specially engineered valves
INDEX

COMPANY PROFILE

Who we are 04
Our customers 05
Facilities 06
Engineering 07
Quality 09

APPLICATIONS

Oil & gas production 13
Oil & gas transmission 14
Oil & gas processing 15
Power generation 16

PRODUCTS

Ball valves 19
Floating Ball 20 Trunnion Mounted Side Entry 21 Trunnion Mounted Welded Body 22 Trunnion Mounted Top Entry 23 Double Block And Bleed 24 Compact Design Double Block And Bleed 25 Cryogenic Service 27

Gate valves 29
Wedge Type Bolted Bonnet 30 Wedge Type Pressure Seal Bonnet 31 Parallel Slide Bolted Bonnet 32 Parallel Slide Pressure Seal Bonnet 33 Through Conduit Bolted Bonnet 34 Through Conduit Expanding Gate 35 Bellows Seal Bolted Bonnet 36 Bellows Seal For Nuclear Power Generation 37 Extended Bolted Bonnet For Cryogenic Service 38 Compact Design Gate Valve 39

Globe valves 41
Globe Bolted Bonnet 42 Globe Pressure Seal 43 Y-Pattern Bolted Bonnet 44 Y-Pattern Pressure Seal Bonnet 45 Bellows Seal For Nuclear Power Generation 46 Extended Bolted Bonnet For Cryogenic Service 47 Stop Check Bolted Bonnet 48 Stop Check Pressure Seal Bonnet 49 Compact Design Globe Valve 50

Check valves 51
Swing Type Bolted Bonnet 52 Swing Type Piggable Bolted Bonnet 53 Swing Type Pressure Seal Bonnet 54 Tilting Disc Type Bonnetless 55 Tilting Disc Type Pressure Seal Bonnet 56 Piston Type Pressure Seal Bonnet 57 Nozzle Type 58 Compact Design Check Valve 59

CERTIFICATIONS

Certifications 62
FLUITEK ORSENIGO VALVES started out ball valves manufacturing for the Oil and Gas industry in 1993 with the Orsenigo brand.

Friulco Spa started its own production of cast steel valves for the energy and petrochemical industry in 1990.

Their paths cross in 2012 with the acquisition of Friulco by FLUITEK ORSENIGO VALVES.

This combined wealth of experience, know how and resources is now integrated in the new reality of FLUITEK ORSENIGO VALVES, with manufacturing facilities and headquarters in the North of Italy.

In 2011, new ownership and management take on the challenge of building a centre of excellence in the engineered valve industry, putting customer first, guaranteeing to deliver cost and time effective solution to EPCs and End Users in the Oil and Gas and Power industries worldwide.

The financial and industrial resources of two large industrial groups are the backbone of this project in the specially engineered valve industry.

Sices 1958 Spa and SBI Spa (which owns 60% of the Mecaer Aviation Group Spa, MAG) are the main shareholders of FLUITEK ORSENIGO VALVES Spa. The Sices Group and Sices 1958 SpA operate in the international markets, having acquired a reputation of reliability in the design, supply, erection and maintenance of pressure vessels, heat exchangers, skid mounted plants, boilers and complete plants for the Oil & Gas, Chemical & Petrochemical, Energy & Power, Environmental & Recovery and Nuclear sectors. The Group employs about 1000 resources in different workshops and offices located in Italy, Poland, Libya, Greece and Egypt.

MAG - Mecaer Aviation Group - is a leading international provider of solutions for Aircraft Landing systems, Aircraft Flight Control systems, Aircraft Modifications and Completions and MRO & services in the Helicopter, Business Aviation and General Aviation markets.

The Group has three operating divisions, Actuation & Landing Systems, MRO & Services, Modifications and Completions, with many approvals and qualifications from regulatory agencies, military organizations, industry and customers. MAG has a global presence in the aviation market, reaching about 110M Euros in revenues, employing 500 people, with five operating facilities in Italy, Canada and the USA.
FLUITEK ORSENIGO VALVES specialty solutions are exported worldwide from the Middle East to Western Europe, from the Americas to Russia and the Far East. The company’s growth in these markets is the evidence of its international vocation and its competitiveness in terms of quality of the products and pricing.

Major End Users and Engineering Companies across the world chose our applications for the Oil and Gas & Energy industry and our own customer focus, extended knowledge base, highly flexible manufacturing capabilities.

FLUITEK ORSENIGO VALVES is proud of working with some of the most important end user worldwide (ARAMCO, ADCO, GASCO, ZADCO, QP, BP, PTT EP, PERTAMINA, SONATRACH, SHELL, PETROBRAS, CONOCO PHILLIPS, and many others) and with a long list of primary Engineering Companies (PETROFAC, PUNJ LLOYD, NPCC, SBM OFFSHORE, SAIPEM, ANSALDO, SIEMENS and others).
KEY MACHINING EQUIPMENT
4 CNC Machining Centre (models 300, 450, 600, 900 Special tooling for forged valves) 4 axis multiplatable capable of lathe, milling, drilling, self monitor feedback system, with very strict tolerance capability. Table Capacity: From 10 Kg Up To 12 Tons.
7 CNC Machining Centre, 900mm max turnable diameter, DN up o 14”
4 Grinding Machine
1 CNC Machining Centre (2”-8” valve body size)
5 Lapping Machine
11 Horizontal Lathes
4 Drilling Machine
3 Sawing Machine
1 Grinding Machine, large size

LIFTING EQUIPMENT
2 Overhead Crane 40 ton
3 Overhead Crane 15 ton
2 Overhead Crane 12 ton
2 Overhead Crane 10 ton
4 Overhead Crane 5 ton
2 Overhead Crane 40 ton
35 Overhead travelling crane 500 to 2000kg
22 Fork trucks 500 to 8000kg

WELDING EQUIPMENT AND PERSONNEL
ASME IX qualified welders and welding procedures (WPS/PQR) as well as per CE/PED requirements
MATERIALS
Carbon & low alloy steel, Austenitic stainless steel, Ferritic and ferritic-austenitic stainless steel, Nickel alloys, Hard facing overlays
METHODS
Gas Metal Arc Welding (GMAW), Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW)
MAIN EQUIPMENT
1 GMAW welding equipment for stellite, nickel alloys coating, 4 GMAW welding equipments, 2 SMAW welding equipments

HEAT TREATMENT
2 on Site Heat Treatment Furnaces (1 gas operated and 1 electrical furnace) with:
Ceramic fiber lining
Temperature calibration per API 6A requirements
Heat treat cycle automatically controlled
Chart temperature recorder
Max dimension: 2m W; 3m L; 3m H
Max temperature up to 1200 °C (2192 °F)
Quench tank
FLUIDDYNAMIC COMPUTERIZED ANALYSIS

FLUITEK ORSENIGO VALVES can perform thermo-fluiddynamic analysis on its products by means of a computerized calculation system (CFD, computational fluid dynamics). Valve design and construction details are improved with the use of virtual modeling techniques and “what-if” simulations. Data concerning pressure and velocity values, forces acting on the surfaces, temperatures and all the main physical variables can be provided to the customers.

Static analysis
With the line conditions as the input values, it is possible to evaluate pressure losses through the valves at different opening conditions, to optimize the flow path, to check the presence of anomalous local values of pressure, velocity or temperature, to evaluate the forces and torques acting on the shell or other valve components.

