Not Just a Name
A Whole New World in itself

- Valves
- Skids / Process Equipments
- Healthcare

OSWAL
INDUSTRIES LIMITED

Mr. Babulal. H. Bokadia [Chairman]

Company Profile

Casting a Success Worldwide

Started way back in 1985 by **Mr. B. H. Bokadia OSWAL INDUSTRIES LTD.,** today has grown manifold to become one of the Industry leaders in Industrial Valves & Castings.

VISION
To become one of the world's leading manufacturer of highly engineered, reliable and quality valves, castings & allied products to the strict & exacting International Standards.

MISSION
Chairman's vision is aptly complimented by management with a mission to create value for our customer's by:-

- Meeting or exceeding customer expectation by partnering with the customer and not just delivering goods /services.
- Acting professionally, responsibly and with integrity in everything we do.
- Ensuring health, safety and the environment in all our activities.
- Committed to promote the sustainable growth.

Chairman's vision and managements mission has catapulated Oswal in to the big league and owning India's largest single location manufacturing base of over 100000 sq. mtr. with state-of -the-art CNC Machines & equipments for manufacturing & testing.

Such success can only be achieved by undertaking strong & firm commitment to the 6pillars of our corporate mission.They are:-

- Self reliance
- Innovation
- Consistency
- Excellence
- Scalability
- Global vision

Our captive foundry for valve castings gives us formidable advantage over others.

Gate, Globe & Check Valves

Accredition

ISO 9001-2000 Certificate

API 6D Certificate

CE - PED

IBR Certificate

TA-Luft Certificate

Cryogenic Test Certificate

CE-PED Foundry Division

ISO Foundry Division

AD-2000-Merkblatt WO

Certification

Oswal quality system is based on strict observance to ISO 9001

OTHER ACCREDITIONS

Gate, Globe & Check Valves

R&D

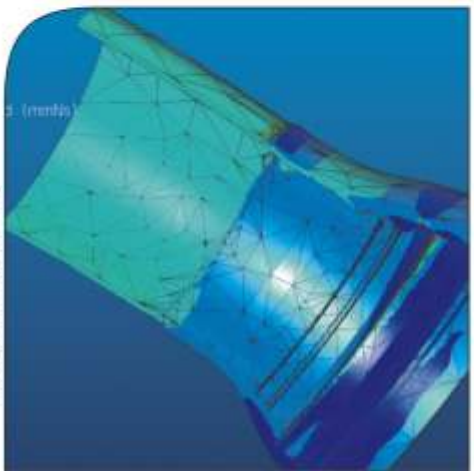
Our **R & D** wing is well equipped with required infrastructure to arrive at an optimum product design to meet customer requirement. Our engineers at R & D have the required expertise to check the product attribute well before its physical procurement. Our Research & Development Centre carries out product design, analysis, process evaluation and simulation using state-of-art facilities like **Pro/E & FEA (Finite Element Analysis)**. With Top down approach of designing, parametric, engineers are able to design in three dimensional environment rendering the process flexible, faster and error free. Stresses and deflections are verified using structural simulations.

We monitor the performance of our products at the customer sites. We give due consideration to the feedback from our clients for constant improvement and up gradation.

The use of sophisticated CAD / CAM tools and National and International standards helps the technical team to arrive at the optimized design parameters with reduced cycle time in product development. We consider suitability of materials, FEA of the design, suitability to long term service conditions, hydraulic and pneumatic behavior of the final products.

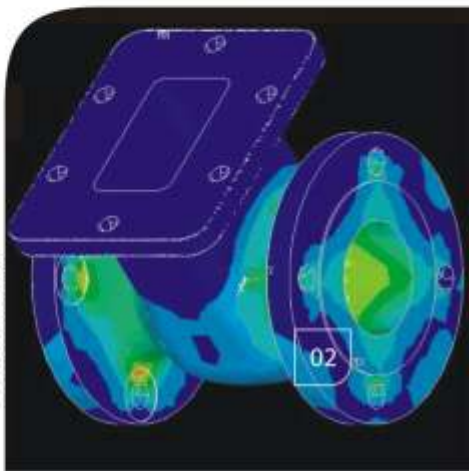
The R & D wing at our end is equipped with all the In-house testing facilities like Fire Safe test rig, Cyclic testing ring, Cryogenic testing rig, Fugitive Emission Testing Rig. Prototype of new products are put through stringent endurance test, the performance is observed for better improvement.

Our technical team with qualified engineers work very closely with end user needs for designing and developing the specialized, customized products for Power plant, Oil & Gas sector, Cryogenic sectors to satisfy the special requirement.



Design and Engineering

Design and Engineering



Gate Valve Ansys

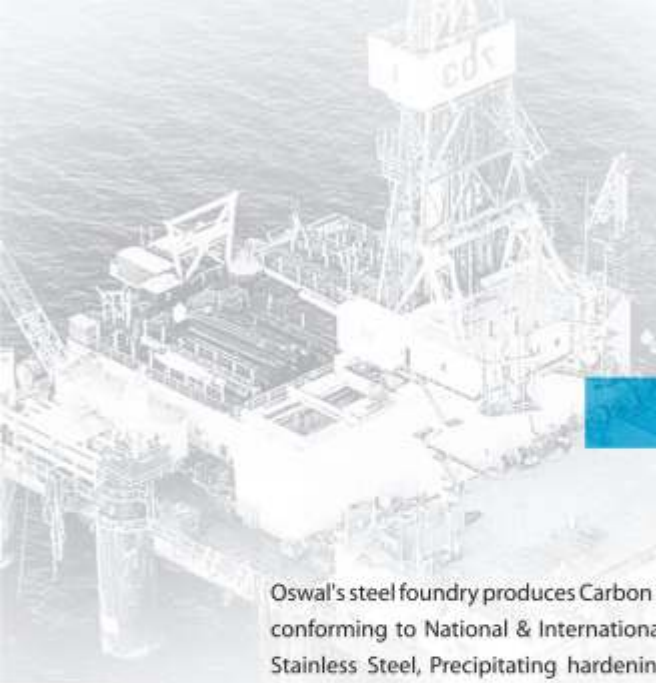
Gate, Globe & Check Valves

Quality Assurance

Both our foundry & Valve units are equipped with state-of-the-art testing machines in order to maintain exacting standard of quality system based on ISO 9001-2000 guidelines & other International quality standards. Every product at our works undergoes stringent quality checkup at every stage. It involves inspection of incoming material, stage inspection and final inspection before dispatch, which includes visual/functional test of valve, destructive non-destructive tests etc.

Special care is taken at the packaging stage so that material does not get damaged during shipment, transport or storage. All the valves are subjected to testing as per API-598 and other relevant testing standard. Special tests are conducted as per customer's requirement.

- Chemical Testing
- Mechanical Testing
- Hardness Testing
- Dye Penetrant Testing
- Magnetic Particle Inspection
- Radiographic Testing
- Helium detection Test
- Fugitive Emission Test
- Fire Safe Testing
- Universal Testing Machine
- Testing Facility



Gate, Globe & Check Valves

Foundry Unit

Oswal's steel foundry produces Carbon Steel, Stainless Steel and Alloy Steel casting conforming to National & International standards. We also manufacture duplex Stainless Steel, Precipitating hardening Alloys, Casting for oil field equipment under NACE being our speciality. Manufacture of casting is done through electric induction melting, moulding & core making by Co_2 binder systems and organic chemical binder systems. Heat treatment is done in ceramic fiber lined, LPG Gas fired and API 6A calibrated furnace.(For alloy steel castings)

Facilities include a machine shop for manufacture of patterns and patterns rigging, two coreless induction, medium frequency furnaces, continuous high speed mixers with compaction table for moulds cores, 72" & 48" table shot blasting machines, tanks for pickling, passivation of Stainless Steel Castings and adequate material moulding facilities.

Quality assurance is ensured by a written assurance program that includes the following testing and inspection. which are available These facilities are available in-house.

- **Chemical** - by a Optical Emission Spectro meter
- **Mechanical** - by Universal Testing Machine
- **NDT** - Radiography , Magnetic Particle Inspection, Dye Penetrant Inspection & Ultrasonic
- **MPI** - for crack detection
- **Impact** Charpy "v" Notch Capable Of Testing Upto-196° C
- **PED & AD 2000WO**

Strict adherence to our quality assurance program resulted in certification to **ISO-9001-2000**

Furnace Capacity: Two crucibles, 1000kg & 1500kg

Single Casting Weight: 25kg - 1500kgs

Production Capacity: 2500 mt per annum.


Pattern & Method dept.


Omega Plant

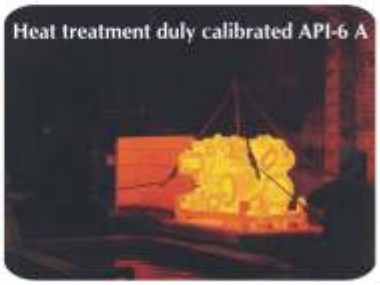

Pouring


Foundry Division


Induction Melting


Shot Blasting


Dimensional Inspection


Heat treatment duly calibrated API-6 A

Gate, Globe & Check Valves

Valve Unit

Automatic Welding Machine

The valve manufacturing units is equipped with all necessary (state-of-the-art) quality equipments and facilities for design on CAD/CAM, pattern development, machining, inspection, assembly and testing as per relevant standard of finished valves.

