



VetcoGray subsea wellhead systems

Advanced solutions for extreme conditions



VetcoGray subsea wellhead systems

As offshore drilling pushes past 10,000-foot water depths and 30,000-foot wells, pressure increases exponentially – and not only below the surface. The extreme operating conditions create extreme financial and technological pressures too. The subsea wellhead system must be reliable if the operation is to succeed.

For over 40 years, we have continually evolved subsea wellhead technologies to meet these ever-changing needs. With more than 5,000 systems installed worldwide, we have proven that we can meet today’s challenges, and those that lie ahead. Our latest products include our most advanced sealing technologies, we’ve added casing strings to FullBore systems for extra structural support when drilling 30,000-foot wells, and have new SlimBore systems with many drill-through scenarios for improved completion cycles and use with older, lower-capacity rigs. And this is just the tip of the iceberg. As exploration, drilling and production push new boundaries, we push technology even further. So you can always have a system to rely on – no matter what challenges the future holds.

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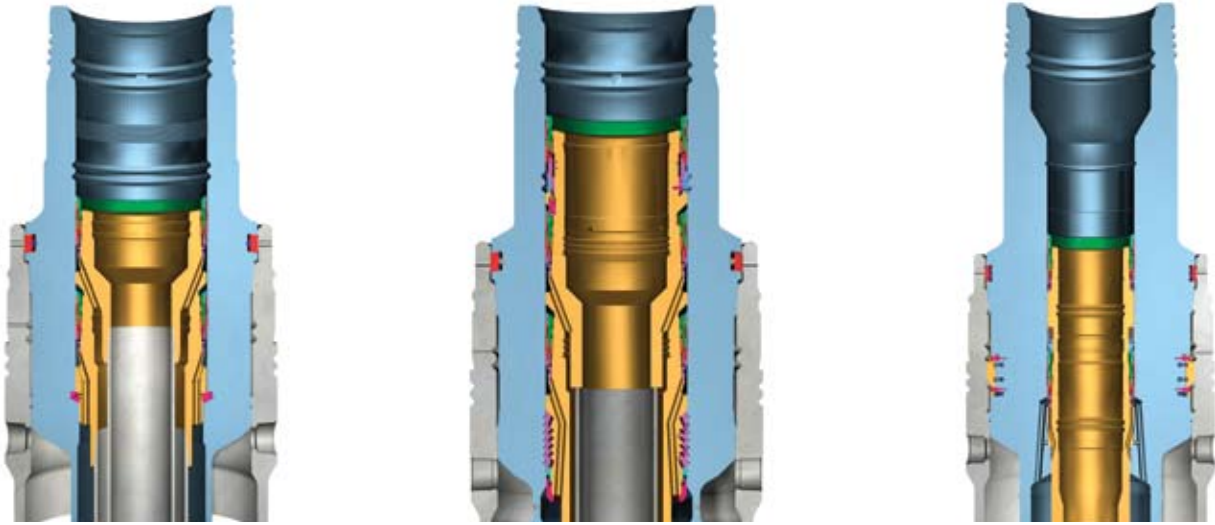
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Quality runs deep

The driving force behind the advanced designs and successful installation of our products has always been our customers' demand for more efficient and reliable drilling. Our patented metal-to-metal seal, advanced material sciences and overall innovative approach combine to help our clients reliably drill deeper wells at the sea floor.

We provide the broadest range of subsea wellhead solutions for global exploration and production. Our portfolio features the familiar VetcoGray MS-700, the VetcoGray SlimBore system for drill thru/slim riser applications and the VetcoGray MS-800 FullBore for ultra deep wells. All our solutions feature the field-proven MS sealing technology and running tool designs.





