

PISHGAM

BALL VALVE MANUFACTURER

کارخانه : تهران، شهرک صنعتی شمس آباد، بلوار بهارستان،
بلوار نارنجستان، انتهای گلبرگ ۴

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www.pishgam.co

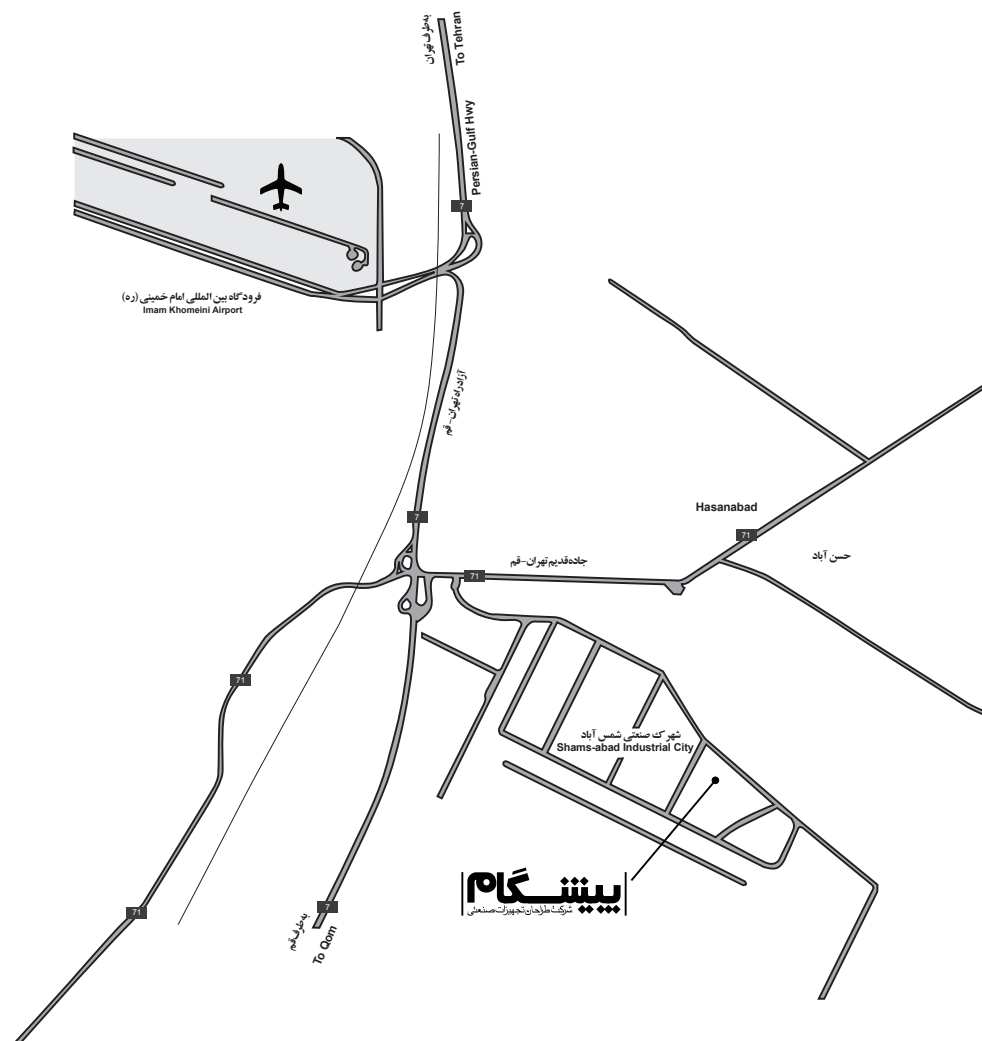
info@pishgam.co

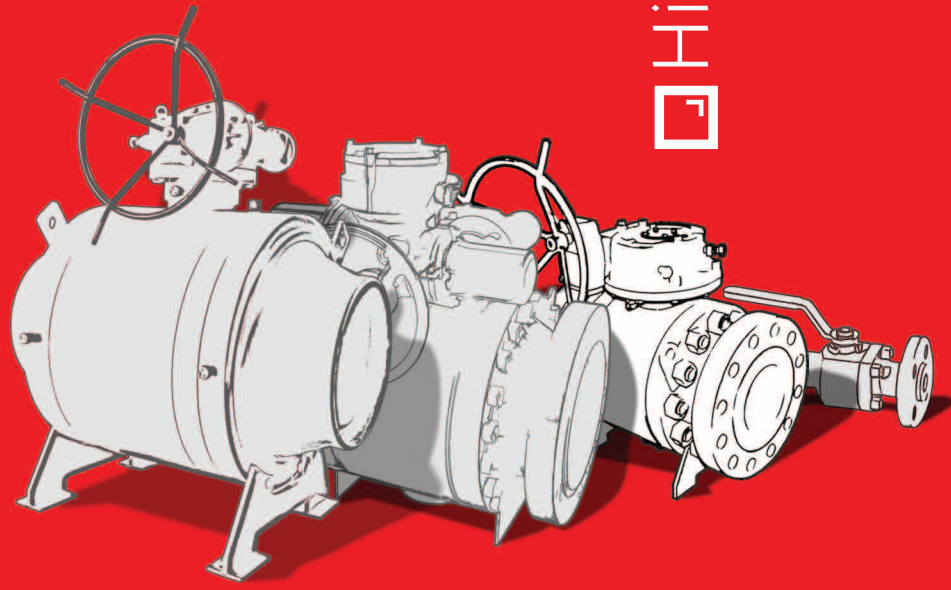
Factory: Golbarg-e-4 St. ,Narenjestan Blvd.,
Baharestan Blvd.,Shamsabad Industrial City,
Tehran ,Iran

Tel : (+98 - 21) 562 30 126

(+98 - 21) 562 33 641-2

Fax : (+98 - 21) 562 30 125





High Pressure

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Company Profile



PISHGAM Industrial Designers Company named "PISHGAM" hereafter is a privately held company led by board of directors consisting of graduates of reputable Iranian universities with high level of educations.

Directors have been chosen and employed among the best educated people holding recognized academic degrees who are experienced and professional in their field of work.

Since 2002 this company has started performing professional activities through experienced staff who have undergone necessary trainings concentrating on design and production of oil and gas equipment through cooperation with top rated companies abroad and intelligent technology transfer.

PISHGAM is emphasizing on production of premium quality products in accordance with national and international standards. For all productions supply, production, and test processes are performed under supervision of quality control