Adequate quality assurance measures are adopted for manufacture of valves to ensure that they comply with the contractual requirements. Close control is maintained on the quality. A compliance and guarantee certificate is issued along with every supply.

Gate, Globe, Ball and Check valves are the main products of the valve manufacturing unit. The size ranges from 2" (50mm) to 48"(1200mm) and pressure rating of ANSI 150# to 1500# can also be supplied. The valves conform to International standards as per the requirements of the customer such as API, ASTM, ANSI, DIN, BSI, NACE & MSS and are produced in stainless steel, carbon steel, Duplex, Super Duplex & other alloy steel.

(Customer's specifications can also be met.)

Gate, Globe & Check Valves

Valve Unit

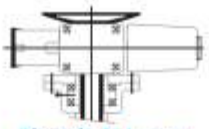
The below mentioned are the standard manufacturing range for cast steel valves.

Standard Product Range

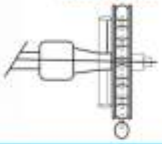
Valve Type	Design Standard	P-T Rating	Testing Standard	Face to Face	End Connection	Size Range
Gate valve	API 600	ASME B16.34	API 598	ASME B16.10	Flange End- ASME B 16.5 Butt Weld-ASME B 16.25	2" - 60" - Class 150 2" - 48" - Class 300 2" - 42" - Class 600
Globe Valve	BS1873	ASME B16.34	BS EN 12266-1	ASME B16.10	Flange End- ASME B 16.5 Butt Weld- ASME B 16.25	2" - 24" - Class 150 2" - 16" - Class 300 2" - 16" - Class 600
Check Valve	BS1868	ASME B16.34	BS EN 12266-1	ASME B16.10	Flange End- ASME B 16.5 Butt Weld- ASME B 16.25	2" - 36" - Class 150 2" - 36" - Class 300 2" - 36" - Class 600

The standard flange facing is RF with smooth finish on the gasket surface.
Other end connections & details available on request.

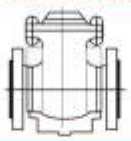
Gear Unit



Electric Actuator



CHAIN WHEEL

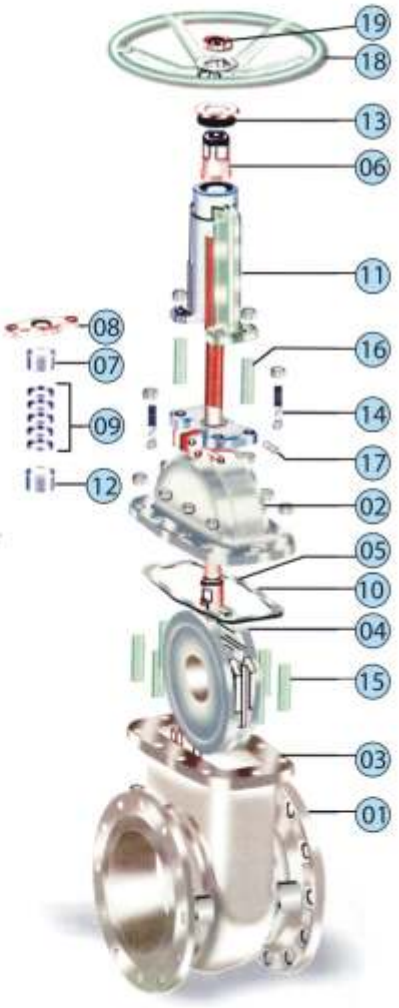


JACKETING

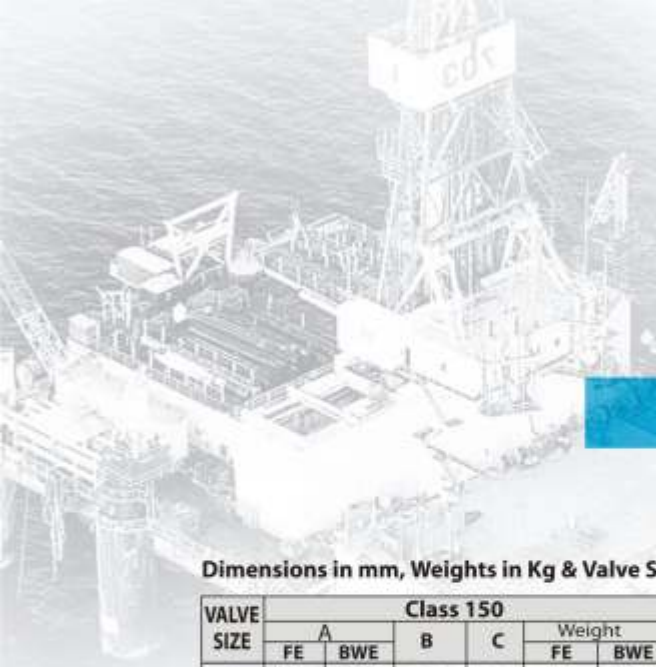
Gate Valve - Feature

Oswal gate valves are heavy duty, outside screw & yoke type, bolted bonnet, rising stem with non rising hand wheel. Straight through bore design assures minimum turbulence, erosion and resistance to flow. The most advanced design features provides the ultimate in dependable, economic flow control. They are available in wide range of sizes and weights. These are widely suited for high pressure and temperature and variety of fluids.

1. Body: Body is cast with integral flanges meeting operating conditions. Bore as per API 600 & Precision machined body permits unobstructed flow, erosion and minimized pressure drop
2. Bonnet: Bonnet is as cast with integral yoke up to size 8". All bonnets are precision machined with exacting tolerance as the body for exact alignment of the stem and wedge center. Body bonnet joints are fine machined for flat face or tongue & groove joint depending upon the pressure rating.
3. Seat Ring: Renewable seats are hard faced and machined to minimize wear. The seat rings are seal welded to the body. Integral Seat is provided for Austenitic Stainless Steel valves. High Quality deposits of Stellite 6 & other hard facing alloys are assured by use of controlled preheating and automatic plasma arc facing and controlled cooling process.
4. Wedge : One piece flexible wedge, with low stem to wedge contact, provides accurate alignment of mating surfaces. The flexibility compensates for seat distortion and ideal for processes with large temperature fluctuations. Solid wedge are also available on request for various processes. Differential hardness of 50 BHN is maintained between wedge and seat ring.
5. Stem: Non rotating stem with precision ACME threads are machined and burnished to mirror finish to 0.8 microns for low torque. The Tee-head connections prevents lateral strain on the stem.
6. Stem Nut :Precision machined stem nut engage the stem for accurate control of wedge position.
7. Gland: Two piece gland for ease of alignment and exerts even pressure on the packing without binding the stem.
8. Gland Flange
9. Packing: Die Molded Grafoil rings with top and bottom braided rings provides ultimate sealing for wide range of service. Assures long packing life and avoids pitting on stem.
10. Gasket: Spiral wound metallic gasket with Grafoil
11. Yoke: Integral up to 8" for better alignment and fewer parts
12. Back Seat bush: Precision Machined bush helps for replacement of packing at open position.
13. Retainer
14. Eye Bolt & nut: Swing type eye bolt for ease in replacement of packing.
15. Body Stud & nut
16. Yoke Stud & Nut
17. Solid Groove pin
18. Hand Wheel: Hand wheel are standard up to 10". Gear operator can also be given on request.
19. Hand Wheel Nut



Gate Valves are adequate for all service media along with Hydrogen service, Oxygen service, Hydrocarbon service and NACE applications. Other optional features like Live loading, lantern ring, Bleed holes, purging lines and other features are available on request. Gear operator for 12" and higher is Oswal standard.