MS subsea wellhead systems

MS-700

- Standard subsea well design
- Tieback and TLP-SPAR
- DP vessel
- Shallow water flow

MS-800

- Deep wells
- High pressure
- High temperature

SlimBore

- Slim well design
- Drill-thru tree, slim riser or tubing spool
- Smaller BOP stacks

Metal-to-metal sealing technology

MS sealing

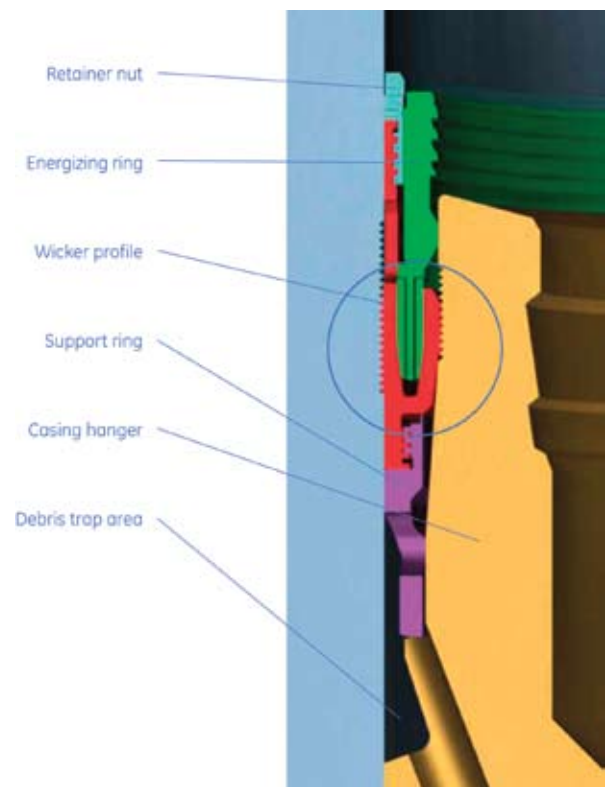
All VetcoGray subsea wellheads benefit from our metal-to-metal sealing technology – superior to elastomer options because it prevents inevitable heat and corrosive fluids from damaging seal integrity.

Both the wellhead and hanger have a sealing area of parallel wickers. Once the seal is properly installed these wickers act as both the sealing and locking mechanism. The seal is installed with a combination of weight and pressure typically applied with the PADPRT, pushing the energizing ring between the metal “U” seal and expanding it into the wicker profiles. This “U” seal expansion forces the wickers into the softer seal metal creating a reliable seal even if the wickers have been damaged.

Emergency sealing

GE Oil & Gas has several contingencies for sealing. The first is the MS-E which is installed via the running tool in the same manner as the MS-1. The only difference between the MS-E and the MS-1 is the soft binary alloy. The binary alloy allows for softer material to flow into damaged areas.

Another option is the SG-TPR. The SG-TPR includes an elastomer and metal sealing combination that seals below the wicker area.



MS-700

Developed in 1991, the MS-700 is the most widely used subsea wellhead system in the world. Its versatility has been proven across TLP/Spar tieback, subsea completion and deepwater drilling applications.

Product Highlights

- 15 KSI @ 250F
- Up to 7.00 MM ft lbs bending capacity
- 18 3/4" nominal bore
- 16" sub mudline
- H-4 connector profile
- VX2/VT2
- Designed for 30" or 36" conductor

Features and benefits

Metal-to-metal sealing

Fundamental to the MS-700 subsea wellhead system is the MS seal which has been proven to be the most reliable metal-to-metal seal offered in the industry.