department which monitors all processes by accurate instrumentation and records the information as per parts recognition procedures. Good reputation in oil and gas industry obliges the company to implement quality standards.

PISHGAM is set and implemented all organizational and information flow procedures in all organizational levels with regard to quality management system. Process improvement is an integral responsibility assigned to all departments which are all monitored by quality assurance department.

Having about 4000 sqm workshop, storage and office; PISHGAM conforms with all necessary standards for work environment; creating a suitable area for business. Benefiting from highly qualified technical and engineering team and holding



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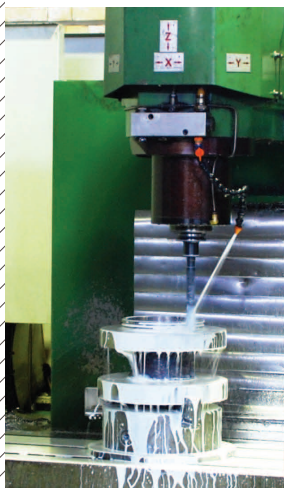
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production license from ministry of mines, industry and commerce, is now serving as a reliable reference in field of globe valves used in oil and gas industry.

PISHGAM is the first company in Iran who has achieved design and production of all fully welded Ball valves which are currently produced in sized from 2 inches to 36 inches and in 150, 300 and 600 classes.

2-piece and 3-piece Ball valves sized from ½ inches to 36 inches in 150, 300 and 600 classes as well as valves required in 900, 1500 and 2500 pressures are amongst other products of this company.