FLANGED END WELD END

Gate Valve - Dimension

Dimensions in mm, Weights in Kg & Valve Size in Inch

FE • Flanged End, BWE • Butt Weld End

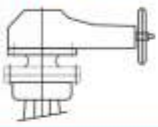
VALVE SIZE	Class 150						Class 300						Class 600					
	A		B	C	Weight		A		B	C	Weight		A		B	C	Weight	
	FE	BWE			FE	BWE	FE	BWE			FE	BWE	FE	BWE			FE	BWE
2"	178	216	320	200	22	20	216	216	315	200	25	23	292	292	310	200	30	27
3"	203	282	390	300	35	32	282	282	385	250	48	44	356	356	365	300	60	55
4"	229	305	445	350	50	45	305	305	440	350	70	65	432	432	435	400	100	92
6"	267	403	550	350	82	75	403	403	590	400	150	138	559	559	635	450	205	188
8"	292	419	755	400	130	120	419	419	755	450	215	195	660	660	755	450	350	320
10"	330	457	890	450	200	185	457	457	915	500	340	300	787	787	955	500	650	570
12"	356	502	955	GB	290	255	502	502	1020	GB	425	375	838	838	995	GB	900	790
14"	381	572	1055	GB	410	360	762	762	1150	GB	715	630	889	889	1115	GB	1300	1145
16"	406	610	1190	GB	505	445	838	838	1320	GB	1050	925	991	991	1265	GB	1610	1415
18"	432	660	1330	GB	605	530	914	914	1390	GB	1235	1085	1092	1092	1400	GB	2275	2000
20"	457	711	1500	GB	735	645	991	991	1495	GB	1655	1455	1194	1194	1540	GB	2970	2615
24"	508	813	1770	GB	1175	1035	1143	1143	1810	GB	2320	2040	1397	1397	1825	GB	3975	3495
26"	559	559	2050	GB	1690	1435	1245	1245	1900	GB	3250	2860	1448	1448	1850	GB	4765	4190
28"	610	610	2120	GB	1980	1685	1346	1346	2020	GB	3645	3095	1549	1549	2095	GB	5800	4930
30"	610	610	2245	GB	2300	1955	1397	1397	2350	GB	4370	3715	1651	1651	2225	GB	6500	5525
32"	660	660	2350	GB	2620	2225	1524	1524	2410	GB	4650	3950	1778	1778	2375	GB	7125	6055
34"	711	711	2450	GB	3015	2560	1626	1626	2400	GB	5750	4480	1930	-	2860	GB	8140	-
36"	711	711	2575	GB	3410	2895	1727	1727	2550	GB	6850	5820	2082	-	3100	GB	9200	-
38"	736	736	2650	GB	3800	3040	-	-	-	-	-	-	-	-	-	-	-	-
40"	762	762	2900	GB	4300	3440	1930	-	3100	GB	8900	-	2286	-	3300	GB	12250	-
42"	787	787	3000	GB	4900	3920	1981	-	3300	GB	9200	-	2438	-	3500	GB	13750	-
44"	810	-	3200	GB	5850	-	-	-	-	-	-	-	-	-	-	-	-	-
48"	864	-	3450	GB	6800	-	2235	-	3900	GB	12560	-	-	-	-	-	-	-
52"	914	-	4050	GB	8500	-	-	-	-	-	-	-	-	-	-	-	-	-
56"	1055	-	4500	GB	10100	-	-	-	-	-	-	-	-	-	-	-	-	-
60"	1119	-	4950	GB	13350	-	-	-	-	-	-	-	-	-	-	-	-	-

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric Actuator

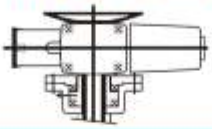
- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.
- Weight for sizes 26" & above are for ASME B16.47 Series B Flanges. For series A consult factory.

Parabolic Disc

Purging Arrangement



GEAR BOX

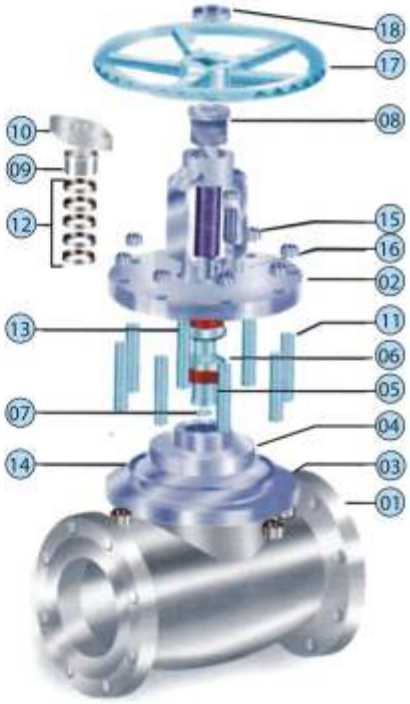


ELECTRIC ACTUATOR

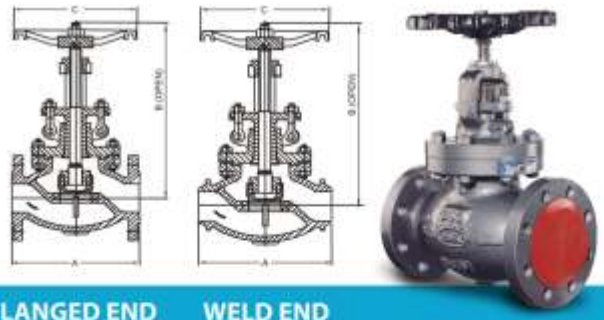
Globe Valve - Feature

Oswal globe valves are heavy duty, outside screw & yoke type, bolted bonnet, rising stem and hand wheel. Valves are highly efficient for services requiring frequent operation and throttling. The internal passage within the valve diverts flow through 90° changes of direction resulting in pressure drop and turbulence. The most advanced design features provides the ultimate in dependable, economic flow control. They are available in wide range of sizes and weights. Globe valves are generally considered where moderate control or regulation of flow is required.

1. Body: Body is cast with integral flanges meeting operating conditions with reinforcement to reduce stress. Flanged end and Butt weld end are available with ASME specifications.
2. Bonnet: Bonnet is as cast with integral yoke for better alignment and fewer parts. All bonnets are precision machines with exacting tolerance as the body for exact alignment of the stem and disc center.
3. Seat Ring: Renewable seat is hard faced and machined to minimize wear. The seat ring is seal welded to the body. Integral Seat is provided for Austenitic Stainless steel valves. High Quality deposits of Stellite 6 & other hard facing alloys are assured by use of controlled preheating and automatic plasma arc facing and controlled cooling process.
4. Disc: Disc is Ground and lapped to mirror finish. Differential hardness difference of 50 BHN is maintained between disc and seat.
5. Stem: Rotating stem with precision ACME threads are machined and burnished to mirror finish to 0.8 microns for low torque. Stem has long engagement with stem nut for accurate sealing.
6. Disc Nut: Disc nut secures stem to the disc. It permits the disc to rotate about the stem axis and aid in tight sealing for trouble free service compensating for disc wear.
7. Thrust Washer: Hard Thrust washer prevents galling.
8. Stem Nut: Precision machined stem nut engage the stem for accurate control of Disc position.
9. Gland: Two piece gland for ease of alignment and exerts even pressure on the packing without binding the stem.
10. Gland Flange
11. Body Stud Nut
12. Packing: Die Molded Grafoil rings with top and bottom braided rings provides ultimate sealing for wide range of service. Assures long packing life and avoids pitting on stem.
13. Back Seat bush: Precision Machined bush helps for replacement of packing at open position.
14. Gasket: Spiral wound metallic gasket with Grafoil enclosed in tongue and groove arrangement.
15. Eye Bolt & nut: Swing type eye bolt for ease in replacement of packing.
16. Solid Groove pin
17. Hand Wheel: Hand wheel are standard up to 10". Gear operator can also be given on request.
18. Hand Wheel Nut



Globe Valves are adequate for all service media. Valves are marked with flow direction since they are recommended to install with flow and pressure under the disc. It can also be installed in reverse condition depending upon the conditions. The Globe Valve is generally faster to operate due to less travel. But requires much force to operate compared to Gate Valves.



FLANGED END WELD END

Globe Valve - Dimension

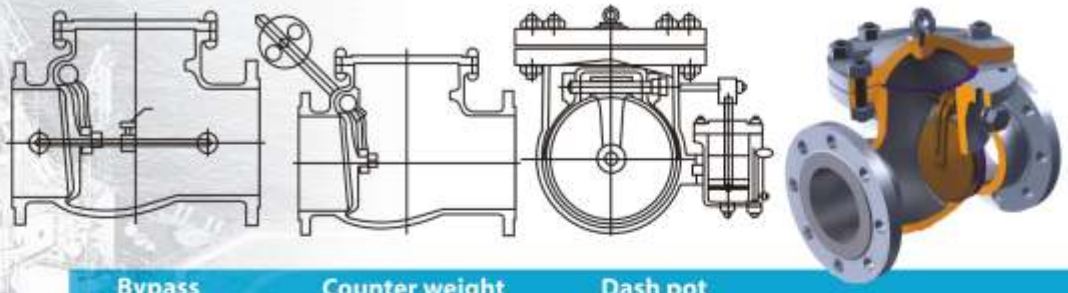
Dimensions in mm, Weights in Kg & Valve Size in Inch

FE • Flanged End, BWE • Butt Weld End

VALVE SIZE	Class 150						Class 300						Class 600					
	A		B	C	Weight		A		B	C	Weight		A		B	C	Weight	
	FE	BWE			FE	BWE	FE	BWE			FE	BWE	FE	BWE			FE	BWE
2"	203	203	305	200	20	18	267	267	330	200	30	28	292	292	350	300	40	36
3"	241	241	380	250	35	32	318	318	380	250	55	50	356	356	430	300	70	65
4"	292	292	410	300	55	50	356	356	410	350	95	88	432	432	505	400	120	110
6"	406	406	450	400	105	95	444	444	510	400	165	150	559	559	560	450	255	235
8"	495	495	545	450	160	148	533	533	645	450	270	250	660	660	660	GB	380	350
10"	622	622	640	450	230	210	622	622	680	500	420	385	787	787	800	GB	585	540
12"	698	698	650	GB	320	280	711	711	725	GB	540	475	838	838	900	GB	890	785
14"	787	787	710	GB	510	450	838	838	760	GB	885	780	889	889	840	GB	1115	980
16"	914	914	735	GB	835	735	864	864	840	GB	1135	995	991	991	935	GB	1450	1275
18"	978	978	820	GB	1290	1135	-	-	-	-	-	-	-	-	-	-	-	-
20"	978	978	1020	GB	1510	1285	-	-	-	-	-	-	-	-	-	-	-	-
24"	1295	1295	1250	GB	1840	1565	-	-	-	-	-	-	-	-	-	-	-	-

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel, Electric Actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.