Dual tapered sockets

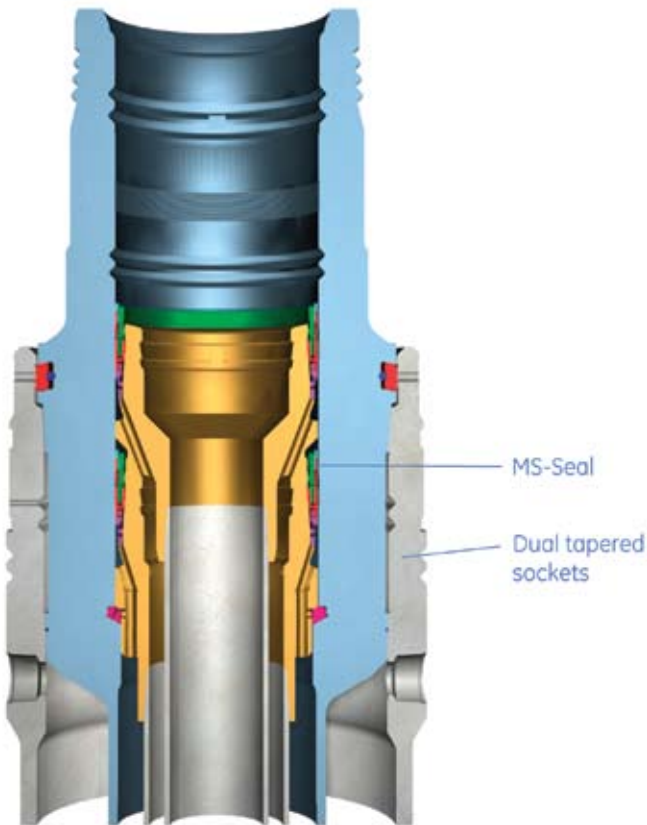
The tapered socket design between the high-pressure and low-pressure housing reduces fatigue in the casing by transmitting the load directly into the conductor housing. No preloading is required to get maximum bending capacity.

Below-mudline equipment

16" submudline equipment allows an additional casing string to be hung at a predetermined position under the wellhead. The system is installed with a single trip running tool that installs both the casing hanger and the seal.

Running tools

Since the inception of the VetcoGray MS-700, we have provided a host of running tools that reduce operating times and risk associated with drilling a subsea well.



GE Oil & Gas provides a host of running tools that have proven their reliability in over 5,000 subsea wellhead installations.

MS-800 FullBore

Developed in 2007 and based on proven technology, the VetcoGray MS-800 takes the industry standard to the next level – providing a cost-effective system that can be utilized in all applications including shallow water and deep wells.

FullBore enables the operator to run one extra casing string under BOP control with a 21" drilling riser. The system also allows more flexibility in designing casing programs by using larger drill bits, testing packoffs to higher pressures and having the option to run 18" and 16" casing strings below the mudline. Furthermore, the system allows potentially larger completion options, by reaching total depth with a larger production string.

Key features and benefits

Running tools

The MS-800 18" and 16" casing hanger running tools set and test the seal via the drill pipe. This reduces valuable rig time.

Below-mudline equipment

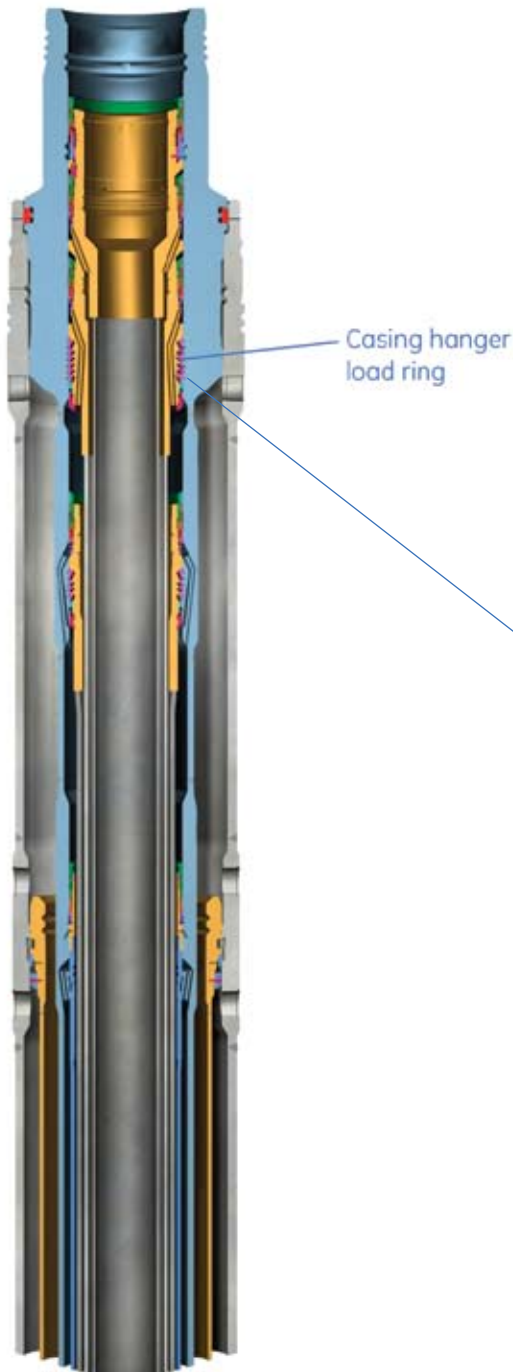
The MS-800 FullBore system features the industry's highest rated below-mudline equipment. The 16" casing hanger equipment is rated at 2.00 MM lbs casing weight capacity at 10,000 psi – and includes true VetcoGray metal-to-metal seals.

