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**

Since its foundation on 1976 Starline has been focus only on production of Ball Valves in Forged Materials. After more than 40 years the imprinting philosophy is still present and the base for the company growth and success. Starting from the experience on the floating valves during the years, Starline has developed a wide and complete range of ball valves in different materials and executions introducing Trunnion Mounted design, Single and Double Block and Bleed, Metal to Metal, Cryogenic and High temperature design. Today Starline with a production capacity of 250,000 valves/year, a complete size range and pressure ratings ½” to 36” – class 150- 2500lbs, API6A rate 3000-15000PSI in all the possible configurations and materials, is considered both by customers and other valve manufacturers one of the Worldwide Market Leaders in Upstream Oil & Gas Applications which represent more than 70% of the final products destination.

**REFERENCES**

- ADCO
- ADGAS
- ADMA-OPCO
- BP
- DSME
- ENI
- EXXON MOBIL
- GASCO
- GRT GAZ
- GAZPROM
- HYUNDAI (HHI)
- INPEX
- JGC CORPORATION
- KBR
- KNPC
- KOC
- NIOC
- NISOC
- NPCC
- PDO
- PETROBRAS
- PETROFAC
- PTSC
- PTTEP
- QATARGAS
- SAIPEM
- SAMSUNG (SHI)
- SHELL CHEVRON
- Snamprogetti
- STATOIL
- TECHNIP
- TECNIMONT
- TOTAL E&P
- TOYO
- 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 increases, the more 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 tests are duly executed and valves are certified.

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

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.

Tungsten Carbide Coating
Excellent resistance to wearing - good resistance to thermal shock. Max temperature +350°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.

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.

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.
Lip seal design is a good alternative where special O’rings are required to cover high percentages of amine or methanol, or where high or low temperatures are too stringent.

Valves require a specific design with modified machining criteria to maintain a high quality performance at all levels. Available for temperatures from minus 100°C to plus 320°C.

**LOW TEMPERATURE CRYOGENIC VALVE**

Fully designed to cover BS6364 requirements for full tightness in medium and severe cryogenic service. This execution has been fully tested at -196°C.

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**

Lip seal design guarantees 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 O’rings are required to cover high percentages of amine or methanol, or where high or low temperatures are too stringent. Valves require a specific design with modified machining criteria to maintain a high quality performance at all levels. Available for temperatures from minus 100°C to plus 320°C.
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.

RELIEF DETAIL

Starline provide a personalized relief valve - designed and manufactured directly - fully tested for high cycle performance.

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

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

NAME PLATE
Starline provide a fully 316 stainless steel name plate as standard clear legible characters – fully in accordance with API 6D and ISO 14313

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

T - HANDLE
For thermal insulation.

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

<table>
<thead>
<tr>
<th>STARLINE CODE</th>
<th>SEAT INSERT MATERIALS</th>
<th>°C</th>
<th>°F</th>
<th>APPLICATION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>REINFORCED PTFE 20% Carbon + 5% Graphite</td>
<td>-196</td>
<td>-321</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>-196</td>
<td>-321</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>DEVLON – V POLYAMIDE – NYLON</td>
<td>-50</td>
<td>-58</td>
<td>Hydrocarbons, H2S, Natural Gas, high pressures</td>
<td>Good for high pressure applications not good for water</td>
</tr>
<tr>
<td>K</td>
<td>KELF POLYETHYLENE</td>
<td>-196</td>
<td>-319</td>
<td>High pressure</td>
<td>Like Virgin PTFE but improve resistance to nitric acid, hydrofluoric acid and liquid oxygen</td>
</tr>
<tr>
<td>P</td>
<td>REINFORCED PEEK REINFORCED POLYETHYLENE KETONE</td>
<td>-196</td>
<td>-321</td>
<td>Hydrocarbons. Naco. For Tobacco and Nuclear Service</td>
<td>High pressure</td>
</tr>
<tr>
<td>X</td>
<td>VESPEL SP 21 POLYIMIDE</td>
<td>-196</td>
<td>-321</td>
<td>Hydrocarbons. Naco. For Tobacco and Nuclear Service</td>
<td>High pressure</td>
</tr>
<tr>
<td>E</td>
<td>UHMWPE POLYETHYLENE</td>
<td>-196</td>
<td>-321</td>
<td>Good Chemical Resistance Nuclear Service</td>
<td>Medium pressure and low temp. – High temp.</td>
</tr>
<tr>
<td>Y</td>
<td>PFA</td>
<td>-196</td>
<td>-321</td>
<td>Lower Porosity – Particularly Good to Avoid Polymerisation</td>
<td>Medium pressure and Low/Medium Temp.</td>
</tr>
</tbody>
</table>