Dynamic analysis
Dynamic analysis is important for the valves operated by the process fluid itself (check valves), as it simulates the interaction between the fluid and the valve movable components. In fact, the disc motion is determined by the fluid speed and conditions, and the dynamic analysis evaluates the correct service parameters, defines the best disc shape, calculates valve opening and closing times, together with all the static analysis’ results.

Thermal analysis
Together with static and dynamic analysis it is possible to introduce the process fluid temperature in the calculation. When required, thermal convection and heat transfer and can be evaluated.

Validation
According to the standard en 1267 “test of flow resistance using water as test fluid”, FLUITEK ORSENIGO VALVES computerized models are actually validated with proper practical tests.
EXAMPLE OF A SWING CHECK VALVE ANALYSIS

Below is a brief summary of the fluiddynamic analysis performed on a swing check valve, to evaluate the valve performances at different fluid speeds. At each speed the overall pressure loss and the discrete pressure values is evaluated. Additionally, the exact disc position is calculated.

<table>
<thead>
<tr>
<th>Fluid Speed [M/S]</th>
<th>Pressure Loss [Bar]</th>
<th>Disc Opening Angle</th>
<th>Ratio Between Actual Opening Angle And Full Opening Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>0.093</td>
<td>47°</td>
<td>82%</td>
</tr>
<tr>
<td>2.7</td>
<td>0.087</td>
<td>43°</td>
<td>75%</td>
</tr>
<tr>
<td>2.4</td>
<td>0.073</td>
<td>48°</td>
<td>70%</td>
</tr>
<tr>
<td>2.1</td>
<td>0.068</td>
<td>32°</td>
<td>56%</td>
</tr>
</tbody>
</table>

Disc opening angle at different speed
The main quality controls carried out by FLUITEK ORENSEGO VALVES are:

**DIMENSIONAL INSPECTION**
All necessary equipment in house
Faro measuring arm.

**NON DESTRUCTIVE TESTING**
MT: Magnetic particles examination
PT: Dye penetrant examination
UT: Ultrasonic examination
RT: Radiographic Examination
    Capability of shooting on site, x-ray films
development and reading in house
    (ASME reference plates)

**PRESSURE TEST TO**
API598 - ISO 5208 - BS 6755 – API 6A –
API 6D – ASME B16.34 – EN 12266 - 1
High Pressure Hydraulic Shell test
High Pressure Hydraulic Back Seat test
High Pressure Hydraulic Seat test
Low Pressure Pneumatic Seat test
Functional test

**TESTS EQUIPMENT:**
3 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 1/2” to 16”, up to class 4500#
3 Hydraulic & Pneumatic vertical testing unit for
   valves DN 2” to 16”, up to class 600#
1 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 10” to 48”, up to class 4500#
2 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 1/2” to 4”, up to class 10000#
1 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 2,1/2” to 20”, up to class 1500#
1 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 2,1/2” to 24”, up to class 1500#
1 Hydraulic & Pneumatic horizontal testing unit
   for valves DN 6” to 36”, up to class 2500#

**CHEMICAL ANALYSIS**
PMI: Positive material identification
Mass spectrometer 16 channels

**MECHANICAL TESTS**
Hardness test
Charpy-V impact test
QUALITY

MICROGRAPHIC ANALYSIS

AVAILABLE ON REQUEST:
Fugitive emission test (helium/nitrogen)
Cryogenic test
Corrosion test
Cleanliness for oxygen application
Fire Safe tests
High pressure gas tests
Tensile test (including hot tensile)
Hyperbaric Test for subsea application
Torque test

QUALIFIED PERSONNEL

FLUITEK ORSENIGO VALVES personnel is qualified to carry out all the above mentioned controls. In particular, for Non Destructive Tests, FLUITEK ORSENIGO VALVES staff includes qualified, certified personnel in accordance with STN-TC-1A and EN 473 requirements as follows:

4 RT Technicians (Radiographic or Gamma-graphic Examination) Level II
5 PT Technicians (Dye Penetrant Examination) Level II
5 MT Technicians (Magnetic Particles Examination) Level II
5 UT Technicians (Ultrasonic Examination) Level II
3 VT Technicians (Visual Examination)
2 LT Technicians (Leakage Examination)

NDT level III available in-house
APPLICATIONS
Our valves are designed and manufactured for a broad range of applications

Oil & gas, power generation, chemical and petrochemical, pulp and paper, cryogenic and other industries. FLUTEK ORSENOValves excels in the design and manufacturing of specially engineered valves for your application.

OIL & GAS PRODUCTION

The main valves associated with oil and gas production are ball and gate valves. The standard of reference for all these valves is API 6A/ISO 10423. FLUITEK ORSENIGO VALVES is specialized in manufacturing the high end range of these valves, that is special high pressure (5000 to 15,000 PSI), high quality demand (PSL2 or PSL3 forged construction), special materials (stainless 13% Cr, F6NM, duplex steels, nickel alloys) and extreme service conditions (low temperature, anti wearing internals). Swing and piston check valves in accordance with API 6A are also available. A specific application related to oil and gas production are the valves installed on off-shore platforms and FPSO. Types and standards are similar if not identical to the valves used in the processing plants, with materials that have to consider marine environment (duplex steels instead of austenitic stainless steels) and sea water fluid.

Specifications
According to API 6A.
Size 1. 13/16” - 7. 1/16” Classes 3000, 5000, 10000, 15000 psi.
Non standard sizes (such as 13.5/8) available upon request.
Extreme service conditions, General and Sour service, low temperature, anti wearing internal components. High quality demand: PSL1, PSL2, PSL3 or PSL4 (on request).
Available in special materials: AISI 4130, AISI 410, F6NM, Duplex Steel, Nickel alloys, Titanium alloys.
Tungsten carbide coating on seating surfaces.
CE/PED requirements compliance available.

Engineered Products
Globe valves designed to API 6A standard ale also available on request. Gate valves designed to API 6A standard for geothermal wellheads are available on request.
Ball and Double Block & Bleed Valves designed to API 6A metal seated.
Special construction with anti-erosion and anticorrosion overlay on wetted surfaces.
Positive and adjustable chokes are available on specific request.
Oil and gas transmission lines use three main ON/OFF valve service products:
- Ball valves, full or reduced bore, Side or Top entry, bolted or welded body.
- Through conduit gate valves (slab or expanding gate).
- Full opening swing check valves.

The main standard of reference for all these valves is API 6D / ISO 14313.

Subsea transmission lines foresee a wide use of Ball Valves that have to resist to hyperbaric outside pressure environment (standard API 6DSS / ISO 14723) FLUITEK ORSENIGO VALVES, facing this application is continuously upgrading its testing equipment to submit its products to various subsea installation conditions.

Gate, ball and check valves are designed to meet the so called “piggable” requirement. The use of equipment launched in pipelines to clean the line (“pigs”) or measure the integrity of the wall thickness of the line (“smart pigs”) has become a standard in the industry.

Specifications
According to API 6D.
Through conduit gate size 2” - 48", Classes 150#, 300#, 600#, 900#, 1500# as applicable. Class 2500# available on request for smaller sizes.
Side entry ball valves size 2” - 36", Classes 150#, 300#, 600#, 900#, 1500# as applicable. Class 2500# available on request for smaller sizes.
Full opening swing check valves size 2”- 48", Classes 150#, 300#, 600#, 900#, 1500# as applicable. Class 2500# available on request for smaller sizes.
Ball valves fire test design to API 607/API 6FA/BS 6755.
Secondary sealing available.
CE/PED requirements compliance available.

