



WORLDWIDE OILFIELD MACHINE

**LEADING
THROUGH
INNOVATION**

**PRODUCTS
AND SERVICES**

Onshore, Offshore and Subsea



WOM proudly celebrates 40 years of providing the oil & gas industry with meticulously designed, well-engineered pressure and flow control equipment. WOM looks forward to continuing to make a positive impact on the process of safely extracting one of the world's most precious resources. We are honored to work with the businesses that have trusted our commitment to excellence and appreciate each member of our group that has contributed to our success.

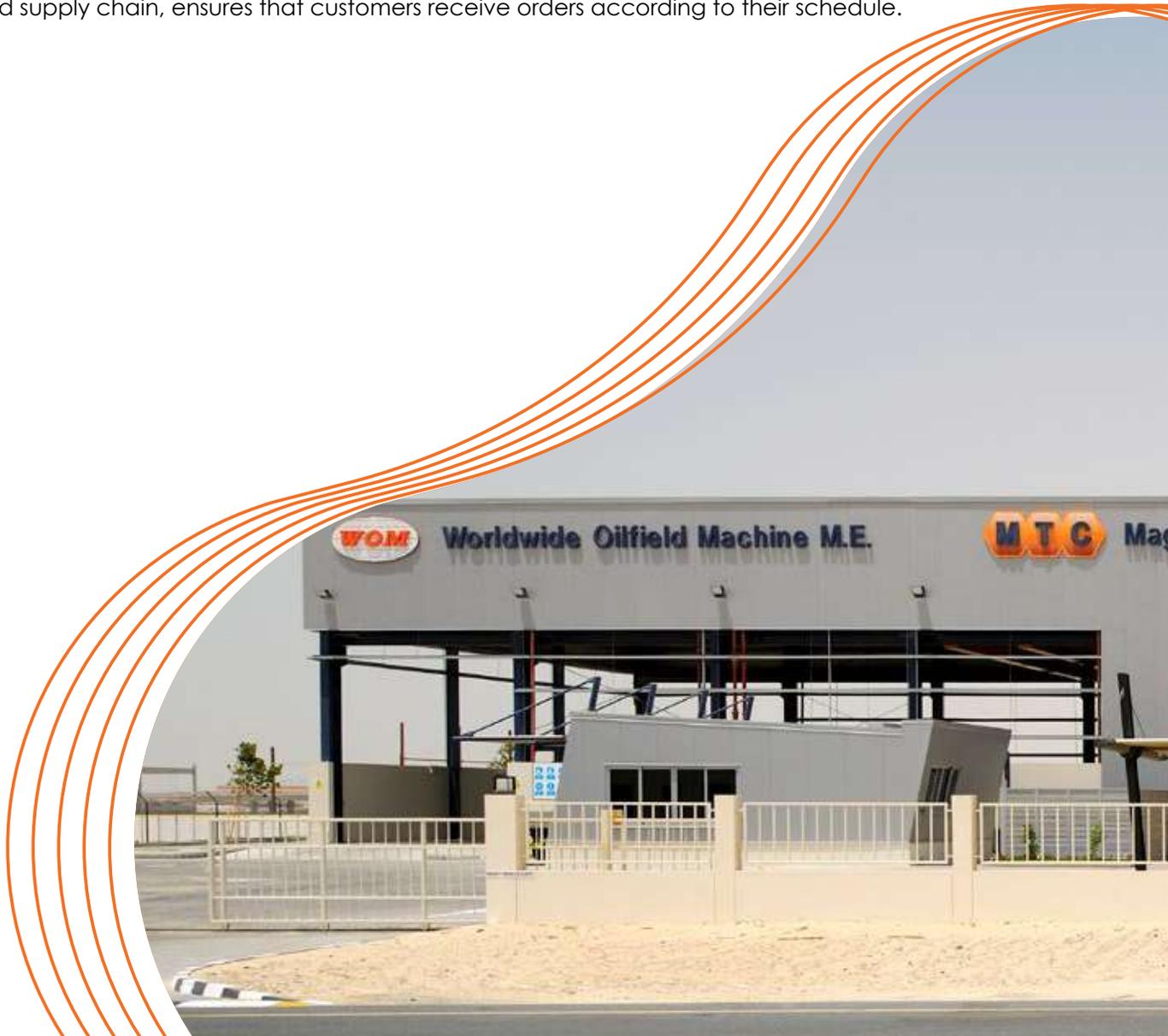
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Introduction

Worldwide Oilfield Machine, Inc. (WOM) is a multinational manufacturer of pressure and flow control equipment with worldwide headquarters in Houston, Texas, and manufacturing, sales and service facilities strategically located throughout the world. Since the company's founding, WOM has applied innovative concepts and engineering excellence to consistently improve reliability and reduce maintenance of process pressure and flow control equipment. In 1985, WOM introduced the breakthrough Magnum Dual-Seal design for high pressure gate valves used in the oil and gas industry. After thorough and rigorous testing at WOM and independent test facilities, the Magnum Gate Valve design proved its superiority and became the gold standard in the industry for high-reliability, low maintenance valve technology. WOM continues to expand its product portfolio, manufacturing capabilities and customer service/support centers to offer customers a single source for world-class pressure and flow control package solutions.

An aggressive product development program has led to oil and gas, petrochemical and power companies worldwide depending on WOM equipment to support their operations while protecting their employees and the environment. All WOM products meet ISO and API performance and are engineered to surpass quality requirements. Complete vertical integration, combined with a well-managed supply chain, ensures that customers receive orders according to their schedule.



Worldwide Service and Support

Satisfying customer needs is top priority at WOM. Whether there is a technical/operational question, custom design requirement or call to service equipment in the field, WOM Engineering and Service Centers are strategically located worldwide to support your operations. With one of the largest inventories of replacement parts available, spares can be rapidly shipped to where they may be needed. Factory-trained technicians, deployed from WOM Service Centers, also perform comprehensive site assessments, reconditioning and upgrading of existing equipment. Recognizing the mission-critical nature of our customers' operations, world-class WOM service facilities and highly trained, experienced service technicians are available 24/7 to support WOM equipment and systems in the field. The WOM comprehensive service program reduces the risk of downtime while increasing safety.

SERVING THE OIL AND GAS INDUSTRY SINCE 1980!

Houston, USA • Aberdeen, UK • Pune, India • Dubai, UAE • Singapore
Ashgabat, Turkmenistan • Jakarta, Indonesia • Seoul, South Korea



This catalog is an overview of the WOM product line, while more details on each product and product family highlighted herein are available within individual product descriptions. Please visit the WOM at www.womusa.com to download a file copy of any product or system

Your local WOM representative is also available to assist in selecting the right piece of equipment to meet the reliability and operating requirements of the application, and ensure the success of your project.

VISION

To make a difference in the communities in which the WOM group of companies operates by providing a world-class organization that develops a way of existence and sets the pinnacle of standards in all walks of life, whether at work or in society, to ensure future generations healthy, stable, and fruitful lives.





MISSION

To service the oil & gas industry by providing relentless reliability in our products and fulfilling our customer's "wish lists" by continuously designing and developing innovative features that will reduce the end users' maintenance and increase overall safety and production.



HSE

The policy of Worldwide Oilfield Machine (WOM) is to maintain a Health, Safety, and Environmental Program by conforming to regulatory standards and best practices while providing a safe, healthy, and sustainable environment for its employees and customers.

Quality Policy Statement

The primary purpose of Worldwide Oilfield Machine, Inc. is to provide products and services that meet the customer's needs and provide them with value. This philosophy will create gainful work for our employees and a profit for our stakeholders. Worldwide Oilfield Machine, Inc. is dedicated to providing the best possible product and/or service to its customers by having well-trained, enthusiastic employees and the effective implementation of this management system.

It is the POLICY of Worldwide Oilfield Machine, Inc. to:

- Operate in a safe, consistent and economical manner
- Maintain conformance to the documented quality management system, including the applicable in-dustry codes, standards and /or specifications and customer-specified requirements
- Maintain compliance to statutory and regulatory requirements
- Prevent nonconformities at all stages of design and manufacturing by implementing the require-ments of this manual and supporting procedures
- Ensure customer satisfaction
- Foster an environment of continual improvement
- Communicate this policy throughout Worldwide Oilfield Machine, Inc. and ensure that it is un-derstood
- Aggressively pursue the Mitigation of systemic Risk™ through the implementation of this management system
- Monitor and periodically review the management system, including stated objectives and this policy for suitability and effectiveness

PATENTED Magnum Gate Valve

The Magnum Gate Valve incorporates a design which has become the cornerstone of the WOM product line and is synonymous in the oil & gas industry for unmatched quality and unsurpassed service life.

Available in a wide range of material selections and suitable for harsh environments such as CO₂ and H₂S applications, the Magnum Gate Valve has proven its versatility in the North Sea, the Gulf Coast, the Middle East, South America, North America, Africa, Singapore, China and drillships and platforms across the globe and is trusted by the biggest names in the industry.

Features and Benefits

- Available in sizes 1-13/16" - 9"
- Working pressure ratings of 2,000 to 20,000 psi.
- Full Bore, Through-Conduit Seal
- Bi-Directional Sealing
 - Primary (Upstream) Seal
 - Secondary (Downstream) Seal
- Lower Torque
 - Floating Gate with T-Slot
 - Centralized stem threads
 - Superior finish on gates and seats
 - Balanced forces on gate and seats
- Longer Life of Valve
 - Minimal exposure to contaminants
 - Minimal lubricant loss
- Elastomer Assist Metal-to-Metal Seal or Non-Elastomeric Seals
- Differential Avoids Pressure Lock
- Extended Service Life with Minimum Maintenance Requirements



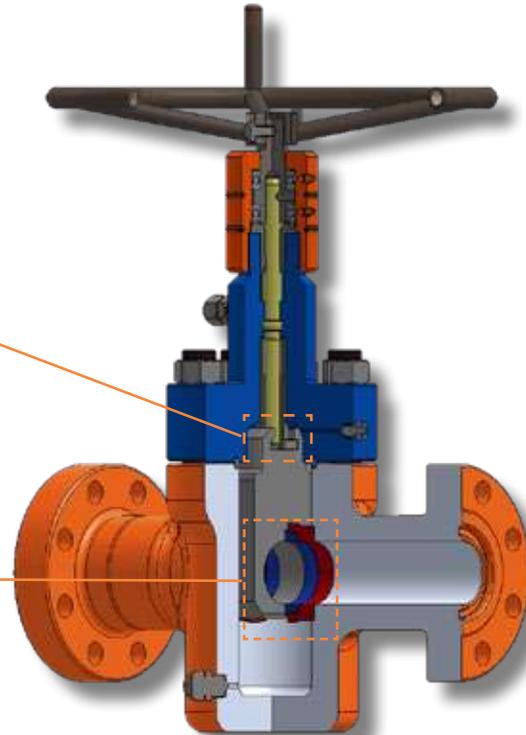
WOM Magnum Gate Valve

Can be equipped with pneumatic or hydraulic actuators and is ideally suited for Manifold and Christmas Tree applications.

Advantages of the Magnum Design

T-SLOT GATE

A T-Slot Gate paired with an independent stem nut allows the gate to float, maintaining contact with the seats without binding on the stem and requiring less torque to cycle the valve during operation.



Compatible with Elastomeric & Non-Elastomeric Seals

Gate in the CLOSED Position
Primary Upstream Seal presses against the gate to provide a seal and avoid intrusion into the body cavity.

Gate in the CLOSED Position
If the Primary Upstream Seal fails, the Secondary Downstream Seal takes over to avoid intrusion into the thru-bore.

Gate in the OPEN Position
Primary Upstream & Downstream Seals press against the gate to provide a seal and avoid intrusion into the body cavity and thru-bore.

Zero Leak

The heart of this bidirectional valve is the MAGNUM "Sure Seal". This simple gate/seat assembly eliminates gate guides, seat skirts and springs. Instead, line pressure expands the seat assembly against the floating gate forming a true upstream seal.

Gate Valve Standard Trim Chart

Sizes: 1-13/16" through 9" (larger sizes available upon request)
 Working Pressures: 2,000 psi through 20,000 psi

Material Class	Body	Bonnet	Gasket	Gate	Seats	Stem	Seat Retainer	T-Nut	Balance Rod
AA	4130	4130	Carbon Steel CAD Plated	4140 HF	4140 HF	4130	17-4H	4130	4130
BB	4130	4130	316/304 SS	410 HF	410 QPQ, 410 HF	17-4PH	410	410	410
CC	410	410	316/304 SS	410 HF	410 QPQ, 410 HF	17-4 PH	410	410	410
DD-0.5*	4130	4130	316 SS	4140 HF	4140 HF	17-4 PH QPQ	17-4 PH	4130	410
DD-1.5	4130	4130	316 SS	4140 HF	4140 HF	4140 QPQ	410	4130	410
DD-360	4130	4130	316 SS	4140 HF	4140 HF	4140 QPQ	410	4130	410
DD-NL	4130	4130	316 SS	4140 HF	4140 HF	4140 QPQ	410	4130	410
EE-0.5*	4130	4130	316 SS	410 HF	410 HF	17-4 PH QPQ	17-4 PH	410	410
EE-1.5	4130	4130	316 SS	410 HF	410 HF	410	410	410	410
EE-360	4130	4130	316 SS	410 HF	410 HF	Inconel 718	410	410	410
EE-NL (-20° to 250°F)	4130	4130	316 SS	410 HF	410 HF	Inconel 718	410	410	410
EE-NL (-20° to 350°F)	4130	4130	316 SS	410 HF	410 HF	Inconel 725	410	410	410
FF-1.5	410	410	316 SS	410 HF	410 HF	410	410	410	410
FF-360	410	410	316 SS	410 HF	410 HF	Inconel 718	410	410	410
FF-NL (-20° to 250°F)	410	410	316 SS	410 HF	410 HF	Inconel 718	410	410	410
FF-NL (-20° to 350°F)	410	410	316 SS	410 HF	410 HF	Inconel 725	410	410	410
HH-NL (-20° to 250°F)	4130 w/Inconel 625 inlay in all wetted areas	4130 w/Inconel 625 inlay in all wetted areas	Inconel 825	Inconel 718 HF	Inconel 718 HF	Inconel 718	Inconel 718	Inconel 718 QPQ	Inconel 718
HH-NL (-20° to 250°F)	4130 w/Inconel 625 inlay in all wetted areas	4130 w/Inconel 625 inlay in all wetted areas	Inconel 825	Inconel 725 HF	Inconel 725 HF	Inconel 725	Inconel 725	Inconel 725 QPQ	Inconel 725

Notes:

- This Chart is based on API 6A 20th Edition & Nace MR 0175 Second Edition
- All Sub-Sea valve Stems are Inconel.
- For -50°F Temperature, there is no change with the valve materials
- Materials shown are for reference purposes only and are subject to change.
- Special trims and materials are available, such as duplex stainless steel for bodies and bonnets, Inconel HF for gates and seats, and Inconel for stems.
- Abbreviations: SS-Stainless Steel; QPQ-Quench Polish Quench; HF-Stellite/ Colmonoy, W/HF-Hard Facing.
- -75°F (-59°C) available upon request.
- Wire-line and fire safe valves available upon request.
- High temperature (450°F) (232°C) valves available upon request.
- QPQ Seats have an option of Colmonoy Hard-Facing.
- Alternate material for Stems-Inconel 725
- Alternate material for HH Trims-Duplex SS



Research and Development



WOM's state-of-the-art Research and Development facility allows for in-house testing, which greatly speeds up the new product development and qualification testing. This lab includes environmental chambers for extreme temperature testing and testing booths for room temperature testing. The temperature chambers are some of the most advanced in the world, capable of reaching temperatures from -100°F to 600°F. WOM has successfully completed HPHT API 6A PR2 testing with a temperature range of -20°F to 450°F for 3-1/16"-20,000 PSI Magnum Gate Valve and 3-1/16"-15,000 PSI Model 200M Gate Valve.