# Seal Material

<table>
<thead>
<tr>
<th>STARLINE CODE</th>
<th>SEAL MATERIALS</th>
<th>°C</th>
<th>°F</th>
<th>APPLICATION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Nitrile</td>
<td>-25</td>
<td>-13</td>
<td>Water Service</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Hydrogenated Nitrile (AED)</td>
<td>-25</td>
<td>-31</td>
<td>High Pressure Water</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Modified Hydrogenated Nitrile (AED)</td>
<td>-55</td>
<td>-67</td>
<td>Sweet gas mixtures, Hydrogen Sulphide up to 10%, Amine Corrosion Inhibitors up to 5%, Methanol</td>
<td>Standard Viton used on lower pressures</td>
</tr>
<tr>
<td>V</td>
<td>Fluoroelastomers (Viton B)</td>
<td>-20</td>
<td>-4</td>
<td>Standard Viton used on lower pressures</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Fluoroelastomers (Viton AED)</td>
<td>-27</td>
<td>-17</td>
<td>Sweet gas mixtures and aromatic hydrocarbons. ED service</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Fluoroelastomers (Viton GLT + AED)</td>
<td>-61</td>
<td>-74</td>
<td>Lower temperatures than standard Viton</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Perfluoroelastomers (Chemraz)</td>
<td>-25</td>
<td>-13</td>
<td>Good chemical resistance, High Temperature, H2S, Xylene, Toluene contents</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Perfluoroelastomers (kalrez)</td>
<td>-20</td>
<td>-4</td>
<td>Good extrusion and chemical resistance. Excellent resistance to Sour oil and Amine.</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Atlas (AED)</td>
<td>-20</td>
<td>-4</td>
<td>Sour gas mixtures and amine based corrosion inhibitors. Good for hot water and steam.</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Silicon</td>
<td>-60</td>
<td>-76</td>
<td>Low temperature applications</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>Silicon + PFA</td>
<td>-60</td>
<td>-76</td>
<td>Low temperature applications / Good Chemical Resistance</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>EPDM</td>
<td>-40</td>
<td>-40</td>
<td>Chemical applications</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Expanded Graphite</td>
<td>-240</td>
<td>-400</td>
<td>Used on Metal Seated High Temperature valves</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>TFM + Elgiloy</td>
<td>-196</td>
<td>-321</td>
<td>Good for Chemical Resistance and Low Temperatures</td>
<td></td>
</tr>
</tbody>
</table>

Values indicated are the original values given by the manufacturers. Additional limitation to these values shall be considered based on the size of valve, seat construction and valve operating pressure.
AUTOMATION

Starline is able to provide any kind of actuated ball valves starting from the customer requirement using the most suitable components according to needs (complete system with rack&pinion actuators, scotch&yoke actuators, compact actuators, SOV, AFR, POV, QQEV, positioner etc.). The final control system is built into a control panel designed and manufactured completely by Starline. The complete system is tested in Starline facilities with a proper FAT according to Starline standards or customer specifications. Starline personnel is qualified to perform SIL certification on the complete unit.

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!

Starline uses the FEA for designing its trunnion mounted ball valves. Finite Element Analysis (FEA) is a very important step of the development phase and ensures the best possible performance requirements. Valves operational problems, pressure/temperature related deformations and flow related forces within a valve can be evaluated.

OPTIONS AVAILABLE

Trunnion mounted ball valves are also available in SBB/DBB, COMPACT and SUBSEA construction.

STANDARDS AND CERTIFICATIONS

ISO 9001
API SPEC Q1
OHSAS 18001
ISO 14001
PED 2014/68/EU MOD.H CAT.3
ATEX 2014/34/EU
SIL 3
CU-TR

API 6D
API 6DSS
API 6A
FIRESAFE API607-API 6FA-ISO10497
BS 6364
NACE MR0175 - NACE MR0103
SHELL TAT
ISO 15848
NDE AND TESTING FACILITIES

- **UT** Ultrasonic testing according to ASME V
- **PT** Dye Penetrant Inspection according to ASME VIII
- **MT** Magnetic Particole Inspection according to ASME V
- **PMI** Positive Material Identification (Alloy Verification) with Niton XL instrument
- **Ferrite Measurement**
- **HT** Hardness Test
- **LT** Leak Test

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**.

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

**Standard tests carried out:**
- Visual and dimensional check
- High pressure hydrostatic shell and seat test
- Low pressure air seat test
- Torque test