Chokes

Invention, Unique Design and Extraordinary Craftsmanship
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Choke Principle

In general choke have the following components.

- Inlet
- Outlet
- Seat
- Throttling Mechanism

The Throttling Mechanism has constrictions/obstructions which lead to energy dissipation and pressure loss when fluid flows through it. Lower outlet pressure will in turn lowers the flow rate.

WOM designs, manufactures and supplies a wide range of low maintenance chokes with a choice of trims, temperature ratings and end connections to meet a variety of services. All chokes are manufactured to API 6A.
Positive and Adjustable Choke

Features and Benefits of Positive and Adjustable Choke

- Interchangeable components which give the operator maximum flexibility of choice in arranging choke assemblies by utilizing one body and changing beans, seats and top-work (bonnet) assembly
- All chokes are offered for manual or automated operation
- Meet or exceed the minimum requirement specified by API 6A latest Edition

Available Sizes and Pressure Ratings

<table>
<thead>
<tr>
<th>Nominal Sizes</th>
<th>API Pressure Range (PSI)</th>
<th>Max. Orifice Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2”</td>
<td>2,000-10,000</td>
<td>1”</td>
</tr>
<tr>
<td>2”</td>
<td>15,000</td>
<td>1”</td>
</tr>
<tr>
<td>3”</td>
<td>2000-10,000</td>
<td>2”</td>
</tr>
<tr>
<td>3”</td>
<td>15,000*</td>
<td>2”</td>
</tr>
<tr>
<td>4”</td>
<td>2,000-10,000*</td>
<td>3”</td>
</tr>
<tr>
<td>5”</td>
<td>2,000-5,000</td>
<td>3”</td>
</tr>
</tbody>
</table>

*2” orifice with ≥15Ksi and 3”orifice with ≥10Ksi adjustable chokes have a pressure balanced stem design to enhance the rangeability of the available standard WOM adjustable chokes. These models are not interchangeable with WOM standard positive and needle chokes.
Positive Choke

The simplest configuration of the choke, which has a blanking plug assembly and flow bean in a standard choke body.

Flow beans have tapered entrance to provide a smooth flow with minimized turbulence and beans retain their accuracy for a longer period of time. Sizes of beans of both integral and fractional 64th are available.

The pressure and flow must be shut and vented before changing of flow beans.
Adjustable Chokes

Needle and Seat is one of the simplest design of adjustable chokes available. It has a standard choke body with an adjustable choke bonnet assembly and Seat. The major parts of the assembly are conical tip rising needle, stainless steel seat and an indicator calibrated in 1/64” increments to enable effective orifice diameters. In highly erosive service a tungsten carbide tipped needle and tungsten carbide lined seat can be supplied.

Needle and seat design is suitable for standard erosive and corrosive services, and less severe service (non-high vibration applications i.e. high gas rates, high solids, etc.) that do not require tight shutoff
Control Chokes

The WOM 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.

**Plug and Cage Choke**

Plug and Cage trim is a robust design with maximum flow capacity, making it ideal for oil production and water injection services.

This trim design is used for high capacity/Medium pressure drop application.

The WOM Plug and Cage style choke features a tungsten carbide cage as the throttling mechanism with a protective steel carrier around it.

Outer Steel carrier is for protection against impacts from debris in the production fluid.

The trim characteristics is equal percentage that provides superior flow control, however, WOM can provide the linear trim as well on demand.

WOM Plug & Cage style design is pressure balanced type so as to minimize the stem loads. Plug is fully guided at the ID and is rigidly attached to the stem to resist any induced vibration damage.
**External Sleeve Choke**

External Sleeve trims possess the same features & are used in high erosive and high pressure drop service. The externally guided flow sleeve controls the opening and rate of flow.

This choke is used for low capacity/high pressure drop applications.

The flow is directed upward away from the outlet, impinges on itself in the centre of the flow cage which in turn isolates the body bore from incoming turbulent flow hence eliminating the body wear.

The seating is achieved through an isolated sealing element contact on a seat outside the flow cage. Keeping the seat surface away from the high velocity flow protects the seat from throttling wear and the seat integrity is maintained.
Control Choke Standard Sizes

The below table shows the standard cage style control valve sizes of plug & cage and external sleeve available with WOM. Other sizes are available on request.

<table>
<thead>
<tr>
<th>Standard End Connection Sizes</th>
<th>Maximum Pressure Rating</th>
<th>Standard Trim</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Psi</td>
<td>kPa</td>
</tr>
<tr>
<td>1”, 2”</td>
<td>10000</td>
<td>69000</td>
</tr>
<tr>
<td>1”, 2”</td>
<td>10000</td>
<td>69000</td>
</tr>
<tr>
<td>2”, 3”</td>
<td>15000</td>
<td>103000</td>
</tr>
<tr>
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<td>103000</td>
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<tr>
<td>3”, 4”</td>
<td>10000</td>
<td>69000</td>
</tr>
<tr>
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</tr>
<tr>
<td>4”, 5”</td>
<td>10000</td>
<td>69000</td>
</tr>
<tr>
<td>5”, 7”, 9”</td>
<td>5000</td>
<td>34000</td>
</tr>
<tr>
<td>5”, 7”, 9”</td>
<td>5000</td>
<td>34000</td>
</tr>
</tbody>
</table>

*ANSI pressure class up-to 2500#
*ANSI F.C.I 70-2-2006 Class IV and V Seat Leakage (class-VI for gas)
Special Trims

Special trims energy dissipating velocity controlled disk stack can be provided as solutions to severe service including anti cavitation, high pressure drop and low noise services.