Engineered Products
Single and double expanding gate valves are available on request.
Stem extensions for valve underground installation are available per customer requirements.
Double block and bleed dual compact ball valves allocated in a single side entry body to ensure positive shut off with leaking detection device.
Fully Welded ball valves.
FLUTEK ORSENIGO VALVES is active in this section of valves application for ON/OFF service valves. The most commonly used valves are ball and gate valves, globe valves and check valves (both swing, tilting disc and piston check available).

All kinds of material combinations are available, depending on service conditions request. Products for corrosion and erosion resistance are available (such as valves for sour oil and gas service, fluids containing particles, etc).

Processing plants have increasingly emphasized the need to control fugitive emissions in the atmosphere both for environmental and safety reasons.

FLUTEK ORSENIGO VALVES has devoted specific attention to the matter by equipping itself for fugitive emission testing of its valves in accordance with ISO 15848 - 1 (Prototype testing) and ISO 15848 - 2 (Production testing). Packing systems are also tested in accordance with the principles of API 622.

Specifications
Designs according to API 600, API 6D, ANSI/SME B16.34, EN 12276.
Sizes 2” through 60”, pressure classes 150# through 1500#.
Bolted bonnet design. Pressure seal bonnet design also available for higher pressure classes.
CE/PED requirements compliance available.
Materials: carbon steel, low temperature carbon steel, low alloy steel, stainless steel (including duplex and super duplex) nickel alloy.
By-pass features, jacket feature, stem extension feature available.
Electric motor operated, hydraulic actuator and pneumatic (double or single effect) available.

Engineered Products
Tilting disc check valves. Non-slam operation. Best service in lines with slow fluid flow. Bonnet less design sizes 3”-30” classes 150# and 300#. Classes 600# and above with pressure seal bonnet.
Bellows seal gate, globe valves gate and globe valves with stainless or nickel alloy hydro-formed bellows seal welded to stem head and body/bonnet joint to eliminate fugitive emissions of dangerous fluids. Construction maintaining secondary stem sealing system for emergency.
Oxygen service valves gate, globe and check valves, assembled and cleaned in environment ensuring total cleanliness from any contaminating residuals.
Essential for safe usage in oxygen lines. Packaged in sealed envelopes to ensure maintaining of cleanliness till installation.
Cryogenic ball, gate and globe valves design with bonnet extension per customer requirements. Service temperatures down to -196° centigrades available with cryogenic testing.
Ball valves equipped with low emission stem packing for lethal service.
FLUITEK ORSENIGO VALVES, through the know how and experience of Friulco, has incorporated a wide range of engineering products for this application. The required valves are wedge or parallel slide gate valves, swing check valves, globe valves, stop check globe valves. Focus is placed on products for high pressure and high temperature service. The media are high pressure feed water service and/or superheated steam high temperature service (lately approaching 650 degrees centigrade continuous service). The design is based on pressure seal bonnet (also called “autoclave”) ideal for body/bonnet joint sealing at high pressures. Materials and manufacturing process controls for all products which will be used in extremely critical conditions are treated with particular care. In fact, material composition, heat treatment, welding procedures, and manufacturing processes are strictly connected with the safety and life-cycle of product in service. For example, the high temperature steam service valves in modified 9 per cent chrome material (C12A castings, F91 forgings, Werkstoff 1.4903 forgings) and materials for high pressure moderate temperature water lines (Werkstoff 1.6368; 15NiCuMo5Nb).

Specifications
Design standards ANSI/ASME B16.34, EN 12516. Pressure seal bonnet design. Bolted bonnet under request for intermediate pressure classes. Cast construction and forged construction available. ASME code compliance and CE/PED requirements compliance both available. Sizes 2” through 48”, pressure classes 150# through 4500# as applicable. Gate valves available in flexible wedge, split wedge and parallel slide disc available. Materials: carbon steel alloy steel and nickel alloys available Electric motor operated, hydraulic actuator and pneumatic (double or single effect) available.

Engineered Products
Three way switch valves: specially designed valves to switch the fluid flow into a by-pass line. Typical service: by-pass preheating water system in case of malfunctioning of the preheater. Stop check y-pattern globes, cast and forged construction acting as Non Return Piston checks with stem in the “open” position and as Off Valve with stem in the “closed” position.
Floating Ball Valves typical application is for smaller sizes (up to 6 inches) and lower pressure classes. They are characterized by simple design, easy maintenance, low cost and quick delivery. Body construction can be two or three pieces, bolted or screwed body, made by forging, forged or rolled bar. Wide range of materials: carbon steels, austenitic or martensitic SS, duplex-supersuper duplex SS, nickel-based alloys, titanium, aluminium-bronze and other exotic materials. Valve main technical features include automatically self relieving body cavity (due to floating ball) and anti blow-out stem.

Main reference codes:
- Standard design in accordance with API 6D and ISO 17292/BS 5351.
- Antistatic design as per API 6D and ISO 17292.
- Valve ends can be flanged (RF, FF, MF or FF, RTJ) according to ASME B16.5, Socket Welding, Butt-Welding, Female Threaded etc.
- Fire Safe according to BS6755 / API 6FA / API 607, since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Floating ball valves can be manual operated (lever or gearbox depending on valve size), but also equipped with an actuator (electric, pneumatic, hydraulic, gas-over-oil etc.).

Standard design is soft seated and lever operated, the following special designs are also available:
- **CRYOGENIC (see specific section)**: full austenitic stainless steel valve, provided with PCTFE or metal seat, lipseals as static and dynamic seals, stem extension according to BS6364 (or as per customer requests).
- **METAL-TO-METAL SEAT**: for high temperatures (larger than 250°C) or dirt/slurry service, Floating Ball Valves can be provided with a spring-energized seat, and hard facing on seat and ball contact surfaces (Tungsten or Chromium Carbide).
- **STEM EXTENSION**: For special applications the operator (lever/gear/actuator) can be lifted by an extension fixed to valve body, and a joint coupled to the stem.

The following optional features are also available:
- Locking device
- Body drain connection
- SS lever group
- Dead man’s handle
Trunnion Side Entry Ball Valves typical application is for gas or crude oil pipelines, larger sizes (up to 60 inches) and higher pressure classes (ASME 4500 or API 15000psi). Body construction can be two or three pieces for smaller sizes (up to 6” RB), three pieces for larger dimensions. Raw material can be either forgings or centrifugal castings. Wide range of materials: carbon steels, austenitic or martensitic SS, duplex-superduplex SS, nickel-based alloys. Bolted body as a standard, welded body for special applications (see specific section).

Valve main technical features include anti blow-out stem and valve seats design available in three different versions:

• **SPE (Single Piston Effect):** the seat is energized by upstream pressure only.
• **DPE (Double Piston Effect):** the seat can be energized by upstream pressure or by body cavity pressure.
• **DUAL (SPE upstream and DPE downstream):** combining the two seat designs explained above, a double barrier can be assured in case of seat sealing failure.

Main reference codes:

• Standard design can be in accordance with API 6D / API 6D SS / ASME B16.34 / API 6A.
• Anti static design as per API 6D and ISO 17292.
• Valve ends can be flanged (RF, FF, MF or FF, RTJ), according to ASME B16.5 (up to 24”) or ASME B16.47 (26” and above), Butt-Welding according to ASME B16.25, or Hub, according to customer Requirements.
• Fire Safe according to BS6755 / API 6FA / API 607, since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Trunnion ball valves can be manual operated (lever or gearbox depending on valve size), but also equipped with an actuator (electric, pneumatic, hydraulic, gas-over-oil etc.).

