

Cryogenic Service Valves

30 Years of Innovation



OMB is a family owned and managed business founded by Mr. Roberto Brevi in 1973. His goal was to build a company that would specialize in the manufacturing of forged steel valves. Since its founding, OMB's capabilities have grown to cover small diameter gate/globe/check valves, small and large diameter floaters and trunnion mounted ball valves, through conduit gate valves, and triple offset butterfly valves. Today OMB operates 5 plants in 3 countries with a worldwide network of agents, distributors, and sales offices.





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NEW on this version

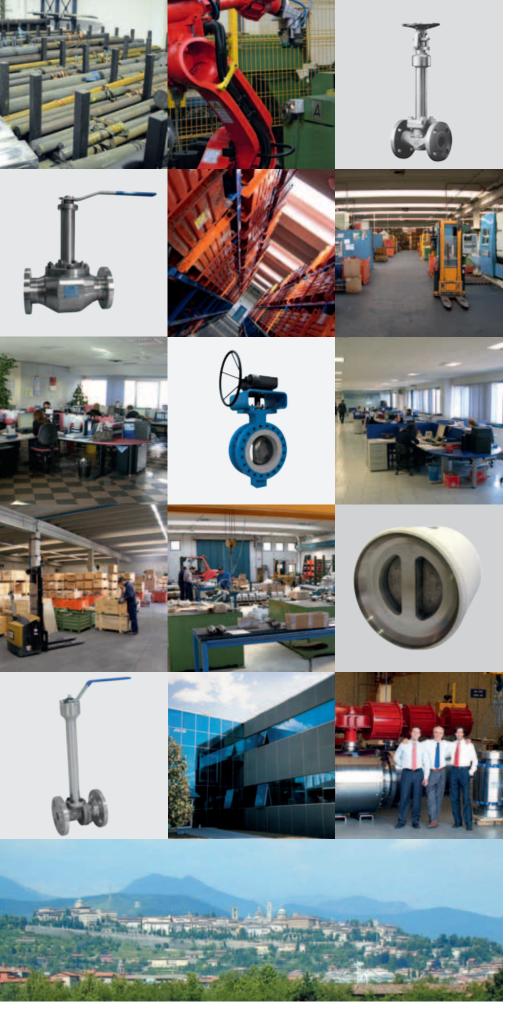


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The Group

At OMB we have developed a comprehensive range of engineered valve products installed globally across a wide range of industries:

- Offshore
- Subsea
- Refinin
- Petrochemical
- Chemical
- Desalination

In these past 40 years OMB has supplied millions of valves to major oil and gas companies worldwide. During this time OMB's name has become synonymous with absolute reliability, superior quality, and competitive pricing.

In the early 80's OMB was the first to introduce robotics in the valve manufacturing process. This included specialized equipment designed to reduce machining time, and increase the quality of the machined components.

Today OMB's commitment to innovation and continuous improvement is higher than ever. With this in mind, OMB is focused on expanding our capacity at home, opening new plants abroad, and extending our distribution network to better serve our customers.

We invite you to visit any of our facilities to meet our experienced workers and see the state of the art equipment they are using to produce the best valve money can buy.

This our promise!

Roberto, Simone and Fabio Brevi

The Brevi family is active in the management of the operations.
Roberto Brevi, founder and chairman with Simone and Fabio managing directors.

OMB is based in Bergamo, a town 45 Km from Milan with easy access to airports, highways and seaport. Bergamo is the world center for the forged steel valves production with a large valve parts subcontracting base.



TECHNOLOGY & QUALITY



OMB cryogenic gate and globe valves have been developed to satisfy the industry needs for a reliable and durable product. In the past 25 years OMB supplied several projects all over the world achieving an outstanding record of installations, with high level of satisfaction from all our customers.

The continous effort to improve our products and our service led to the development of a new range of cryogenic valves which includes the latest technical advancements and has been tested through the most innovative test rigs simulating the actual working condition of the valve in the plants.

In the following pages you will find the most relevant answer to your needs in controlling gas and fluids at high pressure and low temperature.

At OMB we are ready to answer all your question regarding these or any other valve because we truly are italics your 'valves specialist'.

A DEFINITION OF CRYOGENIC SERVICE

'Cryogenic Service' refers to service condition where temperaturesare significantly below normalatmosfheric temperatures. Definitions vary, but often anytemperature below -50°F/ - 45°C is considered cryogenic.

The bonnet of gate and globe valves is of the extended type with sufficient length and a vapour space between body and stuffing box in order to maintain the gland packing sufficiently near ambient temperature to prevent icing of the top works and keep the packing soft and pliable for optimum sealing characteristics.

ENGINEERING

For liquid service where boil off or vaporization might be a problem (which is usually the case), OMB propose a solution for venting boiled-off gases to prevent overpressuring damage.

Vent holes are provided in gate valve wedges (as seen on the side) with a clear marking on the outside of the valve. The use of globe valves that are inherently free from trapped volumes are as well a common solution.







STANDARD DESIGN & FEATURES OF CRYOGENIC SERVICE VALVES

In the following pages you will find some of OMB's solution to the 'cryogenic service' problem with a listing of the type of gate, globe and ball valves engineered by OMB for typical cryogenic applications.

As shown above, the gate valves feature a pressure release device to prevent the pressure increase following thermal expansion of gases trapped in the upper stem chamber.

Both gate and globe valve extensions are made in one single piece of forged steel material, thus improving the strength of the complete valve.

Four bolts connect the body to the extension in the lower presure range (up to the Class 800) while higher pressure valves have the body connected to the extension with 6 or 8 bolts. This design allows an easy disassembly of the extension/bonnet part to inspect the seats and wedge/disc area and, if needed, maintenance.

Custom design and modified materials are available to special request. OMB has achieved a superior reputation as a high quality manufacturer. Starting in the mid '70s, a fully implemented Q.A. programme has improved the level of service and the overall products quality. In 1990 this system was first certified according ISO 9001 standards.

Engineering, manufacturing, assembly and testing is therefore submitted to close quality monitoring procedures. Cryogenic service valves components are submitted to a stringent evaluation procedure for their critical application.

A team of skilled and experienced personnel assemble the cryogenic products.

Thorough testing and inspection of all product components ensure the integrity and reliability of OMB cryogenic valves. The in-house laboratory use the latest technologies in control equipment as well as custom designed machines and test rigs. The capability of performing all the relevant tests in house guarantees a higher level of control and cost efficiency. At each stage in the development procedure the aim of OMB's engineering team is to design a valve combining the best performance at the lowest manufacturing and operating cost. For this reason OMB's cryogenic service valves achieved outstanding results in all the markets gaining OMB a reputation as reliable and efficient supplier.





PRODUCT LINE

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	GATE/GLOBE CHECK	FLOATING	TRUNNION	TRIPLE OFFSET METAL SEATED	TOVB TOP ENTRY	DUAL PLATE Check vave
Body Construction	Close Dye Forgings	Close Dye Forgings	Ring Forgings	Castings	Castings	Castings, Forgings
Valve construction	2 pieces with bonnet extension	2 or 3pieces with bonnet extension	2 or 3 pieces with bonnet extension	1 piece with bonnet extension	1 piece with bonnet extension	1 piece
Size range	1/2" to 2"	1/2" to 6"	1/2" to 48"	3" to 60"	3" to 60"	3" to 48"
ASME classes	150,300,600,800, 1500,2500	150,300,600,800, 1500,250	150, 300, 600, 1500, 2500	150, 300, 600, 900 1500, 2500	150, 300, 600, 900 1500, 2500	150, 300, 600, 900 1500, 2500
Fire Safe	Design	Certified	Certified	Design	Design	Design
Specifications	IS015761 API602		API6D	API 609	API 609	API 594
Extension	BS6364	BS6364	BS6364	BS6364	BS6364	n/a
Bore dimension	Full and Std port	Full and Std port	Full and Std port	n/a	n/a	n/a





GATE/GLOBE/CHECK

- Flanged and BW: 150,300,600,1500, 2500
- SW and NPT: 800, 1500, 2500
- Close Dye Forgings MADE IN ITALY
- · Extension dimension to BS6364 or customer specification
- 2 pieces with bonnet extension Body to extension constrcution: Bolted (std) Full Pen Welding on request
 - Bleed Hole in wedge
 - · Graphite or PTFE packing/ gasket



FLOATING

- · 2 or 3pieces with bonnet extension
- Flanged and BW: 150,300,600,900, 1500, 2500
- SW and NPT: 800, 1500, 2500
- Close Dye Forgings MADE IN ITALY
- · Extension dimension to BS6364 or customer specification
- · Body to extension constrcution: Bolted (std) Full Pen Welding on request
- · Bleed hole in ball or Special energized seat design
- · Graphite, PTFE or LipSeal seal



PRODUCT LINE







Manufactured by



TRUNNION

- 2 or 3 pieces with bonnet extension
- · Flanged and BW: 150,300,600,900, 1500, 2500 •
- Ring Forgings MADE IN ITALY
- · Extension dimension to BS6364 or customer specification
- Body to extension constrcution: Bolted
- Self Relieving Seat design

TOBV-METAL SEATED

- 1 piece with bonnet extension Body to extension
- Flanged and BW: 150,300,600,900, 1500, 2500 • Bi-Directional
- · Castings EU and INDIA sources
- Extension dimension to BS6364 or customer specification
- constrcution: Bolted
- Graphite







Manufactured by

Fluicon

TOBV-TOP ENTRY

- 1 piece with bonnet extension Body to extension
- Flanged and BW: 150,300,600,900, 1500, 2500 •
- · Castings EU and INDIA sources
- · Extension dimension to BS6364 or customer specification
- constrcution: Bolted
- Bi-Directional
- Graphite
- Top Entry for in-line maintenance

DUAL PLATE CHECK VALVE

- 1 piece
- · Retainerless metal seated
- Class 150, 300, 600, 900, 1500, 2500
- · casting EU & India Sources