The lab also includes an advanced control room from where the testing can be monitored remotely, providing a safe environment away from the actual product testing.



Before - 20°F to 450°F Testing

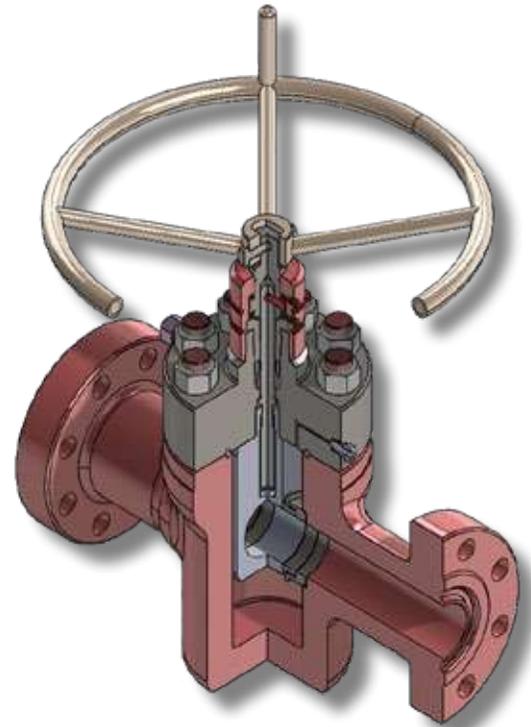


After - 20°F to 450°F Testing

Model 200M Gate Valve

Features and Benefits

- Available in sizes 1-13/16" - 7-1/16"
- Working pressure ratings from 2,000 psi-15,000 psi
- Forged body and bonnet for the highest mechanical integrity
- Bi-directional flow design offers versatility and increased service life
- Grease injection fitting located in bonnet, eliminating body penetration
- Bearing cap grease fitting allows positive bearing lubrication
- Available in standard flange ends, butt weld ends and block body configurations
- Can be equipped with pneumatic or hydraulic actuators
- The 200M Gate Valve has been API 6A fire tested to 450°F and can be fitted for HPHT service

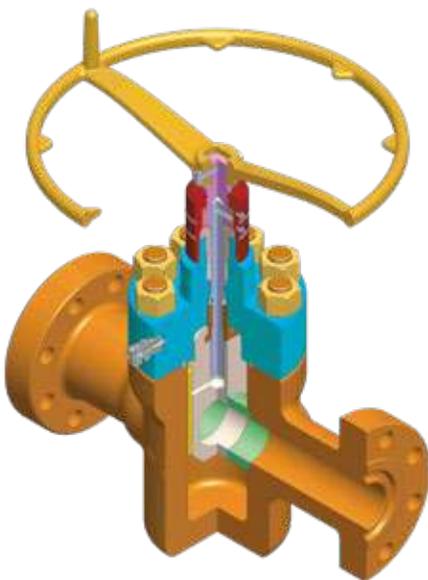


Model 200M Gate Valve

Model 500 Gate Valve

Features and Benefits

- Available in sizes 1-13/16" to 7-1/16"
- Working pressure ratings from 3,000 psi-15,000 psi
- Forged body and bonnet for the highest mechanical integrity
- Bi-directional sealing, seat to Body and Gate to Seat
- Grease injection fitting located in bonnet, eliminating body penetration
- Bearing cap grease fitting allows positive bearing lubrication
- The unique Wedge Guide design protects the Seat seal from damage and exposure to well pressure
- Body pocket Seat sealing area is protected from foreign particles entering and damaging the area
- Seat Assembly is locked in place providing a perfect downstream seal.
- Stem metal-to-metal backseat with Bonnet to isolate stem packing and allows stem packing to be replaced while valve is under pressure



Model 500 Gate Valve

WOM Subsea



WORLDWIDE OILFIELD MACHINE
SUBSEA

WOM Subsea is a specialized division of Worldwide Oilfield Machine which is focused on providing custom-engineered subsea solutions to WOM clients around the globe. Located in Houston, Texas, WOM Subsea is a rapidly growing division of WOM and has recently expanded its operations to a 10,000 sq ft highbay which allows for up to 3 Subsea Intervention Systems to be worked on simultaneously. WOM Subsea's operations are closely integrated with the established infrastructure which WOM has built over the past 35 years. This gives WOM Subsea easy and rapid access to facilities and personnel needed to support its operations while remaining focused on innovation in the subsea space as well as providing its customers with maintenance, modification, installation, repair and refurbishment and storage capabilities.



WOM Asia Pacific

WOM Asia Pacific (WOM AP) formerly known as Magnum Subsea Systems (MSS), is focused on designing and delivering reliable subsea systems which meet our client's technical requirements. WOM AP has combined with WOM SEA (referred to solely as WOM AP) to provide its customers with Front End Engineering Design (FEED) study, project Management Services, Field Support Services along with refurbishment, redesign and recertification Services, all from one point of contact.



WORLDWIDE OILFIELD MACHINE
Asia Pacific



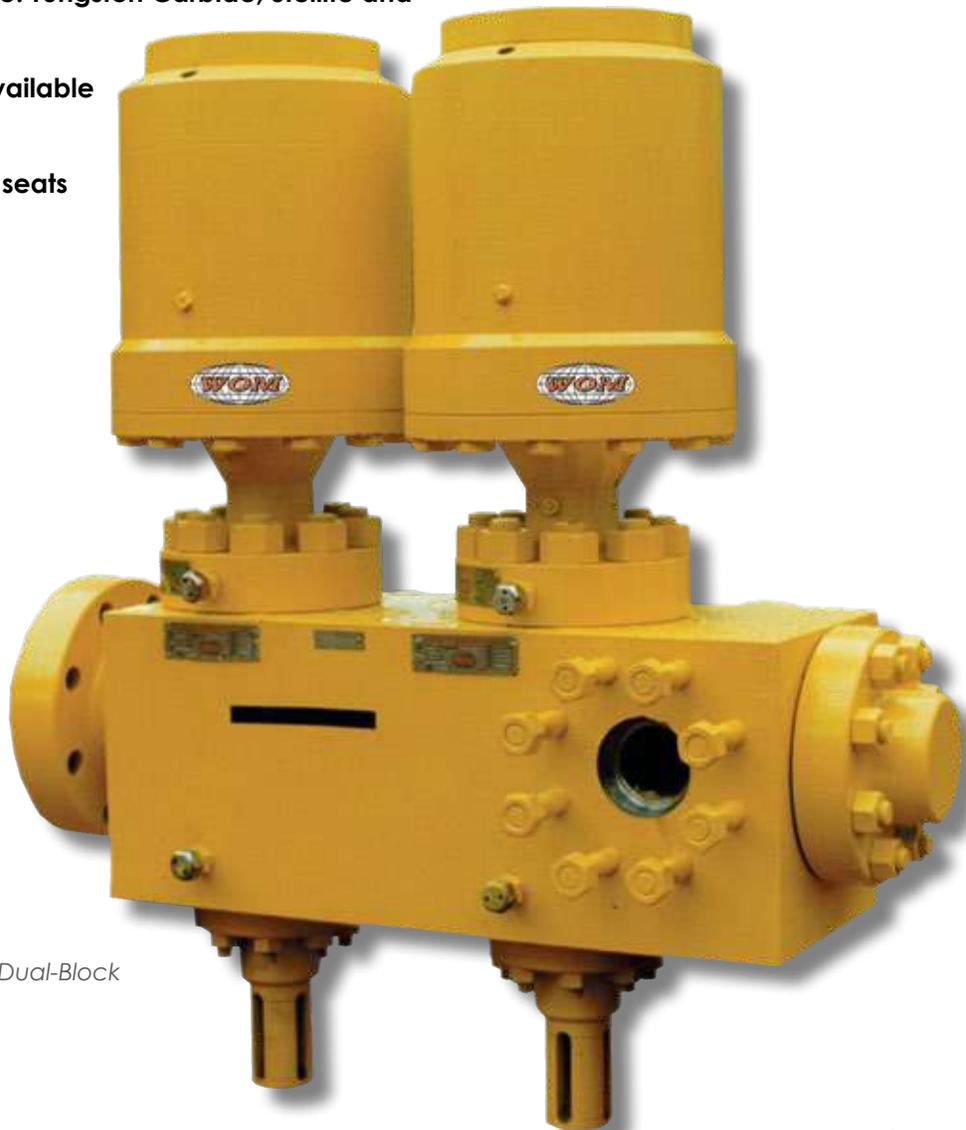


WOM Magnum Dual Block used for capping on Macondo Well (Gulf of Mexico)

Subsea Gate Valve

Features and Benefits

- Designed, built and tested to API 6A and 17D
- Tested to a water depth of 13,200 feet
- Anti-explosive decompression seals and energized non-elastomeric lip seals
- Metal-to-metal seal (seat to gate)
- Magnum “Dual-Seal” seat design seals upstream and downstream
- With Magnum “Dual-Seal” seat design seals “thru-conduit”, bonnet can be removed and replaced while the valve is in working condition. This will minimize the maintenance time and inventory cost for customers
- Gate and seat faces are hard faced with Colmonoy 4, 5 & 75 and polished to 1-2 RMS. This is for wear resistance and low operating torque. Tungsten Carbide, Stellite and other HF material are also available
- Cladding of “all wetted parts” is available
- “T” Slot stem and gate connection allows the gate to “Float” between seats without misaligning the stem under pressure



Magnum Subsea Dual-Block

Actuators

Fail Safe Pneumatic and Hydraulic Actuator

Features and Benefits

- WOM's pneumatic and hydraulic actuators are manufactured and tested to API 6A
- Single forged unitized top cap and cylinder for simple in-line maintenance
- Quick disconnect mechanism allows for fast removal without disturbing the body/bonnet connection and provides immediate access to stem packing
- Anti-explosive decompression seals and energized non-elastomeric lip seals are available
- Factory preset drift eliminates the need for field adjustments



Hydraulic Fail Safe Actuator



Pneumatic Fail Safe Actuator

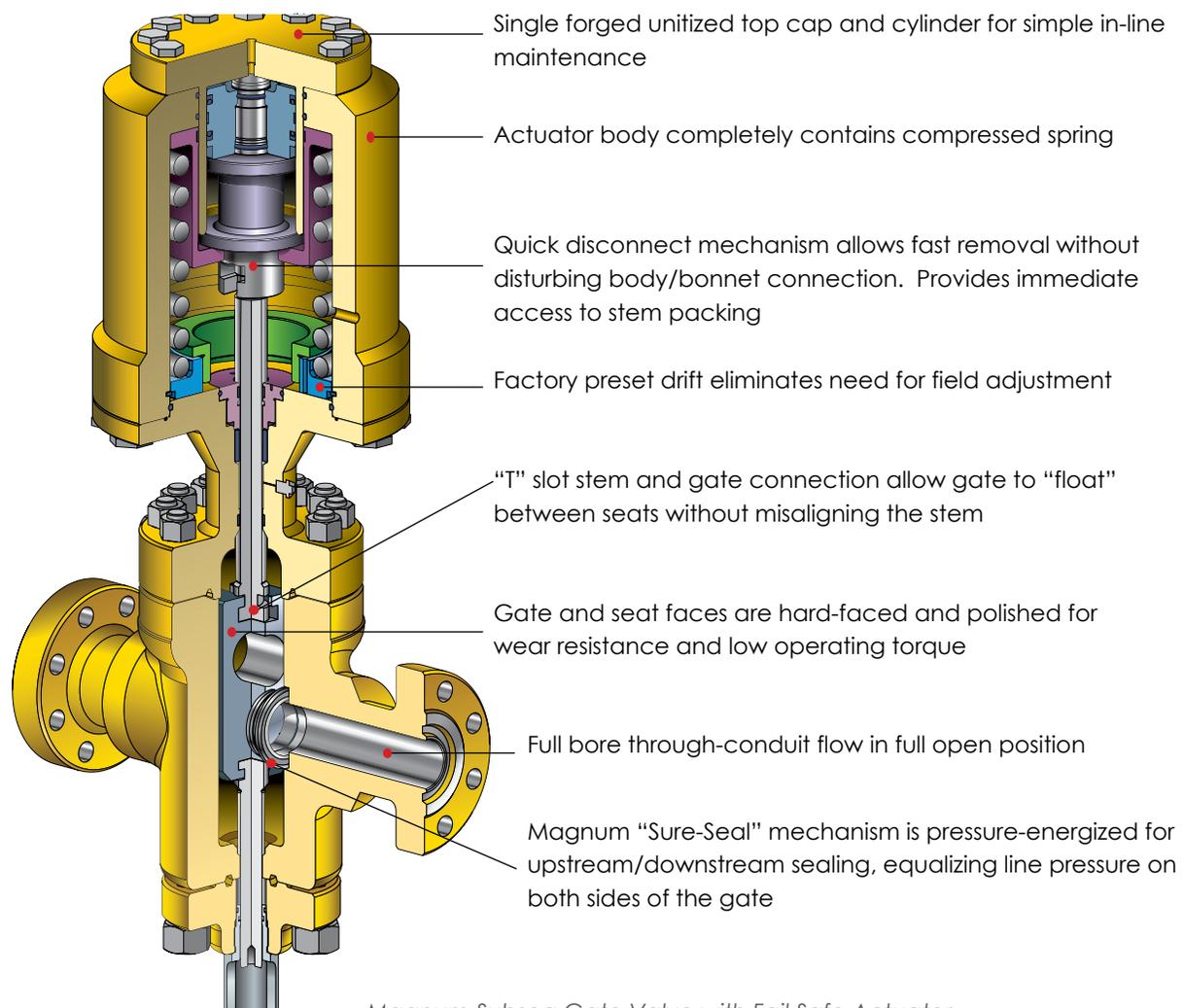


Features and Benefits

- Magnum Subsea Actuators are designed, built and tested to API 6A and 17D
- Magnum Subsea Actuators are designed and tested to a water depth of 13,200 feet
- Equipped with anti-explosive decompression seals and energized non-elastomeric lip seals
- Pressure equalization system maintains 0 psi differential pressure
- Factory pre-set drift eliminates the need for field drift adjustments

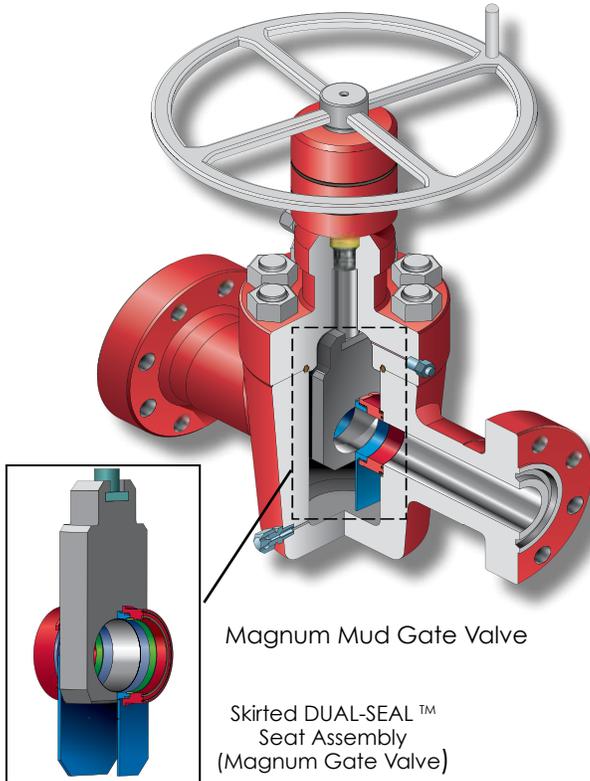
Magnum Subsea Actuator

WOM's Magnum Subsea Actuator design boasts a "Truly Fail Safe" capability- no line pressure or hydraulic control pressure is required to assist in closing the valve. A unique feature of the Magnum Subsea Actuator is its "Double-Safe" design which incorporates a single acting fail-safe hydraulic actuator with a spring return. In addition to an ROV mechanical override, the Magnum Subsea Actuator offers an additional port to accommodate ROV hydraulic override.