Casing hanger load ring actuation

The load-bearing jewellery is located on the casing hanger and is actuated by a tag shoulder. Once the casing hanger is set, the running tool will actuate the MS seal and test in a single trip.

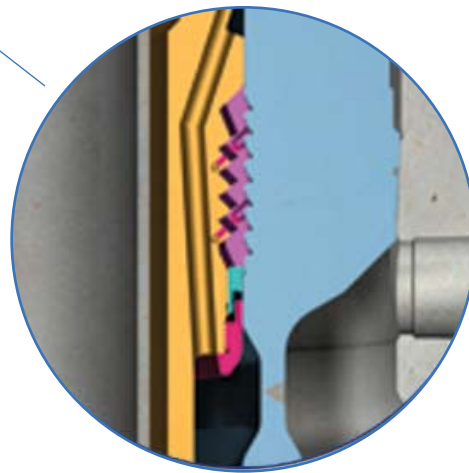
20 KSI capabilities

MS-800 is also available for high-pressure (20,000 psi) and high-temperature (350°F) applications.



Product Highlights

- FullBore
- 15 or 20 KSI @ 350F
- Up to 7.00 MM ft lbs bending capacity
- 18 3/4" nominal bore
- 2.00 MM lbs 1st position casing hanger capacity
- 2.00 MM lbs 16" sub-mudline casing hanger capacity



MS-800 casing hanger load ring detail

SlimBore

As many older rigs are being brought back into service to meet increasing demand, operators are facing new challenges when drilling in deep water. Weight restrictions require smaller risers/BOPs/less mud. Trips to run trees and tubing hanger spools cost more today than ever due to unprecedented day rates.

Product Highlights

- Up to 10KSI @ 250°F
- Up to 4.00 MM ft lbs bending capacity
- 13" - 16 ³/₄" nominal bore sizes
- High capacity casing hanger
- H-4 Connector Profile
- VX2/VT2

Key features and benefits

Trip saving

The VetcoGray SlimBore wellhead system enables operators to cut trip time in half when using a subsea completion system. In Drill-Thru (DT) mode, a horizontal tree can be run immediately after running the subsea wellhead system. From that point, all drilling and completion operations can be performed.

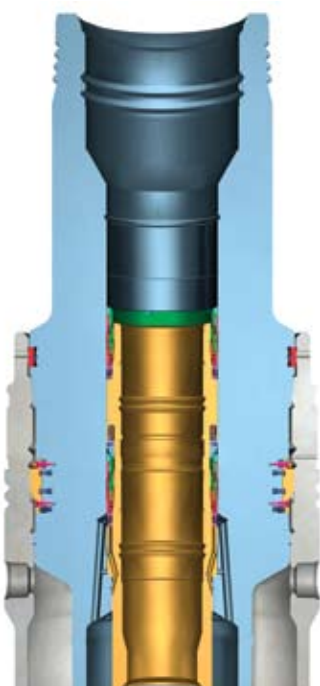
The SlimBore system can provide savings potential in a non-DT mode as well, simply by using a smaller riser, less drilling mud and a smaller BOP stack – enabling the use of an older generation rig which generates significant day rate savings.