CRYOGENIC GATE VALVES



CRYOGENIC GATE VALVES TO ISO 15761 AND API 602

- 2 pieces with bonnet extension
- Flanged and BW: 150,300,600,1500, 2500
- SW and NPT: 800, 1500, 2500
- Close Dye Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution:
 - Bolted (std)
 - Full Pen Welding on request
- Bleed Hole in wedge
- · Graphite or PTFE packing/gasket

CONSTRUCTION

Close Dye Forgings

2 pieces with bonnet extension

size range 1/2" to 2"

Class 150, 300, 600, 800, 1500, 2500

Fire Safe Design

ISO 15761 and API602

Extension BS6364

Full and Std port



CRYOGENIC GATE VALVES MATERIALS







DESCRIPTION	LF2/410	F304/304	F316/316	F51/F51
WHEELNUT	Carbon steel	Carbon steel	Carbon steel	Carbon steel
NAMEPLATE	Aluminium	Aluminium	Aluminium	Aluminium
HANDWHEEL	Carbon steel	Carbon steel	Carbon steel	Carbon steel
YOKE NUT	416	416	416	416
GLAND NUT	Gr.8	Gr.8	Gr.8	Gr.8
GLAND FLANGE	LF2	F304	F316	F51
GLAND STUD	B8	B8	B8	B8
GLAND	410	304	316	316
PACKING	PTFE	PTFE	PTFE	PTFE
BOLTS	L7	B8	B8	B8
STEM	410	304	316	F51
BONNET	LF2	F304	F316	F51
GASKET	18/8+PTFE spiral wound	18/8+PTFE spiral wound	18/8+PTFE spiral wound	18/8+PTFE spiral wound
SEAT	410	304	316	F51
BODY	LF2	F304	F316	F51
EXTENSION	LF2	F304	F316	F51
WADGE	410	304	316	F51





CRYOGENIC GLOBE VALVES TO ISO 15761 AND API 602

- 2 pieces with bonnet extension
- Flanged and BW: 150,300,600,1500, 2500
- SW and NPT: 800, 1500, 2500
- Close Dye Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution:
 - Bolted (std)
 - Full Pen Welding on request
- · Graphite or PTFE packing/gasket

CONSTRUCTION

Close Dye Forgings

2 pieces with bonnet extension

size range 1/2" to 2"

Class 150, 300, 600, 800, 1500, 2500

Fire Safe Design

ISO 15761 and API602

Extension BS6364

Full and Std port



CRYOGENIC GLOBE VALVES MATERIALS

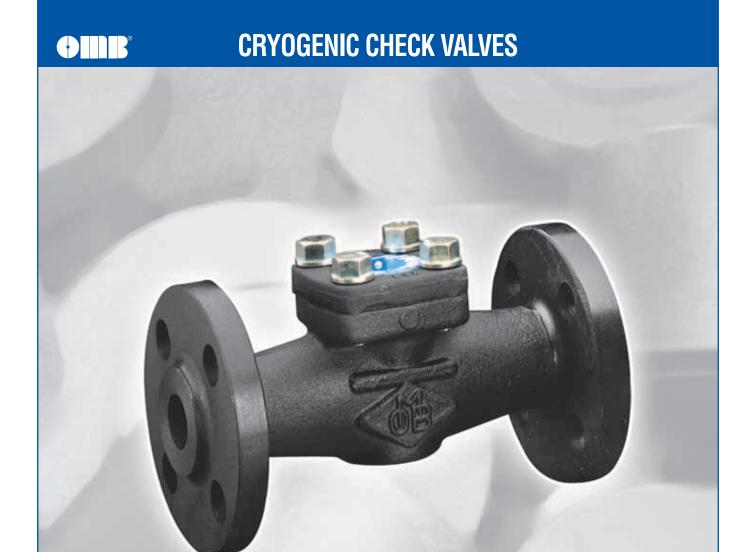






DESCRIPTION	LF2/316	F304/304	F316/316	F51/F51
WHEELNUT	Carbon steel	Carbon steel	Carbon steel	Carbon steel
NAMEPLATE	Aluminium	Aluminium	Aluminium	Aluminium
HANDWHEEL	Carbon steel	Carbon steel	Carbon steel	Carbon steel
YOKE NUT	416	416	416	416
GLAND NUT	Gr.8	Gr.8	Gr.8	Gr.8
GLAND FLANGE	LF2	F304	F316	F51
GLAND STUD	B8	B8	B8	B8
GLAND	316	304	316	316
PACKING	316	PTFE	PTFE	PTFE
BOLTS	L7	B8	B8	B8
STEM	410	304	316	F51
BONNET	LF2	F304	F316	F51
GASKET	316L spiral wound + graphite			
SEAT	410	304	316	F51
BODY	LF2	F304	F316	F51
EXTENSION	LF2	F304	F316	F51
DISC	410	304	316	F51





CRYOGENIC CHECK VALVES TO ISO 15761 AND API 602

• Flanged and BW: 150,300,600,1500, 2500

• SW and NPT: 800, 1500, 2500

• Close Dye Forgings MADE IN ITALY

· Graphite or PTFE gasket

CONSTRUCTION

Close Dye Forgings

2 pieces

size range 1/2" to 2"

Class 150, 300, 600, 800, 1500, 2500

Fire Safe Design

ISO 15761 and API602

Extension n/a

Full and Std port



CRYOGENIC CHECK VALVES MATERIALS







DESCRIPTION	LF2/316	F304/304	F316/316	F51/F51
RIVET	Carbon steel	Carbon steel	Carbon steel	Carbon steel
NAMEPLATE	Aluminium	Aluminium	Aluminium	Aluminium
BOLTS	L7	B8	B8	B8
COVER	LF2	F304	F316	F51
GASKET	316L spiral wound + graphite			
SEAT	410	304	316	F51
BODY	LF2	F304	F316	F51
PISTON	410	304	316	F51
SPRING	AISI 302	AISI 302	AISI 302	AISI 302



CRYOGENIC FLOATING BALL VALVES SIDE ENTRY



CRYOGENIC FLOATING BALL VALVES SIDE ENTRY TO ISO 17292-ASME B16.34

- 2 or 3 pieces with bonnet extension
- Flanged and BW: 150,300,600,900, 1500, 2500
- SW and NPT: 800, 1500, 2500
- Close Dye Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution:
 - Bolted (std)
 - Full Pen
 - Welding on request
- Bleed hole in ball or Special energized seat design
- Special: Graphite, PTFE or LipSeal

CONSTRUCTION

Close Dye Forgings

2 or 3 pieces with bonnet extension

size range 1/2" to 6"

Class 150, 300, 600, 800, 1500, 2500

Fire Safe Certified

Extension BS6364

Full and Std port



CRYOGENIC FLOATING BALL VALVES SIDE ENTRY **OFFICE**





DESCRIPTION	A105/316	LF2/316	F316/316
NAMEPLATE	Aluminium	Aluminium	Aluminium
LEVER	Carbon Steel	Carbon Steel	Carbon Steel
LEVER NUT	AISI 303	AISI 303	AISI 303
GLAND FLANGE	AISI 303	AISI 303	AISI 303
WASHER	Harmonic Steel	Harmonic Steel	Harmonic Steel
GLAND	UNSS 30400	UNSS 30400	UNSS 30400
PACKING	Graphite	Graphite	Graphite
SPIRAL WOUND GASKET	316 + Graphite	316 + Graphite	316 + Graphite
BOLTS	B7/H2	L7/Gr4	B8/Gr8
EXTENSION	A105	LF2	F316
INSERT	RPTFE	RPTFE	RPTFE
BALL	ST/ST316	ST/ST316	ST/ST316
BODY	A105	LF2	F316
CLOSURE	A105	LF2	F316



CRYOGENIC FLOATING TOP ENTRY BALL VALVES



CRYOGENIC FLOATING BALL VALVES TOP ENTRY TO ISO 17292-ASME B16.34

- 1 piece body with bonnet extension
- Flanged and BW: 150,300,600,900, 1500, 2500
- Ring Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution: Bolted
- Self Relieving Seat design (energized) or fixed seat with vent hole
- Seal: PTFE or Lip Seal

CONSTRUCTION

Close DYE Forgings

1 piece body with bonnet extension

size range 1/2" to 48"

Class 150, 300, 600, 1500, 2500

Fire Safe Certified

API6D

Extension BS6364

Full and Std port



CRYOGENIC FLOATING TOP ENTRY BALL VALVES **CHINIS**



DESCRIPTION	A105/316	LF2/316	F316/316
NAMEPLATE	Aluminium	Aluminium	Aluminium
LEVER	Carbon Steel	Carbon Steel	Carbon Steel
LEVER NUT	AISI 303	AISI 303	AISI 303
GLAND FLANGE	AISI 303	AISI 303	AISI 303
WASHER	Harmonic Steel	Harmonic Steel	Harmonic Steel
GLAND	UNSS 30400	UNSS 30400	UNSS 30400
PACKING	Graphite	Graphite	Graphite
SPIRAL WOUND GASKET	316 + Graphite	316 + Graphite	316 + Graphite
BOLTS	B7/H2	L7/Gr4	B8/Gr8
EXTENSION	A105	LF2	F316
INSERT	RPTFE	RPTFE	RPTFE
BALL	ST/ST316	ST/ST316	ST/ST316
BODY	A105	LF2	F316
CLOSURE	A105	LF2	F316



CRYOGENIC TRUNNION BALL VALVES SIDE ENTRY



CRYOGENIC TRUNNION BALL VALVES SIDE ENTRY TO API6D

- 2 or 3 pieces with bonnet extension
- Flanged and BW: 150,300,600,900, 1500, 2500
- Ring Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution: Bolted
- Self Relieving Seat design
- Seal: LipSeal on stem and seats

CONSTRUCTION

Ring Forgings

2 or 3 pieces with bonnet extension

size range 1/2" to 48"