Magnum Subsea Gate Valve with Fail Safe Actuator

Slurry Service Gate Valve



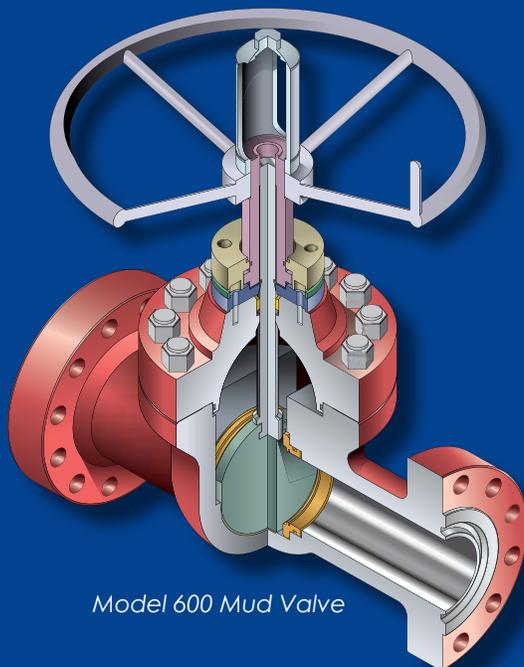
Designed for mud, cement, fracturing and water service to handle high and fluctuating pressure and abrasives

Features and Benefits

- Available in sizes 1-13/16" - 5"
- Available in working pressure ratings from 3,000 psi-15,000 psi
- Features WOM's patented Magnum Dual Seal™ system
- Thru-Conduit seal eliminates the turbulence experienced in paddle gate mud valves
- Skirted seat assembly prevents contaminants from entering the valve body cavity
- Body cavity is exposed to line pressure only during valve opening and closing
- Better lubricant retention, less exposure to line contaminants and longer service life than comparable valves
- Can be easily serviced in-line and all internal components can be inspected and replaced
- All mud valves meet or exceed the requirements for API 6A

Model 600 Mud Valve

The Model 600 Mud Valve was designed for corrosive CO₂ injection and waterflood applications in the enhanced oil recovery market. It is commonly used for applications such as high pressure mixing lines, standpipe manifolds, wellheads, production manifolds and production gathering systems.



Features and Benefits

- Available in sizes 1 13/16" - 5 1/8"
- Available in working pressures from 5,000 psi and 7,500 psi
- Floating slab gate design
- Heavy duty roller bearings
- Seat assembly engineered with "lock shell" ensures accurate seat alignment
- Available with threaded, welded and flanged end connections
- Rising stem design with visual position indicator lens
- Replaceable stem packing

Line Pressure Operated SSV

Features and Benefits

- Available in sizes ranging from 1-13/16" - 7-1/16"
- Available in working pressures from 2,000 psi to 20,000 psi
- Ideal for single point protection where control pressure is not available, installed as a secondary master on a tree, on flow lines, header valves, gathering lines, pipelines and transmission lines
- Self-operating system which uses line pressure as control pressure to activate the actuator
- High and low pressure pilots sense line pressure continuously. Abnormal pressure changes cause the pilots to exhaust control pressure from the safety valve, closing the valve
- Centralized stem threads and T-nut combined with T-slot gate reduce the overall torque needed to cycle the valve
- Colmonoy 4, 5 & 75, Tungsten Carbide, Stellite and other HF materials are available
- Compatible with elastomer-assist metal-to-metal seals or non-elastomeric seals

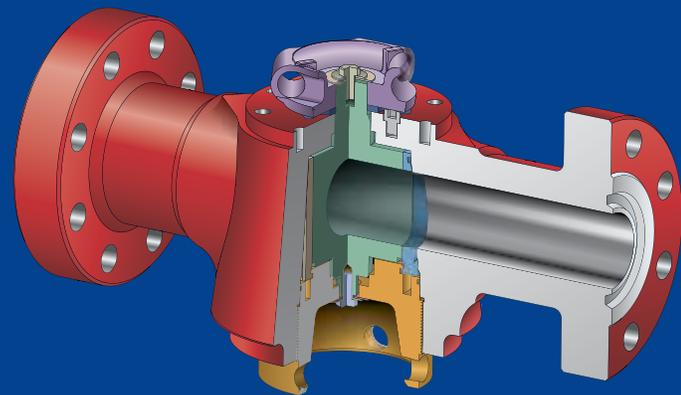


WOM's Line Pressure Operated Surface Safety Gate Valve

Model 700 Plug Valve

The Model 700 Plug Valve is a tapered seal, non-lubricated, quarter-turn plug valve for rapid operation. The body cavity is tapered to ensure uniform seating of the sealing inserts, providing a reliable seal at a full range of pressures. It is engineered to provide low operating torque and resistant to tough abrasive and corrosive conditions.

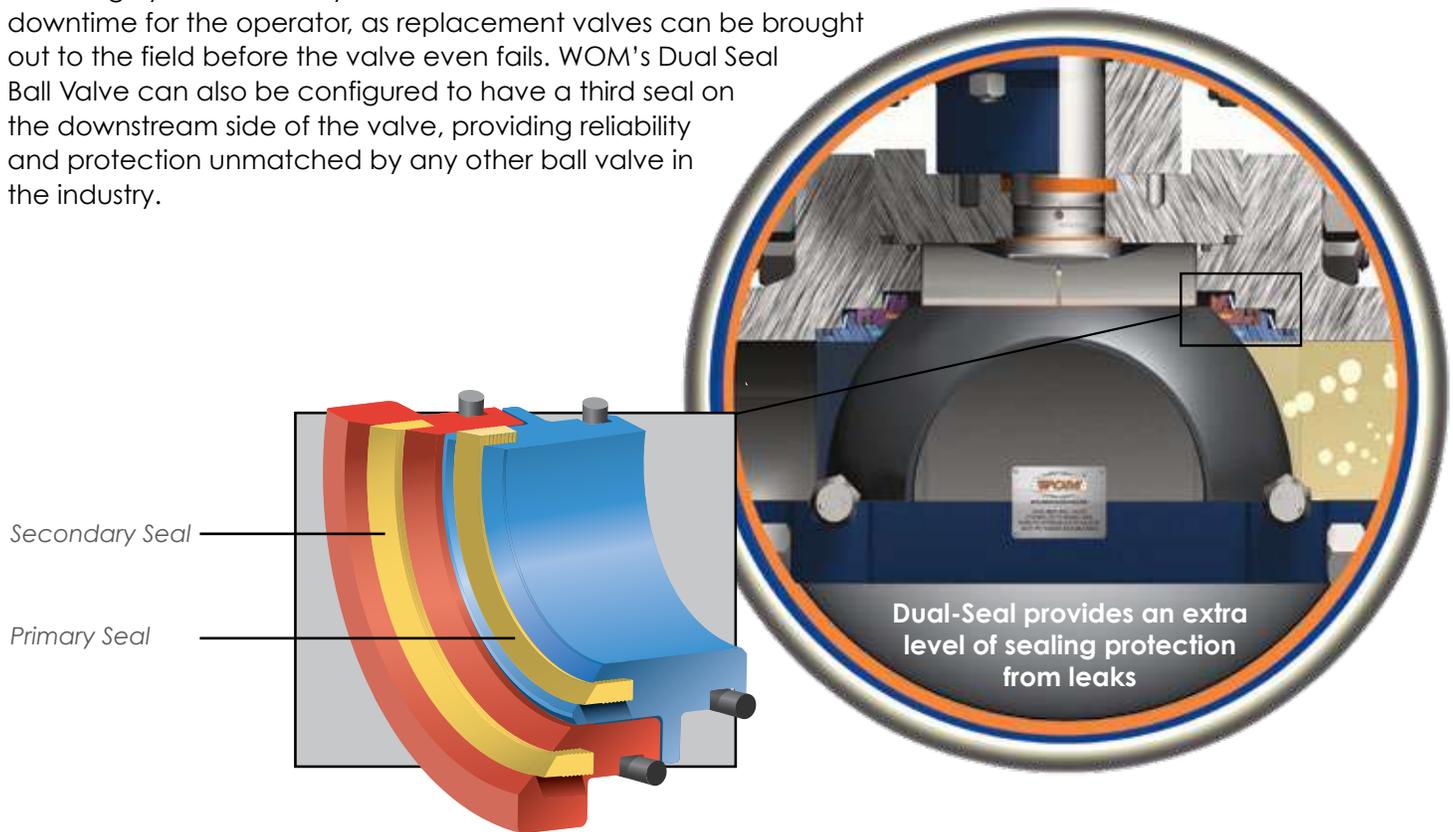
WOM offers several end connection choices for the Model 700. Connection types such as Hammer Unions, Line Pipe, API Flanged, Tool Joint, Clamp Hub, Weld End and a metal-to-metal WingSeal, are available. All sizes of WOM valves can be equipped with your choice of end connections or combinations to suit your specific application.



Model 700 Plug Valve

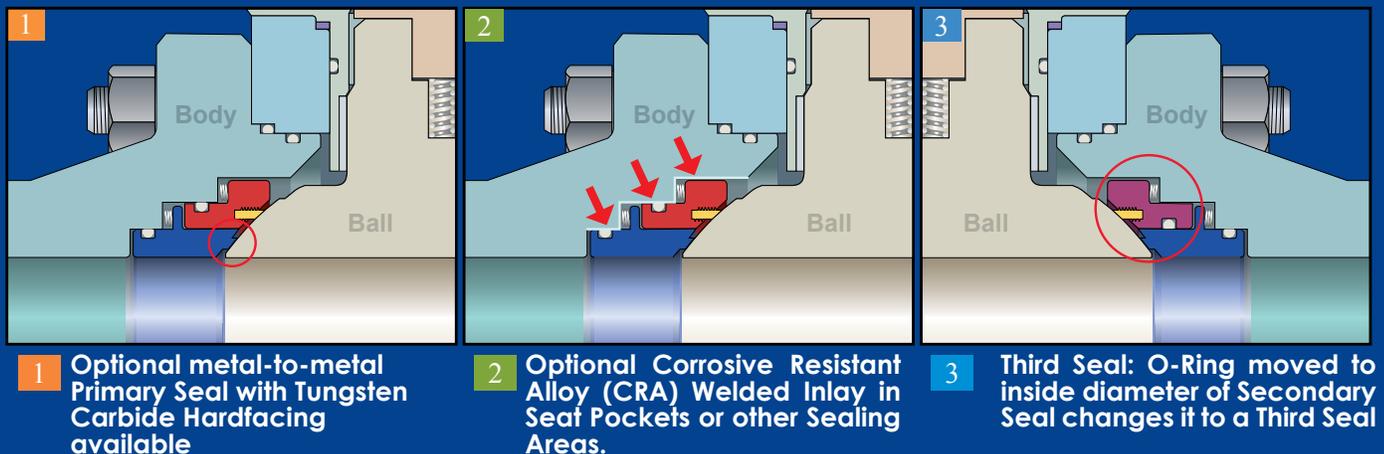
PATENTED Dual-Seal Ball Valve

WOM's Dual Seal Ball Valve is the only ball valve in the oil & gas, pipeline, petrochemical and process industries that boasts two independent seals on both the upstream and downstream sides of the valve. If the Primary Seal becomes damaged during operation, the Secondary seal will automatically engage. The integrity of the Primary Seal can be checked while the valve is still in-line. This translates into minimal downtime for the operator, as replacement valves can be brought out to the field before the valve even fails. WOM's Dual Seal Ball Valve can also be configured to have a third seal on the downstream side of the valve, providing reliability and protection unmatched by any other ball valve in the industry.



TWO VALVE MODELS, both having the patented Dual-Seal seat technology:

- Model 30 – bolted on External upper and lower trunnions
- Model 40 – patented Internal split trunnion blocks - allows the stem to be installed before the valve is assembled.





Features and Benefits for Model 30 & 40

- Primary Seal acts as a wiper ring to clean off the ball and protect the Secondary Seal
- All valves are Double Block and Bleed (DBB)
- All valves are low fugitive emission tested per ISO 15848-1
- All Dual Seal Ball Valves are ISO Fugitive Emissions Certified per ISO 15484-1: 2006
- Model 30 available in sizes ranging from 2" to 36", Available in ASME Pressure classes 150-900
- Model 40 available in sizes ranging from 2" to 12", Available in ASME Pressure classes 150-1500, with working pressures ranging from 285 psi to 3,705 psi
- Fire-Safe per ISO, API 6FA, or API 607
- API 6A - 2,000-3,000 PSI in size 2 1/16" - 7 1/16" in Model 40
- Integral stop ensures precise 90 degrees of rotation
- Patented Split-Block in the Model 40 features the Valve stem inserted from body interior, making the stem positively blowout proof
- In Liquids service there is no need for external pressure relief from thermal expansion. Valve self-relieves internally
- Optional Third Seal for additional protection, and to control which end of the valve the thermal relief will bleed to
- Optional Metal to Metal Primary seat for severe service conditions
- Designed to replace through-conduit gate valves in mainline service