Bypass Arrangement | Counter weight & lever | Dash pot arrangement

Swing Check Valve - Features

Swing Check Valve

Oswal check valves are heavy duty, bolted cover, renewable seat ring, and body mounted disc swing type. Valves are straight through flow which works automatically. They are opened by the force of velocity pressure and closed by the force of gravity and back pressure. The valves are single direction flow and restrains flow in opposite direction. Distortion, wear and noisy operation of the valve can be avoided by selecting the size of the valve on the basis of flow conditions.

Swing Check valves are best suited for moderate velocity operations. Swing check valves are normally designed for horizontal installations. It can be installed in vertical direction with flow in upward under the disc. There is no tendency for seat to gall because the disc meets flat surface without rubbing upon contact.

The most advanced design features provides the ultimate in dependable, economic flow control. They are available in wide range of sizes and weights. Flow directions are marked as cast on the body for ease of installation.

.1 Body: Body is cast with integral flanges meeting operating conditions with rigid construction and reinforcement to reduce stress. Flanged end and Butt weld end are available with ASME specifications.

2. Cover: Cover permits easy access to hinge and disc arrangement without removing the valve from the line.

3. Seat Ring: Renewable seat is hard faced and machined to minimize wear. The seat ring is seal welded to the body. Integral Seat is provided for Austenitic Stainless steel valves.

4. Disc: Disc is Ground and lapped to mirror finish. It is designed to close on its self weight. It is free to rotate in the hinge compensates for the seat wear Differential hardness difference of 50 BHN is maintained between disc and seat.

5. Hinge: Hinge is mounted in the body.

6. Hinge Pin

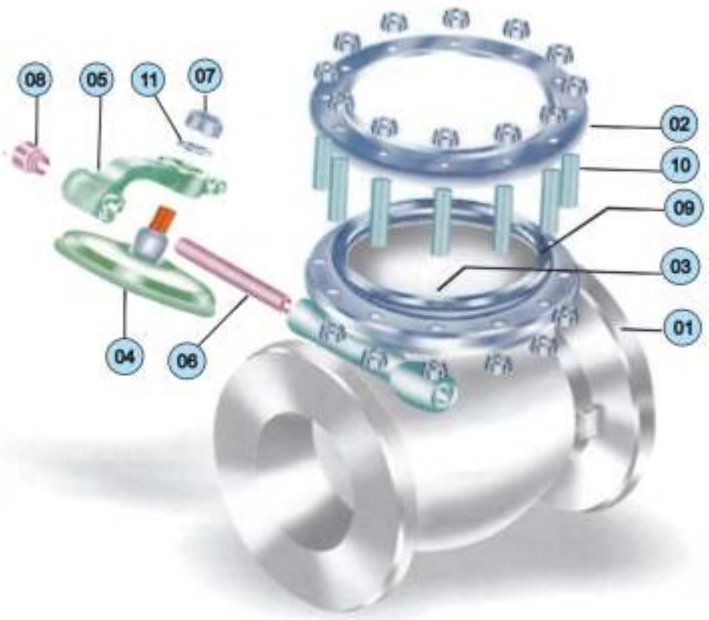
7. Disc Nut: Disc nut secures disc to the hinge. It permits the disc to rotate about its axis and aid in tight sealing

8. Pin plug

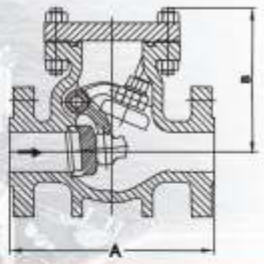
9. Gasket

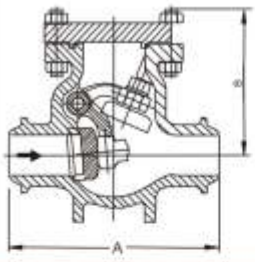
10. Body stud & nut

11. Disc washer



Swing Check Valves are adequate for all service media. Valves can also be supplied with counter weights and dash pot arrangement depending upon the condition and request.





FLANGED END WELD END

Swing Check Valve-Dimension

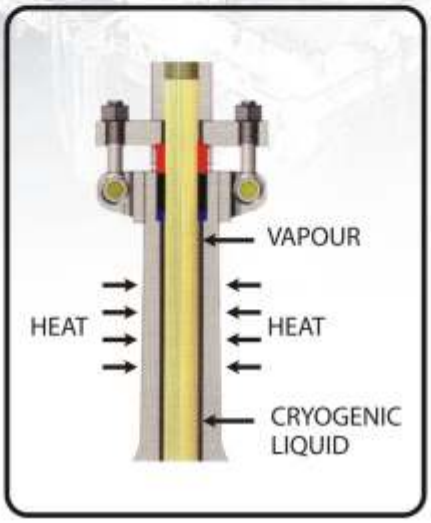
Dimensions in mm, Weights in Kg & Valve Size in Inch **FE • Flanged End, BWE • Butt Weld End**

VALVE SIZE	Class 150					Class 300					Class 600				
	A		B	Weight		A		B	Weight		A		B	Weight	
	FE	BWE		FE	BWE	FE	BWE		FE	BWE	FE	BWE		FE	BWE
2"	203	203	160	15	13	267	267	165	18	16	292	292	165	28	25
3"	241	241	185	27	24	318	318	205	45	41	356	356	205	52	45
4"	292	292	190	45	40	356	356	240	70	65	432	432	250	90	80
6"	356	356	225	75	69	444	444	280	114	105	559	559	300	225	210
8"	495	495	280	120	110	533	533	315	220	205	660	660	380	355	325
10"	622	622	340	195	180	622	622	365	335	305	787	787	410	675	620
12"	698	698	380	275	242	711	711	645	470	415	838	838	425	790	695
14"	787	787	430	360	315	838	838	480	600	530	889	889	450	890	785
16"	864	864	480	490	430	864	864	520	850	750	991	991	560	1200	1055
18"	978	978	545	650	572	978	978	575	1005	885	1092	1092	620	1600	1410
20"	978	978	595	850	748	1016	1016	630	1275	1120	1194	1194	745	2420	2130
24"	1295	1295	680	1350	1188	1346	1346	760	1650	1452	1397	1397	845	3150	2775
26"	1295	1295	780	1830	1555	1346	1346	800	2250	1915	1448	1448	910	4010	3410
28"	1448	1448	840	2150	1830	1499	1499	890	2800	2380	1600	1600	980	5160	4385
30"	1524	1524	980	3000	2550	1594	1594	970	3200	2720	1651	1651	1100	6540	5550
32"	1676	1676	1100	3650	3100	1787	1787	1010	4000	3400	1787	1787	1250	7230	6145
34"	1829	1829	1250	3730	3330	1905	1905	1320	4350	3950	1905	1905	1320	7380	6920
36"	1956	1956	1380	3980	3680	2083	2083	1410	4730	4450	2083	2083	1450	8350	7970

MATERIAL	
Shell	WCB, WC1, WC6, WC9, LCB, LCC, C5, C12, CF3, CF3M, CF8, CF8M, CF8C, CD4MCu, Hastalloy, Inconel, Duplex Stainless steel.
Trim	13% Cr Steel, SS 304, 316, 304L, 316L, 321, 347, F51, Monel
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.

- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Other flange drilling available on request.
- Weight indicated are approximate.
- Other accessories like damper arrangement, dashpot arrangement available on request.

Cryogenic Valves

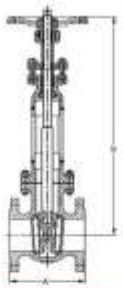


Cryogenic valves are specially engineered and designed for piping systems used in the storage and transport of liquefied gasses such as LNG and liquid nitrogen and oxygen. Oswal Cryogenic valves faces the harsh conditions of services involving temperatures down to - 254° C. The main structural feature of these valves is an extended bonnet with an enclosed vapor chamber to isolate & eliminate any chance of frosting of packing. The presence of bleed hole in the Gate valves wedge helps equalize the body cavity pressure with the upstream pressure . Liquid nitrogen testing facilities go much further to assure proven performance in this most demanding application.