Standard design is soft seated and gear operated, the following special designs are also available:

• **CRYOGENIC (see specific section):** full austenitic stainless steel valve, provided with PCTFE or metal seat, lipseals as static and dynamic seals, stem extension according to BS6364 (or as per customer requests).
• **METAL-TO-METAL SEAT:** for high temperatures (larger than 250°C) or dirt/slurry service, hard facing on seat and ball contact surfaces (Tungsten or Chromium Carbide).
• **SUBSEA DESIGN:** for subsea applications, Side entry Ball valves are provided with additional seals, blind nuts, subsea actuators etc. Valve design according to API 6D SS and ISO 14723.
• **STEM EXTENSION:** For special applications the operator (lever/gear/actuator) can be lifted by an extension fixed to valve body, and a joint coupled to the stem.

The following optional features are also available:

• Locking device.
• Floating ball valves for drain and vent connections (if prescribed by Customer requirements).
• Emergency stem seal injection.
• Emergency seats sealant injection.
• Weld overlay (316 or Inconel 625) on dynamic sealing areas or in all wetted parts.
• Removable supports.
• Certified lifting devices.
• Welded glandplate.
• Seal welded fittings.
Trunnion Welded Body Ball Valves typical application is for gas transmission, buried pipelines (underground), larger sizes (up to 60 inches) and medium pressure classes (up to ASME 900 psi). Raw material can be either forgings or centrifugal castings. Wide range of materials: carbon steels, austenitic or martensitic SS.

Valve main technical features include anti blow-out stem and valve seats design available in three different versions:
- **SPE (Single Piston Effect):** the seat is energized by upstream pressure only.
- **DPE (Double Piston Effect):** the seat can be energized by upstream pressure or by body cavity pressure.
- **DUAL (SPE upstream and DPE downstream):** combining the two seat designs explained above, a double barrier can be assured in case of seat sealing failure.

Main reference codes:
- Standard design can be in accordance with API 6D / API 6D SS / ASME B16.34.
- Antistatic design as per API 6D and ISO 17292.
- Valve ends can be flanged (RF, FF, MF or FF, RTJ), according to ASME B16.5 (up to 24”) or ASME B16.47 (26” and above), Butt-Welding according to ASME B16.25.
- Fire Safe according to BS6755 / API 6FA / API 607, since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Welded body ball valves can be manual operated (lever or gearbox depending on valve size), but also equipped with an actuator (electric, pneumatic, hydraulic, gas-over-oil etc.).

Standard design is soft seated and gear operated, the following special designs are also available:
- **METAL-TO-METAL SEAT:** for high temperatures (larger than 250°C) or dirt/slurry service, hard facing on seat and ball contact surfaces (Tungsten or Chromium Carbide).
- **SUBSEA DESIGN:** for subsea applications, Side entry Ball valves are provided with additional seals, blind nuts, subsea actuators etc. Valve design according to API 6D SS and ISO 14723.
- **STEM EXTENSION.** For underground/ buried applications. The operator (lever/gear/actuator) can be lifted by an extension fixed to valve body, and a joint coupled to the stem.

The following optional features are also available:
- **Locking device.**
- Extended SS tubing cw Floating ball valves for drain and vent connections (underground / buried)
- Emergency stem seal injection;
- Emergency seats sealant injection;
- Welded glandplate.
Trunnion Top Entry Ball Valves add to the main features of Side Entry Type, the possibility to make maintenance without removing the valve from the pipeline. Special tools provided by Fluitek Orsenigo (necessary only for larger sizes) allow the User to remove the trim vertically, from bonnet side. Body raw material can be forging (for smaller sizes) or sand casting (for larger sizes). Wide range of materials: carbon steels, austenitic SS, duplex-superduplex SS, nickel-based alloys.

Valve main technical features include anti blow-out stem and valve seats design available in three different versions:

- **SPE (Single Piston Effect):** the seat is energized by upstream pressure only.
- **DPE (Double Piston Effect):** the seat can be energized by upstream pressure or by body cavity pressure.
- **DUAL (SPE upstream and DPE downstream):** combining the two seat designs explained above, a double barrier can be assured in case of seat sealing failure.

Main reference codes:

- **Standard design** can be in accordance with API 6D / ASME B16.34 / API 6A.
- **Antistatic design** as per API 6D and ISO 17292.
- **Valve ends can be flanged (RF, FF, MF or FF, RTJ),** according to ASME B16.5 (up to 24”) or ASME B16.47 (26” and above), Butt-Welding according to ASME B16.25.
- **Fire Safe according to BS6755 / API 6FA / API 607,** since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Trunnion ball valves can be manual operated (lever or gearbox depending on valve size), but also equipped with an actuator (electric, pneumatic, hydraulic, gas-over-oil etc.).

Standard design is soft seated and gear operated, the following special designs are also available:

- **METAL-TO-METAL SEAT:** for high temperatures (larger than 250°C) or dirt/slurry service, hard facing on seat and ball contact surfaces (Tungsten or Chromium Carbide).
- **SUBSEA DESIGN:** for subsea applications, Top Entry Ball valves are provided with additional seals, blind nuts, subsea actuators etc. Valve design according to API 6D SS and ISO 14723.
- **STEM EXTENSION.** For special applications the operator (lever/gear/actuator) can be lifted by an extension fixed to valve body, and a joint coupled to the stem.

The following optional features are also available:

- **Locking device.**
- **Floating ball valves for drain and vent connections (if prescribed by Customer requirements)***
- **Emergency stem seal injection;**
- **Emergency seats sealant injection;**
- **Weld overlay (316 or Inconel 625) on dynamic sealing areas or in all wetted parts.**
- **Certified lifting devices;**
- **Seal welded fittings.**
Double Block and Bleed Ball Valves are aimed to get a double barrier on the piping, and bleed the fluid trapped between the two balls from a dedicated drain line. Body construction can be either forging or centrifugal casting. Wide range of materials: carbon steels, austenitic or martensitic SS, duplex-superduplex SS, nickel-based alloys.

Valve design can be either Trunnion or Floating type, anti blow-out stem and typically SPE seat design. Drain port is normally provided with a floating ball valve, to be fitted with Final User drain line. Valve seats can be soft or metal to metal hard-faced.

Main reference codes:
• Standard design in accordance with API 6D / ASME B16.34 / API 6A.
• Antistatic design as per API 6D and ISO 17292.
• Valve ends can be flanged (RF, FF, MF or FF, RTJ), according to ASME B16.5 (up to 24”) or ASME B16.47 (26” and above), Butt-Welding according to ASME B16.25, or Hub, according to customer Requirements.
• Fire Safe according to BS6755 / API 6FA / API 607, since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Double Block and Bleed ball valves are typically manual operated, but can be equipped also with an actuator (electric, pneumatic, hydraulic).

The following optional features are available:
• Locking device.
• Emergency stem seal injection;
• Emergency seats sealant injection;
• Weld overlay (316 or Inconel 625) on dynamic sealing areas or in all wetted parts.
• Removable supports;
• Certified lifting devices;
• Seal welded fittings.
Fluitek Orsenigo can meet all the requirements coming from the Customer, including the need of valves with reduced dimensions and weight. For Double Block and Bleed design, Trunnion or Floating Type, special body design without flanges results in a very short end-to-end dimension. Pipeline bolts shall be screwed into threaded blind holes machined into valve body.