Dual-Seal Ball Valve Trim Chart

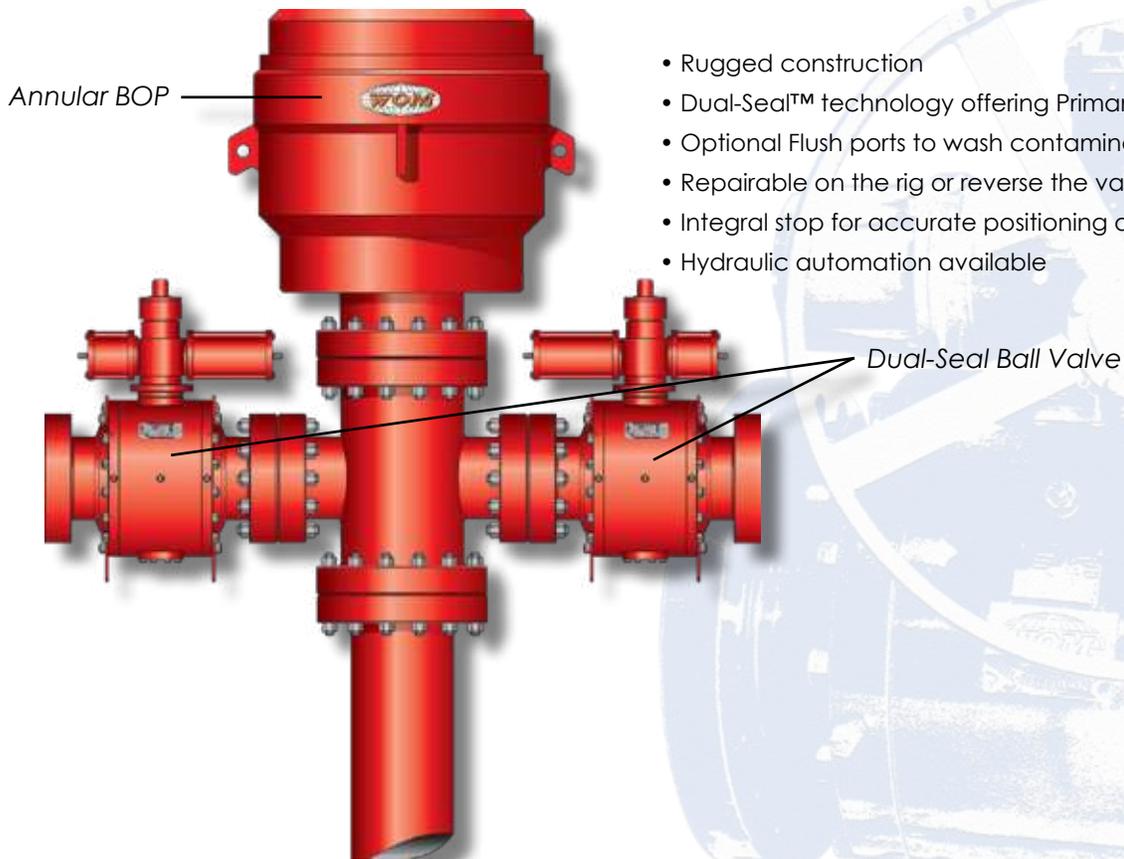
WOM Dual Seal™ Ball Valve Material Selection							
Component	Trim A	Trim B	Trim C	Trim D	Trim E	Trim F	Trim G
	General Service- Oil, Natural Gas, Refined Products Temp Range: -29 to +121C, -20F to +200F	Low Temperature Service -Oil and Gas Service Temp Range: -45C to +121C, -50C to +200F	Mild Brine Service- Temp Range: -29C to +121C, -20F to +200F	Severe or Sour Brine Service - Temp Range: -29C to +121C, -20F to +200F	Severe Sour Service- Oil and Gas NACE S.S. Trim Temp Range: -29C to +121C, +20F to +200F	Highly Corrosive Oil and Gas H2S/CO2 Sour Service- NACE Full S.S. Temp Range: -29C to +121C, -20F to +200F	Highly Corrosive hydrocarbon and chemicals NACE Full S.S Temp Range: -29C to +121C, -20F to +200F
Body, End Connections (1)	Alloy Steel	Alloy Steel, Q&T controlled hardness RC-22 max A216 WCB	Alloy Steel Seat Pockets overlaid with 316 S.S. A216 WCB	Alloy Steel controlled hardness, RC-22 max. Seat pockets overlaid with 316 S.S A216 WCB	Alloy Steel controlled hardness A216 WCB	CF8M Cast Stainless Steel	Duplex Stainless Steel
Stem	4130 Alloy w/ENP	4130 Alloy Steel w/ENP Controlled Hardness	4130 Alloy w/ .003" ENP	17-4 PH S.S	Inconel 718	Inconel 718	Duplex Stainless Steel
Seat Assembly	Carbon Steel/ Electroless Nickel Plate	Carbon Steel/ Electroless Nickel Plate	Carbon Steel w/.003" Electroless Nickel Plate	17-4 PH S.S	17-4 PH S.S	17-4 PH S.S	Duplex Stainless Steel
Ball	Carbon Steel/ Electroless Nickel Plate	Carbon Steel/ Electroless Nickel Plate	Carbon Steel w/.003" Electroless Nickel Plate	17-4 PH S.S	17-4 PH S.S	17-4 PH S.S	Duplex Stainless Steel
Seat Insert	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon
Stem Seal (2)	Viton	Viton	Viton	Viton	Viton	Viton	Viton
Springs	17-7 S.S	Inconel X-750	17-7 S.S	Inconel X-750	Inconel X-750	Inconel X-750	Inconel X-750
O-Rings (3)	Viton	Low Temp O-Ring	Viton	Viton	Viton	Viton	Viton
Bolting	A193-B7	A193-L7M	A193-B7	A193-B7 Fluoropolymer coated	A193-B7M	A193-B7M	A193-B7M
Body Fittings	Carbon Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel

Notes:

1. C.R.A (Corrosion Resistant Alloys) inlay in seat pockets can be added to any valve
2. Upper stem seals are self-energized Viton seals with additional Viton back up O-rings
3. Various O-ring materials can be used depending on temperature range and service conditions
4. Fluorocarbon coating on bolting is optional



Diverter System Valves



- Rugged construction
- Dual-Seal™ technology offering Primary and Secondary Seals
- Optional Flush ports to wash contaminants from body
- Repairable on the rig or reverse the valve for a new set of seals
- Integral stop for accurate positioning of open/closed
- Hydraulic automation available

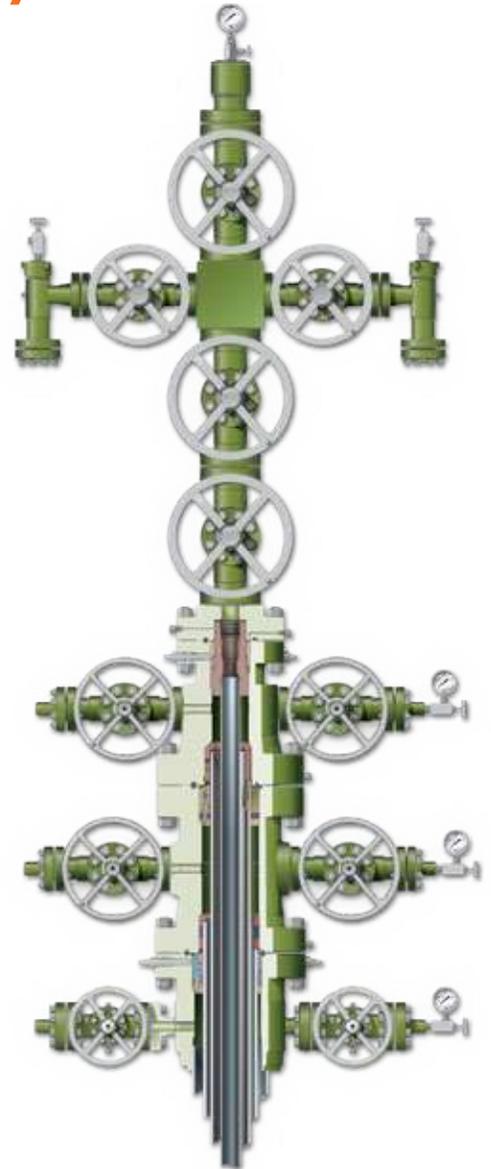
NO FUGITIVE EMISSIONS

ISO Spec 15848-1: 2006 (E), valve cannot exceed 50ppm of fugitive emissions after 1500 full pressure openings at 2220 psi.

The Dual-Seal Ball Valve passed this test with standard stem seals.



Wellhead and Christmas Tree Systems



Typical WOM XMAS Tree

The Patented Magnum Gate Valve, the key component of any WOM wellhead system, provides the most reliable long-term seal and lowest lifecycle costs. WOM designs, manufactures and supplies Wellhead and Christmas Tree Systems of all sizes, working pressures, and trims. The WC-22 wellhead system is the standard for outstanding service - onshore and offshore. The WC-22 wellhead system can be built to meet specific requirements for pressures from 2,000 psi through 20,000 psi, with metal-to-metal seal technology being standard on high-pressure applications.



Wellhead Products

Casing Heads

WOM's vast offering of Casing Head designs guarantee that our equipment is compatible with any industry-standard system. Casing Heads are compatible with WC-21, WC-22 and WC-29 casing hangers and Mandrel casing hangers. WOM's Casing Heads can be used in onshore and offshore environments, for general and sour service and in conventional or specialty wellhead systems.

Features and Benefits

- Manufactured to API 6A and available in nominal flange sizes from 11" to 21-1/4" in pressure ratings to 10,000 psi
- Outlet options available are threaded, studded, and flanged
- Available with two lockscrews/full sets of lockscrews or without lockscrews
- Optional bottom preparation including slip-on weld (SOW), Threaded bottom, or Slip Lock bottom preparation
- PSL-1 to 3 certified
- PR-1 and PR-2 certified
- Available trims in DD-NL, EE-NL, FF-NL, and HH-NL
- Optional Landing Base Plate assembly available for 20" to 30" conductor pipe



WC-22 BTS BP Casing Head



WC-29 SOW-BP Casing Head



WC-29 SL MS ET Casing Head

Casing Head Spools

WOM Casing Head Spools are designed to accept WC-21, WC-22 and WC-29 casing slip hangers as well as Mandrel casing hangers. WOM's Casing Heads can be used in onshore and offshore environments, for general and sour service and in conventional or specialty wellhead systems.

Features and Benefits

- Available in nominal flange sizes from 11" to 13-5/8" and pressures ratings to 15,000 psi
- Manufactured to API 6A specification or customize to meet customer requirements.
- Outlet options available to meet customer requirements
- Available with two lockscrews/full sets of lockscrews or without lockscrews
- Optional integral double FS-Seal, P-Seal, and metal-to-metal seal bottom preparation for high temperature and high pressure (HTHP) application



WC-29 MS ET Casing Head Spool



WC-22 FS BP Casing Head Spool

Wellhead Products Con't.

Tubing Head Spools

WOM's Tubing Head Spools feature a straight bore design for single and multiple completions. This design accepts all WTC series tubing hangers and easily converts from a single completion to multiple completions

Features and Benefits

- Available in nominal flange sizes from 7-1/16" to 11" and pressure ratings to 20,000 psi
- Outlet options available to meet customer requirements
- Designed to accept WC-21, WC22, and WC29 casing slip hanger and Tubing hangers
- Available with full sets of lockscrews
- Optional integral single or double Down Hole Control Line (DHCL) preparation
- Optional integral double FS-Seal, P-Seal and interchangeable metal-to-metal seal bottom preparation for HTHP application



WTC-MS1-ET Tubing Head Spool



WTC-FS-ET Tubing Head Spool

Tubing Hangers

WOM Tubing Hangers allow for nipping up/down the Christmas tree without blowout preventer (BOP) protection. WOM Tubing Hangers feature an annulus compression elastomer seal pack off or an optional annulus metal-to-metal seal energized by a compression ring.

Features and Benefits

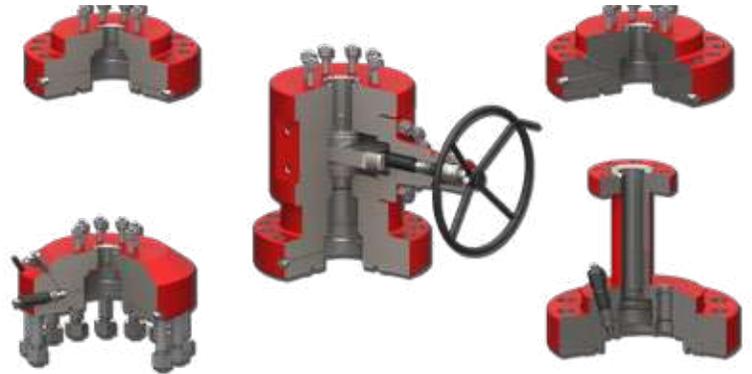
- Available in nominal sizes from 7-1/16" to 11" and pressure ratings to 20,000 psi
- Manufactured to API-6A specifications with stainless or Inconel body material and can be customized
- Extended Neck with multiple elastomer type seals or optional metal-to-metal seals are available for high temperature and high pressure (HTHP) application
- Annulus compression elastomer seal pack off or optional annulus metal-to-metal seal are energizing by compression ring
- Available with internal or external running and retrieving thread
- Standard type "H" Back Pressure Valve (BPV) preparation
- Available with API or Premium bottom internal thread
- Available with or without continuous and non-continuous Down Hole Control Line (DHCL) preparation



WOM WTC Series Tubing Hangers

Tubing Head Adapters

WOM Tubing Head Adapters are suitable for conventional and specialty wellhead systems, onshore and offshore and general and sour service applications. Designed for containing pressure and fluids within the tubing bore. WOM Tubing Head Adapters are fully customizable for the project at hand. Options include continuous or non-continuous Down Hole Control Line inlet preparation and integral manual or actuated Lower Master Valve.



WOM Tubing Head Adapters

Features and Benefits

- Available in studded or flange bottom sizes from 7-1/16" to 11" and studded or flange top sizes from 2-1/16" to 4-1/16", with pressure ratings for both to 20,000 psi
- PSL-1 to 3G certified
- PR-1 and PR-2 certified
- Available trims: DD-NL, EE-NL, FF-NL and HH-NL
- Available with S-Seal or metal-to-metal seal bottom preparation
- Available with or without continuous and non-continuous Down Hole Control Line (DHCL) inlet preparation
- Available with integral manual or actuated Lower Master Valve



Single Piece (SP™) Wellhead System

WOM's SP™ Compact Wellhead is a single-piece, compact wellhead system developed to accommodate different requirements of working pressure and casing programs. The SP™ Wellhead uses a minimum number of components all which are interchangeable within the system resulting in reduced installation time, possible leak paths and overall costs.

Features and Benefits

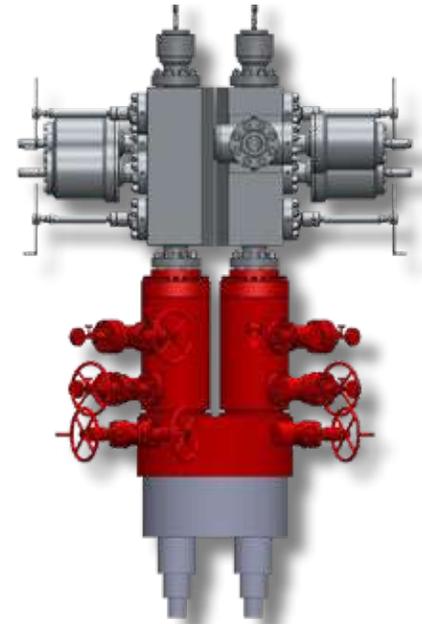
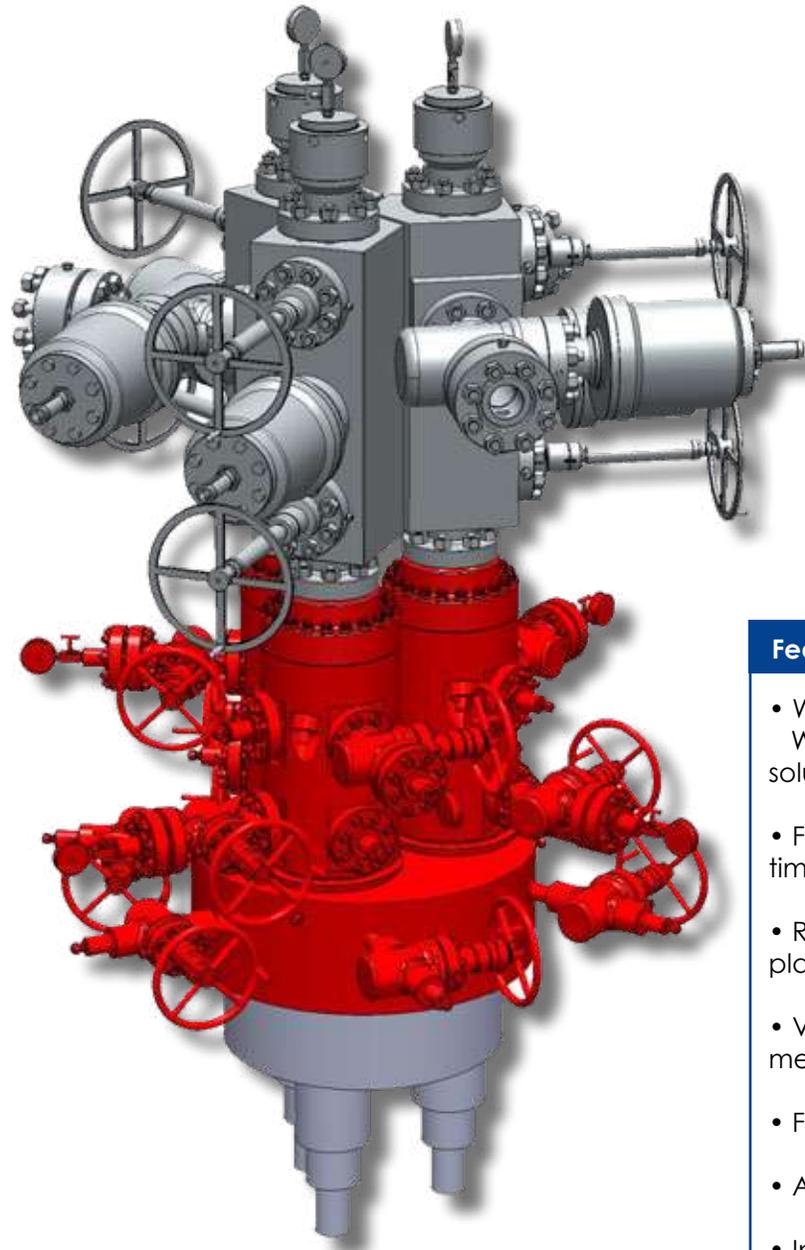
- Compact design saves space and permits the use of smaller platforms at a reduced cost
- Nominal size 9", 11", 13-5/8" or 18-3/4" and pressure rating of 5,000 psi or 10,000 psi
- Available in 2 or 3 stage hanger systems
- "WQ" Quick Connector on housing top connection
- Casing programs offer flexibility and can be easily changed on site
- Fluted mandrel-type hangers for effective cementing flow-by
- Mandrel-type hangers offer complete BOP control, eliminating work under BOP stack and enhancing safety
- Internal lockdown for hangers
- Same pack-off for all sizes of mandrel hangers
- Elastomeric and metal seal assemblies are interchangeable
- Design based on field-proven and fully tested technology
- Enhanced safety with minimum through-wall penetrations
- Cold cut option is available for emergency purposes
- Designed to meet API 6A, latest edition to PSL 1-4, Temperature Rating 0-350° F and Material Classification AA-HH meet NACE requirements