Design Standard	ASME B16.34 / BS 6364
Testing Standard	BS 6364
Face to Face	ASME B 16.10
End Connection	Flanged End - ASME B16.5
	Butt Weld End - ASME B16.25
Pressure-Temperature Chart	ASME B 16.34
Body Material	CF8M, CF8 and other low temperature steels

PRODUCTION MATERIALS

ASTM : A351-CF8, CF8M, CF3, CF3M, or Equivalent



Cryogenic Gate Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150				Class 300				Class 600			
	A	B	C	Weight	A	B	C	Weight	A	B	C	Weight
2"	178	645	200	33	216	640	200	37	292	660	200	45
3"	203	715	300	52	282	710	250	70	356	715	300	90
4"	229	770	350	75	305	765	350	105	432	785	400	150
6"	267	875	350	125	403	915	400	225	559	985	450	305
8"	292	1080	400	195	419	1080	450	325	660	1105	450	525
10"	330	1215	450	300	457	1240	500	510	787	1305	500	975
12"	356	1280	GB	375	502	1345	GB	555	838	1345	GB	1170
14"	381	1380	GB	535	762	1475	GB	930	889	1465	GB	1690
16"	406	1515	GB	655	838	1645	GB	1365	991	1615	GB	2095
18"	432	1655	GB	785	914	1715	GB	1665	1092	1750	GB	2955
20"	457	1825	GB	955	991	1820	GB	2150	1194	1890	GB	3860
24"	508	2095	GB	1525	1143	2135	GB	3015	1397	2175	GB	5160

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS304 , 316, 304L, 316L,
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.
- 250 mm Stem Extension is our standard as per Non cold box application. If any special height required consult factory.

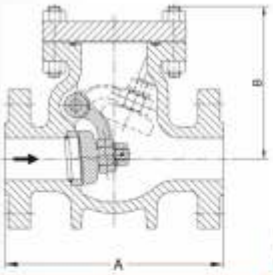
Cryogenic Globe Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150				Class 300				Class 600			
	A	B	C	Weight	A	B	C	Weight	A	B	C	Weight
2"	203	630	200	30	267	655	200	45	292	675	300	60
3"	241	705	250	52	318	705	250	82	356	755	300	100
4"	292	735	300	82	356	735	350	145	432	830	400	180
6"	406	775	400	155	444	835	400	245	559	885	450	300
8"	495	870	450	240	533	970	450	405	660	985	GB	520
10"	622	965	450	345	622	1005	500	630	787	1125	GB	780
12"	698	975	GB	475	711	1050	GB	800	838	1225	GB	970
14"	787	1035	GB	665	838	1085	GB	1150	889	1165	GB	1230
16"	914	1060	GB	1085	864	1165	GB	1475	991	1260	GB	1650

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS 304 , 316 , 304L , 316L ,
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, etc.
Operation	Hand wheel operated, Gear Operated, Pneumatic, Hydraulic, Chain Wheel. Electric actuator

- GB stands for Gear Box.
- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Weight indicated are without gear box.
- Other accessories like limit switch, solenoid valve, air filter regulator, positioner available on request.
- Other flange drilling available on request.
- 250 mm Stem Extension is our standard as per Non cold box application. If any special height required consult factory.



Cryogenic Swing Check Valve-Dimensions

Dimensions in mm, Weights in Kg & Valve Size in Inch

VALVE SIZE	Class 150			Class 300			Class 600		
	A	B	Weight	A	B	Weight	A	B	Weight
2"	203	160	16	267	165	20	292	165	30
3"	241	185	30	318	205	50	356	205	58
4"	292	190	50	356	240	80	432	250	100
6"	356	225	85	444	280	125	559	300	250
8"	495	280	135	533	315	245	660	380	390
10"	622	340	215	622	365	370	787	410	745
12"	698	380	305	711	645	520	838	425	870
14"	787	430	395	838	480	660	889	450	980
16"	864	480	540	864	520	935	991	560	1320
18"	978	545	715	978	575	1105	1092	620	1760
20"	978	595	935	1016	630	1400	1194	745	2665
24"	1295	680	1485	1346	760	1815	1397	845	3465

MATERIAL	
Shell	LCB, LCC, CF3, CF3M, CF8, CF8M,
Trim	SS 304, 316, 304L, 316L,
STRUCTURE	
End Connection	Flanged End Raised Face, Butt Weld End, RTJ, Etc.

- Dimensions, Weights and other Engineering data are subjected to change without notice.
- Other flange drilling available on request.
- Weight indicated are approximate.

TEMPERATURE LIMITS OF SHELL MATERIALS

MATERIAL	ASTM SPECIFICATION	LOWER TEMPERATURE °F (°C)	HIGHER TEMPERATURE °F (°C)
Carbon Steel	ASTM A216 Gr WCB	-20 (-29)	1000(538)
Martensitic 1¼ Cr - ½ Mo	ASTM 217 Gr WC6	-20 (-29)	1100(593)
Martensitic 2 ¼ Cr - 1 Mo	ASTM A217 Gr WC9	-20 (-29)	1100(593)
Martensitic 5 Cr - ½ Mo	ASTM A217 Gr C5	-20 (-29)	1200(649)
Martensitic 9 Cr - 1 Mo	ASTM A217 Gr C12	-20 (-29)	1200(649)
Austenitic Stainless Steel	ASTM A351 Gr CF8 / CF8M	-320 (-198)	1200 (649)
Carbon Steel	ASTM A352 Gr LCB	-50 (-45)	650 (343)
3 ½ Ni	ASTM A352 Gr LC3	-150 (-101)	650 (343)

Other material like Duplex Stainless steel, Hastalloy, Monel, etc made available on request.

DISC SEATS AND BODY SEATS

Following are the Trims as per API 600, Table 3. available as our standard. Other Material combination available on request.

Trim No.	Nominal Trim	Trim Material	Stem Material	Temperature
1.	F6/F6	a) ASTM A 182 F6 / 13% Cr Steel	13%Cr(410)	1100°F
		b)I 3% Cr Deposit		
2.*	304 / 304	a) ASTM A 182 (F304) or A351 (CF8)	304 SS	1200°F
		b) 304 deposit		
5.	HF/HF	Co-Cr-W Alloy (Stellite 6) Deposit	13%Cr(410)	1200°F
8.	F6/HF	Trim No. 1 + No. 5	13%Cr(410)	1100°F
9.*	Monel / Monel	a) Monel Deposit	Monel	450° F
		b)B164		
10.*	316/316	a) ASTM A 182 (F31 6) or A351 (CF8M)	316SS	850° F
		b) 316 Deposit		
11.*	Monel / HF	Trim No.5 + No. 9	Monel	450° F
12.*	316 /HF	Trim No. 5 + No. 10	316SS	850° F

* Available optionally.

Trim parts are defined as follows

Gate Valve - Body & Wedge seating surface, Stem, Back seat surface.

Globe Valve - Body & Disc seating surface, Stem, Back seat surface.

Check Valve - Body & Disc seating surface, Hinge pin.

SOUR GAS SERVICE MATERIALS

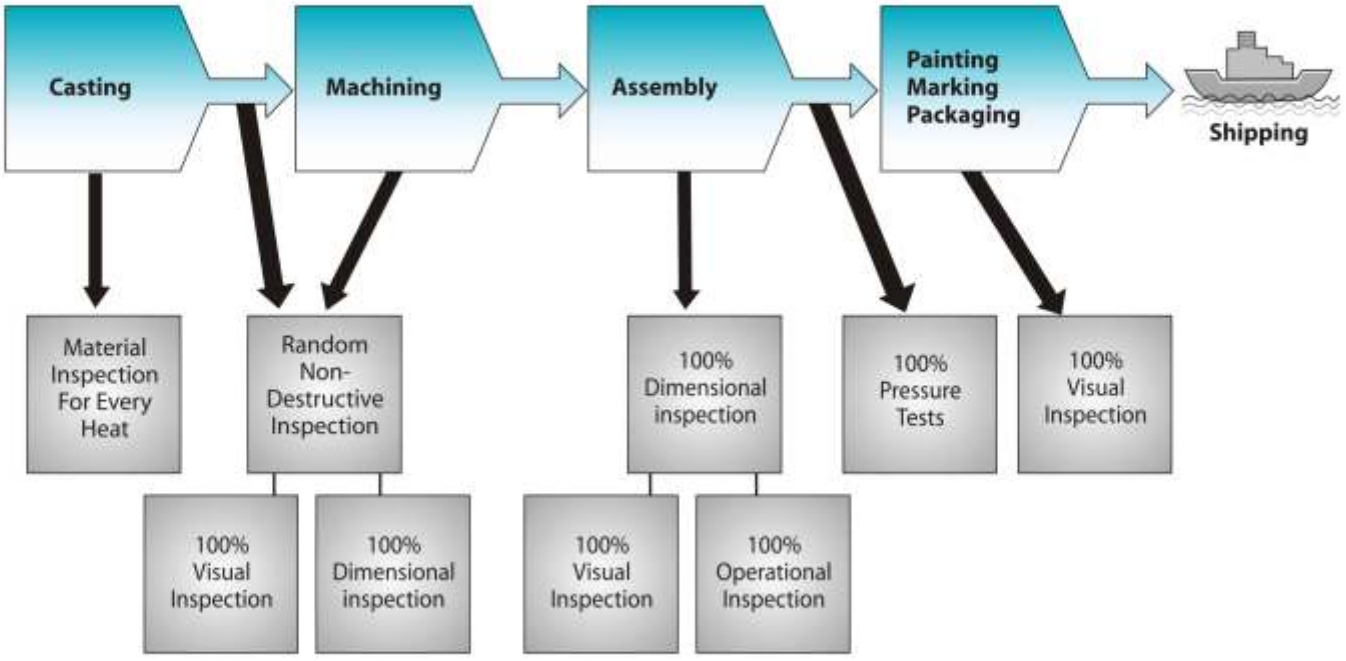
For servicing sour gases or other hydrocarbon fluids, Oswal cast steel valves may be furnished with materials specially heat treated and hardness controlled in compliance with NACE MR 0175 standard. The shell are WCB with double tempered trim 2 and class II bolting. Other materials and trims are also available on request.