Our major clients include National Iranian Oil Company, National Iranian Gas Company, National Iranian Petrochemical Company, National Iranian Oil Production and Distribution Company and affiliates such as Oil Supplies Company, Pars Oil and Gas Company, Iranian Gas Engineering and Development Company as well as Petrochemical Kala Company.



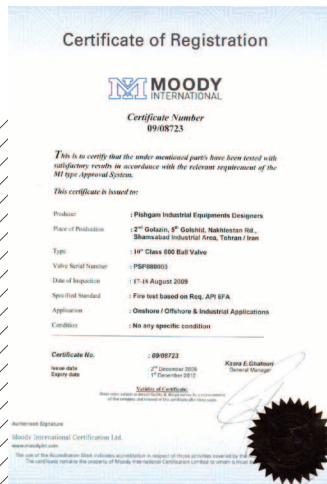
می باشد و تمامی واحدهای سازمان تحت نظارت واحد تضمین کیفیت مشغول فعالیت می باشد. شرکت پیشگام با بهره گیری از نزدیک به ۴۰۰۰ متر فضای کارگاهی، اداری و انبار در تمام بخشها استانداردهای لازم را در محیط کار رعایت نموده و فضاهای متناسب با نیاز کسب و کار را ایجاد نموده است.

شرکت پیشگام با بهره گیری از تیم فنی و مهندسی قوی علاوه بر دارا بودن پروانه بهره برداری در تولید شیرآلات از وزارت صنعت و معدن و تجارت، مجوز تأسیس واحد تحقیق و توسعه را اخذ نموده است و به عنوان یک مرجع در حوزه شیرآلات تویی کاربردی در صنعت نفت، گاز و پتروشیمی در ایران مطرح می باشد.

شرکت پیشگام اولین شرکت در بین تولید کنندگان شیرهای تویی در ایران می باشد که موفق به طراحی و ساخت شیرهای تمام جوشی در ایران گردید و امروز این شیرها از سایز ۲ اینچ الی ۳۶ اینچ در کلاسهای ۱۵۰، ۳۰۰ و ۶۰۰ تولید می شوند.

از دیگر تولیدات شرکت می توان به شیرهای تویی دو یا سه تکه از سایز ۱/۴ اینچ الی ۳۶ اینچ در کلاس های ۱۵۰، ۳۰۰ و ۶۰۰ و همچنین شیرهای مورد نیاز در فشارهای ۹۰۰، ۱۵۰۰ و ۲۵۰۰ اشاره کرد.

از مشتریان اصلی ما می توان به شرکت های ملی گاز، ملی نفت، ملی پتروشیمی، ملی پالایش و پخش فرآورده های نفتی و کلیه شرکت های تابعه ایشان همچون شرکت کالای نفت، شرکت نفت و گاز پارس، شرکت مهندسی و توسعه گاز و کالای پتروشیمی اشاره نمود.



معرفی شرکت

شرکت طراحان تجهیزات صنعتی پیشگام که در این کاتالوگ به نام «پیشگام» شناخته می شود، یک شرکت سهامی خاص است که در رأس آن هیئت مدیره قرار دارد. اعضای هیئت مدیره از فارغ التحصیلان دانشگاههای معتبر ایران با مدارک عالی می باشند و رهبری شرکت را به عهده دارند.

مدیران اجرایی شرکت از بین بهترین افراد تحصیل کرده با مدارک علمی معتبر که دارای تجربه و تخصص در رشته مرتبط با فعالیت خود هستند انتخاب و به خدمت گرفته شده اند.

این شرکت در فعالیتهای تخصصی خود از پرسنل مجرب و کارآموده که آموزشهای لازم را برای انجام فعالیتهای خود گذرانده اند، بهره گرفته است. وبا تمرکز بر طراحی وتولید تجهیزات مورد نیاز صنایع نفت وگاز وپتروشیمی کشور از طریق همکاری با شرکت های برتر خارجی وانتقال هوشمندانه دانش فنی از سال ۱۳۸۱ فعالیت خود را شروع کرده است.