This customization of the product is possible, indeed, on all Fluitek Orsenigo Ball Valves production: all the dimensions coming from international codes [valve bore, valve end to end] of coming from Fluitek Orsenigo standard production range [valve weight, height form ground, operator height form line axis] can be modified trying to meet the requirements of the Customer for the specific project.
Almost all Fluitek Orsenigo Ball Valve types can be designed in a special version suitable for cryogenic service. In this case, all the materials and technical features are designed to withstand minimum design temperature required by the Customer, down to -196°C. If required by the customer, specific Cryogenic Tests are performed to verify the behavior of production valves in terms of valve torque, sealing capability, emissions vs the ambient.

Body construction can be two or three pieces, forged or cast. Valve design can be either Floating Type or Trunnion Type. Body and trim materials are austenitic SS, because of their ductility at low temperatures. Cryogenic Valves can be soft seated (PCTFE) or metal-to-metal seated. Valve static and dynamic seals are lip-seals PTFE based, due to the fact that PTFE material is suitable to cryogenic conditions. These seals are spring self-energized but in service are also pressure-energized by line fluid. Anti blow-out stem warrants high safety during operation and maintenance activities.

Main reference codes:
- Valve Design in accordance with API 6D / ASME B16.34, but comply also to the additional requirements prescribed by BS6364 or Customer Specifications for Cryogenic Service.
- Antistatic design as per API 6D and ISO 17292.
- Valve ends are normally flanged (RF, FF, MF or FF, RTJ), according to ASME B16.5. Other valve ends available on request.
- Cryogenic stem extension length in accordance with BS6364 or Customer Specifications.
- Fire Safe according to BS6755 / API 6FA / API 607, since each sealing point is provided by a secondary fire-safe seal in graphite. Valve soft seats also are provided with secondary metal-to-metal seal in case of fire.

Valves in Cryogenic service can be manual operated (lever or gearbox depending on valve size), but also equipped with an actuator (electric, pneumatic, hydraulic).
GATE VALVES
The most traditional, widely used, on-off valve FLUITEK ORSENIGO VALVES’s approach to manufacture this type of valve is to maintain high integrity of components, traceability, process controls and tests in order to supply a superior product to for particular customers demands.

Specific attention is given to products in other than day-to-day used material, i.e. carbon steel. In particular: low temperature carbon and low alloy (nickel) steels, chrome-moly low alloy steels, austenitic and austenitic-ferritic duplex stainless steels, nickel alloys. Basic standard of reference is API 600, but also EN 12516 can be referred to. Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions.

Pressure classes are normally ranging from 150# to 300# and 600#. Flanged or butt weld ends configurations are both available. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
FLUITEK ORSENIGO VALVES has a very extended experience in manufacturing this type of valve. It’s the most well known on-off valve for high pressure applications.

It’s features:
• flex wedge disc
• pressure seal body/bonnet joint (also called autoclave)
• high strength construction

are deemed to obtain optimum and safe functioning at medium to high pressures. The pressure seal body/bonnet joint uses a composite graphite/stainless steel seal ring that is today’s optimum solution sealing mechanism. Bi-directional on-off functioning is guaranteed with both seats being tested. Operation, depending on size, pressure class and customer demand can be manual with handwheel, manual with gear operator, electric motor actuated, pneumatic operated.

Design can be to ASME B16.34 as well as to EN 12516. Cast body construction (both flanged and with butt weld ends) and forged body construction (with butt weld ends) are both available.

Materials range from carbon steel to low alloy steels (including the widely used modified 9% chrome alloys), to austenitic stainless steels, to nickel alloys. Packing systems are based on graphite material, but ceramic fiber yarn packing sets are also available for temperatures exceeding 600°C. Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ASME standard) are normally ranging from 900# to 1500#, 2500# and 4500#, the last one being manufactured only in the forged body construction.

These valves require, depending on operation conditions, body cavity overpressure relief systems and/or warm up bypass systems, all made available by FLUITEK ORSENIGO VALVES to customer’s demand. The forged body construction allows FLUITEK ORSENIGO VALVES to supply this product with dimensions and pressure classes out of standard, designed to the specific requirements of the customer (temperature, pressure, size of the line) without any dimensional limitation.
This type of on-off valve is an alternative to the traditional wedge type gate valves. The disc is in two halves, spring loaded, that seat on parallel seat rings. The disc "slides" in contact with the seats, hence the name. The advantages of this product versus the traditional wedge type product are:

- **the disc never blocks in closed position** (phenomenon that may occur with a wedge type that is closed with the line in temperature and opened when the line is cold).

- **The opening/closing torque is much lower than a corresponding wedge type valve**, resulting in less expensive actuation systems.

- **The "sliding" feature keeps dirt away from the seating surface.**

The double spring loaded disc has the tendency to trap working fluid in the body cavity when the valve is closed. This is avoided, when unidirectional functioning is allowed, by applying an equalizing hole on the upstream part of the disc.

Design codes and overall configuration, including stem-to-disc connection are the same than the wedge type gate valves. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to nickel alloys.

Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ANSI standard) are normally ranging from 150# to 300# to 600#. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
FLUITEK ORSENIGO VALVES has very extended experience in manufacturing this type of valve. They are an alternative to the traditional flex wedge type gate valves. The disc is in two halves, spring loaded, that seat on parallel seat rings. The disc “slides” in contact with the seats, hence the name. The advantages of this product versus the traditional wedge type product are:

- The disc never blocks in closed position (phenomenon that may occur with a wedge type that has been closed with the line in temperature and opened when the line is cold).
- The opening/closing torque is much lower than a corresponding wedge type valve, resulting in less expensive actuation systems.
- The “sliding” feature keeps dirt away from the seating surfaces.

The double spring loaded disc has the tendency to trap working fluid in the body cavity when the valve is closed. This results in the need of pressure equalizing system between the body cavity and the upstream line. This is obtained with internal equalizing hole or external equalizing line. Should it be necessary to maintain a bi-directional operation feature, the equalizing system can be obtained with an external by-pass and equalizing system with two bypass valves. This allows a warm-up bypass feature (two open bypass valves) and pressure equalizing system in one or the opposite direction by opening one bypass valve and keeping the other in the closed position.

Design codes and overall configuration, including stem-to-disc connection are the same than the flex wedge type gate valves. Cast body construction and forged body construction are both available. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to nickel alloys. Packing systems are based on graphite material, but ceramic fiber yarn packing sets are also available for temperature exceeding 600°C. Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions.

Pressure classes (per ANSI standard) are normally ranging from 900# to 1500# to 2500#. Class 4500# is also theoretically possible, but normally not requested by the market. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.

The forged body construction allows FLUITEK ORSENIGO VALVES to supply this product with dimensions and pressure classes out of standard, designed to the specific requirements of the customer (temperature, pressure, size of the line) without any dimensional limitation.
Through conduit gate valves are an alternative to ball valves for transmission pipelines. The choice is very often based on past customer satisfaction, more than any technical consideration. FLUITEK ORSENIGO VALVES through conduit valves feature standard principles of this well known type of product. The disc is of slab type gate, seat rings are floating, energized by means of multiple springs, and the line fluid pressure pushes the upstream ring against the disc, thus assuring the sealing. The system allows the so called “self relieving” effect, i.e. any over-pressure acting in the body cavity is discharged in the line when force caused by the over-pressure on the seats exceeds the force provided by the springs. At the same time, the construction permits the double block and bleed functioning meaning that pressure applied contemporaneously upstream and downstream pushes both seats against the disc and opening the body cavity bleed relieves any pressure and fluid in the body cavity.