WOM Design SP 3 Stage Wellhead System

Multi-Completion (WMC™) Wellhead System

WOM WMC™ Wellhead System combines two or more wellhead systems, providing the ability to reach multiple pay zones, from a single conductor.



Multi-Completion (WMC™) Wellhead System

Features and Benefits

- WMC™ Wellhead System is WOM's field-proven SP™ Wellhead, that offers a compact, safe and reliable solution to multiple completion projects
- Fewer connections in the system results in significant rig time reduction
- Reduced envelope dimension allows for smaller platform requirement
- Various casing separation methods are available to meet specific drilling requirement
- Full metal to metal (MTM) seal completion is available
- Available in 2-in-1 and 3-in-1 configurations
- Individual wellheads can be configured to have a 9", 11", or 13-5/8" nominal size, up to a 10,000 psi pressure rating and a temperature range of -75°F to 250°F
- Manufacturing meets API Spec. 6A standards, and can be specified to meet at the material class, temperature class, and PSL level requirements of this specification



Manifold Systems

WOM specializes in the manufacture of manifolds for a complete range of onshore and offshore applications. WOM Manifold Systems may incorporate WOM Magnum Gate Valves, Check Valves, Chokes and WOM Actuators depending upon the application. WOM manifold designs meet virtually any industry requirement, including H₂S environments up to 20,000 psi. Skid mounted and fully automated packages are available complete with control panels and instrumentation.

Choke Manifolds

WOM's Choke Manifolds incorporate Magnum Gate Valves which have set the industry standard for reliability. All Manifold Systems are tested for function and pressure rating prior to delivery. WOM offers Choke Manifolds in five valve rectangular and four valve diamond patterns for limited space on offshore rigs.



Cement Manifolds

WOM's Cement Manifolds are available in working pressures up to 20,000 psi. Each system incorporates Magnum Gate Valves or Model 700 and is designed for heavy slurry and high pressure. WOM can design and manufacture Cement manifold to meet any custom requirements.

Standpipe Manifolds

WOM's Standpipe Manifolds incorporate Magnum Mud Gate Valves or Model 600 Mud Gate Valves and are rated for pressures up to 10,000 psi. Welded, flanged, hubbed, high-pressure fittings and hammer union constructions are built to meet customer preference. All systems are designed, manufactured and certified in accordance to recognized oilfield standards.

Blow Out Preventers

Typical WOM WGK Annular and
WU Ram Type BOP Assembly



For onshore and offshore operations, WOM manufactures popular Annular and Ram BOP designs.

WOM is certified to ISO 9001
Designed to NACE MR-01-75 materials standard for resistance to sulfide stress cracking.

Ram Type WU BOP

The WU BOP's simple and compact design makes it well suited for operations offshore and onshore. WOM's WU BOP's parts are fully interchangeable with U-Type BOPs in the market. The operation system of WU BOPs are designed to provide a fast and reliable closure around pipe or casing in the well bore. The sealing is energized by the pressure and is maintained even with loss of closing pressure. WOM's WU BOPs are operating in various places all over the world such as USA, Algeria, Kuwait, UAE, India, Indonesia, China and Oman.



WU Ram BOP

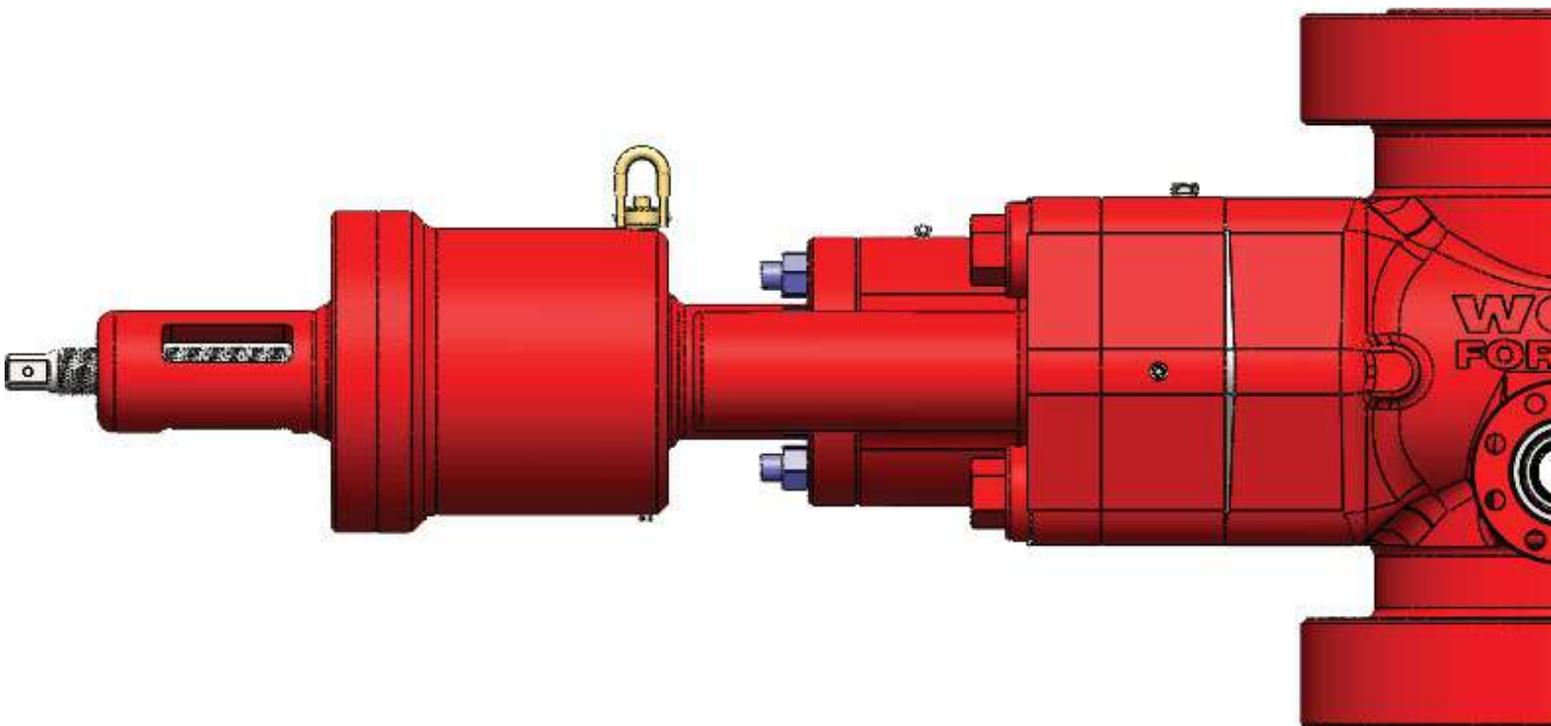
Features and Benefits

- Available in sizes ranging from 7"-5K to 26"-3K
- Ram packing is generous and self-feeding. It cannot be dislodged by fluid flow
- Operating pressure is moderate, due to the large area of the piston
- Changing the ram is quick and easy
- Hydraulically operated locking mechanisms to hold the Rams closed without actuation pressure
- Seals and a vent hole prevent well pressure from bleeding into operating cylinder
- All operating parts, as well as rams and seals, can be replaced on location, thus providing a completely reconditioned preventer

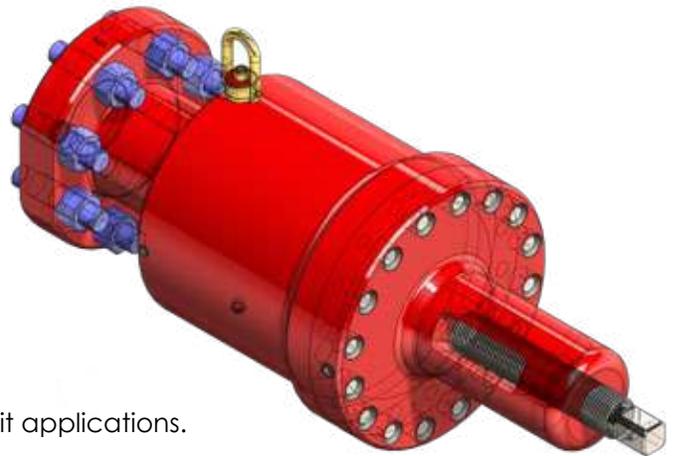
Super Power (SP) Tandem Boosters*

WOM's new Super Power (SP)-Tandem Boosters* are designed to enhance the shearing force of vRam-type BOPs. WOM's SP –Tandem Boosters offer more advantages and benefits over those of traditional shear boosters.

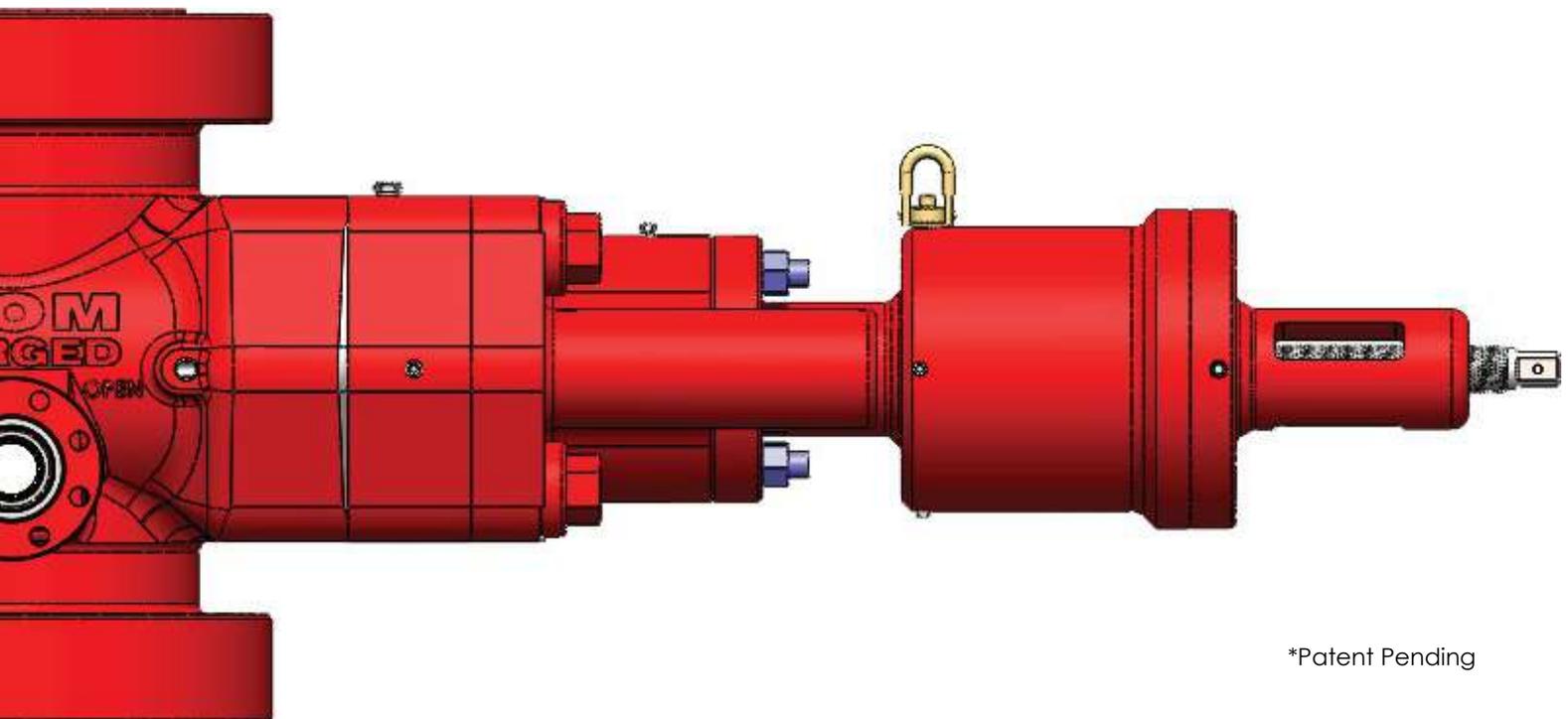
- May be utilized on any size of ram-type BOP such as but not limited to 7-1/16", 11", 13-5/8", 18 ¾" and 21 ¼".
- Offers ability to shear larger and heavier sizes of drill pipe required for deep drilling, where extra heavy wall-thickness is required for hydrocarbon producing wells or extreme sour environments.
- SP-Tandem Boosters with large bore bonnets have a rigid power of approximately one million pound force, capable of shearing drill pipe at any extreme well condition and harsh environment.
 - SP-Boosters provide twice the shearing force than traditional tandem boosters.
- SP-Tandem Boosters use of internal hydraulic flow path for hydraulic operations, eliminates external piping and exposure to damage during handling, storage, and shipping.
- Quick and easy field replacement of standard seals.
 - The SP-Tandem Booster uses the same seals as the large bore piston and shaft seals.
- Rigid and robust design. Each part is engineered in-house to meet and/or exceed national petroleum industry code and standards.