Class 150, 300, 600, 1500, 2500

Fire Safe Certified

API6D

Extension BS6364

Full and Std port



CRYOGENIC TRUNNION BALL VALVES MATERIALS **CHINIS**



DESCRIPTION	F136	INCONEL 625
BUSH	316 +TEX + PTFE	Inc. 625 + TEX + PTFE
NAMEPLATE	Stainless Steel	Stainless Steel
SPRING	Inc. Alloy 718	Inc. Alloy 718
BALL	F316	Inc. Alloy 625
SCREW	B8	B8
DRAIN	F316	Inc. Alloy 625
MOTOR FLANGE	F316	Inc. Alloy 625
PACKING	Graphite	Graphite
BOLTS	B8/Gr 8	B8/Gr 8
STEM	F316	Inc. Alloy 625
BONNET	F316	Inc. Alloy
GASKET	Graphite	Graphite
SEAT	F316 + KEL F	Inc. Alloy 625 + KEL F
BODY	F316	Inc. Alloy 625
EXTENSION	F316	Inc. Alloy 625
TRUNNION	F316	Inc. Alloy 625
PRIMARY SEALS	PTFE + Elgiloy	PTFE + Elgiloy



CRYOGENIC TRUNNION BALL VALVES TOP ENTRY



CRYOGENIC TRUNNION BALL VALVES TOP ENTRY TO API6D

- 1 piece with bonnet extension
- Flanged and BW: 150,300,600,900, 1500, 2500
- •Forgings MADE IN ITALY
- Extension dimension to BS6364 or customer specification
- Body to extension constrcution: Bolted
- Self Relieving Seat design
- Seal: LipSeal

CONSTRUCTION

Cast or Forged body

2 or 3 pieces with bonnet extension

size range 1/2" to 48"

Class 150, 300, 600, 1500, 2500

Fire Safe Certified

API6D

Extension BS6364

Full and Std port





DESCRIPTION	A105/316	LF2/316	F316/316
NAMEPLATE	Aluminium	Aluminium	Aluminium
LEVER	Carbon Steel	Carbon Steel	Carbon Steel
LEVER NUT	AISI 303	AISI 303	AISI 303
GLAND FLANGE	AISI 303	AISI 303	AISI 303
WASHER	Harmonic Steel	Harmonic Steel	Harmonic Steel
GLAND	UNSS 30400	UNSS 30400	UNSS 30400
PACKING	Graphite	Graphite	Graphite
SPIRAL WOUND GASKET	316 + Graphite	316 + Graphite	316 + Graphite
BOLTS	B7/H2	L7/Gr4	B8/Gr8
EXTENSION	A105	LF2	F316
INSERT	RPTFE	RPTFE	RPTFE
BALL	ST/ST316	ST/ST316	ST/ST316
BODY	A105	LF2	F316
CLOSURE	A105	LF2	F316



CRYOGENIC TRIPLE OFFSET METAL SEATED



CRYOGENIC TRIPLE OFFSET METAL SEATED

- · Quarter Turn non-rubbing & frictionless sealing
- Low fugitive emissions in compliance with ISO 15848 & API 622
- Anti Blow-Out stem design in full compliance with API 609
- · Optimized disc design for maximum flow capacity
- · Resilient metal-to-metal seal
- Size range from 3" to 60"
- Pressure range from Cl.150 to Cl.900 full rating
- Bi-directional torque seated design
- Inherently Fire-Safe API 607 Tested
- Solid seal ring assures ZERO LEAKAGE according to API 598 resilient seated and API 6D
- Stellite hard-faced integral seat or hardened bolted seat



STANDARD CONFIGURATION CRYOGENIC SERVICE



Cryogenic service is a very severe application that requires a valve with superior performances.

Fluicon Triple Offset Metal Seated Cryogenic Valve benefits from the well known triple eccentric design.

The addition of features like the cryogenic extension, the careful selection of materials such as dynamic gaskets in pure graphite, the use of solid seal ring for maximum robustness and the absence of any soft component make the Triple Offset the valve of choice for cryogenic service.

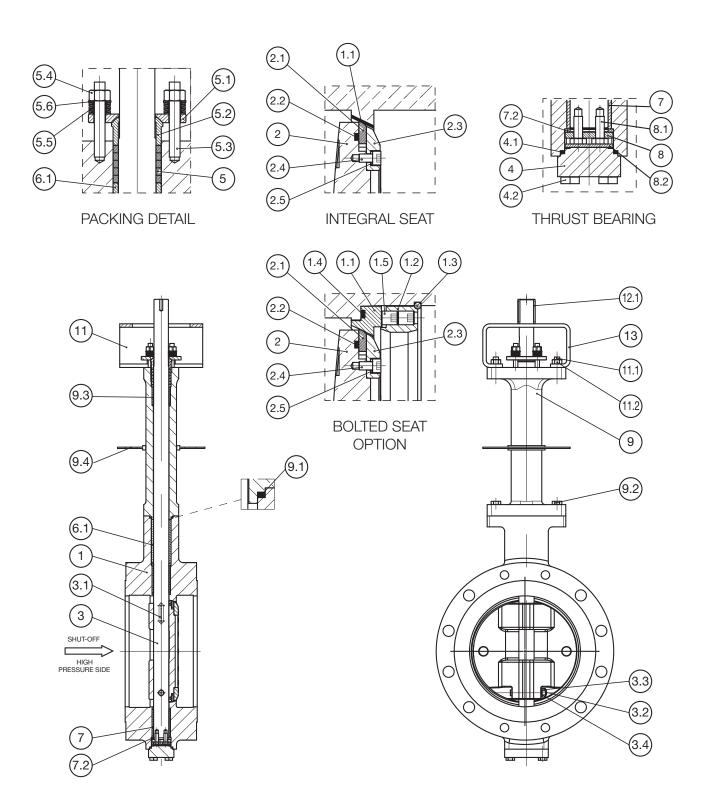
In Triple Offset Metal Seated Valve design, the absence of rubbing between seal ring and seat throughout the entire valve stroke combined with the selection of materials of equal thermal expansion coefficient guarantee the best valve performances and long life cycle.

The Triple Offset design delivers leakage rates according to the most stringent international and customer standard.





STANDARD CONFIGURATION





TYPICAL BILL OF MATERIALS



Item	Description	Material	Note	Spare Part
1	Body	ASTM A351 CF3		
1.1	Seat	Stellite 21® weld overlay		•
2	Disc	ASTM A351 CF3 or A182 F304L		
2.1	Solid seal ring	UNS S31603 hardened		•
2.2	Seal ring gasket	High density graphite		•
2.3	Seal ring retaining flange	UNS S30400		
2.4	Retaining flange screw	A4-70 (UNS S31600)		
2.5	Retaining flange screw washer	UNS S31600		
3	Shaft	A479 Gr. XM19 (UNS S20910)		
3.1	Shaft key	Nitronic 50 HS®		
3.2	Shaft pin	Nitronic 50 HS®		
3.3	Shaft pin retainer	ASTM A193 B8		
3.4	Shaft pin retainer washer	UNS S31600		
4	Bottom flange	ASTM A240 Tp.304 or A182 F304		
4.1	Bottom flange gasket	AISI 316 + graphite		•
4.2	Bottom flange bolting	ASTM A193 B8		
5	Packing	Graphite		•
5.1	Gland flange	UNS S31600		
5.2	Gland follower	UNS S31600		
5.3	Gland stud	ASTM A193 B8		
5.4	Gland nut	ASTM A194 Gr. 8		
5.5	Belleville springs	Stainless steel	optional	
5.6	Belleville springs washer	UNS S31600	optional	
6.1	Spacer	UNS S31600		
7	Bearing	UNS S31600 PTFE coated		
7.2	Washer	UNS S31600 PTFE Coated		
8	Thrust bearing	UNS S31600 PTFE coated		
8.1	Thrust bearing bolting	ASTM A193 B8		
8.2	Locking plate	UNS S31600 PTFE coated		
9	Cryo extended bonnet	ASTM A351 CF3		
9.1	Bonnet gasket	AISI 316 + graphite		•
9.2	Bonnet bolting	ASTM A193 B8		
9.3	Bonnet Bearing	UNS S31600 PTFE coated		
9.4	Collar drip plate	UNS S31600	optional	
11	Bracket	Carbon steel		
11.1	Bracket stud bolt	Alloy steel, HDG		
11.2	Bracket nut	Alloy steel, HDG		
12.1	Gear key	Alloy steel		
13	Nameplate	Stainless steel		

BOLTED SEAT OPTION

1.1	Bolted seat	UNS S30400 hardened	optional	•
1.2	Seat retaining flange	UNS S30400	optional	
1.3	Seat retaining ring	UNS S30400	optional	
1.4	Seat gasket	High density graphite	optional	•
1.5	Seat retaining ring dowel	A4-70 (UNS S31600)	optional	





CRYOGENIC TRIPLE OFFSET METAL SEATED TOP ENTRY

- · Quarter Turn non-rubbing & frictionless sealing
- Low fugitive emissions in compliance with ISO 15848 & API 622
- Anti Blow-Out stem design in full compliance with API 609
- · Optimized disc design for maximum flow capacity
- · Resilient metal-to-metal seal
- Size range from 3" to 60"
- Pressure range from Cl.150 to Cl.900 full rating
- Top Entry design for easy in-line maintenance
- Bi-directional torque seated design
- Inherently Fire-Safe API 607 Tested
- Solid seal ring assures ZERO LEAKAGE according to API 598 resilient seated and API 6D
- · Hardened bolted seat





Fluicon Triple Offset Metal Seated Top-Entry Valve is the ultimate solution for easy in-line maintenance.

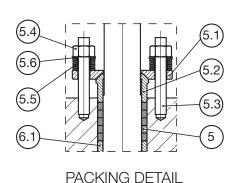
Thanks to the Top-Entry flange located above the internal sealing elements and the use of bolted seat design, quick and easy maintenance is guaranteed.

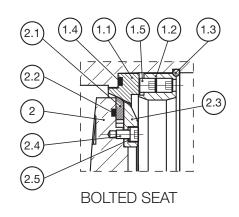
Both the seal ring and the seat become spare parts that can be replace during plant shut-downs or quick turn-arounds.