TEST PRESSURE

Hydrostatic Shell Test	Hydrostatic tested at 1.5 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598
Hydrostatic Seat Test	Hydrostatic tested at 1.1 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598
Pneumatic Seat Test	Pneumatic tested at 80 Psi pressure at 100°F in accordance with ASME B16.34 and API 598
Hydrostatic Back Seat Test	Hydrostatic tested at 1.1 Times the rated pressure for applicable pressure class at 100°F in accordance with ASME B16.34 and API 598

TEST /INSPECTION	METHOD	ACCEPTANCE CRITERIA
Mechanical Property	ASTM A 370	Relevant ASTM Standard
Chemical Composition Analysis		Relevant ASTM Standard
Radiography Inspection	ASME B 16.34/ASTME142	ASME B 16.34 / ASTM A446
Liquid Penetrant Inspection	ASTM E 165	ASME B 16.34
Magnetic Particle Inspection	ASTM E 138/ASTME709	
Low Temperature Impact Test	ASTM E 23	ASTM A 352
Pressure Test	ASME B16.34 /API 598	ASME B 16.34 /API 598
Dimensional Inspection		Valve Standard
Visual Inspection		MSS SP - 55
Ultrasonic Inspection	ASTM A 388	ASME B 16.34

OSWAL INSPECTION FLOW CHART



Gate, Globe & Check Valves

The new environmental protection policy of reduction in volatile organic compound and particularly hazardous compound leakage resulting from chemical processes and plant equipment was released for the human concern by the Environmental Protection Agency in U.S.A in 1990. The new law required the plant handling the toxic gas to periodically monitor the leakage for not exceeding 500 ppm. If so then the equipment is to be repaired or replace.

In 1995, the leak level was restricted to below 100 ppm and is expected that such restriction will be more stringent in all countries in the world.

Oswal Industries, with several testing, have designed, engineered and manufactured low emission valves to meet the 100 ppm maximum emission level. Gate & Globe valves are meeting the requirement of TA-LUFT and with reference to VDI 2440. The major design considerations for having achieved this performance are as below.

Gland Packing

Flexible graphite packing set consist of 04 die formed flexible graphite rings and 02 braided flexible graphite rings, along with pure carbon bush.

Bonnet Gasket

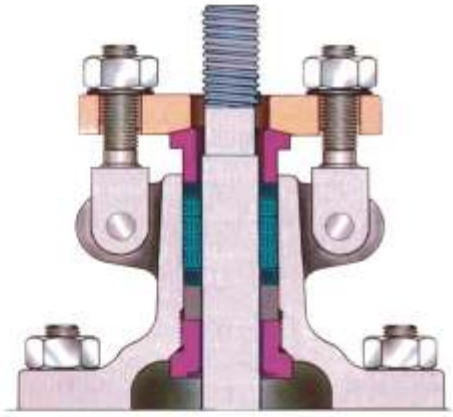
Spiral wounded flexible graphite filler and stainless steel hoop is provided.

Interface Clearance

Small Diametrical interface clearance between vital parts like stem to gland, stem to bonnet bushing, gland to stuffing box.

Stem and Stuffing box

6 to 32 RMS surface finish is provided for stem. Straightness and roundness are precision controlled for super finish. 63 to 125 RMS surface finish is provided for Stuffing box. Cylindricity and verticality are precision controlled in manufacturing.



STANDARD ARRANGEMENT

OPTIONAL

Leak-off

Lantern ring is provided with double packing set in critical service (as shown in figure) with a leak-off connection. The leak-off is provided to allow collection of leakage from the packing set.

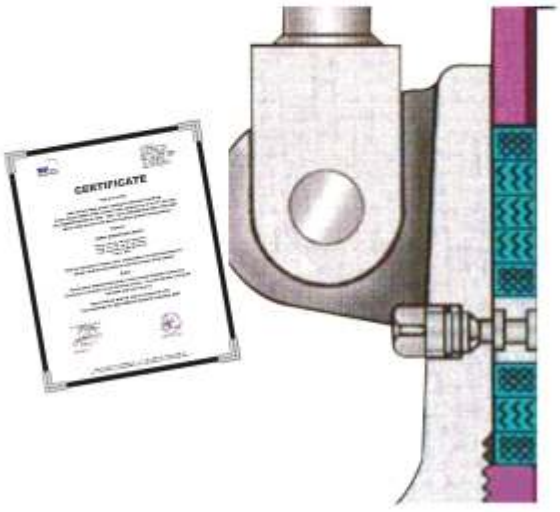
Packing Ring compression

Each packing rings are compressed in stuffing box to ensure equal stress distribution of all rings

Live Loading

Two sets of Belleville springs are provided above the gland flange to maintain permanent packing stress. This feature provide longer life to low emission valves at frequent pressure and temperature transients.

Stainless Steel plate is affixed to the body flange indicating "LOW EMISSION"



LEAK-OFF PLUG AND LANTERN RING

Service recommendations for gate valve

1. Gate valves are normally used for on-off service and are not recommended for throttling service.
2. Gate valves are normally installed in horizontal pipe lines with valve stem vertically up.
3. Flexible wedges are recommended for valves in service above 500° F to avoid wedge binding when the valve is closed when cold, and then heated to operating temperature
4. Seal weld seats in valves are recommended for high velocity (turbulent) flow or thermal cycling.
5. After closing a gate valve with sufficient force to develop shut off, the stem should be backed up slightly (1/8 to 1/4 turn) to relieve stem load. This will enable the stem to expand slightly without damaging the valves.

Service recommendations for globe valve

1. Globe valves are normally installed with flow and pressure under the disc. Check the direction of flow on the valve casting. Consult the manufacturer before installing the valve in other direction

   For valves equipped with cylinders, electric actuators there may be cost advantage in designing and installing the valves with flow and pressure above the disc.
2. Conventional globe valves are suitable for throttling applications. Prolonged opening at less than 10% of opening is not recommended due to possibility of excessive vibration, noise and damage of disc and seats. Continuous severe throttling applications may require control valve.
3. Seal welded seats in valves in service with high velocity (turbulent) flow or thermal cycling recommended.

Service recommendations for check valve

1. Swing check valves are best suited for moderate velocity applications .Either a too low velocity or too high velocity can damage valve internals and shorten valve life. Correct sizing of swing check valves is important.
2. Service in system involving rapid and frequent flow reversals should be avoided. Locating swing check valve away from elbows, equipments etc, with in the piping system can minimize or eliminate problem.
3. Swing check valves are normally designed for installation in horizontal pipe runs. Valves may also be installed in vertical runs but flow and pressure under the disc and opening the disc.
4. Out side lever and weights are effective in preventing slamming of swing check valve in size above 6" NB.
5. Seal welded seats in valves in service with high velocity (turbulent) flow or thermal cycling recommended.

General recommendation for handling and trouble free operation

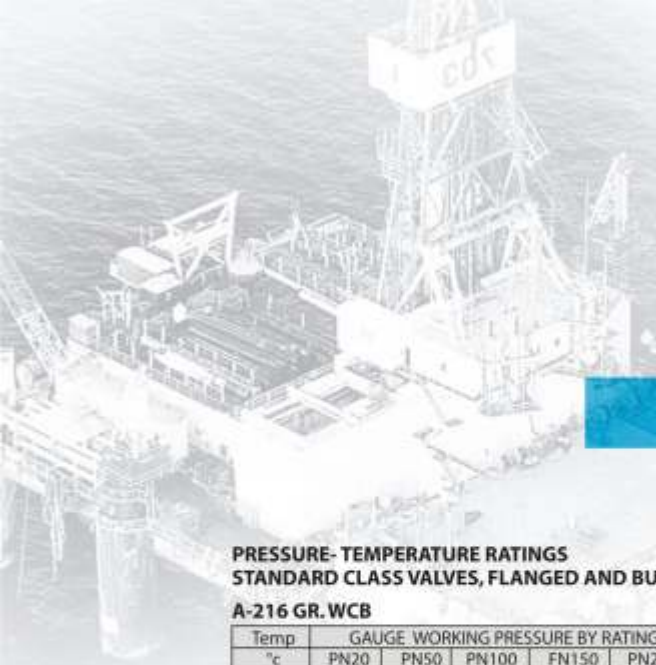
1. End protectors are attached to each valve before shipment. Do not remove the protector until installing the valve.
2. Valves must be stored in dust free, dry and clean storage room on a proper rubber sheet, wooden crates.
3. For lifting the valves use proper rope, wire,. Etc through the lifting lugs to avoid damage.
4. Do not use actuator or valve stem for lifting purpose.
5. Depressurize and drain the testing fluid in the pipe line before installation.
6. Before mounting the valves, make sure all foreign objects such as sands or scales are removed by filters or strainers to protect valve seat surface.
7. Ensure that valve flanges and pipe flanges are coupled with correct alignment.
8. After mounting the valves, clean the inside of the pipes again so that no weld spatters, chips, scales or sand are left.
9. For flanged end valves tightening of bolts must be done alternately and diagonally. Provide valve support if required, to reduce pipe stresses.
10. If leakage is observed from the gland while valve in service, the gland must be retightened immediately. Gland must be tightened just sufficient to stop the leakage. If operating torque is increased after this procedure then it is recommended to replace the packing.
11. It is recommended to replace the packing during valve maintenance operation. But never replace while valve is being pressurized.
12. Care to be taken to clean the packing chamber and the valve stem before replacing the packing.

