TRUNNION MOUNTED BALL VALVES
COMPANY PROFILE

Founded in 1976 by Mr. Santo Rota, Starline S.p.A. has grown to be one of the leading companies in the production of Forged ball valves in the world. Since the origin the target of the Company was to manufacture a quality product using Forged components and qualified high level suppliers for all the soft parts (seats and seals) most of which were specifically developed according to Starline design requirements.

The small size valves and related models originally created are still today a masterpiece in the sector, well known by all the end users and manufacturers. Around year 2000 when most of the European manufacturers decided to move production and/or purchases to new Economies in Far East and China, Starline decided to step up the target of the quality and developed new products for critical applications. The range is now extended to larger sizes – Metal seated valves - Cryogenic applications and much more. Today Starline structure counts approx 60 employees.

We are moving into a new factory that extends on an area of 31,700 square meters (of which 17,000 covered) and the production raised up to more than 300,000 valves per year – and still continue to grow.

An accurate R&D department is continuously looking for improvements in design and materials, sophisticated valve testing, dimensional and quality control as well as stocking and logistic systems. Starline already counts now on the most sophisticated solutions for production management, stock and WMS The new factory is an example of modern technologies applied to every industrial process.
PHILOSOPHY

Starline’s philosophy is based on the achievement of the standardization of the highest quality requirements in each single product. All materials used are mandatory produced in Western Europe and all forging companies are located in Italy.

A product **FULLY MADE IN ITALY**

SALES ORGANIZATION

Starline is organized with different offices and distribution points worldwide.

REFERENCES

ABB LUMMUS
ADCO
ADGAS
ADMA-OPCO
ADNOC
AGA CRYO
AIR LIQUIDE
AKER
ALSTOM POWER
AURAMARINE
BRITISH GAS
CELLIER
CHEVRON
DSME
ENAGAS
ENI
ENPPI
FLUXYS
FORSMARKS KRAFTS GROUP
FOSTER WHEELER
GASCO
GAZ DE FRANCE
HYUNDAI
ILVA
INITEC
INTECSA
J.RAY MCDERMOTT
JGC CORPORATION
KBR
KNPC
KOC
LINDE
MARINO ROSETTI
NESTE OIL
NIGC
NIOC
NPCC
PDO
PETROBRAS
PHILLIPS PETROLEUM
PTTEP
SAIPEM
SAMSUNG
SBM
SHELL INTERNATIONAL
SNAMPROGETTI
SONATRACH
SPIE CAPAG
STATOIL
TECHNIP
TECNIMONT
TOTAL
WINTERSHALL
ZADCO
Trunnion mounted ball valves are based on a system that provides a fixed ball and floating seat rings, moving along the valve axis. The side load given by the pressure acting on the ball is absorbed by the bearings. At low pressure the sealing on the seats is obtained by the spring action on the seat rings. The more the pressure increase it pushes the seats against the ball.

**DOUBLE BLOCK AND BLEED**

Starline valves are supplied as standard execution in **DOUBLE BLOCK & BLEED** – Both seats hold the pressure independently from the body cavity pressure. Block and Bleed execution and Double Piston Effect execution are available as an option.

**INDEPENDENT BALL AND STEM**

Ball and stem are manufactured in two separate pieces to reduce the effect of the side load generated by the pressure acting on the ball.

**ANTI-STATIC DEVICE**

All valves are guaranteed for electrical continuity between all the metal components type tested are duly executed and valves are certified.

Starline trunnion mounted valves are available from ½” to 12” – ASME class 150 to 2500 - as well as API 6A 5000 and 10,000 – in several combinations of materials and execution to cover all possible service application from low temperature to high pressure.
**TRUNNION MOUNTED**

**ANTI-BLOWOUT STEM**
Stem is retained by the stem cover – other designs are available for each specific request.

**FUGITIVE EMISSION REQUIREMENTS**
All Starline ball valves guarantee a full tightness in accordance with the most stringent fugitive emission testing requirements such as ISO 15848 and Shell SPE 77/312). Starline valves covers rate B of both specification as standard execution and RATE A is available on request.