MS-1 sealing

The SlimBore system uses reliable MS-1 sealing technology. This seal is rated to 10,000 psi and has 500,000 lbs lockdown rating.

Running Tools

The SlimBore system utilizes most of the same tools as the MS-700 system.



VetcoGray MS-700



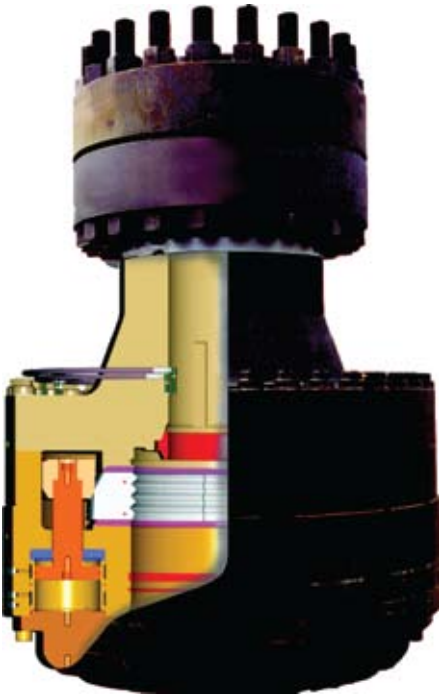
PADPRT casing hanger RT



90ft SlimBore wellhead joints installed from a barge offshore Brazil

H-4 connector and VX/VT sealing

All VetcoGray subsea wellheads come with the proven reliability of our H-4 connector – used on more than 50% of the floater rigs drilling today. The stainless steel VX2/VT2 gasket, located between the connector and wellhead, is rated for 15,000 psi and 250°F. The latest in our line of connectors is the DW HD H-4 connector. This connector is a high-capacity wellhead connector that provides 5.25 million ft lbs of bending load capacity when coupled with the DMS subsea wellhead.

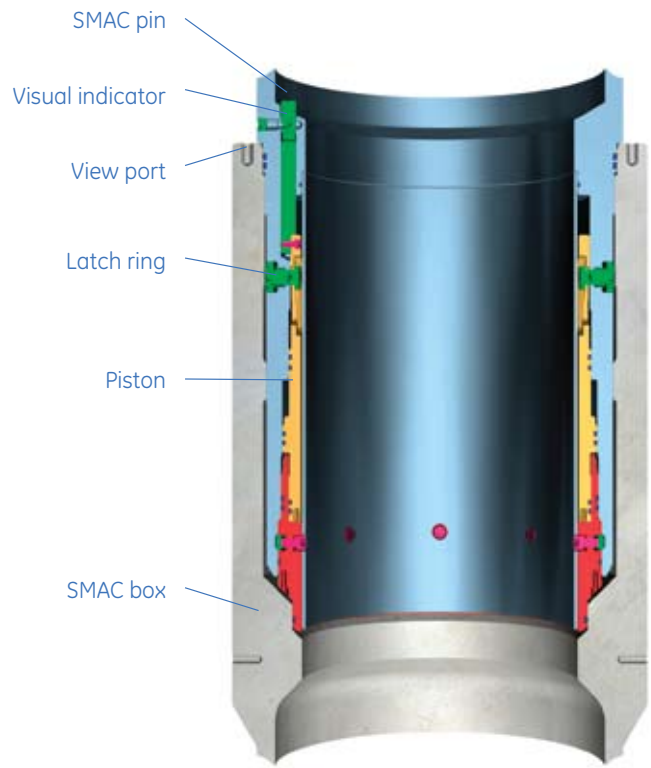


H-4 Connector

The industry standard
for offshore drilling
and production

Remote-release connector

Subsea wellhead retrieval is made easy with our ROV-operated Submudline Abandonment Connector (SMAC), welded to the 30" or 36" conductor. Once the well has been abandoned, the casing is cut and the SMAC is disengaged for retrieval back to the rig. This wellhead equipment can usually be refurbished for use in other subsea wells.