- Requires only three main components: Housing, Piston and End Plate; making assembly and disassembly quicker with low maintenance.
 - Eliminates the need for spacers, connectors, and other parts used in traditional tandem boosters.
- Weighs less than traditional boosters.
- Existing WU BOPs and other OEM BOPs may be retrofitted with SP-Tandem boosters to provide extra shearing force.
 - External hydraulic lines may be required for retrofit applications.
- May be utilized in smaller size ram-type BOPs, offering a reduction in size, weight and overall cost.
- WOM has successfully completed shear tests on 13 5/8" 10,000-psi blowout preventer utilizing SP-Tandem Shear Booster for the following drill pipes, witnessed by WOM's certified quality assurance personnel as per API-16A guidelines.
 - Drill Pipe OD 5", Grade S-135, PPF 25.6, closing pressure 2300-psi
 - Drill Pipe OD 5 1/2", Grade S-135, PPF 24.7, closing pressure 2200-psi
 - Drill Pipe OD 6 5/8", Grade S-135, PPF 25.2, closing pressure 1500-psi
 - Drill Pipe OD 6 5/8", Grade S-135, PPF 27.6, closing pressure 2,400-psi
- Above test criteria and governing rules meet the requirements of hydraulic closing pressure for drill pipe shear as per API-53 which is 90% below the rated hydraulic maximum pressure.



(Test charts and test data is available on request)



*Patent Pending

WGK Annular BOP

The WGK Annular BOP has proven reliability with an easy to operate design. The piston and packing unit are the only moving parts, ensuring minimal wear. The WGK Annular BOP is safer and more efficient, requiring less maintenance and downtime. WOM offers both WGK Screw type and WGK latch type Annular BOPs.

Features and Benefits

- Available in sizes ranging from 7"-5K through 21" - 3K
- Conical bowl design of the piston provides a simple and efficient method of closing the packing unit
- Design enhances the ability of the packing unit to reopen to full bore position
- Remaining packing unit life is measurable without disassembly and ensures the longest and safest use of the packing unit
- Pipe can rotate and tool joints stripped without breaking the seal during engagement
- Optional packing unit rubber compounds permits more flexible applications



WOM WGK BOP (Latched Type)



WOM WGK BOP (Screw Type)



Deepwater Riser System

The Deepwater Riser System is fitted with an Emergency Shut Down (ESD) control system. The system will carry out a controlled closure of the Flowhead, EDP (Emergency Disconnect Package), and LRP (Lower Riser Package) valves in emergency situations. The Deepwater Riser Components, Flowhead, EDP, LRP and Choke Manifolds will isolate and secure the well. Additional components of the Deepwater Riser System are the HPU (Hydraulic Power Unit) and the Umbilical Reeler.

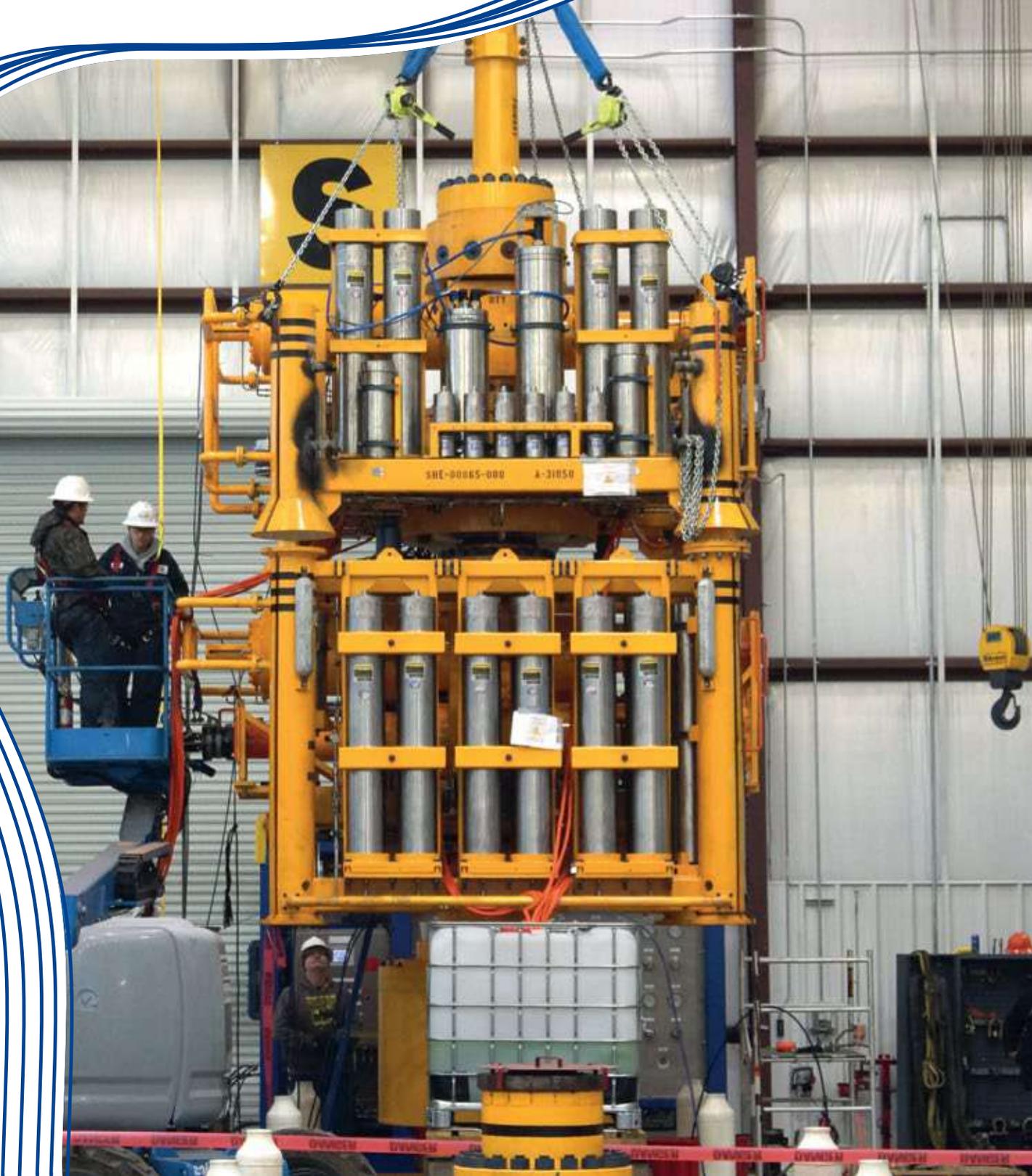


WOM's Deepwater Riser System - DRS (also known as Subsea Intervention System-SIS) being deployed on Cal Dive's (Helix) Q-4000

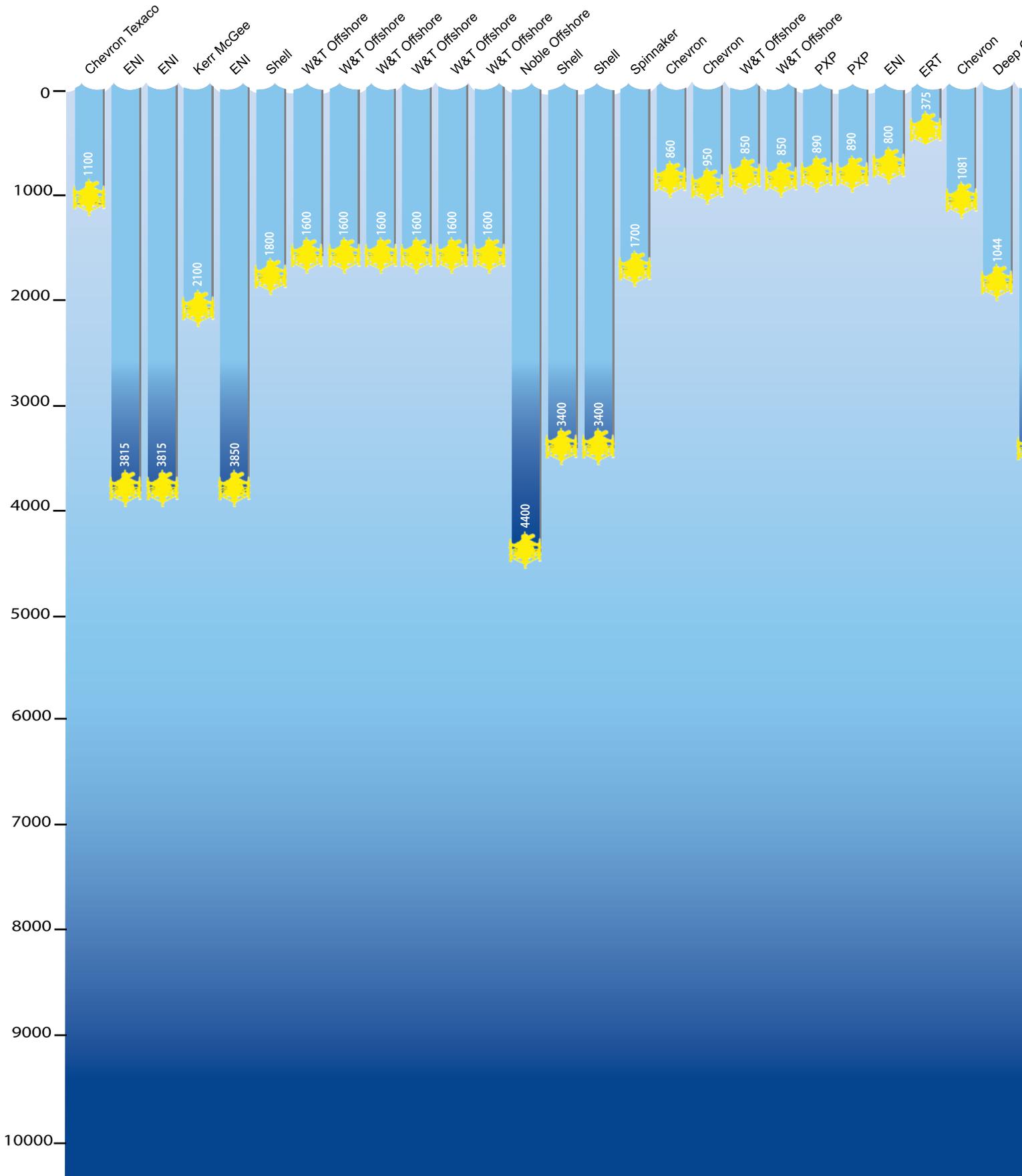
Features and Benefits

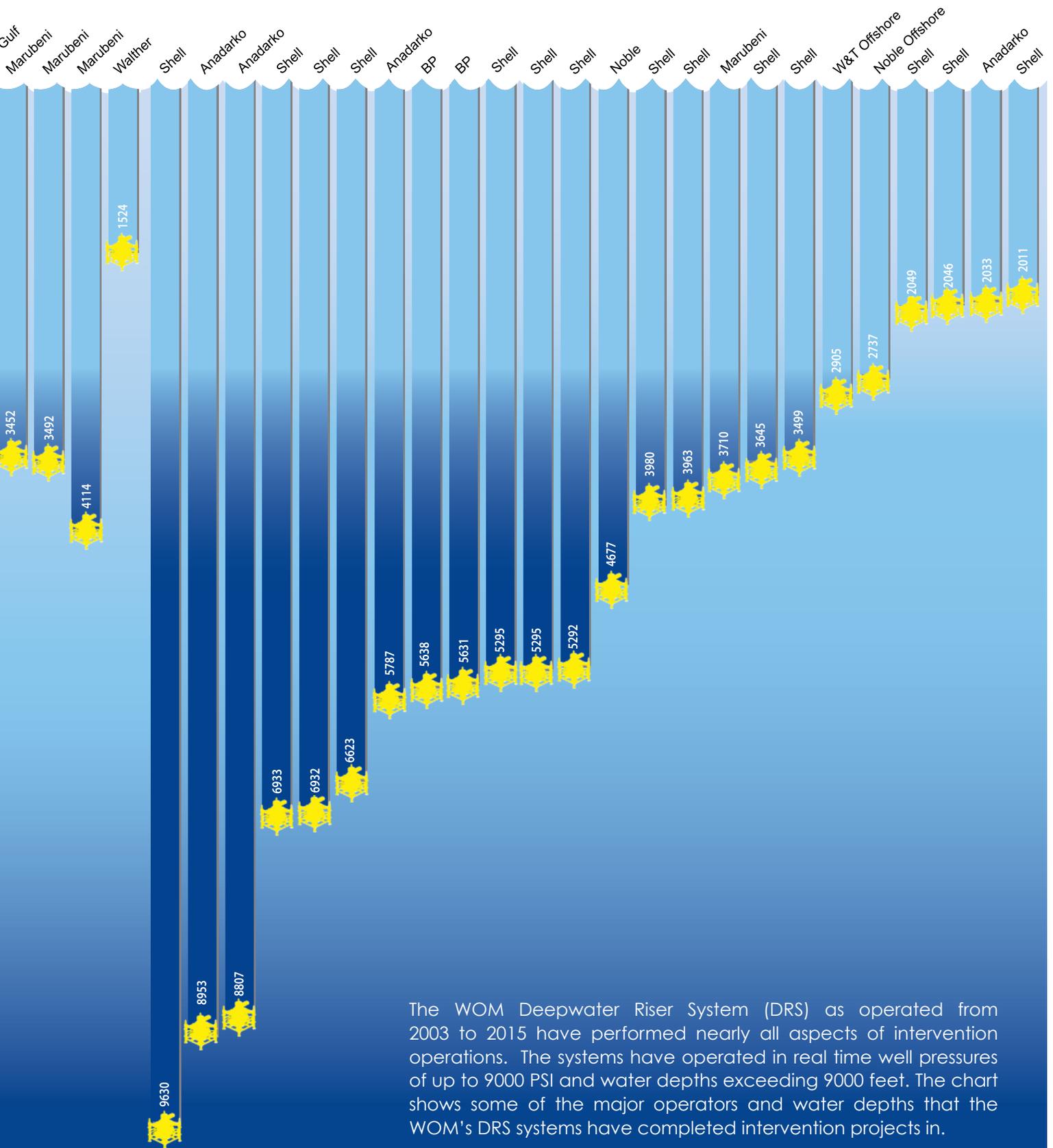
- Compact, lightweight modular system design
- Significant weight and space advantages
- Can be run guideline or guideline less
- Safely work over wells from much smaller, less expensive vessels
- Offers two levels of redundancy for safety
- Ability to isolate wellbore pressure when changing out tools
- Ability to cut 2-7/8" coil tubing to shut in the well
- The WOM "Sure-Seal" has proven to successfully seal the well after cutting, in low pressure gas testing
- Will interface with both Horizontal or Vertical trees
- Quickly adapts to Tree Running Tool's (TRT) and or wellhead connectors offshore
- The system can be outfitted for Riser or open water wireline operations
- Full metal-to-metal thru bore sealing on all well control valves
- Capable of shearing coil tubing and wireline/slickline
- All pressure containing valves and components rated to full working pressure (thru bore and annulus)
- Can be deployed on dedicated intervention vessels or, vessels of opportunity (VOO) - MODU's
- On board hydraulic equipment (SPM's, regulators, subsea accumulation) allow for direct hydraulic or MUX control system interface
- IWOCS control lines with pass thru capability eliminates the need for Guillotines or running of IWOCS umbilical over the side.

Deepwater Riser System



Deepwater Riser Deployment Summary Chart





The WOM Deepwater Riser System (DRS) as operated from 2003 to 2015 have performed nearly all aspects of intervention operations. The systems have operated in real time well pressures of up to 9000 PSI and water depths exceeding 9000 feet. The chart shows some of the major operators and water depths that the WOM's DRS systems have completed intervention projects in.