OSWAL 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.

BODY AND BONNET MATERIALS

Material Common	Group Name	Nominal Type	UNS	Forging Spec.	Casting Spec. Equivalent	DIN	DIN W. N	Application Notes
Carbon Steel	CS	C-Mn-Fe	K03504	A105N	A216-WCB	C22.8 DIN 17243	1.0460	General non-corrosive service from-20F(-29C) to 800F(427c)
Low Temperature Carbon Steel	LTCS	C-Mn-Fe	K03011	A350-LF2	A352-LCA A352-LCB A352-LCC	TSTE 355 DIN 8103	1.0566	General non-corrosive from - 50F (-46C)to650F(340C),LF2to800(427C).
Low Temperature Alloy Steel	Nickel Steel	3.1/2Ni	K32025	A350-LF3	A352-LC3	10Ni14	1.5637	-150F(-101C)to650F(340C)
Low Alloy Steel	Moly Steel	C-1/2Mo	K12822	A182-F1	A217-WC1	15MO3	1.5415	Up to 875F (468C)
	Alloy Steel Chrome Moly	1.1/4Cr-1/2Mo	K11572	A182-F11c12	A217-WC6	13CRMO44	1.7335	Up to 1100F (593C
		2.1/4Cr-1Mo	K21590	A182-F22cl3	A217-WC9	10CRM0910	1.7380	Up to 1100F(593C), HP Steam
		5Cr-1/2Mo	K41545	A182-F5	A217-C5	12CRM0195	1.7362	High temp refinery service
		9Cr-1Mo	K90941	A182-F9	A217-C12	X 12 CrMo91	1.7386	High temp erosive refinery service
		9Cr-Mo-V		A182-F91	A217-C12A	X10CrMoVNb 91	1.4903	High pressure steam
Stainless Steel	Austenitic S. Steel 300 series S. Steel	304 : 18Cr-8Ni	S30400	A182-F304	A351-CF8	DIN X5CrNi189	1.4301	0.04%Min.carbon for temp.>1000F(538C)
		304L : 18Cr-8Ni	S30403	A182-F304L	A351-CF3	X 2 CrNi9 11	1.4306	Up to 800F (427C)
		304H:	S30409	A182-F304H		n/a	n/a	
		316 :16Cr-12Ni-2Mo	S31600	A182-F316	A351-CF8M	DIN X5CrNiMo 18 10	1.4401	0.04% min. carbon for temp.>1000F(538C)
		316L:16Cr-12Ni-2Mo	S31603	A182-F316L	A351-CF3M	X 5 CrNiMo 17 12 2	1.4404	Up to 800F(427C)
		316H :	S31609	A182-F316H		n/a	n/a	
		316Ti :	S31635	A182-F316Ti		X 6 CrNiMoTi 17 12 2	1.4571	
		321 :18Cr-10Ni-Ti 321H	S32100 S32109	A182-F321 A182-F321H		X 6 CrNiTi 18 10 n/a/	1.4541 n/a	0.04% min.carbon(grade F321H)& heat treat at2000F(1100C)forservicetemps.>1000F(538C)
		347:18Cr-10Ni-Cb(Nb) 347H	S34700 S34709	A182-F347 A182-F347H	A351-CF8C	DIN 8556 n/a	1.4550 n/a	0.04% min.carbon(grade F321H)& heat treat at2000F(1100C)forservicetemps.>1000F(538C)
		317L	S31703	A182-F317L	A351-CG3M	X2CrNiMo18-19-4	1.4438	
	Alloy 20	28Ni-19Cr-Cu-Mo	N08020	A182-F20	A351-CN7M	DIN 1.4500	2.4660	service to 600F(316C)
	Duplex 2205	22Cr-5Ni-3Mo-N	S31803 532205	A182-F51	A890-J92205	X2CrNiMoN22-5-3 DIN 10088-1 (95)	1.4462	service to600F(316C)-The original S31803 UNS designation has been supplemented by S32205 which has higher minimum N, Cr and Mo.
	Super Duplex 2507	25Cr-7Ni-4Mo-N	S32750	A182-F53	A351-CD4MCu A890 5A	X2CrNiMoN25-7-4 DIN10088-1 (95)	1.4501	service to 600F(316C)
	Super Austenitic 6 Mo	20Cr-18Ni-6Mo	S31254	A182-F44	A351-CK3MCuN	X1CrNiMoCuN20-18-7 DIN 10088-1 (95)	1.4547	service to 600F (316C)
Nickel-Iron Alloy	Incoloy 800	33Ni-42Fe-21Cr	N08800	B564-N08800		X10NiCrAlT32-20	1.4876	service to 1000F(538C)
	Incoloy 825	42Ni-21.Cr-3Mo-2.3Cu	N08825	B564-N08825	A494-CU5MCuC	DIN 17744	2.4858	service to 600F(316C) for N02200, 1200F(648C) for N02201
Nickel	Nickel	99/95Ni	N02200	B160-N02200	A494-CZ-100	NW2200	1.7740	
Nickel-Copper	Monel 400 Monel 500	67Ni-30Cu	N04400 N05500	B564-N04400 B564-N05500	A494-M35	DIN 17730	2.4360 2.4375	
Nickel Alloy	904L		N08904	904L	n/a	Z2NCDU 25-20	1.4539	
Nickel Superalloys	Inconel 600	72Ni-15Cr-8Fe	N06600	B564-N06600	A494-CY40	DIN 17742	2.4816	
	Inconel 625	60Ni-22Cr-9Mo-3.5Cb	N06625	B564-N06625*	A494-CW-6MC		2.4856	*Difficult to forge in close dye
	Hastelloy C-276	54Ni-15Cr-16Mo	N10276	B564-N10276*	A494-CW-2M	NiMo16 Cr 15W	2.4819	*Difficult to forge in close dye

Notes : these charts are for reference only. OSWAL recommends customer engineers to analize service requirements and specify the materials they consider optimium. OSWAL cannot be held liable for any damage occured due to the use of the tables.



PRESSURE- TEMPERATURE RATINGS
STANDARD CLASS VALVES, FLANGED AND BUTT WELD END

A-216 GR. WCB

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	19.6	51.1	102.1	153.2	255.3	425.5	765.8
50	19.2	50.1	100.2	150.2	250.4	417.3	751.1
100	17.7	46.4	92.8	139.1	231.9	396.5	695.7
150	15.8	45.2	90.5	135.7	226.1	376.9	678.4
200	14.0	43.8	87.6	131.5	219.1	365.2	657.3
250	12.1	41.7	83.4	125.2	208.6	347.7	625.8
300	10.2	38.7	77.5	116.2	193.7	322.8	581.0
350	8.4	37.0	73.9	110.9	184.8	308.0	554.4
375	7.4	36.5	72.9	109.4	182.3	303.9	547.0
400	6.5	34.5	69.0	103.5	172.5	287.5	517.5
425	5.6	28.8	57.5	86.3	143.8	239.6	431.4
450[2]	4.7	20.0	40.1	60.1	100.2	166.9	300.5
475[2]	3.7	13.5	27.1	40.6	67.7	112.9	203.2
500[2]	2.8	8.8	17.6	26.4	44.0	73.3	131.9
525[2]	1.9	5.2	10.4	15.5	25.9	43.2	77.7
540[2]	1.3	3.3	6.5	9.8	16.3	27.2	48.9