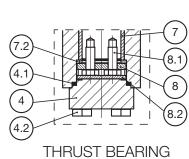
No special tools are required for components dismantling and reassembly.

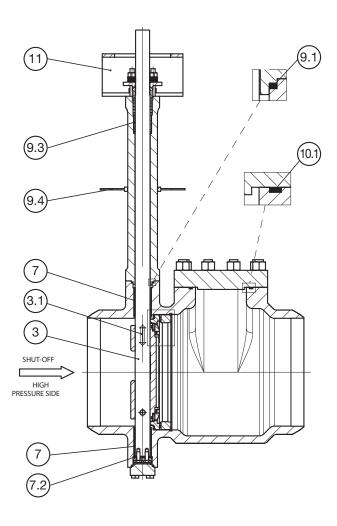


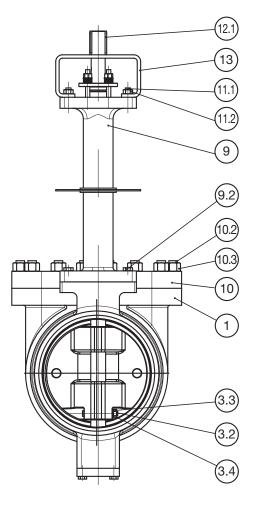
TOP ENTRY CONFIGURATION











TYPICAL BILL OF MATERIALS



Item	Description	Material	Note	Spare Part
1	Body	ASTM A351 CF3		
1.1	Bolted Seat	UNS S30400 hardened		•
1.2	Seat retaining flange	UNS \$30400		
1.3	Seat retaining ring	UNS \$30400		
1.4	Seat gasket	Graphite		•
1.5	Seat retaining ring dowel	A4-70 (UNS S31600)		
2	Disc	ASTM A351 CF3		
2.1	Solid Seal ring	UNS S31600 hardened		•
2.2	Seal ring gasket	Graphite		•
2.3	Seal ring retaining flange	UNS \$30400		
2.4	Retaining flange screw	A4-70 (UNS S31600)		
2.5	Retaining flange screw washer	UNS S31600		
3	Shaft	ASTM A479 XM-19 (UNS S20910)		
3.1	Shaft key	NITRONIC 50 HS ®		
3.2	Shaft pin	NITRONIC 50 HS ®		
3.3	Shaft pin nut	ASTM A194 GR.8M		
3.4	Shaft pin retainer washer	UNS S31600		
4	Bottom flange	ASTM A240 S30403		
4.1	Bottom flange gasket	AISI 316 + graphite		•
4.2	Bottom flange bolting	ASTM A193 B8M CL.II		
5	Packing	Graphite		•
5.1	Gland flange	UNS \$31600		
5.2	Gland follower	UNS \$31600		
5.3	Gland stud	ASTM A193 B8M CL.II		
5.4	Gland nut	ASTM A194 GR.8M		
5.5	Belleville springs	HARMONIC STEEL	optional	
5.6	Belleville springs washer	UNS \$31600	optional	
6.1	Spacer Spacer	UNS \$31600	ориона	
7	Bearing	UNS S31600 PTFE Coated		
7.2	Washer	UNS S31600 PTFE Coated		
8	Thrust bearing	UNS S31600 PTFE Coated		
8.1	Thrust bearing bolting	ASTM A193 B8M CL.II		
8.2	Locking plate	UNS S31600 PTFE Coated		
9	Cryo extended bonnet	ASTM A351 CF3		
9.1	Bonnet gasket	AISI 316 + graphite		•
9.2	Bonnet bolting	ASTM A193 B8M CL.II		
9.3	Bonnet Bearing	UNS S31600 PTFE Coated		
9.4	Collar drip plate	UNS \$31600	optional	
10	Top Entry flange	ASTM A240 S30403	οριιοπαι	
10.1	Top Entry gasket	Graphite		•
10.1	Top Entry stud bolt	ASTM A193 B8M CL.II		-
10.2	Top Entry nut	ASTM A193 B8M CL.II ASTM A194 GR.8M		
11	Bracket stud holt	Carbon steel		
11.1	Bracket stud bolt	Alloy steel, HDC		
11.2	Bracket nut	Alloy steel, HDG		
12.1	Gear key	Alloy steel		
13	Nameplate	Stainless steel		



CRYOGENIC TRIPLE OFFSET DUAL PLATE

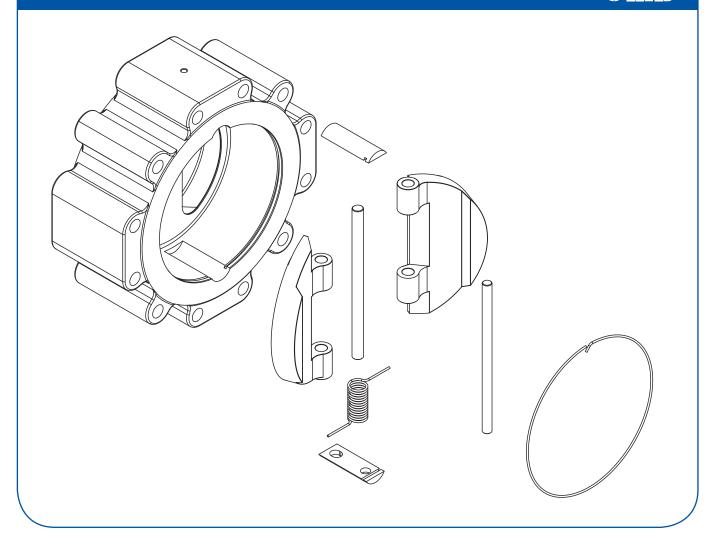


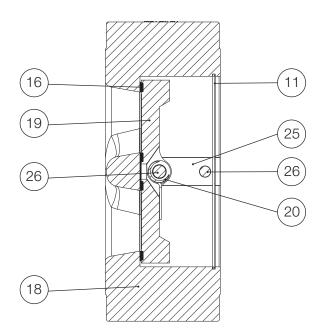
CRYOGENIC TRIPLE OFFSET DUAL PLATE

- 1 piece body
- Retainerless, metal seated
- Standard product range 3" to 48" ANSI 150 to 2500
- Body style: Wafer, Lugged, Double flanged Butt-weld & Hubs.



CONFIGURATION AND TYPICAL BILL OF MATERIALS





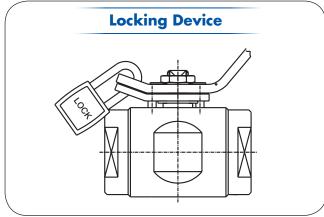
Item	Description						
11	Snap ring						
16	Integral seat						
18	Body						
19	Clapper						
20	Spring						
25	Pin retainer						
26	Pin						



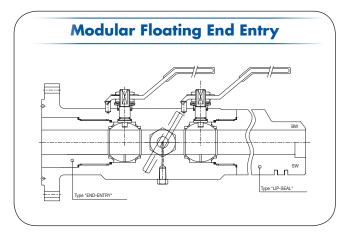
OPTIONS



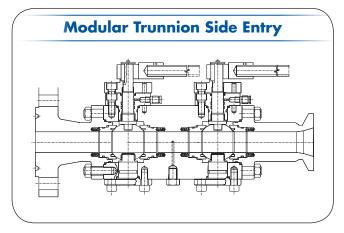








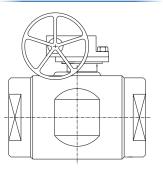






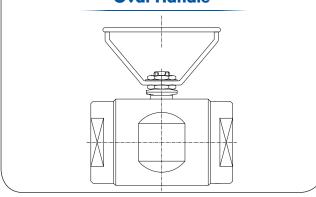
OPTIONS





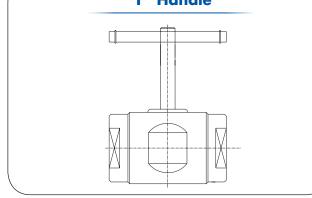


Oval Handle



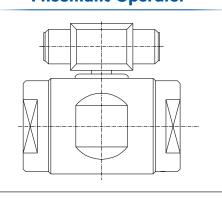


"T" Handle





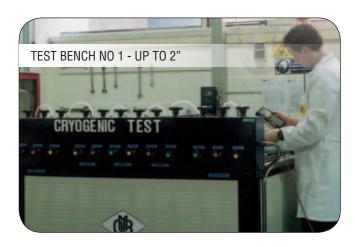
Pneumatic Operator



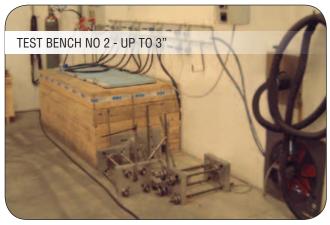




CRYOGENIC & LOW TEMPERATURE TEST AREA

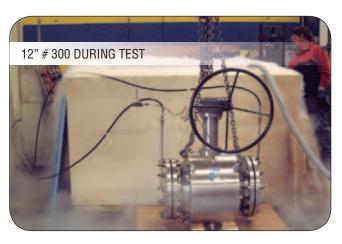


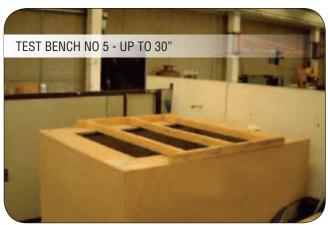








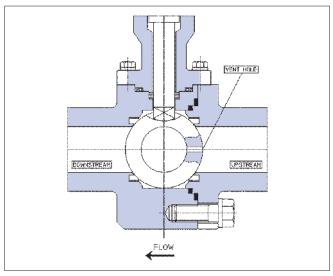




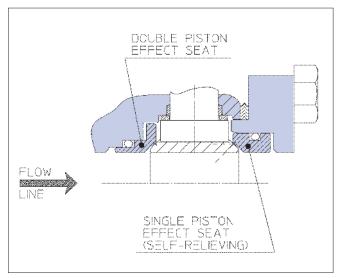




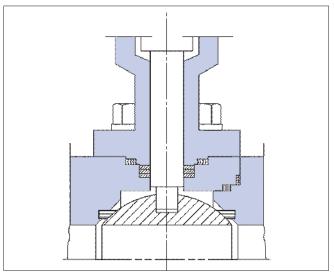
CRYOGENIC & LOW TEMPERATURE OPTION



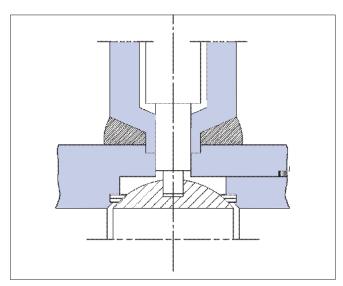
FLOATING BALL VALVE VENT HOLE



SINGLE PIATON/DOUBLE PISTON EFFECT



BOLDED EXTENSION - DETAIL



WELDED EXTENSION - DETAIL







BODY & TRIM MATERIALS

OMB valves are manufactured in a wide range of materials, supplied by the best available steel mills, formed by well known forge master with outstanding equipment and experience. All the material can be certified for chemical composition and mechanical properties.