Standard construction is based on cast body, disc from plate or forging and all parts, particularly body cavity and disc, are precisely machined to control with high accuracy the parallelism and orthogonality of the parts. Two basic sealing systems are provided: soft seating and metal-to-metal seating. The first for gas and clean liquids service, the second for fluids containing solids or otherwise abrasive components. The soft seated construction is normally provided with secondary sealing system, i.e. with the ability of injecting a highly dense fluid (grease) into the seating area to help sealing mechanism in case of damage of the soft inserts.

A variety of materials are available: carbon steel, low temperature carbon steel, austenitic stainless steel, duplex and superduplex stainless steel and nickel alloys. Compliance with NACE MR-01-75 and NACE MR-01-03 is provided. Soft seated valves are provided with reinforced PTFE or Nylon inserts, depending on specific service and pressure class. Coatings include electroless nickel plating, nickel alloy overlays of seat pockets, tungsten carbide coating for metal-to-metal seated valves.

Standard of reference is API 6D full bore. Flanged and BW ends available. Construction with extension pups is also available, upon customer request. Stem sealing alternatives: o-rings, adjustable packing system, enclosed packing system with Chevron-type rings and lantern ring with grease injection fitting. Very often this type of valve is used in underground service and proper stem extensions are provided. Testing is per standard requirements, or per any supplementary test request by customers.
This type of valve includes in itself the features of a through conduit service and of a standard gate valve with a parallel seating surfaces. The through conduit service implies the continuity of fluid flow conduit, excluding any dirt accumulation in the body cavity. The gate is in two halves (the so called “gate” and “segment”) with angled sliding surfaces, kept together by springs or by a lever system for larger dimensions.

Construction is available with single expanding or double expanding system. In the first case, the two halves of the gate are pushed against the seats in the valve closed position by having an internal stop acting on one of the two halves. In the second case the same expansion is also obtained in the valve open position.

During the gate travel from open to close, or close to open, the gate springs or the lever system prevent the gate from being in contact with the seats by “contracting” the two gate halves together. Usual construction is bolted bonnet. FLUITEK ORSENIGO VALVES can supply these valves in a variety of materials: carbon steel, low temperature carbon steel, austenitic stainless steel, duplex and super duplex stainless steel and nickel alloys.

Seating surfaces (seats, gate, sliding surfaces of the two gate halves) are provided with tungsten carbide coating, particularly for high pressure services.

Pressure classes range from ANSI 300# to 600#, 900#, 1500# and 2500#.
Bellows seal valves are used in applications where a hermetic tightness is essential in order to prevent any possible leakage of process fluid into the atmosphere, where the fluid is particularly hazardous (poisonous, aggressive, radioactive). FLUITEK ORSENGO VALVES is specialised in gate valves with bellows seals, in particular in the manufacturing of:

- **Valves of large diameter** (e.g. 48” gate) normally for low pressure applications (typically class 300 ANSI)
- **Valves of medium-small diameter** (e.g. from 1/2” to 12”) normally for high pressure applications (class 600, 900, 1500, 2500 ANSI)

In both cases the construction of the bellows and its assembly system to other components of the valve are essential, in particular for the resistance of the bellows which is subjected to fluid working pressure on the external side.

Materials used are all grades normally required by the various services: cast or forged carbon steel, low alloy steel, austenitic steel (AISI 316L, AISI 321) or nickel alloys (INCONEL 600, INCONEL 718). Bellows are hydro-formed to shape. Bellows materials are usually AISI 316L, INCONEL 625, INCONEL 718. FLUITEK ORSENGO VALVES bellows seal valves are always supplied with a packing system (stem packing) for safety secondary seal.

FLUITEK ORSENGO VALVES bellows seal valves are also tested in-house for fugitive emissions. The test standard is ISO 15848 that requires the valve to be pressured with helium gas. The Gate valve is pressurised at about 150 Bar. For example the valve is then open-close cycled at room temperature 250 times total and 250 times total at 400°C. Helium leakages are detected with an appropriate helium gas leak detector called sniffer.

Leakages are checked at body-to-bonnet joint at emergency stem packing system. The packing system test is done by creating a vacuum around the area. Leakages rates are less than 10 at minus six measuring units for packing system and 50 parts per million for body to bonnet joint. The test qualifies bellows seal gate valves with similar construction for all pressure classes below the tested one and stem dimensions that are not less than half or above double of the valve tested.
Valves used in the primary heat transport system of nuclear power plants are designed in accordance with ASME Boiler And Pressure Vessel Code, Section III, Subsection NB. They have to answer to three major technical requirements: tightness of sealing system to prevent radioactive fluid leakages into the atmosphere, earthquake resistant constructions, construction in accordance with normally required endurance tests at service condition.

A typical well proven construction are bellows seal gate valves, ASME/ANSI classes 600#, 900# and 1500#, materials low temperature carbon steels, austenitic stainless steels, nickel alloys, sizes ranging from 3/4” to 8” nominal size. FLUITEK ORSENIGO VALVES design has considered and applied the following principles:

- eliminate the use of castings for pressure containing parts
- eliminate the use of strength welds, using threaded and seal welded connections where needed
- use of a very compact and geometrically homogeneous design, reducing stress concentration points
- introduction of a system (see separate presentation) allowing verification in service of the integrity of the bellows and, at the same time, verification of the sealing capacity of the secondary stem sealing system.

The ability of submitting production samples to endurance tests (e.g. cycling to failure at pressure and temperature conditions), to demonstrate conformity with the guaranteed minimum cycle life required, is available. The verification of the design in relation to the ability of withstanding earthquake loads is carried out using a shake table and operating base earthquake details.
FLUITEK ORSENIGO VALVES provides considerable experience in the production of gate valves for low temperature service (below -50°C). Low temperature test in accordance with BS 6364:1984 Appendix A is available.

Standard materials are austenitic steels (e.g. CF8/CF3; CF8M/CF3M) with metal seals and/or soft inserts (usually based on PTFE). The implementation requires extremely accurate machining for a smooth functioning of the valve in service.

A special kind of service is the oxygen service in the air liquefaction plants. For that application FLUITEK ORSENIGO VALVES has developed a procedure and a dedicated production shop. The valves are cleaned and treated in order to meet the industry requirements, with the capability of performing quantitative verification of the degree of cleanliness.

The valves are supplied on request with mounting plate for installation in ”cold box”.

Equalizing systems are provided to prevent trapping of fluid in the body and bonnet extension cavities.
FLUITEK ORSENIGO VALVES has applied its extended experience in high pressure applications of gate valves to a line of small size (1/2” to 2”) forged construction specially designed gate valves. Standard of reference is API 602 / ISO 15761 and/or EN 12516.

Materials are either the traditional ASTM/ASME materials, harmonized EN materials or special non-harmonized materials (ranging as usual from carbon steel, low temperature carbon steel, low alloy steel, austenitic stainless steel, austenitic-ferritic stainless steel, nickel alloys). Pressure classes are normally on the high range side (900#, 1500#, 2500#, 4500#). Construction is either with bolted bonnet, seal welded bonnet, full penetration welded bonnet, pressure seal bonnet (as below sketched). Dimensions are per specific design, depending on customer specifications. Compliance with AD2000 requirements is available.
FLUITEK ORSENIGO VALVES has a very extended experience in globe valves manufacturing. In this kind of valve, the disc is moving in a perpendicular direction away from the seats. This implies the disc-to-seat ring contact to be at right angle, which permits the force of closing to tightly seat the disc, reducing the seat leakages. Normally, the globe valves are arranged so that the disc closes against the direction of fluid flow.