A-217 GR. WC6

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	50.7	103.4	155.2	258.6	431.0	775.9
100	17.7	51.4	103.0	154.5	257.4	429.1	772.4
150	15.8	49.6	99.6	149.2	248.8	414.5	746.3
200	13.9	48.1	95.5	143.9	239.8	399.6	719.6
250	12.1	46.2	92.4	138.6	231.0	385.0	692.6
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	3.89	77.6	116.6	194.1	323.3	582.0
400	6.5	36.5	73.3	109.8	183.1	305.0	548.7
425	5.6	35.2	70.2	105.4	175.7	292.6	526.3
450[2]	4.6	33.7	67.7	101.4	169.1	281.9	507.2
475	3.7	31.7	63.4	95.1	158.2	263.9	475.0
500	2.8	25.3	50.6	75.7	126.1	210.1	378.6
525	1.9	18.1	36.3	54.5	90.8	151.2	272.5
550	1.4[1]	12.7	25.4	38.1	63.6	105.9	190.7
575	1.4[1]	8.8	17.7	26.3	44.0	73.4	132.1
600[2]	1.4[1]	6.0	12.0	18.3	30.3	50.5	90.8

A-217 GR. WC9

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	51.7	103.4	155.2	258.6	431.0	775.9
100	17.7	51.6	103.1	154.6	257.7	429.5	773.2
150	15.8	50.3	100.3	150.6	250.9	418.3	753.0
200	13.9	48.8	97.5	146.3	244.1	406.6	731.9
250	12.1	46.3	92.7	139.1	231.9	386.3	695.0
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	38.9	77.6	116.6	194.1	323.3	582.0
400	6.5	36.5	73.3	109.8	183.1	305.0	548.7
425	5.6	35.2	70.2	105.4	175.7	292.6	526.3
450[2]	4.6	33.7	67.7	101.4	169.1	281.9	507.2
475	3.7	31.7	63.4	95.1	158.2	263.9	475.0
500	2.8	27.7	55.7	83.4	139.0	231.8	417.4
525	1.9	21.6	43.3	64.9	108.4	180.6	325.3
550	1.4[1]	15.4	30.7	46.1	77.0	127.9	230.7
575	1.4[1]	10.5	21.1	31.7	52.7	87.7	158.1
600[2]	1.4[1]	6.9	13.8	20.7	34.6	57.4	103.2

CAST: ASTM MATERIAL STANDARD-TO ASME B 16.34
(bar/°C) CLASSES 150-4500

A-217 GR. C5

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	51.7	103.3	155.0	258.6	430.3	774.6
100	17.7	51.1	102.3	153.4	257.2	425.9	766.8
150	15.8	49.3	98.6	148.2	246.8	411.2	740.5
200	13.9	48.7	97.4	146.1	243.7	406.0	730.8
250	12.1	46.3	92.7	139.1	231.9	386.3	695.0
300	10.2	42.9	85.8	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	38.9	77.5	116.4	193.9	323.0	582.0
400	6.5	36.5	72.6	109.2	181.8	303.0	545.4
425	5.6	35.2	70.1	105.4	175.6	292.4	526.1
450[1]	4.6	33.7	67.1	100.8	167.9	280.1	504.0
475	3.7	27.6	55.0	82.6	137.7	229.7	413.5
500	2.8	21.3	42.6	64.0	106.4	177.4	319.5
525	1.9	16.1	32.3	48.3	80.5	134.1	241.7
550	1.4[1]	12.1	24.3	36.0	60.3	100.3	180.8
575	1.4[1]	9.0	17.9	26.6	44.3	74.1	133.2
600[2]	1.4[1]	6.2	12.6	18.8	31.3	52.0	93.4
625[2]	1.3[1]	3.9	8.1	12.0	20.0	33.3	59.9
650[2]	1.0[1]	2.4	4.8	7.2	11.7	19.7	35.5

A-217 GR. C12

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	20.0	51.7	103.4	155.2	258.6	431.0	775.9
50	19.5	51.7	103.4	155.2	258.6	431.3	775.9
100	17.7	51.6	103.1	154.6	257.7	429.5	773.2
150	15.8	50.3	100.3	150.6	250.9	418.3	753.0
200	13.9	48.8	97.5	146.3	244.1	406.6	731.9
250	12.1	46.3	92.7	139.1	231.9	386.3	695.0
300	10.2	42.9	85.5	128.6	214.4	357.2	642.8
350	8.3	40.3	80.3	120.8	201.1	335.4	603.5
375	7.4	38.9	77.5	116.6	194.1	323.3	582.0
400	6.5	36.5	73.3	109.8	183.1	305.0	548.7
425	5.6	35.2	70.2	105.4	175.7	292.6	526.3
450	4.6	33.7	67.7	101.4	169.1	281.9	507.2
475	3.7	31.7	63.4	95.1	158.2	263.9	475.0
500	2.8	27.7	55.7	83.4	139.0	231.8	417.0
525	1.9	21.4	42.8	64.1	107.1	178.6	321.1
550	1.4[1]	15.0	30.0	45.0	75.0	125.1	225.0
575	1.4[1]	0.4	21.0	31.4	52.1	87.2	156.7
600	1.4[1]	7.2	14.3	21.5	35.8	59.9	107.5
625	1.4[1]	4.9	9.9	14.8	24.7	41.5	74.5
650	1.4[1]	3.4	7.2	10.7	17.6	29.7	53.1

A-351 GR. CF8M[3] , A351 GR. CF3M[2]

Temp	GAUGE WORKING PRESSURE BY RATING NUMBER, bar						
°c	PN20	PN50	PN100	FN150	PN250	PN420	PN760
38	19.0	49.7	99.3	149.0	248.3	413.8	744.8
50	18.3	48.1	96.3	144.4	240.6	401.0	721.9
100	16.1	42.3	84.6	126.8	211.0	351.7	633.2
150	14.8	38.6	77.1	115.7	192.4	320.8	577.7
200	13.9	48.8	97.5	146.3	244.1	406.6	731.9
250	12.0	33.5	66.8	100.3	167.0	278.2	500.8
300	10.2	31.6	63.1	95.0	158.1	263.6	474.6
350	8.3	30.4	61.0	91.3	152.3	253.9	456.9
375	7.4	29.6	59.9	89.7	149.3	249.1	448.3
400	6.5	29.3	59.0	88.2	147.2	245.4	441.9
425	5.6	29.6	58.3	87.3	145.6	242.9	437.2
450	4.6	29.0	57.7	86.7	144.3	240.4	432.8
475	3.7	28.7	57.3	86.1	143.4	239.0	430.3
500	2.8	27.3	54.8	82.1	136.7	228.0	410.5
525	1.9	25.2	50.6	75.9	126.4	210.7	379.2
550(3)	1.4(1)	24.0	47.8	71.8	119.8	199.5	359.0
575(3)	1.4(1)	22.8	45.4	68.3	114.1	190.1	341.9
600(3)	1.4(1)	19.9	39.9	59.7	99.5	166.0	298.6
625(3)	1.4(1)	15.7	31.7	47.4	79.2	131.7	237.3
650(3)	1.4(1)	12.6	25.3	37.9	63.2	105.7	189.8
675(3)	1.4(1)	10.1	20.6	30.8	51.4	86.1	154.8
700(3)	1.4(1)	83	16.9	25.1	42.0	69.8	125.8
725(3)	1.4(1)	6.9	13.9	21.1	35.0	58.2	104.9
750(3)	1.4(1)	5.7	11.3	17.1	28.7	47.7	85.7
775(3)	1.4(1)	4.6	9.0	13.7	22.8	38.1	68.4
800(3)	1.4(1)	3.5	7.0	10.6	17.4	29.2	52.6

TRUNNION MOUNTED BALL VALVE SPECIFICATION

Size Range	:	2" TO 16" - 2 Piece design
		18" TO 48" - 3 Piece design
Pressure Rating	:	Class 150 to 2500
End Connection	:	Flanged End (RF & RTJ) - ASME B16.5 Butt Weld End - ASME B16.25 Other types of welding & clamped connection also available on request.
Design Standard	:	API 6D / ASME B16.34
Testing Standard	:	API 6D / API 598
Fire Safe	:	API 6FA / API 607
Bore	:	Full Bore & Reduced Bore

Ball Valve

PRESSURE SEAL VALVE SPECIFICATION

Size Range	:	2" TO 24"
Pressure Rating	:	Class 900 to 2500
End Connection	:	Flanged End (RF & RTJ) - ASME B16.5 Butt Weld End - ASME B16.25 Other types of weld end & connection also available on request.
Design Standard	:	ASME B16.34 / API 600
Testing Standard	:	ASME B16.34 / BS EN 12266-1

Pressure Seal Valve

GLOBAL PRESENCE

Marketing Offices (India & Overseas)

Representatives / Associates

- Saudi Arabia
- Qatar
- Singapore
- Malaysia
- Brazil

INTERNATIONAL APPROVALS/ REFERENCES

GLOBAL REACH

ABB
Agip
AIR LIQUIDE
lyondellbasell
Advancing Possible
ALSTOM
BHEL
HMEL
Orpic
NPCC
AkerSolutions
angola LNG
BECHTEL
BG GROUP
Bharat Petroleum
bp
CAIRN
EIL
Enppi
ESSAR
EXXON Mobil
FLUOR
GAIL
GASCO
GAZPROM
GS E&C
HP
Honeywell
IndianOil
JACOBS
Joint Operations
Karachaganak
KNPC
KSS
Linde
MLNG
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