CHEMICAL COMPOSITION										
BODY AND BONNET MATERIALS										
ASTM Material	C %	MN %	P %	S %	Si %	NI %	Cr %	Mo %	Co %	Other
ASTM A350 LF2	0.22	0.60 1.35	0.035	0.040	0.15 0.30	0.40 max	0.30 max	0.12 max	-	CU 0.40 max Nb 0.02 max V 0.05 max
ASTM 182F304	0.08 max	2.0 max	0.045	0.030	1.00 max	8.00 11.00	18.00 20.00	-	-	N. 0.10 max
ASTM 182 F316	0.08 max	2.0 max	0.045	0.030	1.00 max	10.00 14.00	16.00 18.00	2.00 3.00	-	N. 0.10 max
ASTM 182 F51	0.030 max	2.0 max	0.030	0.020	1.00 max	4.50 6.50	21.00 23.00	2.50 3.50	-	N. 0.08 N. 0.20

CHEMICAL COMPOSITION										
TRIM MATERIALS & BOLTING MATERIALS										
ASTM Material	C %	MN %	P %	S %	Si %	NI %	Cr %	Mo %	Co %	Other
ASTM A276 Type 410	0.15 max	1.00 max	0.040	0.030	1.00 max	-	11.50 13.50	-	-	-
ASTM A479 Type 304	0.08 max	2.00 max	0.045 max	0.030 max	1.00 max	8.00 10.50	18.00 20.00	-	-	N. 0.10 max
ASTM A479 Type 316	0.08 max	2.00 max	0.045 max	0.030 max	1.00 max	10.00 14.00	16.00 18.00	2.00 3.00	-	N. 0.10 max
STELLITE Gr. 6	1.00	1.00 max	-	-	1.00	3.0 max	28.00	-	-	Fe: 3.0 max W: 4.0 CO: Bal.
ASTM A193 Type B7	0.37 0.49	0.65 1.10	0.035 max	0.04 max	0.15 0.35	-	0.75 1.20	0.15 0.25	-	-
ASTM A193 Type B8	0.08 max	2.00 max	0.045 max	0.030 max	1.00 max	8.00 10.50	18.00 20.00	-	-	-
ASTM A194 Type 2H	0.40 min	1.00 max	0.40 max	0.050 max	0.40 max	-	-	-	-	-
ASTM A194 Gr. 8	0.08. max	2.00 max	0.045 max	0.030 max	1.00 max	8.00 10.5	18.00 20.00	-	-	-

Note: these charts are for reference only. OMB recommends customer engineers to analyse service requirements and specify the materials they consider optimium. OMB cannot be held liable for any damage resulting from the use of the tables.

MATERIAL TEST, INSPECTION AND CERTIFICATION

Upon receiving forgings OMB QC department inspect each lot in the laboratory to test material conformity with the standards and with the customer specifications. Each valve is then supplied with mill test certificate (according to DIN 31B) proving the material origin and quality.

SPECIAL MATERIALS

Special grades of LF1, LF2,LF3, F347, F321, F53 and F44 have been selected and used for cryogenic applications: OMB has a long experience in supplying customer specified material grades.





BODY & TRIM MATERIALS



			VALVES MAI	NUFACTURING E TEST SPECIFICATIONS
STANDARD	REV	API related std	Content	
ISO 17292:2004	2004	API608/4th	Design	Metal ball valves for petroleum, petrochemical and allied industries ISO 17292:2004 specifies the requirements for a series of metal ball valves suitable for petroleum, petrochemical, natural gas plants, and related industrial applications. It covers valves of the nominal sizes DN 8, 10, 15, 20, 25, 32, 40 50, 65, 80, 100, 150, 200, 250, 300, 350, 400, 450 and 500, corresponding to nominal pipe sizes NPS 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2, 2 1/2, 3, 4, 6, 8, 10, 12, 14, 16, 18 and 20, and is applicable for pressure designations of Class 150, 300, 600 and 800 (the last applicable only for valves with reduced bore and with threaded and socket welding end and PN 16, 25 and 40.
BS5351 (discontinued)	1986		Design	Valve seat and body pressure/temperature ratings, the design, materials, dimensions, operation, performance, testing and marking of straightway steel ball valves having specified wall thickness, antistatic feature and fire tested design. Valves of PN 10 to PN 40 and classes 150, 300, 600 and 800 with a variety of end fittings.
ASME B16.34	2009		Design	This standard applies to new construction and covers pressure-temperature ratings, dimensions, tolerances, materials, nondestructive examination requirements, testing, and marking for cast, forged, and fabricated flanged, threaded, and welding end and wafer or flangeless valves of steel, nickel-base alloys, and other alloys shown in Table 1. Wafer or flangeless valves, bolted or through-bolt types, that are installed between flanges or against a flange are treated as flanged-end valves Alternative rules for NPS 2½ and smaller valves are given in Mandatory Appendix V
ISO 14313:2007/Cor 1:2009	2009	API6D	Design	Petroleum and natural gas industries - Pipeline transportation systems - Pipeline valves 3rd edition.
IS05211	2001		Feature	Industrial valves Part-turn actuator attachments
IS05208:2008	2008	API598/9th	Test	Industrial valves Pressure testing of metallic valves
API598/9th	2009		Test	This standard covers inspection, examination, supplementary examinations, and pressure test requirements for resilient-seated, nonmetallic-seated (e.g. ceramic), and metal-to-metal-seated valves of the gate, globe, plug, ball, check, and butterfly types
ISO15848-1:2006	2006	API622/API624	Test	Industrial valves Measurement, test and qualification procedures for fugitive emissions Part 1: Classification system and qualification procedures for type testing of valves
ISO15848-2:2006	2006	API622/API624	Test	Industrial valves Measurement, test and qualification procedures for fugitive emissions Part 2: Production acceptance test of valves
ISO10497:2004	2004	API607/6th 2010		Testing of valves Fire type-testing requirements ISO 10497:2010 specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of a valve under pressure during and after the fire test. It is not applicable to the testing requirements for valve actuators other than manually operated gear boxes or similar mechanisms when these form part of the normal valve assembly. Other types of valve actuators (e.g. electrical, pneumatic or hydraulic) can need special protection to operate in the environment considered in this valve test, and the fire testing of such actuators is outside the scope of ISO 10497:2010

Flow Coefficent and TORQUE* for floating BV

6175	COEFFI	CENT Cv
SIZE	Reg. Port	Full Port
1/4	-	8
3/8	-	8
1/2	8	12
3/4	12	33
1	33	48
1 1/4	48	83
1 1/2	83	120
2	120	250

S	SIZE		275 p.s.i. 20 bar		500 p.s.i. 35 bar		720 p.s.i. 50 bar		1000 p.s.i. 70 bar		p.s.i. bar	2000 p.s.i. 140 bar	
Regular Bore	Full Bore	Kgm	Ft-Lb	Kgm	Ft-Lb	Kgm	Ft-Lb	Kgm	Ft-Lb	Kgm	Ft-Lb	Kgm	Ft-Lb
1/2	1/4 3/8	0.41	3.0	0.41	3.0	0.41	3.0	0.41	3.0	0.48	3.5	0.82	6.0
3/4	1/2	0.69	5.0	0.69	5.0	0.69	5.0	0.69	5.0	0.82	6.0	1.72	12.5
1	3/4	1.03	7.5	1.03	7.5	1.03	7.5	1.38	10.0	1.79	13.0	3.45	25.0
1 1/4	1	1.38	10.0	1.72	12.5	2.07	15.0	2.28	16.5	3.45	25.0	5.73	41.5
1 1/2	1 1/4	1.72	12.5	2.07	15.0	2.76	20.0	3.45	25.0	4.14	30.0	7.88	57.0
2	1 1/2	2.75	20.0	3.45	25.0	4.83	35.0	6.08	44.0	6.91	50.0	13.8	100.0
-	2	5.80	42.0	7.60	55.0	10.36	75.0	16.59	120.0	24.88	180.0	29.03	210.00



MATERIALS

OMB valves are manufactured in a wide range of materials, supplied by the best available steel mills, forged by well known forgery with outstanding equipment and experience. All the material can be certified in the chemical composition and the mechanical characteristic.

