Choke Valves
INTRODUCTION

Ringo Válvulas (RV) is located in the industrial city of Zaragoza, Spain. Since its establishment, RV has designed and manufactured its own cast and forged choke valves. Our experience of over 40 years in the upstream industry is the key to our international success and recognition. We export more than 75% of our production all over the world.

Contrary to other types of valves, the function of choke valves is to absorb a fraction of the inlet pressure to modulate the fluid pressure under control. During this process the kinetic energy generated by the pressure drop is translated into turbulence, heat, vibration and noise, which can cause significant wearing of several valve components.

Ringo Válvulas choke valve series includes single staged choke valve for non-critical process conditions to special multi-staged designs to work under the most severe services.

The company has extensive, modern facilities of over 12,000 m² (130,000 ft²) with state-of-the-art installations and equipment for the assembly, testing and inspection of chokes according to API 6A, including bunker with test bench to perform High Pressure Gas tests.
Ringo is API 6A certified for production and testing of chokes according to all Product Specification Levels: PSL1, PSL2, PSL3, PSL3G and PSL4 as well as for the two different Product Requirements: PR1 and PR2, depending on service and customer requirements. In addition, our chokes can be design and produce according to other different standards on request, such as ASME B16.34 or GOST.

<table>
<thead>
<tr>
<th>Pressure Rating</th>
<th>Temperature Rating</th>
<th>Characteristic</th>
<th>Shut-Off Class</th>
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### Material Class

<table>
<thead>
<tr>
<th>Minimum Materials Requirements</th>
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</thead>
<tbody>
<tr>
<td><strong>Body, Bonnet, End &amp; Outlet Connections</strong></td>
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<tr>
<td><strong>Body materials</strong></td>
</tr>
<tr>
<td>AA - General Service</td>
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<tr>
<td>BB - General Service</td>
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<tr>
<td>CC - General Service</td>
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<tr>
<td>DD - Sour Servicea</td>
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<tr>
<td>EE - Sour Servicea</td>
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<tr>
<td>FF - Sour Servicea</td>
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<tr>
<td>HH - Sour Servicea</td>
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<tr>
<td>ZZ - Sour Service</td>
</tr>
<tr>
<td>a As defined by NACE MR0175/ISO 15156 in compliance with NACE MR0175/ISO 15156.</td>
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<tr>
<td>b In compliance with NACE MR0175/ISO 15156.</td>
</tr>
<tr>
<td>c CRA required on retained fluid wetted surfaces only. CRA cladding of low alloy or stainless steel is permitted.</td>
</tr>
<tr>
<td>d CRA as defined in Clause 3 of this International Standard. NACE MR0175/ISO 15156 definition of CRA does not apply.</td>
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</tbody>
</table>

- **Body materials**
  - Carbon Steel: A216-WCB/A105/4140/4130
  - Cr+Mo Alloy Steel: A217-WC6, A217-WC9/A182-F27/A182-F11
  - Cr+Mo-V Alloy Steel: A217-C12A, A182-F91
  - Stainless steel 18% Cr: A351-CF8M, A351-CF8C/A182-316/A182-347
  - Cr + Ni Stainless steels: Alloy 20, A351-CK3MCuN, A182-F44
  - Duplex: A890 Gr 4A, A182 F51
  - Super Duplex: A890 Gr 6A, A182 F53, A182 F55
  - Nickel based alloys, Hastelloy, Inconel: Monel, Titanium

- **Cladding and Overlays**
  - Stellite: Hardness HRC 45 RC & Maximum working temperature 500°C
  - Tungsten carbide: Hardness HRC 74 RC & Maximum working temperature 550°C
  - Chromium carbide: Hardness HRC 68 RC & Maximum working temperature 870°C
  - Inconel: Hardness HRC 23 RC & Maximum working temperature 700°C

- **Trim materials**
  - Martensitic: A276-410, A276-420
  - Austenitic: A276-316
  - Cr+Ni Stainless steels: Alloy 20, A182-F44
  - Duplex A182-F51, Super Duplex A182-F55
  - Nickel based alloys, Hastelloy, Inconel, Monel, Titanium

- **Full tungsten carbide trims**
  - Where high hardness is required (dirty fluids with particles). Produced by sinterization.