شرکت پیشگام در تولید محصول با کیفیت عالی که در انطباق با استانداردهای ملی وبین المللی باشد اصرار می ورزد و برای تولید یک محصول با کیفیت بر اساس مستندات تدوین شده، کلیه فرآیندهای تأمین، تولید وتست را تحت نظر واحد کنترل کیفیت انجام میدهد. واحد کنترل کیفیت با بهره گیری از ابزارهای لازم و دقیق که در اختیار دارد کلیه فرآیندهای تولید محصول را زیر نظر دارد واقدام به ثبت اطلاعات طبق رویه های شناسایی قطعات می نماید. بهره مندی از شهرت خوب در عرصه صنعت نفت وگاز وپتروشیمی به سبب التزام شرکت در بکارگیری استانداردهای کیفیت می باشد.

شرکت پیشگام با پیاده سازی نظام مدیریت کیفیت، کلیه فرآیندهای سازمانی و گردش اطلاعات خود را تدوین ودر تمام لایه های سازمان پیاده سازی کرده است. بهبود فرآیندها توسط همه واحدها امری ضروری

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Company Overview



Engineering Expertise

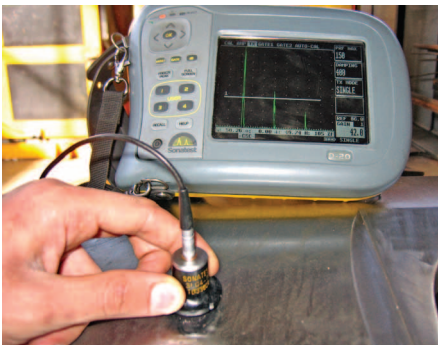
The PISHGAM's expertise in ball valve engineering covers most of the processes in oil, gas and petrochemical industries. Extensive experience gained over the past years from the design, development, and manufacture of custom-engineered solutions serves as the basis for mastering new challenges.

The wide range of products proven in practice can be customized in close cooperation with the customer to provide a commercially acceptable solution to meet the requirements of even the most complex applications.

Quality Assurance Programme

The PISHGAM is sincerely committed to supplying Quality Assured products throughout the petrochemical and process industries. The fine reputation and position in the industry enjoyed by this company is wholly attributed to a rigid adherence to all aspects of Quality Control and Assurance.

It is the intent of PISHGAM to provide our customers with products of genuine quality. These products will be manufactured in strict compliance with all Code requirements and standards of quality and all customer specifications which are accepted by PISHGAM as a part of the customer Purchase Order.



Effective Logistics

In order to remain a valve manufacturer even under the changing conditions The PISHGAM has built a logistics system to ensure that the company is able to react quickly, flexibly, and in line with demand on a long-term basis. This logistics system increases the availability of PISHGAM products.

The purchase of raw materials, semi-finished parts, and services for use in our product will be in accordance with Material Specifications. In addition, foresighted production of components and peripheral devices as well as the quick final assembly according to customer specifications take place on short routes under the watchful eye of an ISO 9001-2008 certified quality assurance system and API specification Q1.



Advanced Manufacturing

The PISHGAM is using a combination of technologies, processes and education to produce ball valves. The production system employs numerical control automatic and semi-automatic machines. Both using these machines and qualified technicians PISHGAM continuously strives to reach the excellent of the quality in its products both for the technical characteristics and the reliability in their use. The entire manufacturing process follows procedures as laid down in the Company Quality Assurance Manual.



Well- Equipped Testing

Production testing is necessary to ensure that the product being shipped to the customer will offer the rated performance and meet the requirements of various regulator codes.

The PISHGAM . conducts his own test and inspection of the assembled ball valve in the presence of the customer's inspector. The first step is a hydrostatic shell test of production ball valves. Valves are closed off and the ball placed in partially open position during the test. The second production qualification is a hydrostatic seat of production ball valves.

This gives a qualification of 1.1 times the pressure rating of body at 100°F.

The optional production qualification is a bi-directional 80 psi air test in which the valve is submerged in air and pressurized. This qualifies the seat and the stem seal, for zero bubble leaks. Fire testing of PISHGAM ball valve is according to the API 6FA.