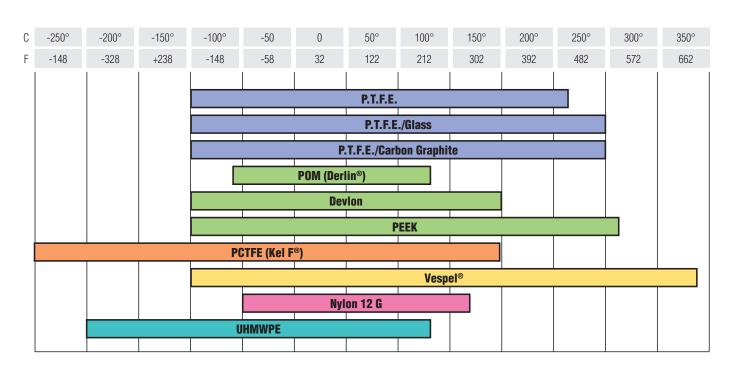
Material Group	Common Name	OMB code	Nominal Type	UNS	Forging Spec. (ASTM)	Casting Spec. Equivalent	DIN	DIN W.No	Application Notes
Carbon Steel	CS	A105N	C-Mn-Fe	K03504	A105N	A216-WCB	C22.8	1.0460	General non-corrosive service from -20F(-29C) to 800F(427C)
	LTCS	LF1			A350-LF1				
Low Temperature Carbon Steel	LTCS	LF2	C-Mn Si	K03011	A350-LF2	A352-LCA A352-LCB A352-LCC	TSTE 355	1.0566	General non-corrosive service from -50F(-46C) to 650F(340C), LF2 to 800F(427C).
Car	LTCS	LF3	3.1/2Ni	K32025	A350-LF3	A352-LC3	10Ni14	1.5637	-150F(-101C) to 650F(340C)
	LTCS	LF6	C-Mn-Si-V		A350-LF6				higher impact test value at low temp than LF2
Steel	Moly Steel	F1	C-1/2Mo	K12822	A182-F1	A217-WC1	15M03	1.5415	Up to 875F(468C)
Alloy S	oly	F11 cl2	1.1/4Cr-1/2Mo	K11572	A182-F11	A217-WC6	13CRM044	1.7335	Up to 1100F(593C)
Low,	me M	F22 cl3	2.1/4Cr-1Mo	K21590	A182-F22	A217-WC9	10CRM0910	1.7380	Up to 1100F(593C), HP steam
les de	OHO OH	F5	5Cr-1/2Mo	K41545	A182-F5	A217-C5	12CRM0195	1.7362	High temp refinery service
High Alloy Steel Low Alloy Steel	Alloy Steel Chrome Moly	F9	9Cr-1Mo	K90941	A182-F9	A217-C12	X 12 CrMo 9 1	1.7386	High temp erosive refinery service
Figh	Allo	F91	9Cr-1Mo-V	K90901	A182-F91	A217-C12A	X 10 CrMoVNb 9 1	1.4903	High pressure steam
		F304	18Cr-8Ni	S30400	A182-F304	A351-CF8	DIN X5CrNi 18 9	1.4301	0.04% min. carbon for temp.>1000F(538C)
		F304L	18Cr-8Ni (C 0.03)	S30403	A182-F304L	A351-CF3	X 2 CrNi 19 11	1.4306	Up to 800F(427C)
		F304H	18Cr-8Ni	S30409	A182-F304H	A351-CF8	n/a	n/a	
		F310	25 Cr-20 Ni		A182-F310	A351-CK20			
	See	F316	16Cr-12Ni-2Mo (C 0.08)	S31600	A182-F316	A351-CF8M	DIN X5CrNiMo 18 10	1.4401	0.04% min. carbon for temp.>1000F(538C)
	ies S.	F316L	16Cr-12Ni-2Mo (C 0.03)	S31603	A182-F316L	A351-CF3M	X 5 CrNiMo 17 12 2	1.4404	Up to 800F(427C)
See See	les OC	F316H	16Cr-12Ni-2Mo	S31609	A182-F316H	A351-CF8M	n/a	n/a	
Stainless Stæl	(teel 3)	F316TI		S31635	A182-F316Ti		X 6 CrNiMoTi 17 12 2	1.4571	
Sta	Austenitic S.Stæl 300 series S.Stæl	F321	18Cr-10Ni-Ti	S32100	A182-F321		X 6 CrNiTi 18 10	1.4541	0.04% min. carbon (grade F321H) and heat treat at 2000F(1100C for service temps.>1000F(538C)
	Ausl	F321H	18Cr-10Ni-Ti	S32109	A182-F321H		n/a	n/a	
		F347	18Cr-10Ni-Cb(Nb)	S34700	A182-F347	A351-CF8C	DIN 8556	1.4550	0.04% min. carbon (grade F347H) and heat treat at 2000F(1100C for service temps.>1000F(538C)
		F347H	18Cr-10Ni-Cb(Nb)	S34709	A182-F347H	A351-CF8C	n/a	n/a	
		F317L		S31703	A182-F317L	A351-CG3M	X 2 CrNiMo 18 16 4	1.4438	
.o. =8	F6a-13Cr - 410	F6	13Cr	S41000	A182 F6	A351-CA15			13% Cr steel (trim material)
Martensitic stainless steel	F6NM	F6NM		S41500	A182 F6NM	A351-CA6NM	X 3 CrNiMo 13-4	1.4313	13% Cr steel with excellent low temperature impact properties an corrosion resistance
	17-4-PH	17-4-PH		S17400	A564 UNS S17400	ASTM A494 CU5MCuC	X 5 CrNiCuNb 16-4	1.4542	
enitic	Super Austenitic 6Mo	F44	20Cr-18Ni-6Mo	S31254	A182-F44	A351-CK3MCuN	X 1 CrNiMoCuN 20 18 7	1.4547	service to 600F(316C)
. Aust	Super Austenitic 6Mo	904L	44Fe-25Ni-21Cr-Mo	N08904	B649-N08904		Z2 NCDU 25-20	1.4539	
Super Austenitic Steel	Super Austenitic 6Mo	926	2011/100 0 14	N08926	A400 F00	1051 0171	X1NiCrMoCuN 25-20-7	1.4529	virtual immunity under practical conditions to chloride-ion stress corrosion cracking
S.Ster	Alloy 20	ALLOY 20	28Ni-19Cr-Cu-Mo	N08020	A182-F20	A351-CN7M	DIN 1.4500	2.4660	service to 600F(316C)
NiCrMo S.Steel	Alloy 28	ALLOY 28		N08028				1.4563	nickel based alloy (Ni/Fe/Cr) with good corrosion resistance and a high range of mechanical strength. The alloy was originally developed for use in the manufacture of phosphoric acid.
Duplex Steel	Duplex 2205	F51	22Cr-5Ni-3Mo-N	S31803 S32205	A182-F51	A890-Grade 4A (UNS J92205) - A995 CD3MN	X2CrNiMON22 5 3	1.4462	service to 600F(316C) -The original S31803 UNS designation has been supplemented by S32205 which has higher minimum N, Cr, and Mo.
-	Super Duplex 2507	F53	25Cr-7Ni-4Mo-N	S32750	A182-F53	A351-CD4MCu A890 5A	X2CrNiMoN25 7 4	1.4410	service to 600F(316C)
Super Duplex Steel	Super Duplex	F55	25Cr-7Ni-3.5Mo-N-Cu-V	S32760	A182-F55	A351 GR CD3MWCuN	X2CrNiMoCuWN25.7.4	1.4501	
Otobi	Ferralium 255	255		S32550		ASTM A487 gr 4C	n/a	n/a	
Nickel	Nickel 200	NICKEL	99/95Ni	N02200	B564-N02200	A494-CZ-100	NW2200	1.7740	service to 600F(316C)
<u> </u>	Incoloy 800	ALLOY 800	33Ni-42Fe-21Cr	N08800	B564-N08800	A351-CT15C	X 10 NiCrAlTi 32 20	1.4876	
Nickel-Iron Alloy	Incoloy 800H	ALLOY 800H		N08810	B564-N08810			1.4876	
kel-Irc	Incoloy 800HT	ALLOY 800HT		N08811	B564-N08811			1.4876	
.Si	Incoloy 825	ALLOY 825	42Ni-21.5Cr-3Mo-2.3Cu	N08825	B425-N08825	A494-CU5MCuC	NiCr 21 Mo	2.4858	service to 1000F(538C)
	Inconel 600	ALLOY 600	72Ni-15Cr-8Fe	N06600	B564-N06600	A494-CY40	NiCr 15 Fe	2.4816	
	Inconel 625	ALLOY 625	60Ni-22Cr-9Mo-3.5Cb	N06625	B564-N06625*	A494-CW-6MC	DIN 17744	2.4856	*Difficult to forge in close dye
alloys	Inconel 718	ALLOY 718	52.5Ni-19Cr-3Mo	N07718	B637-N07718			2.4668	Alloy 718 is a precipitation hardenable nickel-based alloy designed display exceptionally high yield, tensile and creep-rupture properti at temperatures up to 1300°F (704°C).
Nickel Superalloys	Hastelloy B2	ALLOY B2	65Ni-28Mo-2Fe	N10665	B564-N10665*			n/a	solid solution strengthened, nickel-molybdenum alloy, with significant resistance to reducing environments like hydrogen chloride gas, and sulfuric, acetic and phosphoric acids
_	Hastelloy C-276	ALLOY C276	54Ni-15Cr-16Mo	N10276	B564-N10276*	A494-CW-2M	NiMo 16 Cr 15 W	2.4819	*Difficult to forge in close dye
	Hastelloy C-22	ALLOY C-22		N06022	B462-N06022		-	2.4602	austenitic nickel-chromium-molybdenum-tungsten alloy with enhanced resistance to pitting, crevice corrosion and stress corrosi cracking
Nº 1 1 C	Monel 400	MONEL	67Ni-30Cu	N04400	B564-N04400	A494-M35-1	DIN 17730	2.4365	
Nickel-Copper	Monel K500	MONEL500		N05500	B865-N05500			n/a	Available as well in 500 grade
Titanium	Titanium	TITANIUM	98Ti	R50400	B381-F2	B367-C2	Ti 2	3.7035	
									ļ.