**3PCS BOLTED CONSTRUCTION**
The 3 pcs construction allows an infinite flexibility in the valve construction in terms of possible end connection combination.

Trunnion mounted with heavy duty construction for large sizes low pressure ball valves

Trunnion mounted with heavy duty construction for large size high pressure ball valves
Valves designed for abrasive service and for resistance to wearing and abrasive media.

This specific execution is using the same basic components of a normal TRUNNION MOUNTED valve and only modify the ball and seat material which are coated by min 150 microns of Tungsten and Chrome. On request this valve can be supplied with higher coating thickness up to 400 Microns. The coating treatment is fully certified according to the highest standard requirements.

Starline can guarantee a tightness class according to ISO 5208 RATE A on all sizes and pressure ratings even with GAS TEST.

**Protected spring solution**
For specifically aggressive service, where there is a problem of polymerization or presence of solid components.

Starline has specifically created a solution with protected springs to guarantee full service of the springs throughout the valve life.

**Tungsten Carbide Coating**
Excellent resistance to wearing - good resistance to thermal shock. Max temperature +540°C. Do not use in presence of medium/high corrosion and water solutions.

**Chrome Carbide Coating**
Excellent used for wearing, erosion and oxidation at high temperatures. Normally used on turbines. Max temperature +820°C.
METAL SEATED HIGH TEMPERATURE

For operation in temperatures that do not allow the use of resilient material – Starline has developed a specific design for high temperature.

Valve is specifically equipped with a stem extension for insulation and is available in many different specific materials to face even extreme temperatures. Starline can guarantee a tightness class according to ISO 5208 RATE A on all sizes and pressure ratings even with GAS TEST.

This specific valve design has been successfully used for steam applications – thermal oil and other typical high temperature services.
LOW TEMPERATURE CRYOGENIC VALVE

Fully designed to cover ASME B6364 requirements for full tightness in medium and severe cryogenic service. This execution has been fully tested at -196° and performed exceptionally.

Extended stem length is adapted to the valve size according to BS6364 – thermal fins isolate the stem tightness from the cold temperature.

BIDIRECTIONAL VALVES

Remarkable results with thermal shock.
LIP SEAL CONSTRUCTION

In spite of the continuous research Starline is conducting in finding materials suitable for any kind of application, lip seal design guarantee a full capability to cover any possible service requirement with a good tightness and long life guarantee.

Lip seal design made of PTFE sealing with ELGILoy springs.

Lip seal design is a good alternative where special Orings are required to cover high percentages of Amine or Methanol, or where high or low temperatures are too stringent.

Valves requires a specific design with modified machining criteria to maintain a high quality performance at all levels.
DOUBLE PISTON EFFECT

This valve is required only for special applications where the automatic body cavity relief of the trunnion mounted valves needs to be controlled, limited to upstream side or handled in every different way.

DPE seat design allows for both seats to seal with pressure acting from the same side of the valve. In the event of one seat becomes damaged, the used has the added advantage of the opposite seat sealing.

By means of this double barrier, the sealing is assured regardless of the direction of the flow through the valve. If the upstream seat (A) becomes damaged and leaks, the pressure entering the body cavity acts on the downstream seats (B) sealing the downstream seat tightly against the ball.
AVAILABLE SEATS AND SEALINGS