The stem and the disc are not strictly fixed together, but the disc can swivel in order to guarantee the complete contact between the disc and seats surfaces. The disc can be plug type, needle type or parabolic type. FLUITEK ORSENIGO VALVES globe valves are on/off valves, but sometimes they are utilized in throttling service. In this case the parabolic disc shape is preferable, since the ratio between the stem position and the fluid flow is constant.

Cast body construction is normally used. Ends configuration is either with flanged ends or with butt weld ends. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to nickel alloys. Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ANSI standard) are normally ranging from 150# to 300# to 600#. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
FLUITEK ORSENIGO VALVES has a very extended experience in globe valves manufacturing. In this kind of valve, the disc is moving in a perpendicular direction away from the seats. This implies the disc-to-seat ring contact to be at right angle, which permits the force of closing to tightly seat the disc, reducing the seat leakages. Normally, the globe valves are arranged so that the disc closes against the direction of fluid flow.

The stem and the disc are not strictly fixed together, but the disc can swivel in order to guarantee the complete contact between the disc and seats surfaces. The disc can be plug type, needle type or parabolic type. FLUITEK ORSENIGO VALVES globe valves are on/off valves, but sometimes they are utilized in throttling service. In this case the parabolic disc shape is preferable, since the ratio between the stem position and the fluid flow is constant.

Cast body construction and forged body construction are both available. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to nickel alloys.

Packing systems are based on graphite material, but ceramic fiber yarn packing sets are also available for temperature exceeding 600°C.

Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions.

Pressure classes (per ANSI standard) are normally ranging from 900# to 1500# to 2500#. Class 4500# is also available to customer request. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
In addition to the line of globe valves bolted bonnet, FLUITEK ORSENIGO VALVES has added a line of same type of valve but with an inclined stem configuration, called Y-pattern type, as an alternative to the straight pattern, also called T-pattern. In principle, the Y-pattern configuration presents lower pressure drops at equal flow rate. The disc is normally either plug type or parabolic shaped. Cast body construction is normally used. Ends configuration is either with flanged ends or with butt weld ends. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to nickel alloys.

Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ANSI standard) are normally ranging from 150# to 300# to 600#. Size range depends on pressure class requirements, normally not exceeding 12”. FLUITEK ORSENIGO VALVES has anyhow no limits in relation to market requirements.
FLUITEK ORSENIGO VALVES has a very extended experience in supplying this type of valve for high pressure applications. The manufacturing features:

- fully guided disc in the body
- alternative shapes of disc (plug type, needle type, parabolic shape)
- swivel type stem-to-disc connection

are all deemed to allow adaptation to various service conditions, including throttling service. The Y-pattern fluid path shape helps to reduce fluid turbulence and consequent cavitation phenomenon. Design can be to ASME B16.34 but, also, to EN 12516. Cast body construction and forged body construction are both available.

Materials range from carbon steel to low alloy steels (including the widely used 9% Cr alloys), to austenitic stainless steel, to nickel alloys. Packing systems are based on graphite material, but ceramic fiber yarn packing sets are also available for temperature exceeding 600°C.

Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ASME standard) are normally ranging from 900# to 1500#, 2500# and 2500#. Class 4500# is also available but only in the forged body construction.
Valves used in the primary heat transport system of nuclear power plants are designed in accordance with ASME Boiler And Pressure Vessel Code, Section III, Subsection NB. They have to answer to three major technical requirements: tightness of sealing system to prevent radioactive fluid leakages to the ambient, construction able to withstand earthquake loads, construction able to pass normally required endurance tests at service condition.

FLUITEK ORSENIGO VALVES provides bellows seal globe valves, ASME/ANSI classes 600#, 900# and 1500#, materials low temperature carbon steels, austenitic stainless steels, nickel alloys, sizes ranging from 3/4” to 8” nominal size.

FLUITEK ORSENIGO VALVES design has considered and applied the following principles:

- eliminate the use of castings for pressure containing parts
- eliminate the use of strength welds, using threaded and seal welded connections where needed
- use of a very compact and geometrically homogeneous design, reducing stress concentration points introduction of a system (see separate presentation) allowing verification in service of the integrity of the bellows and, at the same time, verification of the sealing capacity of the secondary stem sealing system.

The ability of submitting production samples to endurance tests (e.g. cycling to failure at pressure and temperature conditions), to demonstrate conformity with the guaranteed minimum cycle life required, is available.

The verification of the design in relation to the ability of withstanding earthquake loads is done with the use of a shake table and operating base earthquake details.
FLUITEK ORSENIGO VALVES provides considerable experience in the production of gate valves for low temperature service (below -50°C). Low temperature test in accordance with BS 6364:1984 Appendix A is available.

Standard materials are austenitic steels (e.g. CF8/CF3; CF8M/CF3M) with metal seals and /or soft inserts (usually based on PTFE). The implementation requires extremely accurate machining for a smooth functioning of the valve in service. A special kind of service is the oxygen service in the air liquefaction plants. For that application FLUITEK ORSENIGO VALVES has developed a procedure and a dedicated production shop. The valves are cleaned and treated in order to meet the industry requirements, with the capability of performing quantitative verification of the degree of cleanliness.

The valves are supplied on request with mounting plate for installation in “cold box”.

EXTENDED BOLTED BONNET FOR CRYOGENIC SERVICE

GLOBE VALVES
FLUITEK ORSENIGO VALVES has introduced a complete line of this type of product. Their function is to combine the off service by blocking the disc in the closed position, with a lift non return check valve service, when stem, not firmly connected with the disc, is in the up position. Construction is with straight pattern (also called "T-pattern"). Normal construction is with cast body and bonnet. Ends configuration is either with flanged ends or with butt weld ends. Materials range from carbon steel to low alloy steel, to austenitic stainless steel, to austenitic-ferritic stainless steels (duplex), to nickel alloys.

Materials are either to ASTM/ASME standards or to EN standards, either harmonized or calculated to design conditions. Pressure classes (per ANSI standard) are normally ranging from 150# to 300# to 600#.
These valves, normally orientated at an angle of 45° ("Y-pattern"), are frequently employed in power generation plants, in the presence of superheated steam or feed water. They can also be installed in process lines (e.g. refining plants) for medium/high pressures and temperatures. They work as non-return valves (so they can be compared to "lift piston check" valves) and can be locked close. They are normally supplied with a pressure seal bonnet and manual actuator, with exception to those when they are mounted on site that is difficult to reach (in this case the actuator is electric).

FLUITEK ORSENIGO VALVES has a great experience in the supply of these valves. Field application has shown potential functioning problems in relation to the fluid type and flow rate. As a consequence, FLUITEK ORSENIGO VALVES has adopted a computational system that allows to simulate valves fluidynamic behaviour and, if necessary, to modify the disc according to the operating conditions in order to optimise the functioning.

The operating pressures are normally high (classes 900, 1500 and 2500 ASME).

The available materials range from carbon steel to low-alloy steels and austenitic steels, both forged and cast (examples: A105/WCB, F22/WC9, F91/C12A, F92, F347/CF8C).

Several design alternatives to ASME standards are available: UNI EN 12516, with materials that can be PED harmonised or not (example: 15NiCuMoNb5 for medium temperatures and very high operating pressures, 600 bar).
FLUITEK ORSENIGO VALVES has applied its extended experience in high pressure applications of globe valves to a line of small size (1/2” to 2”) forged construction specially designed globe valves, straight pattern.