SEAT MATERIALS

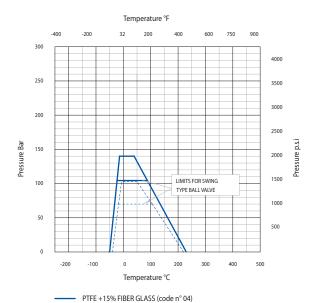


	OMB Designation	CHEMICAL Name/designation	TEMPERATURE RANGE	APPLICATION	TRADEMARK
	P.T.F.E	Polytetrafluoroethylene	-100° to + 180°/220°C	Virgin PTFE is used as a standard material for its high lubricity and superior sealing up to 180°C. It is white in colour.	DuPont™ Teflon®
	R.P.T.F.E/Glass	Polytetrafluoroethylene glass filled	-100° to + 200°/250°C	Reinforced PTFE seats are made with glass filled PTFE (20%). They are harder than virgin PTFE. White in colour with green or blue speckles.	DuPont™ Teflon®
	R.P.T.F.E/Carbon Graphite	Polytetrafluoroethylene carbon-graphite filled	-100° to + 200°/250°C	Reinforced PTFE with 20% carbon and 5% Graphite. These seats are black in colour.	-
)IC	POM (Delrin®)	Polyoxymethylene acetal resin	-57°C to 82°C	This material is very rigid it has a combination of strength, stiffness, hardness dimensional stability, toughness, fatigue resistance, abrasion resistance low wear and low friction. It can withstand pressure up to 5000 PSIG depending on valve size. Do not use on oxygen service.	DuPont™ Delrin®
THERMOPLASTIC	Devlon [®] V	Polyamide	-100° to +150°C	Devlon® V is similar to Nylon 12G, but with a wider range of temperature application (lower and higher).	Devol Eng. Ltd.
THE	PEEK	Polyetheretherketone	-100° to 260°C	Peek is recommended for high temperature (up to 260°C) but it is very hard compared to other non metallic materials. Not applicable for concentrated sulphuric acid.	-
	PCTFE (Kel F®)	Polyclorotrifluoroethilene	-250° + 150°C	PCTFE is specifically recommended for cryogenic service.	3-M™ KEL-F® Daikin™ Neoflon®
	Vespel® Sp21 15% Graphite Fille Polyimide		-100° to 340°C	15% Graphite filler. Performs well in a variety of chemical environments and a variety of industrial fluids at elevated temperatures.	DuPont™ Vespel®
	Nylon 12 G Polyamide		-50° to + 120°C	Nylon 12G is more suitable than PTFE for higher pressure, but has a limited range in temperature.	-
	UHMWPE Ultra High Molecular Weight Polyethylene		-200°C to 80°C	UHMWPE (05) is a common substitute where PTFE is not permitted and has excellent abrasion resistance.	-



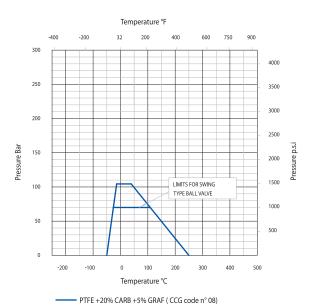


CHANGEAT MATERIAL PRESSURE - TEMPERATURE LIMIT



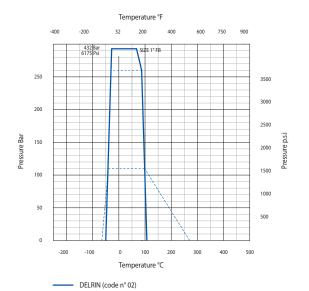
PTFE + 15% Fiberglass

The glass content decreases the characteristics when in the presence of alcohol and it can be corroded by hydrofluoric acid.



PTFE + 20% Graphite & 5% Carbon

Graohite and Carbon content increase temperature and pressure range of this compound which is the OMB standard.



----- PTFE +316 (code n° 03)

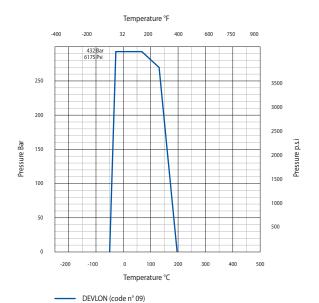
Derlin®

DuPont's trademark for Polyoxy-methylene. This material is very rigid and does not undergo cold flow. It has a combination of strength, stiffness, hardness, dimensional stability, toughness, fatigue resistance, abrasion resistance, low wear and low friction. it can withstand pressure up to 5000 PSIG depending on valve size. Has a temperature range of -70°F to 180°F (-57°C to 82°C). Better radiation rating than PTFE with maximum 1x106 rads lifetime dose Do not use on oxygen service. Color - glossy white.

Deriln® is a DuPont's trademark



SEAT MATERIAL PRESSURE - TEMPERATURE LIMIT

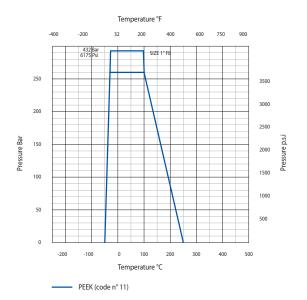


Devion®

Devlon V-API has many advantages over nylon and PTFE, with one material replacing several thermoplastics over a wide range of operating pressures and temperatures. In comparison with virgin or glass-filled PTFE, Devlon V-API has similar friction values at low and high temperatures, with the benefit of superior dimensional stability.

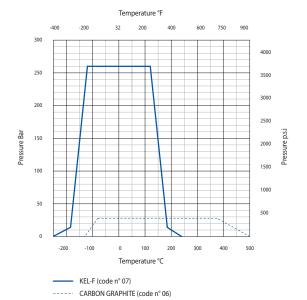
It also has a considerable cost advantage over PTFE and PEEK, and can be manufactured up to 2.25m (88.6-inch) diameter.

Devlon® is a Devol Eng. Ltd trademark



PEEK* (Unfilled) Polyetheretherketone

Peek Polymer offers a unique combination of chemical, mechanical and thermal properties. Excellent for water and steam application at elevated temperatures up to 600°F and pressures up to 6000 PSIG. Not aplicable for concentrated sulfuric acid. Excellent resistance to radiation with maximum 1x10° rads lifetime dose. Colorbeige.

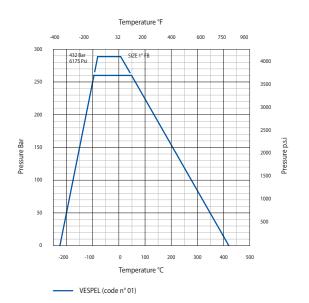


KEL-F® Polychlorotrifluoroethylene (PCTFE)

PCTFE is a fluorocarbon based polymer. It offers a unique combination of physical and mechanical properties non-flammability, chemical resistance, and near zero moisture absorption. It has a temperature range of -400°F to 400°F (-240°C to 204°C) which is suitable for **cryogenic** applications.

KEL-F® is a 3-M's trademark

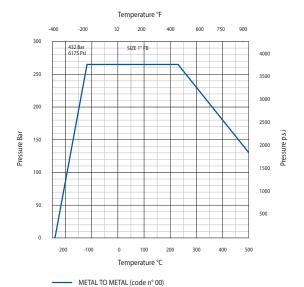




VESPEL®

Vespel® SP-1 are high-performance polyimide shapes offer a broad combination of temperature resistance, chemical resistance, mechanical toughness, natural lubricity, wear-resistance and insulation properties.

Vespel® is a DuPont's trademark



METAL TO METAL

Tungsten carbide is an inorganic chemical compound containing equal parts of tungsten and carbon.

It is approximately three times stiffer than steel leading to high abrasive resistance.

TCC can be used in high temperatures service where Thermoplastic cannot survive.

The application method is High velocity oxy-fuel HVOF thermal spray coating done on both ball and seats. This type of finish increase the torque value of the valve and the table on page 30 is not applicable to this option.

(See table on page 37)





SEAL MATERIALS



SEAL TYPE	DEFINITION/BRAND	MAKER	AED GRADE	MIN	MAX T
FPM (FKM ASTM grade)	Fluoroelastomer				
FPM (FKM ASTM grade)	Viton®	® DuPont	AED	-30C	200C
FPM (FKM ASTM grade)	FR58/90	® J Walker	AED	-30C	200C
HNBR	Hydrogenated Nitrile				
HNBR	ELAST-O-LION®101	® J Walker		-29C	160C
HNBR	ELAST-O-LION®985	® J Walker	AED	-55C	150C
TFE/P (FEPM ASTM grade)	Tetrafluoroethylene/Propylene				
FEPM (Aflas®)	AF 85/90	® Asahi Chem	AED	0	200C
FFPM (FFKM ASTM grade)	Perfluoroelastomer				
FFPM (FFKM ASTM grade)	Kalrez® 1050 LF	® DuPont		5C	365C
FFPM (FFKM ASTM grade)	Kaflon 72B	TM GMI		-25C	315C



INTERNATIONAL STANDARDS	
ASTM D5538	ASTM D5538 - 07 Standard Practice for Thermoplastic Elastomers-Terminology and Abbreviations
ISO 18064:2003	Thermoplastic Elastomers-Terminology and Abbreviations
ASTM D1418	ASTM D1418 - 10a Standard Practice for Rubber and Rubber Latices-Nomenclature
ISO 1629:1995	Rubber and Latices-Nomenclature
ISO 6472:2010	Rubber compounding Nomenclature



METAL TO METAL

EXCELLENT SEALING CHARACTERISTICS

WIDE RANGE OF FLUID SERVICES

STANDARD AND EXTREME OPERATING TEMPERATURES

Superior Sealing

High precision machining results in superior ball and seat interfacing for tight shutoff conforming to ANSI B16.104 class V and MSS SP-61.

Dependable Operations

Spring loaded seats maintain close contact with the ball assuring tight sealing even at low pressures. This results in stable opening and closing torques at high differential pressures over a wide range of temperatures as well as high frequency.

Fire Safe

The combination of metal seats and soft carbon seals insure fire-safe capabilities.

Material Selection

Various material components are available for a variety of service applications up to 500° C (932° F).

Versatility

Surface-hardened ball and seats allows use in more severe applications such as

slurries, pulp stock and other abrasive media in long life.