**SEAT INSERT MATERIAL**

<table>
<thead>
<tr>
<th>STARLINE CODE</th>
<th>SEAL MATERIALS</th>
<th>TEMPERATURE RANGE °C</th>
<th>Application</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>REINFORCED PTFE 20% Carbon + 5% Graphite</td>
<td>-190 to +250</td>
<td>Natural Gas, Steam Service, Diathermic Oil, Hydrocarbons, H2S, Medium Pressure, Low / High Temperature</td>
<td>Higher Temp. and Pressure than Virgin PTFE. Good for Steam Service</td>
</tr>
<tr>
<td>T</td>
<td>VIRGIN PTFE</td>
<td>-198 to +200</td>
<td>Hydrocarbons, H2S, All Chemicals, Natural Gas, low pressure.</td>
<td>All services subject to temperature limitation.</td>
</tr>
<tr>
<td>N</td>
<td>DEVLOV – V POLYAMIDE – NYLON</td>
<td>-100 to +155</td>
<td>Hydrocarbons, H2S, Natural Gas, high pressure.</td>
<td>Good for high pressure applications not good for water.</td>
</tr>
<tr>
<td>D</td>
<td>DEVLON ACETAL RESIN</td>
<td>-70 to +95</td>
<td>Hydrocarbons, Nace.</td>
<td>Co2. High pressure Low temperature</td>
</tr>
<tr>
<td>P</td>
<td>PEER POLYETHER KETONE</td>
<td>-80 to +220</td>
<td>Hydrocarbons, Nace.</td>
<td>Do not use for oxygen</td>
</tr>
<tr>
<td>E</td>
<td>VESPEL SP 21 POLYMIDE</td>
<td>-200 to +260</td>
<td>Good Chemical Resistance. For Gas, Oil, Petroleum. Not for Steam</td>
<td>High pressure</td>
</tr>
<tr>
<td>U</td>
<td>UHMWPE POLYETHYLENE</td>
<td>-150 to +150</td>
<td>Food and Tobacco industries Nuclear service</td>
<td>Low temperature</td>
</tr>
<tr>
<td>Z</td>
<td>TEFZEL ETPE (704-25)</td>
<td>-100 to +180</td>
<td>Good Chemical Resistance Nuclear Service</td>
<td>Medium pressure Low temp. – High temp.</td>
</tr>
<tr>
<td>Y</td>
<td>PFA</td>
<td>-196 to +260</td>
<td>Lower Porosity – Particularly Good to Avoid Polymisation</td>
<td>Medium pressure Low/Medium Temperature</td>
</tr>
</tbody>
</table>

**SEAL MATERIALS**

<table>
<thead>
<tr>
<th>MATERIAL TYPE</th>
<th>TEMPERATURE RANGE °C</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>NITRILE NBR</td>
<td>-30/-22°F to +120/248°F</td>
</tr>
<tr>
<td>M</td>
<td>HYDROGENATED NITRILE HNBR</td>
<td>-30/-22°F to +160/320°F</td>
</tr>
<tr>
<td>E</td>
<td>MODIFIED HYDROGENATED NITRILE HNBR</td>
<td>-40/-40°F to +160/320°F</td>
</tr>
<tr>
<td>V</td>
<td>FLUOREOELASTOMERS (VITON B) FKM</td>
<td>-20/-4°F to +220/428°F</td>
</tr>
<tr>
<td>V</td>
<td>FLUOREOELASTOMERS (VITON AED) FKM</td>
<td>-20/-4°F to +220/428°F</td>
</tr>
<tr>
<td>V</td>
<td>FLUOREOELASTOMERS (VITON GLT) FKM</td>
<td>-40/-40°F to +220/428°F</td>
</tr>
<tr>
<td>C</td>
<td>PERFLUOREOELASTOMERS (CHEMraz 528) FFKM</td>
<td>-25/-13°F to +250/482°F</td>
</tr>
<tr>
<td>K</td>
<td>PERFLUOREOELASTOMERS (KALREZ) FFKM</td>
<td>-20/-4°F to +327/620°F</td>
</tr>
<tr>
<td>A</td>
<td>AYLAS FEP</td>
<td>+5/+41°F to +200/392°F</td>
</tr>
<tr>
<td>I</td>
<td>SILICON+PFA</td>
<td>-60/-78°F to +240/464°F</td>
</tr>
<tr>
<td>G</td>
<td>EXPANDED GRAPHITE</td>
<td>-240/-400°F to +680/1256°F</td>
</tr>
<tr>
<td>L</td>
<td>PTFE + ELGILOY</td>
<td>-196/-320°F to +260/+500°F</td>
</tr>
</tbody>
</table>

**FIRE SAFE SEAL**

<table>
<thead>
<tr>
<th>MATERIAL TYPE</th>
<th>TEMPERATURE RANGE °C</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>GRAPHITE</td>
<td>-240/-400°F to +680/1256°F</td>
</tr>
</tbody>
</table>

Note: all information reported are based on material data sheet – Starline reserve the right to verify such information contained here above referred to specific media concentration and pressure/temperature related.
CONTINUOUS RESEARCH AND DEVELOPMENT

Have you got a problem on a specific service application? Get in touch with us and we will certainly find a proper solution!