VetcoGray SMAC connector



Extending equipment life

Dual-taper interface

Extreme bending moments seen in subsea drilling and SPAR/TLP applications have led us to develop the dual-tapered socket feature. This interface is placed between the upper and lower profile of the high pressure and conductor housing. Introduced in 1991, the tapered socket design has proven itself to be the best in class for dispersing the effects of high currents, drive off or fatigue-related loads.

RL-2HCX

In addition to the wellhead tapered socket interface, We offer an added solution for fatigue and high bending. The VetcoGray RL-2HCX conductor connector is a pre-loaded, high strength connector with a 2 start thread for make up in less than one turn.

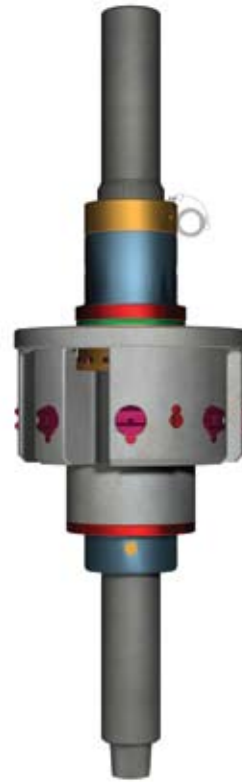
Thick wall extension

SPAR/TLP applications can create high fatigue loading on the 22"/20" extension from the high pressure housing. Addition of a thick wall extension reduces stress concentrations by creating a smoother transition from the wellhead housing to the casing.

Trip saving features

Bit run wear bushing

GE Oil & Gas offers a variety of solutions designed to decrease the amount of time required to drill a well. Our wear bushing or nominal seat protector can be run into the wellhead and left for retrieval at a later time or can be retrieved on each bit trip. The drill-ahead tool is another time-saving device that allows the next casing string to be drilled after jetting in the conductor, effectively eliminating one trip.



Drill ahead tool



Bit run nominal seat protector



Strength and stability

We have been an industry-leading supplier of products, systems and services for drilling, completion and production for more than a century. Our specialty wellheads, trees, valves, connectors, controls and related systems provide superior performance around the globe - onshore, offshore and subsea. We design products for the unique challenges of extreme pressure and temperature applications, at both ends of the spectrum. We regularly incorporate new technologies and resources developed throughout the extensive GE network of industrial businesses, with each advancement helping our customers achieve greater levels of performance and productivity.

Applications

- Capital drilling systems
- Floating drilling systems
- Onshore drilling systems
- Offshore surface systems
- Subsea drilling systems
- Subsea processing and power

Products and Services

- BOP connectors
- Casing connectors
- Diversers
- Flow assurance systems
- Gate Valves
- Installation tooling and service
- Intelligent well technology
- Manifolds and templates
- Marine risers
- Mudline suspension
- Subsea control systems
- Subsea electrical connections
- Subsea flowline connections
- Subsea manifolds
- Subsea separation
- Subsea tree systems
- Subsea wellheads
- Surface wellheads
- Surface tree systems

Subsea wellhead system matrix

Family	System	Pressure Rating (KSI)	Bending (MM FT lbs)	Max Conductor Size	Hanger Positions	All Metal Sealing	FullBore	18" Submudline	16" Submudline	VX2/VT2 Profile
MS-700	18 3/4"	15	2.10	30"	3	•			•	•
MS-700	18 3/4"	15	4.00	36"	3	•			•	•
MS-700	18 3/4"	15	5.25	36"	3	•			•	•
MS-700	18 3/4"	15	7.00	36"	4	•			•	•
MS-800	18 3/4"	20	7.00	36"	3	•	•	•	•	•
MS-800	18 3/4"	15	4.00/5.25 7.00	36"	3	•	•	•	•	•
SlimBore	13"	10	4.00/5.25 7.00	36"	3	•				•
SlimBore	13 5/8"	10	4.00/5.25 7.00	36"	3	•				•
SlimBore	16 3/4"	10	4.00/5.25 7.00	36"	3	•				•

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GE imagination at work