BALL/SEAT/COATING - TEMPERATURE LIMITATION GUIDELINES

		BASE I	MATERIAL (GRADES		ASE MATERI emp. Limit °		(COATING		COATING Temp. Limit		COMBINED Temp. Limit °C
	Duplex		ASTM A182 F			370			TCC ENP		230		230 370
			ASTM A182 F	55				SiC			230 400 550		370
-	014		10T11 1100 F	4.4					CCC		650		370
	6Mo	, , , , , , , , , , , , , , , , , , ,	ASTM A182 F Alloy 20	44	427				TCC ENP		230 400		230 400
			Alloy 20						ENP SiC CCC		400 550 450		400 427 427
-	13Cr	Δ	ASTM A 182 F	6Δ	640				TCC		230		230
	1001		STM A182 F6	• • •		040			FNP		400 550		400
									SiC		550 450		400 550 450
ŀ	CRA		625			700							
			625 718 X-750					TCC ENP SiC			230 400 550		230 400
			825						CCC				550 450
	SS	А	STM A182 F3	16	700				TCC ENP		230		230 400
		A	ASTM A182 F3 ASTM A182 F3	04 47					SiC		400 550		400 550
									CCC		450		550 450
С	-200°	100°	180°	230°	250°	300°	315°	370°	380°	400°	450°	550	° 650°
F	-328°	212°	356°	446°	482°	572°	599°	698°	716°	752°	842°	1022	2° 1202°
h		TO	CC			on request							
i					E	NP		•					
ŀ													
			I			S	iC				_		
	ļ					CCC							
L			<u> </u>		11-	 	ANALDEZ®	Graphite seat	h 1 O 1	l de el me //			

Maximum temp applicable on TCC is 230°C Recommended thickness is 150 micron Maximum temp applicable on CCC is 450°C Recommended thickness is 150 micron Maximum temp applicable on SCC is 550°C Recommended thickness is 35 micron



PRESSURE - TEMPERATURE



PRESSURE RATINGS

	VALUES FROM API 6D AND API 6A													
Pressure class of valve		ANSI 150 PN 20	ANSI 300 PN 50	ANSI 600 PN 100	ANSI 800 (*)	ANSI 900 PN 150	ANSI 1500 PN 250	ANSI 2500 PN 420	API 2000	API 3000	API 5000	API 10000		
MAYIMUM ODEDATING	Bar	19	49.6	99.3	138	148.9	248.2	413.7	138	207	345	690		
MAXIMUM OPERATING PRESSURE 38°C-100F	Psig	275	720	1440	2000	2160	3600	6000	2000	3000	5000	10000		
LUESSANE SO P-100L	kPa	1900	4960	9930	13800	14890	24820	41370	13800	20700	34500	69000		
LIVEDOCTATIO	Bar	29.3	75.8	150	207	224.1	372.3	620.5	276	414	690	1035		
HYDROSTATIC SHELL TEST	Psig	425	1100	2175	3000	3250	5400	9000	4000	6000	10000	15000		
SHELL ILST	kPa	2930	7580	15000	20700	22410	37230	62050	27600	41400	69000	103500		

¹ bar = 100 kPa - 1 Psig = 0.06894757 bar - 1 bar = 14.5 Psig

 (\star) Class 800 is not normally tabulated ASME/ANSI B16.34 designation, bat it is an intermediate class that is wildely used

CLASS 800

According to ISO 15761

_	According to 157 of												
_	RVICE TEMP.		A105 ⁽¹⁾ A350- LF2 ⁽²⁾	A182 ⁽³⁾ F11	A182 ⁽³⁾ F22	A182 F5	A182 F9	A182 F304	A182 F316	A182 F304L	A182 F347H		
C°	-29 to 38	Bar	136.2	137.9	137.9	137.9	137.9	132.4	132.4	110.3	132.4		
F°	-20 to	Psi	1975	2000	2000	2000	2000	1920	1920	1600	1920		
C°	93.5	Bar	124.1	131.0	131.9	137.9	137.9	110.3	114.1	93.1	116.9		
F°	200	Psi	1800	1900	1910	2000	2000	1600	1655	1350	1695		
C°	149	Bar	120.7	123.8	124.5	133.8	133.8	97.2	103.1	83.4	108.3		
F°	300	Psi	1750	1795	1805	1940	1940	1410	1495	1210	1570		
C°	204.5	Bar	116.6	121.0	119.3	129.7	129.7	86.5	94.5	75.9	102.1		
F°	400	Psi	1690	1755	1730	1880	1880	1255	1370	1100	1480		
C°	260	Bar	110.0	117.9	117.6	122.4	122.4	80.3	87.9	70.3	95.2		
F°	500	Psi	1595	1710	1705	1775	1775	1165	1275	1020	1380		
C°	315.5	Bar	100.7	113.4	113.4	113.4	13.4	76.2	83.1	66.2	90.3		
F°	600	Psi	1460	1615	1615	1615	1615	1105	1205	960	1310		
C°	343.5	Bar	98.6	108.3	108.3	108.3	108.3	75.2	81.7	64.5	88.3		
F°	650	Psi	1430	1570	1570	1570	1570	1090	1185	935	1280		
C°	371	Bar	97.9	104.5	104.5	104.5	104.5	74.1	79.3	63.1	86.2		
F°	700	Psi	700	1515	1515	1515	1515	1075	1150	915	1250		
C°	399	Bar	92.7	97.9	97.9	97.9	97.9	73.1	77.9	61.7	84.8		
F°	750	Psi	750	1420	1420	1420	1420	1060	1130	895	1230		
C°	426.5	Bar	75.9	93.4	93.4	91.4	93.4	72.4	76.2	60.3	83.8		
F°	800	Psi	1100	1355	1355	1325	1355	1050	1105	875	1215		
C°	454.5	Bar	49.3	89.7	89.7	80.7	89.7	71.4	74.5	59.3	81.7		
F°	850	Psi	850	1300	1300	1170	1300	1035	1080	860	1185		
C°	482	Bar	715	82.8	82.8	64.8	82.8	70.7	72.4		79.3		
F°	900	Psi	31.7	1200	1200	940	1200	1025	1050		1150		
C°	510	Bar	460	69.3	69.3	47.9	67.9	69.0	71.0		71.0		
F°	950	Psi	19	1005	1005	959	985	1000	1030		1030		
C°	538	Bar	275	41.0	49.3	35.2	53.8	59.3	66.9		66.9		
F°	1000	Psi	9.7	595	715	510	780	860	970		970		
C°	565.5	Bar	140	25.2	36.6	25.9	34.8	56.9	66.2		66.2		
F°	1050	Psi		365	530	375	505	825	960		960		
C°	593.5	Bar		17.6	20.7	19.0	20.7	47.2	59.3		59.3		
F°	1100	Psi		255	300	275	300	685	860		860		
C°	621	Bar		9.7	19.0	12.8	13.8	35.9	50.7		50.7		
F°	1150	Psi		140	275	185	200	520	735		735		
C°	649	Bar		6.6	10.0	8.3	9.6	28.6	37.9		31.7		
F°	1200	Psi		95	145	120	140	415	550		460		

CARBON STEEL A105(1) & A350 LF2(2)

According to ISO 15761

	RVICE EMP.		PN20	PN50	PN100	PN250	PN420
C°	38	Bar	19.6	51.1	102.1	255.3	425.5
C°	50	Bar	19.2	50.1	100.2	250.4	417.3
C°	100	Bar	17.7	46.4	92.8	231.9	386.5
C°	150	Bar	15.8	45.2	90.5	226.1	376.9
C°	200	Bar	14.0	46.2	90.5	226.1	376.9
C°	250	Bar	12.1	41.7	83.4	208.6	347.7
C°	300	Bar	10.2	38.7	77.5	193.7	322.8
C°	350	Bar	8.4	37.0	73.9	184.8	308.0
C°	375	Bar	7.4	36.5	72.9	182.3	303.9
C°	400	Bar	6.5	34.5	69.0	172.5	287.5
C°	425	Bar	5.6	28.8	57.5	143.8	239.6
C°	450	Bar	4.7	20.0	40.1	100.2	166.9
C°	475	Bar	3.7	13.5	27.1	67.7	112.9
C°	500	Bar	2.8	8.8	17.6	44.0	73.3
C°	525	Bar	1.9	5.2	10.4	25.9	43.2
C°	540	Bar	1.3	3.3	6.5	16.3	27.2

	ERVICE TEMP.		150	300	600	1500	2500
F°	-20 to100	Psi	285	740	1480	3705	6170
F°	200	Psi	260	675	1350	3375	5625
F°	300	Psi	230	655	1315	3280	5470
F°	400	Psi	200	635	1270	3170	5280
F°	500	Psi	170	600	1200	2995	4990
F°	600	Psi	140	550	1095	2735	4560
F°	650	Psi	125	535	1075	2685	4475
F°	700	Psi	110	535	1065	2665	4440
F°	750	Psi	95	505	1010	2520	375
F°	800	Psi	80	410	825	2060	3430
F°	850	Psi	65	270	535	1340	2230
F°	900	Psi	50	170	345	860	1430
F°	950	Psi	35	105	250	515	860
F°	1000	Psi	20	50	105	260	430
F°	1050	Psi					
F°	1100	Psi	-	-	-	-	-

Notes: (1) Permissible, but not recommended for prolunged use above 800°.

(3) Permissible, but not recommended for prolonged use above 1050°F.

(2) Not to be used over 650°F.

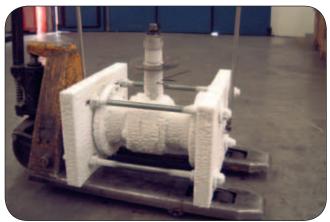
Notes: (1) Permissible, but not recommended for prolunged use above 800°F. (2) Not to be used over 650°F



CRYOGENIC SIDE ENTRY BALL VALVES





















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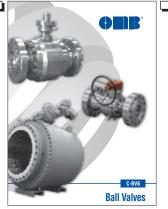
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