Superior Service

The PISHGAM provides a superior product with superior service at competitive pricing. PISHGAM's sales force provides professional service to each customer and will discuss individual applications to provide the proper valve solution. After the sale, PISHGAM continues to add value for our customers. PISHGAM offers 24-hour emergency service as well as commissioning assistance to ensure valve integrity during installation and testing.



Applicable Standards

Ball valve standards are design to ensure interchangeability and reasonable functioning of the valve. The adaption of standards guarantees not only the performance of the product but also the continuity of supply, conformance to quality norms, and the incorporation of all product improvements.

PISHGAM ball valves conform to the latest edition of the following standard specifications as to face-to-face dimensions, pressure ratings, materials of construction, design dimensions for some valve components to ensure adequate strength and procedures for the testing of ball valves.

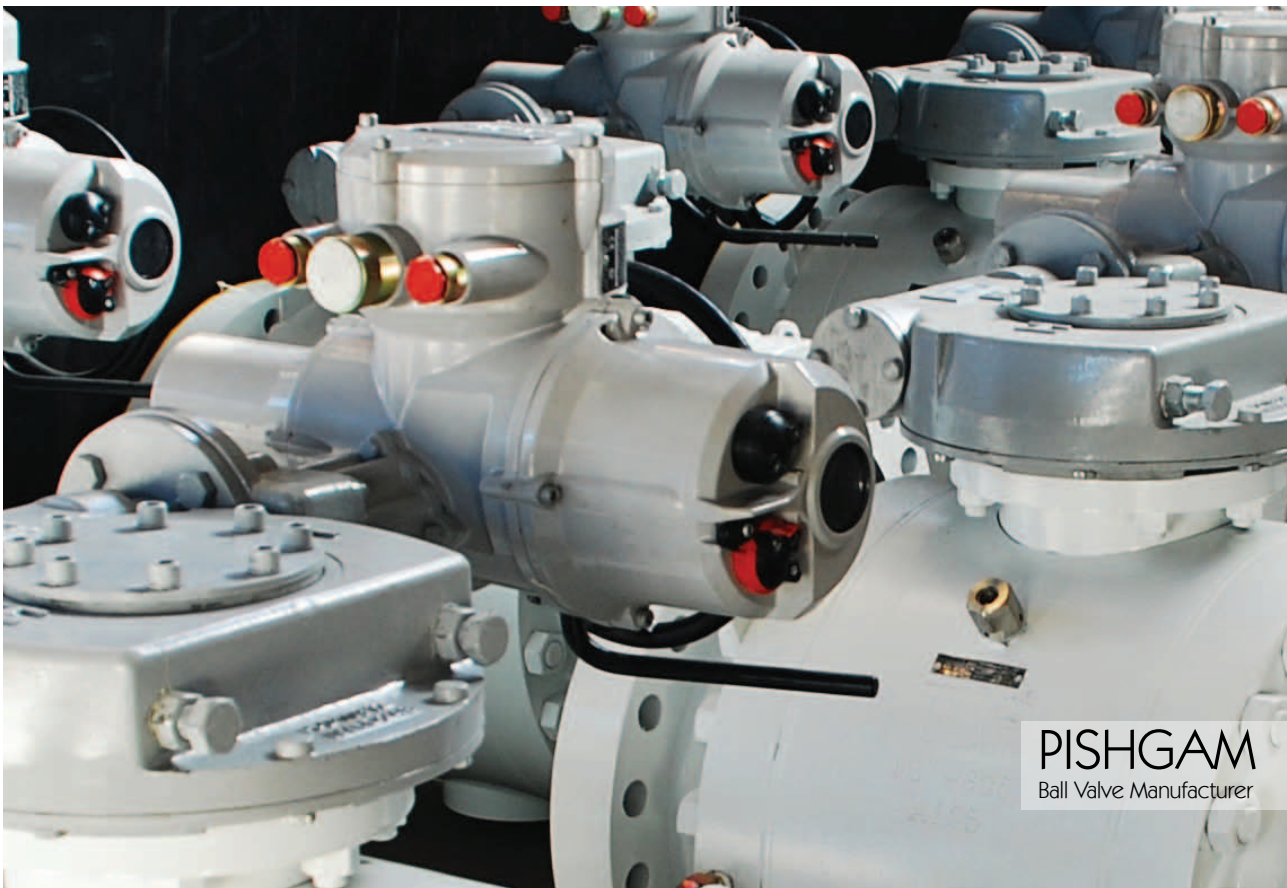


 American Petroleum Institute	API-6D	Specification for pipeline valve
	API-6FA	Fire test for valve
	API-598	Valve inspection and testing
	API-608	Metal ball valve – flanged, Threaded and welding end
 American Society of Mechanical Engineers	ASME- B 16.5	Pipe flanges and flanged fittings
	ASME- B 16.25	Butt welding ends
	ASME- B 16.10	Face-to-face and end-to-end dimension of valve
	ASME- B 16.34	Valve-flanged, threaded and welding end
	ASME- Section VIII, div.1	Rules for construction of pressure vessels
	ASME- Section VIII, div.2	Alternative rules for construction of pressure vessels
	ASME- Section V	Nondestructive Examination
 British Standards Institution	BSI-BS 4504	Circular flanges for pipes, valve and fittings
	BSI-BS 5146	Inspection and test of valves
	BSI-BS 5351	Specification for steel ball valves
	BSI-BS EN 558	Industrial valves
 Iranian Gas Standards	IGS-M-PL-010-1	Ball valves, class 150