In the Multi stage trim, the resistance, number and area of the individual flow passages are custom matched to the specific application, and exit velocities are managed to eliminate cavitation and erosion in liquid service and vibration and noise in gas service.
Trim Characteristics

The choke valve flow porting falls into three broad trim characteristics:
- Quick Opening
- Linear
- Equal percentage: Percentage of choke opening is equal to the percentage of change in the flow capacity. It is an exponential curve that has better flow controllability at low opening positions.
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. WOM drilling chokes are designed as per API 16C.

WOM Drilling chokes are designed to encounter large cuttings coming up with the drilling mud. These chokes features cutting edge gate and seat design which reduces wear in extremely hostile flow conditions. Their consistent performance has been proved in kick control, well testing, well clean-up and other harshest of conditions. Available in 1-3/4” orifice trim with 5,000, 10,000 and 15,000 PSI pressure ratings.

- Tungsten Carbide gate and seat have reversible design which increases life of the choke.

- Pressure balanced trim considerably reduces the torque required to operate the choke.

- Large body cavity around trim components reduces the speed of the solids in the fluids, thus enhances the body life.

- Extended wear sleeve limits downstream erosion to the trim, protecting the body from damage.

- Gate is fully guided by the Bonnet Extension which can be rotated with Bonnet to shift the surface wear.
Disc Type Choke

The disc type valve is designed for MPD packages (Managed Pressure Drilling) where the valve witnesses polluted media & high pressure differentials. Chokes meets all API 16C Requirements.

The valve uses two Tungsten Carbide discs with holes of specific geometry. The upper disc is rotated relative to the lower disc (manually or by actuator) varying the orifice size. The discs are rotated 180 degrees between open and closed position. In addition, the lapped matting surfaces of the discs designed to provide positive seal.

WOM disc type choke is a robust design that guarantees excellent controllability and protection of the sealing surfaces against erosive media. Available in 1”, 1.5”and 3” maximum orifice trim with 5000 to 15000 PSI maximum working pressure.

Different Geometry of Trims Available

Tear Drop Profile Trim

Half Moon Profile Trim
**Additional Features**

**Pressure Balancing Hole**
Pressure balance hole is provided in all WOM choke valves so as to equalise the pressure around the Stem Seal which reduces the stem load & in turn the torque required to operate the valve.

**Micrometer Indicator**
Linear allowance in the Micrometer Indicator marking for easy calibration of the Indicator after assembly.

- Large visual Dial Indicator for easy operation.
- Stem Travel, % Open and Bean Size are shown on the Indicator Marking for easy & correct positioning of the valve.

**Thumb Screw**
Thumb Screw maintains set position of the Stem by resisting rotation of the drive nut.

**Stem Packing & LIP Seals**
Spring energized lip seals with scrapers used for dynamic seals enhance reliability of stem packing and pressure balance sealing.
Contact Us

Worldwide Oilfield Machine, Inc. - U.S.A
11809 Cansons Mont Street
Houston, Texas 77035 USA
Phone: +1 (713) 729-9200
Fax: +1 (713) 729-7321

Worldwide Oilfield Machine Pvt. Ltd - India
Gat No. 778, at Post Vela
Pune Satara Rd.
Tal. Bhor, Dist. Pune 412 205, India
Phone 1: +91-8308213030
Phone 2: +91-8308215300

Worldwide Oilfield Machine, M.E. - U.A.E
Jebel Ali Free Zone (JAFZA) South,
Plot S61302, Near Gate #12,
P.O. Box: 32478
Dubai (UAE)
Phone: (971-4) 81 63 600
Fax: (971-4) 81 63 601

Magna Casting & Machine Works
Gat No. 777, at Post Vela
Pune Satara Rd.
Tal. Bhor, Dist. Pune 412 205, India
Phone 1: +91-8308213030
Phone 2: +91-8308215300

Magnum Forge & Machine Works
Gat No. 777, at Post Vela
Pune Satara Rd.
Tal. Bhor, Dist. Pune 412 205, India
Phone 1: +91-8308213030
Phone 2: +91-8308215300

Magnum Technology Center
Jebel Ali Free Zone (JAFZA) South,
Plot S61302, Near Gate #12,
P.O. Box: 32478
Dubai (UAE)
Phone: (971-4) 81 63 600
Fax: (971-4) 81 63 601

Worldwide Oilfield Machine, Inc. - Indonesia
11625 Fairmont St.
Houston, Texas 77035 USA
Phone: +1 (713) 721-5200
Fax: +1 (713) 721-5205

PT Worldwide Oilfield Machine - Indonesia
#11-08 One Pacific Place
Sudirman Central Business District
Jl. Jenderal Sudirman Kav. 52-53,
Jakarta 12190
Phone: +1-832-372-0674

Worldwide Oilfield Machine, Inc. - Turkmenistan
Yimpash Business Centre
Turkmenbashy Shoyoly 54
Office #308 3rd Floor
Ashgabat, Turkmenistan 744000
Phone 1: +99-365 820130
Phone 2: +99-365 309757

Worldwide Oilfield Machine Asia Pacific-Singapore
17 Gd Way
Singapore 629194
Phone: +(65) 6901700
Fax: +(65) 65603859

Worldwide Oilfield Machine Ltd. - UK
7 St Machar Road
Aberdeen
AB24 2UJ
Scotland, UK
Phone: +44 (01224) 484400
Fax: +44 (01224) 489740

Worldwide Oilfield Machine - Korea
#1012, 48-10, Bukucksan Digital Valley-II,
Gasandong, GumhonGu
Seoul, Korea 153-803
Phone: +82-2-854-6806

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