000 psi internal pressure, 250 degrees F, and is manufactured from corrosion resistant material.

The carbon steel VX-2 gasket is a lower cost/lower performance version. It is rated for 10,000 psi internal pressure, 250 degrees F, and is coated for corrosion resistance.

The VGX-2 gasket is a higher performance/higher cost version. It is rated for 15,000 psi internal pressure, 350 degrees F, and is manufactured from high yield strength stainless steel with a silver coating. The higher yield

strength material provides a large range of elastic action, while the silver coating provides resistance to galling. The coefficient of thermal expansion of the gasket approximates that of the wellhead and the H-4 upper body.

The VT-2 gasket seals on a secondary independent seal surface and is used when the primary VX sealing surface is damaged. It is rated for 15,000 psi internal pressure, 250 degrees F, and is manufactured from corrosion resistant material.

Other API sizes and optional configurations are available. Insert options include Hycar, lead, and tin indium materials.

VX-2, VGX-2 and VT-2 gaskets



VX-2 gasket



MS-700 wellhead with VX-2 gasket prior to makeup with H-4 connector



MS-700 wellhead and H-4 connector in test fixture

Dimensional data: VX-2, VGX-2 and VT-2 gaskets

	VX-2 gasket (gas/liquid)	VX-2 gasket (gas/liquid)	VT-2 gasket (gas/liquid)	VGX-2 gasket (gas/liquid)
Working pressure (psi)	15,000	10,000	15,000	15,000
Temperature range (°F)	35 - 250	35 - 250	35 - 250	35 - 350
External pressure rating (psi)	1,000	2,500	1,000	3,500
Seal material	Stainless steel (316)	Mild steel	Stainless steel (316)	Stainless steel / Corrosion resistant alloy
Surface coating	Moly based	Moly based	Moly based	Moly based
PSL-4 qualifications	yes	yes	yes	yes



## RADAR - Riser Active Data Acquisition Recorder

RADAR was developed to address the need for an efficient, safe and cost-effective method of internal inspection of drilling and production risers, choke and kill lines, and other metal pipes.

### Features and benefits

- Uses real-time data acquisition and analysis to enable drilling contractors to monitor life-cycle wear measurements of drilling riser components
- Helps minimize risk by identifying marginal equipment
- Plan for regular repairs, maintenance and part replacement to avoid costly rig shutdowns

Inspection data for specific risers can be stored digitally for easy retrieval and used to track riser assets by serial number to facilitate their transfer between rigs and regions.

RADAR tools and procedures have been witnessed and certified by DNV.

RADAR is a tool for data acquisition and analysis that performs extensive data processing to:

- Identify defects based on specific rejection criteria
- Determine location, orientation, type and size of reportable flaws
- Present the data in a meaningful display
- Video record the internal portion of the pipe
- Identify defects based on specific rejection criteria

### Weld quality inspection

- Two time-of-flight-diffraction (TOFD) channels for inspection of the entire weld volume along the length of the weld
- Four pulse-echo shear wave transducers in a 4-channel setup to analyze the root and cap regions of the weld

### Pipe thickness inspection

- Four pulse-echo longitudinal wave transducers in a 4-channel setup spaced at 90 degrees apart for increased data acquisition speeds

### Video record

- Video record of internal condition of riser body tube
- Analysis programs complement the data acquisition system and operate on the same computer platform. The processed data are displayed in two presentations.

### Color thickness map

- Ultrasonic data is displayed in various colors as a function of the depth and position along the length and circumference of the riser

### B-Scan display

- Enables the operator to use critical Rf waveform data and the B-Scan images created from these waveforms to accurately identify and assess flaws

Reporting criteria can be customized to each particular application, following industry standards, or alternative criteria based on fit-for-purpose analysis.