	IGS-M-PL-010-2	Ball valves, class 300
	IGS-M-PL-010-3	Ball valves, class 600
	IGS-M-PL-007	Valve actuator, gas-over-oil type
	IGS-M-PL-009	Hand wheel Operated Gear Box For Ball , Plug and Butterfly Valves
 Manufacturers Standardization Society	MSS-SP-6	.Standard finishes for contact face of pipe flanges
	MSS-SP-55	Quality standard for steel casting for valves, flanges and fitting s and other .piping components
 National Association of Corrosion Engineers	NACE-MR 0175	Sulfide Stress Cracking Resistant Metallic Material for Oilfield Equipment
 International Organization for Standardization	ISO-14313	Petroleum and natural gas industries-pipeline transportation systems-pipeline valves
	ISO-5208	Industrial valves-pressure testing of valves
	ISO-5211	Industrial valves-part turn actuator attachment
	ISO-7121	Flanged steel ball valve

Product Range

Trunnion – Mounted Ball Valve

Size		ASME Class			End Connection			Bore		Operating Device		
NPS	DN	900	1500	2500	Flanged RF	Butt Welding	Flanged RTJ	Full	Reduced	Wrench	Gearbox	Actuator
2"	50	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	✓
3"	80	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4"	100	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
6"	150	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
8"	200	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
10"	250	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
12"	300	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	✓
14"	350	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓
16"	400	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓
18"	450	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓
20"	500	✓	✓	-	✓	✓	✓	✓	✓	-	✓	✓
22"	550	✓	-	-	✓	✓	✓	✓	✓	-	✓	✓
24"	600	✓	-	-	✓	✓	✓	✓	✓	-	✓	✓



PISHGAM
Ball Valve Manufacturer

Trunnion-Mounted Ball Valve

The PISHGAM "PBT-31H" Ball Valve is made of three forged parts of body and the bolted construction allows disassembly on the job site for repairs.