Disc shape can be plug or needle type. Configuration can be bolted bonnet, seal welded bonnet and, most often, pressure seal bonnet. Materials are either the traditional ASTM/ASME materials, harmonized EN materials or special non-harmonized materials (ranging as usual from carbon steel to low temperature carbon steel, low alloy steels, austenitic stainless steel, austenitic-ferritic duplex stainless steel, nickel alloys). Pressure classes are normally on the high range side (900#, 1500#, 2500#, 4500#). Dimensions are per specific design, depending on customer specifications. Compliance with AD2000 requirements is available.
CHECK VALVES
FLUTEK ORSENIGO VALVES has a very long experience in supplying this type of non return valve. It’s the most used one by the industry, normally coupled with on-off bolted bonnet gate valves and globe valves.

Most used standard of reference are API 6D, regular opening, API 594, BS 1868, EN and ISO standard can also be referred to.

Constructions with internal hinge pin are available, together with the more traditional construction with hinge pin inserted from the side. The latter allows application of optional requests, such as position indicator (with or without limit switches), locking systems in the open position (to exclude the unidirectional non return function), anti-slam external counter weights. A rotary anti-slam system applied to the external part of the hinge pin is also available (industry calls it “dash pot system”).

Materials available include carbon steel, low temperature carbon steel, low alloy steel, austenitic stainless steels, austenitic-ferritic duplex stainless steel, nickel alloys. ANSI classes normally available are 150#, 300# and 600#.
The on-off pipeline valves included in FLUITEK ORSENIGO VALVES lines of production (ball valves, through conduit gate valves) need very often to be installed in lines subject to “pigging” operations, either for lines internal periodical cleaning and/or for checking status of corrosion of the pipeline. In this case the non return valves need to present no obstacle to the passing of the pig.

FLUITEK ORSENIGO VALVES has a line of such valves, referred as full opening in API 6D standard. Normal construction is with internal hinge pin, but construction with hinge pin with external insertion is also available. This second construction allows application of additional market requirements, such as position indicator (with or without limit switches), locking systems in the open position, anti-slam external counter weights, rotary anti-slam system (so called “dash pot”).

Materials available are all those used in oil or gas pipelines that include carbon steel, high strength carbon steel, low temperature carbon steel, low alloy steel for extra low temperature environment, austenitic stainless steel. ANSI classes normally available are 150#, 300# and 600#.
This type of valve, non-return, is coupled with on-off valves in high pressure lines to protect the system from the fluid reversing flow, when regular flow is stopped. The disc resistance to flow is keeping it open, a minimum flow rate being needed. FLUITEK ORSENIGO VALVES can supply, based on service conditions (fluid, temperature, pressure, flow rate) the analysis of the behavior of the valve and its limits. One of the limits of this type of valve is “slamming” to close position when fluid flow stops. FLUITEK ORSENIGO VALVES can supply counter weights, rotary dumpers (also called “dashpot systems”) to prevent “slamming”, all requiring the hinge mounted outside of the body. Design can be to ASME B16.34 but, also, to EN 12516.

Cast body construction (both flanged and with butt weld ends) and forged body construction (with butt weld ends) are both available. Materials range from carbon steel to low alloy steel (including the widely used modified 9% Cr alloys) to austenitic stainless steels, to nickel alloys.

Pressure classes (per ANSI standard) are normally ranging from 600# to 900#, 1500# and 2500#. 4500# class is also available in the forged body construction only. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
Tilting disc check valves, otherwise called "equilibrated disc check valves", have the well known features of a typical "no slam" behavior. The disc is maintained open in equilibrium by the fluid flow and when it stops the reversed flow makes the disc move to the closed position by rotating it against the seat, not slamming into it as it happens in a swing check valve.

Such a valve is obtained in case of lower range pressure classes (ANSI 150# and 300#) in the so called bolted bonnet configuration. Indeed the body (cast construction) is in two halves with a bolted connection at 45 degrees angle in relation to the horizontal axis of the valve.

FLUITEK ORSENGO VALVES has a unique design that eliminates that bolted connection (and consequent possible leakages to the external) while maintaining the basic features of the tilting disc. No change in possible maintenance necessities: both configurations require disassembling of the valve from the line to access to the internals.
This type of valve (also called “equilibrated disc non return valve”) is coupled with on-off valves in high pressure lines to protect the system from the fluid reversing flow, when regular flow is stopped.

The characteristic of this valve is “non slamming”. The disc, with its shape, is maintained in the open position by the fluid flow and its return to closed position does not cause a sudden violent hit against the seat. Design can be to ASME B16.34 but, also, to EN 12516.

Cast body construction and forged body construction are both available. Materials range from carbon steel to low alloy steel (including the widely used modified 9% Cr alloys) to austenitic stainless steels, to nickel alloys. Pressure classes (per ANSI standard) are normally ranging from 600# to 900#, 1500# and 2500#. Size range depends on pressure class requirements, FLUITEK ORSENIGO VALVES having no limits in relation to market requirements.
The swing check valves and the tilting disc type check valves are not the only ones used in the high pressure, high temperature lines, typical of the power and steam generation industries. The process industry sometime also uses the herebelow described product. FLUITEK ORSENIGO VALVES can offer a piston type check valve line for high pressure, high temperature service. Construction is with Y-pattern (lifting direction inclined versus fluid centerline). Both forged and cast body construction are available.

Piston is either spring loaded or not, depending on customer choice. Ends configuration is quite normally with butt weld ends. Materials are to ASTM/ASME standards or EN standards, either harmonized or not, ranging from carbon steels, to low alloy steels, to austenitic stainless steels, to austenitic-ferritic stainless steels (duplex), to nickel alloys.

FLUITEK ORSENIGO VALVES offers, as a special added on feature, the possibility of simulating the fluiddynamic behavior of this type of valve, determining its proper functioning at certain specified flow rates, with customer furnished data of fluid conditions.
This type of non return valve is mainly used in gas systems for the protection of the compressors in case of reverse flow. The main features are a non-slam functioning, low pressure drop related to the geometry of the flow path, elimination of the risk of fluid leakages to the environment obtained by trim construction, fully contained in the body. FLUI TEK ORSENIGO VALVES line of product can be substantiated with computerized fluidynamic analysis determining the flow behavior at the service conditions indicated by the customer.

Design is normally complying with ASME B16.34. Materials are normally carbon steel, low temperature carbon steel, but other materials (such as austenitic stainless steel) can be used per customer request. Seats are normally with soft inserts. Pressure classes are normally ANSI 600# or 900#. Other pressure classes are anyhow available per specific customer request.
FLUITEK ORSENIGO VALVES has applied its extended experience in high pressure applications of check valves to a line of small size (1/2” to 2”) forged construction specially designed check valves. Most used configuration is swing type, but piston lift type is also available. Bonnet configuration is normally bolted type but pressure seal type is also available as well as seal welded bonnet.

Materials are either the traditional ASTM/ASME materials, harmonized EN materials or special non-harmonized materials (ranging as usual from carbon steel to low temperature carbon steel, low alloy steel, austenitic stainless steel, austenitic-ferritic duplex steel, nickel alloys). Pressure classes are normally on the high range side (900#, 1500#, 2500#, 4500#). Dimensions are per specific design, depending on customer specifications. Compliance with AD2000 requirements is available.
CERTIFICATIONS

ISO 9001:2008
97/23/EC – PED directive
94/9/EC – Atex directive
IEC 61508:2010 SIL
API 6D / ISO 14313
API 6DSS / ISO 14723
API 6A / ISO 10423
API 600
API 17D / ISO 13628-4
GOST certifications