TECHNICAL FEATURES
Starline Trunnion mounted valves are supplied as standard in Double Block and Bleed execution single piston effect (self relieving seats), with 2 bleeder on all sizes (for safety reasons).

ACCESSORIES AVAILABLE

BLEEDER
Anti-blowout bleed plug with 2 orings as standard execution.

STEM/SEAT SEALING INJECTION
Typical execution of stem and seat grease injection for valves 2” and above.

LOCKING DEVICE
Two different execution of locking device are available for these valves.

EXTENDED STEM WITH LANTERN RING
For fugitive emission requirement, typical extended stem with leak detection.

T - HANDLE
T - handle for thermal insulation.

NAME PLATE
Starline provide a fully 316 stainless steel name plate as standard clear legible characters – fully in accordance with API 6D – ISO 14313
All valves are ready to fit actuator – with ISO 5211 top.
Testing facilities are available for functional tests with valve/actuator.
Valve torque values are available upon request and are calculated in a very accurate way and adjusted according to the following table:

### SAFETY FACTORS CALCULATION

<table>
<thead>
<tr>
<th>Net Break Away Torque of Valve</th>
<th>Process Media</th>
<th>Process temperature</th>
<th>Frequency of Operation</th>
<th>Suggested Safety Factor</th>
<th>Torque to Select Actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid, clean particle free</td>
<td>10%</td>
<td>Ambient -29°C +38°C</td>
<td>10% one per day to one per week</td>
<td>10% gear</td>
<td>30%</td>
</tr>
<tr>
<td>Liquid, dirty, slurry, raw water</td>
<td>60%</td>
<td>Low -29°C -90°C</td>
<td>30% one per week to one per month</td>
<td>20% actuator</td>
<td>30%</td>
</tr>
<tr>
<td>Liquid, black liquor lime slurry</td>
<td>80%</td>
<td>Cryogenic -90°C -196°C</td>
<td>90% over one per month</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Liquid, oil, lubricating</td>
<td>10%</td>
<td>Medium +38°C +200°C</td>
<td>30% Emergency shut down</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Liquid, viscous, molasses</td>
<td>30%</td>
<td>High +300°C +700°C</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas, clean &amp; wet, saturated steam</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas, dry, steam, natural gas</td>
<td>80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slurry service</td>
<td>90%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen, chlorine, hydrogen, helium</td>
<td>80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### QUALITY STANDARDS

All valves respond to the following technical requirements:

- **ISO 9001:2008**
- **API6D ISO14313**
- **API 6A (IF APPLICABLE)**
- **ISO 5211**
- **NACE MR0175 - NACE MR0103**
- **ASME B16.5 - ASME B16.10**
- **ASME B16.25 - ASME B16.34**
- **SIL 3**
- **FIRESAFE API607 - API 6FA - ISO10497**
- **TA-LUFT**
- **PED MOD H CAT.3**
- **ISO 15848**
NDE AND TESTING FACILITIES

- **UT** Ultrasonic testing according to ASME V
- **DPI** Dye Penetrant Inspection according to ASME VIII
- **MPI** Magnetic Particle Inspection according to ASME V
- **PMI** Positive Material Identification (Alloy Verification) with Niton XL instrument

Specific valve testing such as:
- Fugitive Emission Testing to ISO 15848 and SPE 77/312 with mass spectrometer Phonix L-300 and duly certified personnel.
- Cryogenic test bench – for low temperature and cryogenic testing up to -196°C.
- High Temperature oven – for high temperature valve testing up to extreme temperatures such as 500 °C.
- Starline tests 100% of the valves manufactured according to API 6D / API 598.

**Standard tests carried out:**
- Visual and dimensional check
- High pressure Hydrostatic shell and seat test
- Low pressure air seat test
- Stem torque check

**Other valve test available:**
- High pressure gas test (shell and seat)
- Antistatic test
- Seat relief test