Deepwater Riser Package

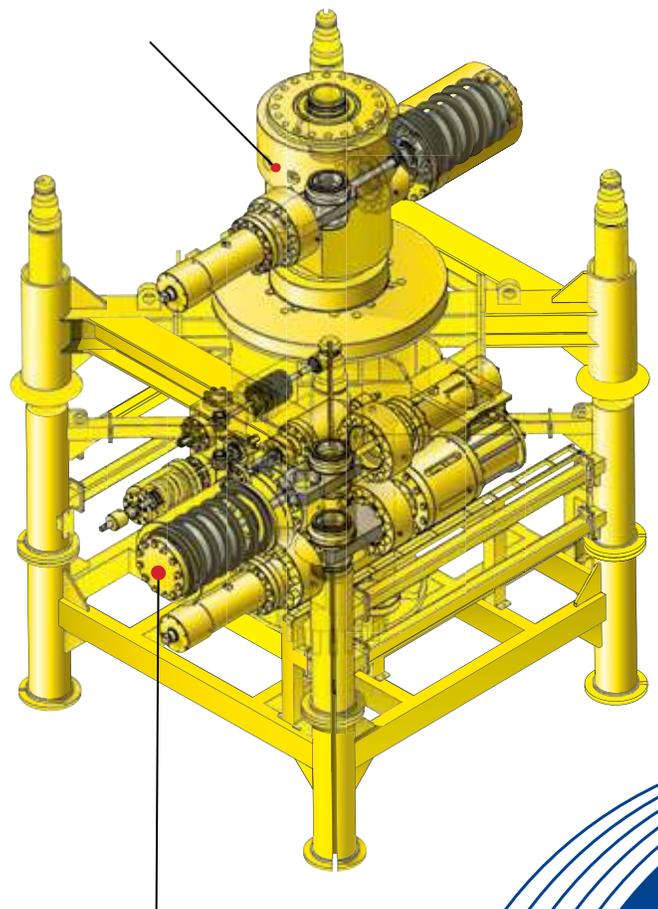
EMERGENCY DISCONNECT PACKAGE FEATURES

The Emergency Disconnect Package (EDP) forms the upper section of the Deepwater Riser System when connected to the Lower Riser Package (LRP). The EDP serves as the disconnect package and also adds another pressure barrier for the wellbore and annulus when in normal riser based operations. The interface to the riser is completed at the top of the RTV (Retainer Valve) block valve on this portion of the package. The EDP assembly consists of the EDP connector and the RTV valve block and EDP annulus valves. This equipment is assembled and secured in a suitable frame complete with control system, pressure compensation system, umbilical termination and annulus termination, accumulation, regulators and ancillary equipment.

The unit consists of:

- 7-3/8" 10k Retainer valve block
- Hydraulic Collet Connector
- 2" bore annulus female receiver
- 2-1/16" 10k Manual Annulus valves
- ROV intervention panels
- Subsea Accumulators
- Hydraulic coupler moving stab plate assembly
- IWOCs pass thru capability
- EH/MUX equipment
- Controls and ancillary equipment
- Frame

Emergency Disconnect Package



LOWER RISER PACKAGE

The Lower Riser Package (LRP) forms the independent well control barrier immediately above the Production Tree or Wellhead. The LRP interfaces with the EDP package by means of a hub end reentry mandrel. The LRP package encompasses the dual valve block assembly that facilitates the well bore sealing mechanism. The Lower cutting valve (LCV) is capable of cutting tubing while the Upper Cutting Valve (UCV) is capable of cutting slickline/wireline. The annulus valve arrangement on the LRP completes the capabilities to access all areas of the well with redundant barriers. This equipment is assembled and secured in a suitable frame complete with control system, pressure compensation system, umbilical termination and annulus termination, accumulation, regulators and ancillary equipment.

The unit consists of:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Hydraulic Connector • Annulus Crossover valve arrangement • Hydraulic Control Coupler Plate • Support and protection Frame • IWOCs pass thru capability | <ul style="list-style-type: none"> • Frame • 7-3/8" 10K Dual Valve Block • 13-5/8" 10K hub end Re-entry Mandrel • Subsea Accumulator bank • ROV Intervention panels • Controls and ancillary equipment |
|---|--|

Lower Riser Package

Riser-Less Light Well Intervention System



With WOM's modular design concept, the basic building blocks of the system allows many of the same pieces to be used both in the riser based and Riser-Less Intervention Systems. Many of the same features of the riser based system are incorporated into the Riser-Less System, i.e. controls options, dual barrier on the LRP package, full cutting capability for wire and e-line, IWOCSS pass thru, etc.

WOM's Riser-Less Light Well Intervention (RLWI) system is designed to perform all types of wireline jobs using braided wire or slickline. It enables operations of toolstrings with variable length, and can be designed with or without the capability of circulating well fluids to the intervention vessel. The system is flexible and can perform operations on all Subsea Tree configurations for production and injection wells.

Subsea Trees

WOM offers Production & Injection Subsea Trees for both shallow water and deep water applications, rated up to 15,000 psi and designed to API 17D specifications.

Vertical Tree Systems

- Available in mono-bore and dual-bore configurations
- Mono-bore configuration built with WOM Patented Magnum Gate Valve blocks available with nominal bore sizes up to 5"
- Dual-bore configuration incorporates annulus access valve to monitor annulus pressure
- Dual-bore configuration available with production bore up to 5" and annulus bore up to 2"



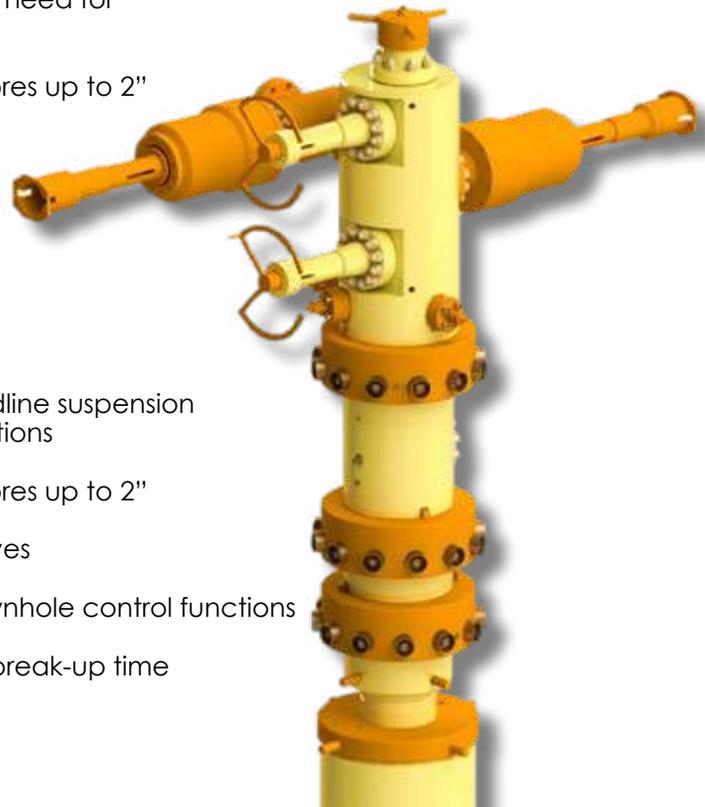
WOM's Mono-bore Vertical Subsea Tree

Horizontal Tree Systems

- Horizontally positioned primary valves give easy access for tubing retrieval and workover intervention without the need for removing the tree
- Available with production bores up to 5" and annulus bores up to 2"
- Tubing hanger features metal-to-metal seal
- Guide funnel allows for running without guide wires
- Optional protective structure is available

Mudline Suspension Tree

- Paired with WOM's MLS Wellhead, the diver-assisted mudline suspension tree is a cost-effective solution for shallow water completions
- Available with production bores up to 5" and annulus bores up to 2"
- Utilizes WOM's dual-seal hydraulic and manual gate valves
- Tubing hanger has required tubing preparation and downhole control functions
- WOM's WQ Mechanical Connector reduces make-up/ break-up time
- Optional protective structure available



WOM's Mudline Suspension Tree

Subsea Manifolds

One of our major areas of expertise includes the design and construction of Subsea Manifolds, PLETs and PLEMs. We provide detail engineering and project management to our clients to ensure successful completion of these structures. The reliable Magnum Subsea Gate Valves and Actuators have been incorporated in several applications of subsea manifolds and Pipeline End Terminations including the East Sterling manifold installed in the North Sea and the Chevron PLETs installed offshore Angola.

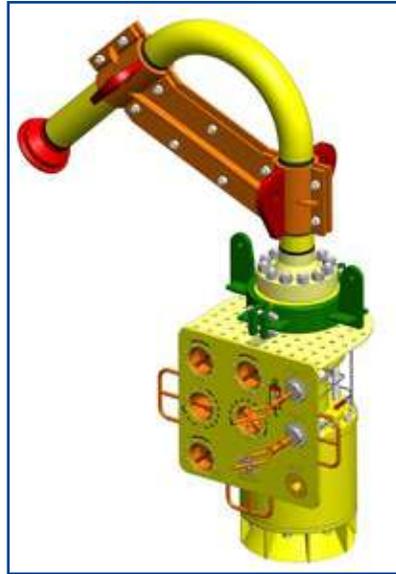
- WOM provides custom engineered subsea manifolds along with the project management support to ensure successful completion of these projects
- Subsea manifolds can be configured with provisions for multi-well tiebacks, flowmeters, chokes, check valves, control systems and inlet and outlet flowline connection systems
- Optional insulation system
- Cathodic protection system



Subsea Connection Systems

WOM's subsea connections use hydraulically actuated Collet segments or a lock ring to connect to the hub and generate preload. A self-locking taper on the Cam ring enables the connector to maintain preload without the need for an external locking pressure

- Wellhead/XT Connector
- Riser adaptor/EDP/LRP Connector
- Flowline/Jumper Connector



WOM's 7-5K Flowline Connector



WOM's 18 3/4-10K Connector
Subjected to Bending Load Test

Well Containment System

Well Containment Device (WellCap) is used in the event of an uncontrolled flow from an existing subsea tree or wellhead during well intervention and light completion and work over's.

The Wellcap can be deployed from any Semi, Drillship or mono hull type vessel that meets the weight and loading requirements. This allows the system to be situated over a flowing well with the thru bore open and unobstructed to allow the well fluids to pass thru the WellCap.

- Dual ram assemblies
- Lightweight assembly capable of being deployed on cable, drill pipe or riser
- ROV-operated controls and on-board accumulators eliminate the need of an external power supply to secure the well.
- Accumulators can be recharged thru a conduit line from the surface or a SAM
- Two dual block valves act as fail-safes and provide venting and circulation underneath the rams



Slimbore Drilling Package

WOM's Slimbore Drilling Package is a 13-5/8" full-bore, modular well control package designed for offshore drilling, completion and work over (intervention) applications particularly where rig/moonpool space is limited.

- Maximum working pressure of 10,000 psi at a depth of 10,000 ft
- Modular uncomplicated design facilitates assembly, deployment and routine maintenance
- Redundant hydraulic, acoustic and mechanical controls with positive feedback ensure reliability and safety.
- Standardized components for ease of operation and maintenance as well as simplified logistics and spare parts inventory



Subsea Shut-Off Device



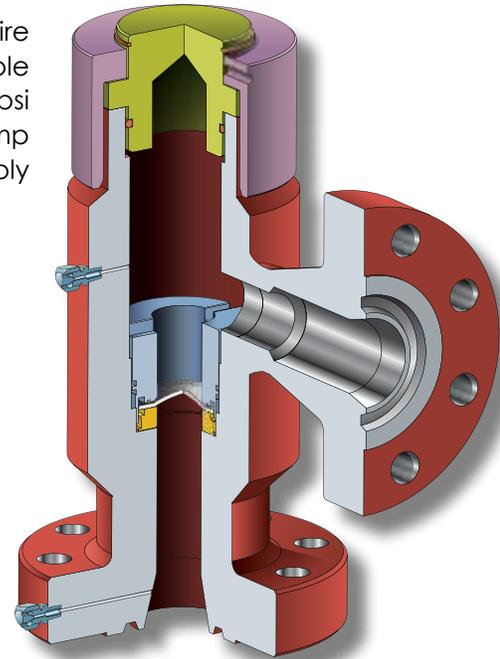
- Provides emergency backup well control in the event of BOP and control unit malfunctions
- Able to cut and seal both wireline and coil tubing
- Optional wellhead connector & mandrel profile designs available
- Can be configured for guideline or guideline-less applications with required coating and cathodic protection
- Controls are isolated from standard BOP control systems and have backup ROV intervention interfaces for increased redundancy and safety

Pump Saver

WOM's Magnum Pump Saver uses easy-to-install rupture disks which require no special tools to remove and replace. Pump Savers from WOM are available in sizes from 2-1/16" to 3-1/16" and in pressure rating from 5,000 to 15,000 psi and are more accurate than standard industry pop/relief valves. WOM's Pump Saver offers a consistent +/- 5% repeatability up to 3,500 psi and a remarkably precise +/- 3% repeatability over 3,500 psi.

Features and Benefits

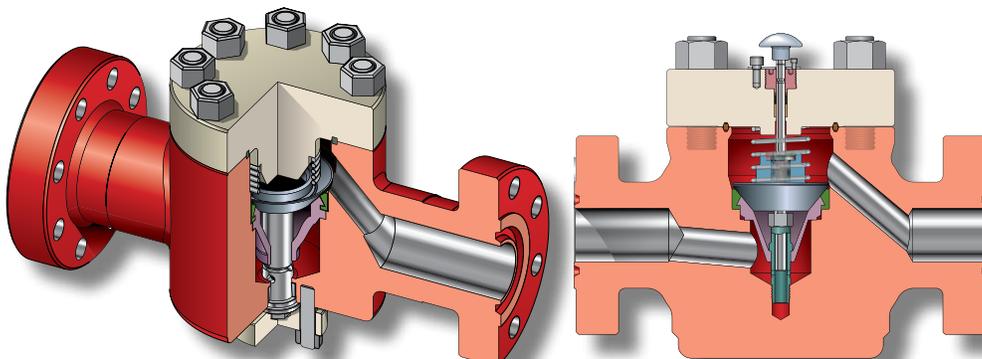
- 4 times more accurate than pop/relief valves
- Quick Make-up Cap Assembly
- Manufactured from quality high pressure forged materials
- Available in a wide choice of end connections
- Trimmed to handle H₂S and salt water contents
- New rupture discs can be easily and quickly replaced
- WOM's Pump Saver is completely interchangeable with existing pop or relief valves.



WOM Pump Saver with high pressure flanged end connections

Check Valves

WOM offers a lift type check valve for the prevention of back flow in high pressure and/or high temperature mud lines, choke & kill manifolds and Christmas tree injection and kill lines. Available in sizes 1-13/16" through 4-1/16" (larger sizes available upon request) and pressure ratings of 3,000 psi through 20,000 psi, WOM Check Valves can be configured with flanged, butt weld, hub type, or a combination of end connections to suit customer's specifications.



Standard Type "R" Check Valve

Lock-Open Type Check Valve

Chokes

WOM manufactures a wide range of low maintenance chokes. WOM chokes are manufactured to API 6A with a choice of trims, temperature ratings, and end connections to meet a variety of services. WOM drilling chokes are designed as per API 16C.

Features and Benefits

- Positive and Adjustable Chokes available in pressure ratings from 2,000 psi to 15,000 psi
- Positive and Adjustable Chokes available with inlet and outlet flanges from 2-1/16" to 5-1/8"
- Control Chokes are available with a plug & cage or an external sleeve trim. These chokes are designed to provide accurate flow control throughout its operating range.
- WOM drilling chokes offer the customer increased service life and cost savings in high pressure drilling operations especially where substantial amount of abrasive fluids are present.
- Drilling chokes are available in 1-3/4" orifice trim with 5000 to 15000 PSI pressure rating.
- The disc type choke valve is designed for MPD packages (Managed Pressure Drilling) where the valve witnesses polluted media & high pressure differentials.
- Disc type choke valve is available in 1", 1.5" and 3" maximum orifice trim with 5000 to 15000 PSI maximum working pressure.