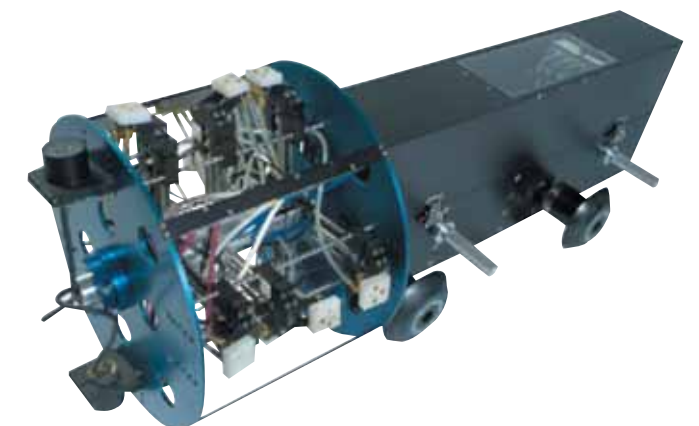
An internal inspection with RADAR has the primary advantage that it eliminates all special handling, stripping or external preparation of the pipe. The inspection itself is performed in a third of the time required for conventional methods.

The RADAR unit and associated equipment is portable so inspections can be performed almost anywhere, including pipe yards, remote/dockside facilities, customers' facilities, and offshore rigs, resulting in significant savings in both time and money.

# Convenient riser inspection on your rig



Inspections can be performed almost anywhere, even on a drillship in transit



RADAR tool for drilling riser inspection

## Breadth and depth

GE's VetcoGray business has been developing industry-leading solutions for more than a century. Our specialty systems enable superior performance around the globe – in harsh environments on land, offshore and subsea.

As the oil and gas industry matures, we provide the knowledge and technologies to take drilling, completion and production further and deeper than they have ever gone.

### Onshore

Surface wells are drilled and completed in every kind of environment from desert sand to Arctic snow. We provide expertise and equipment for them all. Our experience covers production of oil, gas and combinations with other products such as water, CO<sub>2</sub> or H<sub>2</sub>S. Our products and services span the entire range of applications, whether for simple low pressure oil wells or the extreme high pressure high temperature (HPHT) wells now being developed worldwide.

### Offshore

Offshore facilities are becoming more diversified as a result of vast differences in water depths and field characteristics. We offer an extensive portfolio of proven systems and products including fixed platforms, jackups and MODUs, TLP/Spars and FPSOs. We frequently partner with our customers in offshore field development and exploitation – providing a full range of industry-leading technologies from drilling to compression and power generation modules.

### Subsea

With offshore development moving into deeper waters and marginal fields, more advanced technologies are needed to increase reliability, flexibility, speed and performance. Our subsea wellheads and connectors have provided solid foundations for more than 40 years. We are also at the forefront of subsea field development, with advanced system integration capabilities and over 1,000 systems installed worldwide. Our portfolio also includes the industry's latest and most advanced trees, production controls, manifolds and connections, processing and distribution systems.

# One source, many solutions

## Strength and stability

As part of GE's Oil & Gas business, VetcoGray benefits from the broad strategic and financial stability that enables strong, long-term investment in and development of new technologies, tools, services and human resources.

### Investment

VetcoGray is committed to investing significant time and resources in order to deliver greater advantages to our customers. We invest in new technologies – researching, developing and testing extensively to ensure that only the best solutions go to market. We also invest in regional economies by spreading our research, manufacturing and service facilities around the world.

### Knowledge

VetcoGray has over 100 years of experience serving the Oil & Gas industry with our field proven technology. Our customers are in a unique position to benefit, not only from our advancements in this industry, but also from the products and services proven by other high-tech parts of our organization. Technologies can be modified and injected from GE's Aviation, Energy, Healthcare and other businesses to improve product performance in oil and gas applications. We also work very closely with key customer engineering teams to create solutions customized to their operations.

### Training

In addition to extensive and demanding training requirements for our own personnel, we provide a variety of standard and specialized programs for our customers. Our courses cover any of our product lines or they may be project specific. Training methods and course documentation is tailored to each customer's particular needs and equipment. We can accommodate programs at any of our global facilities or at customer sites.

### Service

We provide inspection, maintenance, repair, spare parts and upgrade services for our current and legacy equipment in every region of the world. VetcoGray has 61 locations in 32 countries. Our well established global service locations continue to support our customers' needs worldwide. Our crews perform extensive onsite support, plus ongoing design and engineering solutions that help prolong equipment life, reduce costs, and improve performance.

### Commitment

VetcoGray is fully committed to helping our customers achieve greater levels of performance and productivity through all phases of Oil & Gas drilling and production.

# On land and at sea





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GE imagination at work