Other materials are available on request.
TRIM CHARACTERISTIC | ANSI B.16.10476 RATED SEAT LEAKAGE | TEMPERATURE LIMIT | APPLICATIONS
--- | --- | --- | ---
**POSITIVE** | Equal percentage | 550°C (1022°F) | Fixed pressure drop
**ADJUSTABLE** | Equal percentage | 550°C (1022°F) | Variable pressure regulation

**MINIFLOW™**
- Modf. Equal percentage
- Class IV STD
- Class V OPT
- 550°C (1022°F)
- Very low flows
- Tight shut-off
- Modulating and on-off applications

**MULTISTEP™**
- Equal percentage
- Class IV STD
- Class V STD
- 550°C (1022°F)
- Most basic plug type
- Low flows

**USS/STD™ or LDB™ Cage**
- Linear
- Class IV STD
- Class V OPT
- Class VI OPT
- 550°C (1022°F)
- Most basic plug type
- Low noise (with LDB™ Cage)
- Modulating and on-off control
- Small actuators
- General purpose applications

**BSS/STD™ or LDB™ Cage**
- Linear
- Class IV STD
- Class V OPT
- Class VI OPT
- 250°C (482°F)
- Low and medium pressure drop
- Light shut-off
- Low noise (with LDB™ Cage)
- Modulating and on-off control
- Steam valves
- General purpose applications

**CAVLESS™/BSSTM Plug**
- Linear
- Class IV STD
- Class V STD
- Class VI STD
- 250°C (482°F)
- Medium and large flows
- Cavitating and flashing service
- Feedwater systems
- Condensed systems
- 2 phase flows

**PILOT Plug/STD™ or LDB™ Cage**
- Linear
- Class V STD
- 550°C (1022°F)
- High temperature service
- Medium and large flows
- Light shut-off
- Low noise (with LDB™ Cage)
- Steam dump

**MULTICYL™/BSSTM Plug**
- Linear
- Class IV STD
- Class V STD
- Class VI OPT
- 250°C (482°F)
- High pressure drop
- Large flows
- Very critical pressure drop steam or gas application
- Very high pressure drop liquid applications for preventing cavitation and trim erosion damage

**SEVERE SERVICE TRIM**

**GENERAL SERVICE TRIM**

**BODY**

**BONNET**

**TRIM SERVICE**

**ACTUATORS**
SEVERE SERVICE ADJUSTABLE CHOKES

Contoured trim

Single stage contoured trim utilizing top and seat guiding for maximum stability while also providing an open flow path to prevent solid particles, such as sand, from getting “trapped.” Both seat and plug as well as optionally available downstream wearing sleeve are made using solid wear resistant materials, such as tungsten carbide, providing exceptional service life under the most extreme conditions.

Multi-stage Solutions

MULTISTEP™

Multistaged trim for small Cv values, normally used for choke valves of small sizes. In addition can be added to other plug types to provide high rangeability (up to 1:200) and multi-stage effect for start up conditions at low stroke, where other common multi-stage system has no effect.

Available in Flow Over the seat and Flow Under the seat configuration.

STD™ Cage:

Multi-hole cage for non-critical modulating service.

LDB™ (LOWdB):

Multi-hole cage with small hole pattern to reduce noise level by decreasing jet diameter and increasing f_p.

Hole distribution for STD cage and its related velocity jet stream

Hole distribution for LDB cage and its related velocity jet stream
**CAVLESS™**

CAVLESS™ cage has a double drilled series of radial holes, which provides a nozzle effect. The design can control the location of the vena-contracta and therefore control the location where cavitation occurs. When the plug is throttling a number of nozzles will be uncovered and the resulting jet stream of cavitation liquid will be directed into the cage center. This diverts the harmful effects of cavitation away from the plug and cage. Only available in Flow Over the seat configuration.

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**MULTICYL™**

With our MULTICYL™ cage the fluid goes through a staged pressure reduction process, utilizing as many stages as necessary to keep pressure drop under critical values. We have the expertise to calculate, design and manufacture the MULTICYL™ trim with the necessary number of stages to have xT and Fl as higher as required by process conditions. Only available in Flow Under the seat configuration.

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**CROSSTEP™**

CROSSTEP™ design behaves as a multistep pressure reducing cage with multidisc stack construction, the crossings being the equivalent of the restrictions-expansions with the advantage of a lower pressure recovery. The cross-sectional area of the channels, the number of channels per disc, the impinging angle at every crossing and the number of crossings, are calculated to best suit every particular set of conditions.