WOM's Adjustable Choke



WOM's Hydraulic Drilling Choke

WOM's Positive Choke

Controls and Instrumentation

Advanced Control Systems

WOM's Advanced Control System is Copyright protected and patent pending.

Application

- Choke and Kill System
- Buffer Manifold Control
- Managed Pressure Drilling (MPD)
- MPD Interlocking System
- PRV Control System
- Single Set Point Choke Control System
- ESD Systems
- Wellhead Control System
- Flowhead Control System
- Liquid Seal Monitoring System

PLC/HMI Features

- 15"/19" HMI
- Widescreen-TFT-Display
- 16 Million Colors
- Proficient Interface, MPI/profibus DP Interface
- Panel Mount Design
- Dual Power Supplies with Redundancy Module
- DP/DP Coupler
- Integrated Display on PLC Faceplate for Controller Status
- Driller Interface
- Data Logging and transfer



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Advanced Control Systems Software

The WOM Control System software is equipped with intelligence that allows mechanization of the well control manifolds. The software's diagnostic configuration resides inside the WOM PLC/HMI. The software (PLC/HMI) is written using Siemens TIA portal and includes the following features:

- **Intergrated System Diagnostics**
- **Fast error localization and error analysis**
- **Identical visualization of error messages in the TIA Portal, on HMI, on the Web server and on the PLC CPU in plain text format**

There are six features remarkably distinguished by the use of the WOM Control System software.

- **Alarm/diagnostics Processing**
- **Calibration**
- **Datalogging**
- **Interlocking Valves**
- **Dynamic Gauges**
- **LQS Monitor**

Industry Standards

- **API 16C Monogram License**
- **DNV-OS-E101**
- **ABS CDS**
- **ATEX**
- **IECEX**
- **CSA**
- **Norsok**



Controls and Instrumentation

Standard Drilling Choke Control Panel

■ Configurations/ Options:

- Stand Alone/Floor Mount
- Blind HPU
- Remote Wall Mount

■ API 16C Drilling Conformance

- **Emergency Operation Provisions**
 - Nitrogen Connection
 - Hand Pump
- **Rig Air Connection**
- **Choke Pressure**
- **Stand Pipe Pressure**
- **Choke Position Indicator**
- **PSC**
- **Primary and Back Up Pump**
- **Accumulator**
 - Increase Choke Speed
 - Smooth Choke Operation
 - Emergency Power Source
- **Choke Speed Control**
- **Power to close Choke from fully open within 30 seconds**

■ Stainless Steel Cabinets Type 316SS

■ 316SS Internal Hard Tubing

■ Suitable for Zone 1 and Zone 2



Floor Mount Local Panel



Wall Mounted Remote Panel

Emergency Shutdown System (ESD)

WOM's ESD system provides a fast acting functional safety shutdown in case of a hydrocarbon escape or other safety issues. This system located on the rig floor is designed to actuate SSV valves installed on or near the flowhead. The control panel includes:

- **One ESD local control; installed on the control panel face**
- **Maximum five (5) Remote ESD control stations**
- **Hi-pilot pressure set point; pilot device**
- **Low-pilot pressure set point; pilot device**
- **Fusible plug**
- **One High Pressure hydraulic hose 100 feet, rated for 6,000 psi**
- **Air Hose(s) for Remote Stations, 100 feet**

Custom configurations available upon request.



ESD System

Flowhead Control Panel

WOM's Flowhead Control Panel located on the rig floor allows for remote shut-in of the well at the flowhead. The system is designed to actuate a maximum of two (2) double acting hydraulic gate valves and two (2) fail-safe actuated valves as follows:

- **Two (2) hydraulic operated fail-safe actuated wing valves**
- **One (1) hydraulic operated swab valve**
- **One (1) hydraulic operated master valve**

Custom configurations available upon request.



Flowhead Control System

Well Test Equipment



Magnum Technology Center
A WOM Group Company

Magnum Technology Center (MTC) designs and manufactures complete equipment packages for well testing & production and managed pressure drilling services and offers an extensive catalog of onshore and offshore well test equipment that has been specifically designed to be as compact and easily deployable as possible. As part of the WOM Group, MTC has full access to the resources and engineering capacity of WOM and makes liberal use of Magnum valves in all of its well test equipment. Fully certified to industry and governmental standards and backed up by extensive operational experience and customer support, MTC delivers well test equipment that is suitable for virtually any well test application.

Standard Managed Pressure Drilling Packages
MPD 5K Choke Manifold Packages
MPD 2K Choke Manifold Packages
MPD Mud Gas Separators
MPD Manifold and BOP Control Panel and Accumulator Packages
MPD Pipe Packages

Standard Well Test Packages
Offshore Packages from Flowhead to Burner Boom
Onshore Packages from Flowhead to Burner
Cost Conscious Packages from Choke to Burner
Trailer Mounted Packages - Twin Trailer Concept



Twin Pot Sand Filter - 3 1/16" 10K psi

10,000psi WP Twin pot sand filter package installed in 20ft CSC & DNV 2.7-1 skid and crash frame supplied with explosion proof lighting package and lifting sling set. Vessels designed for inside to outside flow with API flanged inlet, outlet and drain connections with quick union type top entry connection.

Vessels inlet, outlet and bypass manifolding supplied as double block and bleed on inlets and outlets of filter vessels and single block on bypass line with 9 x API 3-1/16" 10,000psi WOM 200M flanged gate valves. Vessel drain manifolding supplied as single block with 2 x API 2-1/16" 10,000psi WOM 200M flanged gate valves and 1 x API 2-1/16" 10,000psi WOM flanged Adjustable choke.

Process Inlet & Outlet connections 3" 1502F x M with blinds / Drain connection 2" 1502M with blind / Flushing system connection 2" 1502F with blind.

Technical Details

- Choice of inner filter screen size in each vessel with DP rating of 2000psi.
- Vessel bled off system with Autoclave / NPT needle valves and tubing.
- 6 point vessel flushing system (2 on inlet side / 4 on outlet side) with Autoclave / NPT needle valves and 1/2" SS tubing supplied from 2" flushing header and 2" 1502 inline check valve on inlet.
- Electronic Delta P Gauge system with Autoclave / NPT needle valves and tubing. Includes optional output to Data acquisition system (DAS).
- Pressure gauges on upstream and downstream block with Autoclave / NPT needle valves.
- Drip pan in skid base with grating and upper working platform with roof access ladders and fold down safety handrails on top of frame with integrated extending frames over each vessel for filter vessel screen removal with manually operated lifting hoists of 2000 Kgs capacity.
- DVR / COC design conformity to ASME VIII Div.2, API 6A and Nace MR01.75.
- Three coat marine paint system with topcoat as specified by client.
- Operating Temp. range -20 to 250 Deg F.
- Design capacity of 35 MMSCFD/ 5,000 BOPD
- Manufacturing codes: ASME VIII Div 2 / API 6A / DD-NL / PSL3 / P+U / NACE MR01-75 / ISO- CSC / DNV 2.7-1 / Eexd Zone 1 Electrics



Well Test Valves

WOM's Well Test Valves take full advantage of the Magnum design providing a bi-directional, thru-conduit, upstream and downstream seal. WOM's Surface Safety Valves (SSV) and Wireline Cutting Gate Valves are enclosed in a protective frame to protect the valve during use. WOM's SSV's and Wireline Cutting Gate Valves are trusted by oilfield operators throughout the industry to reliably close and cut under any condition.

Both the SSV and the Wireline Cutting Gate Valve meet API standards and can be provided with a variety of connections including hammer lug unions, Graylocks, API 16A hubs or API 6A flanges.

SSV's can be configured with a manually operating hydraulic pump or a hydraulic control unit with Emergency Shut Down system.

The Wireline Cutting Gate Valve is capable of cutting braided line or slick line up to 7/32" in diameter and provides a single point cut to ensure a reliable seal after a cutting.



Flowheads

- WOM's Modular Flowhead uses a tubing swivel to allow for string rotation without the need for rotation of the flowhead itself
- WOM's Solid Block Flowhead Systems are designed with the choke and kill line outlets at a downward angle in order to satisfy minimum space requirements
- Flowheads can be supplied with any connection type and are manufactured, assembled and tested as a complete field unit
- WOM offers both Modular Flowheads and Solid Block Flowhead Systems
- Removable crash frame included to provide protection for valves and actuators
- All valves are single-piece slab gate valves with hard faced surfaces



Custom Design and Manufacture

Customer requirements for controlling unique pressure situations may not always be successfully achieved by off-the-shelf components.

To address these potential situations, WOM provides custom designed systems for onshore, offshore and subsea applications. All of WOM's custom designed production equipment utilizes Magnum technology wherever possible to provide the highest level of reliability in every package. WOM's custom designed packages are made to meet and surpass the guidelines of both the client and industry regulatory agencies. All custom packages are manufactured using the API and ISO approved facilities and methods with which WOM's standard products are manufactured. The basic building block of these systems is the Magnum Gate Valve. The versatility, adaptability and reliability of this valve design ensures ease of incorporation with other components to provide greater safety, longer service life and minimized maintenance.



Magnum Forge and Machine Works

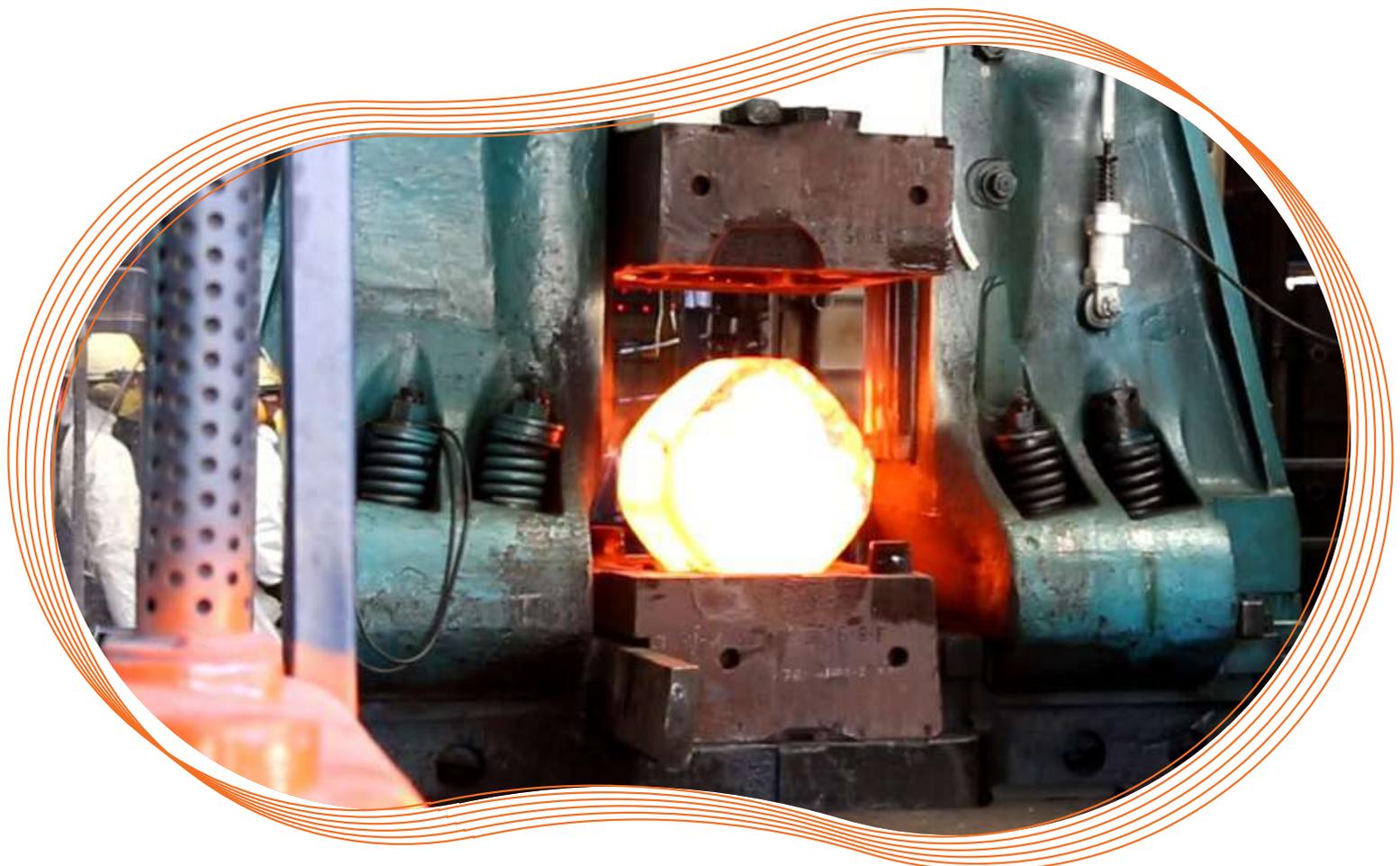


MAGNUM FORGE AND MACHINE WORKS

Magnum Forge produces forgings in a variety of configurations to meet virtually any customer requirement. Magnum Forge maintains strict quality control procedures that conform to standards set by the industry in which the product will be used. The plant has the capacity to ensure quick delivery with competitive pricing.

- Heat Treatment & 4,700 Gallon (18,000 liter) Quenching Tank
- CNC Machines/Die Sinking Machines
- Ultrasonic Testing
- Chapry Impact Testing
- Physical & Metallurgical Laboratory
- 16 Ton Pneumatic Closed Die Hammer
- Heat Treatment Furnaces
- Cutting Shop
- Alloy Steel
- Inconel
- Duplex & Super Duplex
- Central Lathe
- Magnetic Particle Testing
- Chemical Laboratory
- Open and Closed Dye Forging
- Bogie & Bofco Furnaces
- Machine Shop
- Low & Medium Carbon Steel
- Stainless Steel
- 17-4PH

FORGED PRODUCTS
High Pressure Fittings
Gate Valve Parts
Ball Valve Balls
Ram BOP Parts
Annular BOP Parts
Wellhead Forgings
XMas Tree and Choke Forgings
Well Testing Forgings
Bodies for High and Low Pressure
Valves up to 20,000psi
Power Transmission Parts
(Hubs & Sleeves)
Open Die Forgings



Global Service and Support

As a manufacturer of quality products, WOM provides factory authorized service on all of its products through strategically located service centers throughout the world. Particular emphasis has been placed on serving regions that are especially active in drilling, completion and production such as North America, Europe, Far East, Middle East and Southeast Asia.

With WOM you get superior systems, engineering, manufacturing and worldwide service and support. All WOM products meet ISO and API standards and quality requirements. WOM offers prompt delivery and dependable after-the-sale service.



At our subsea facility, WOM employee testing a repaired Flowhead before it goes back to the customer

Along with manufacturing and refurbishment, WOM provides in-the-field service support for its complete catalog of equipment. WOM's team of highly trained technicians have decades of experience installing, maintaining and repairing WOM equipment and have the capability to be deployed wherever in the world they are needed. Service work can cause hours of downtime and there is no better solution for minimizing this cost than utilizing WOM's in-house service department to quickly and effectively diagnose and repair any piece of WOM-manufactured equipment.

Repair and Retrofit

To help lower the total cost of ownership of used valves, WOM provides a comprehensive remanufacturing process for all major brands of gate valves. "Magnumize" your existing valve inventory with Magnum Dual-Seal™ components.

This service can provide customers with advanced Magnum sealing technology: **zero leak, lower torque, longer life of critical components, upstream and downstream thru-conduit sealing.**

All gate valves that undergo the WOM remanufacturing process are tested to OEM specifications and delivered with a full two-year limited warranty.



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