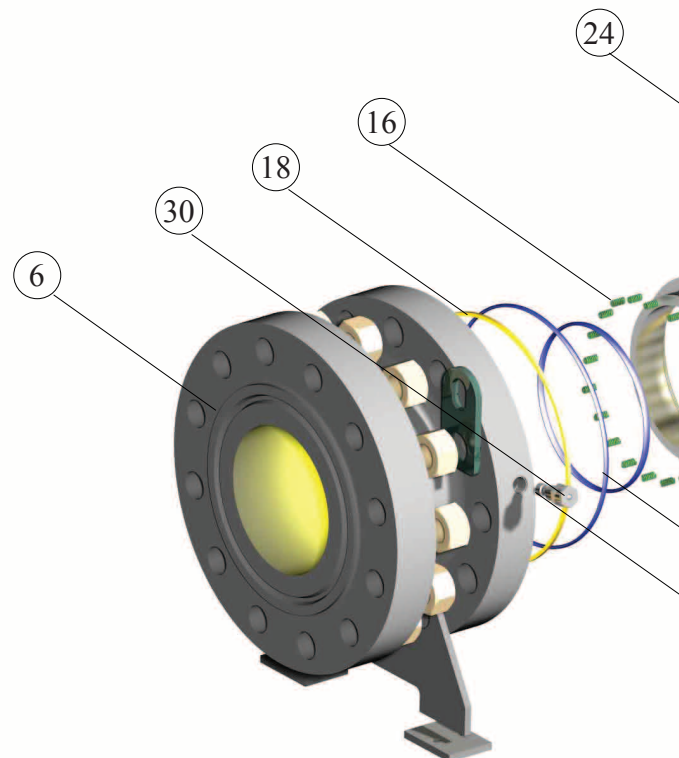
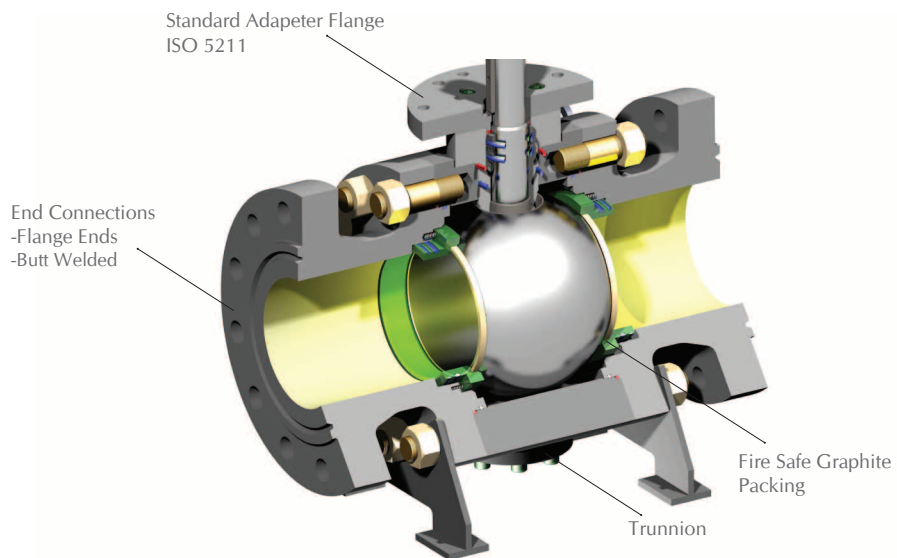
The body drain is located in the lowest part of the body cavity and consists of a NPT drain valve with safety plug.

Graphite rings are provided to guarantee full compliance with API 6FA Fire Safe Standards.

The stem of the "PBT- H" ball valves is of an anti-blow-out design. The pressure thrust on the stem is supported by a thrust washer in antifricition material. The stem function is to transmit torque and to absorb the line pressure thrust together with the Trunnion.

The block and bleed and double block and bleed (DBB) requirements are available as per API 6D definition.

NO.	Part Name
01	Body
02	Seat Holder
03	Stem
04	Gland Flange
05	Ball
06	Closure
07	Trunnion
08	Adaptor Flange
09	Retaining Ring
10	Seat Insert
11	Packing
12	Bush
13	Washer
14	Lifting Lug
15	Support Lug
16	Seat Spring
17	Antistatic Spring
18	Gasket
19	Adaptor Flange Screw
20	O-Ring
21	Parallel Pin
22	Parallel Key
23	Stem O-ring
24	Body Studs
25	Gland Flange Screw
26	Drain Plug
27	Body Nuts
28	Vent
29	Ball Sealant Injector
30	Check Valve



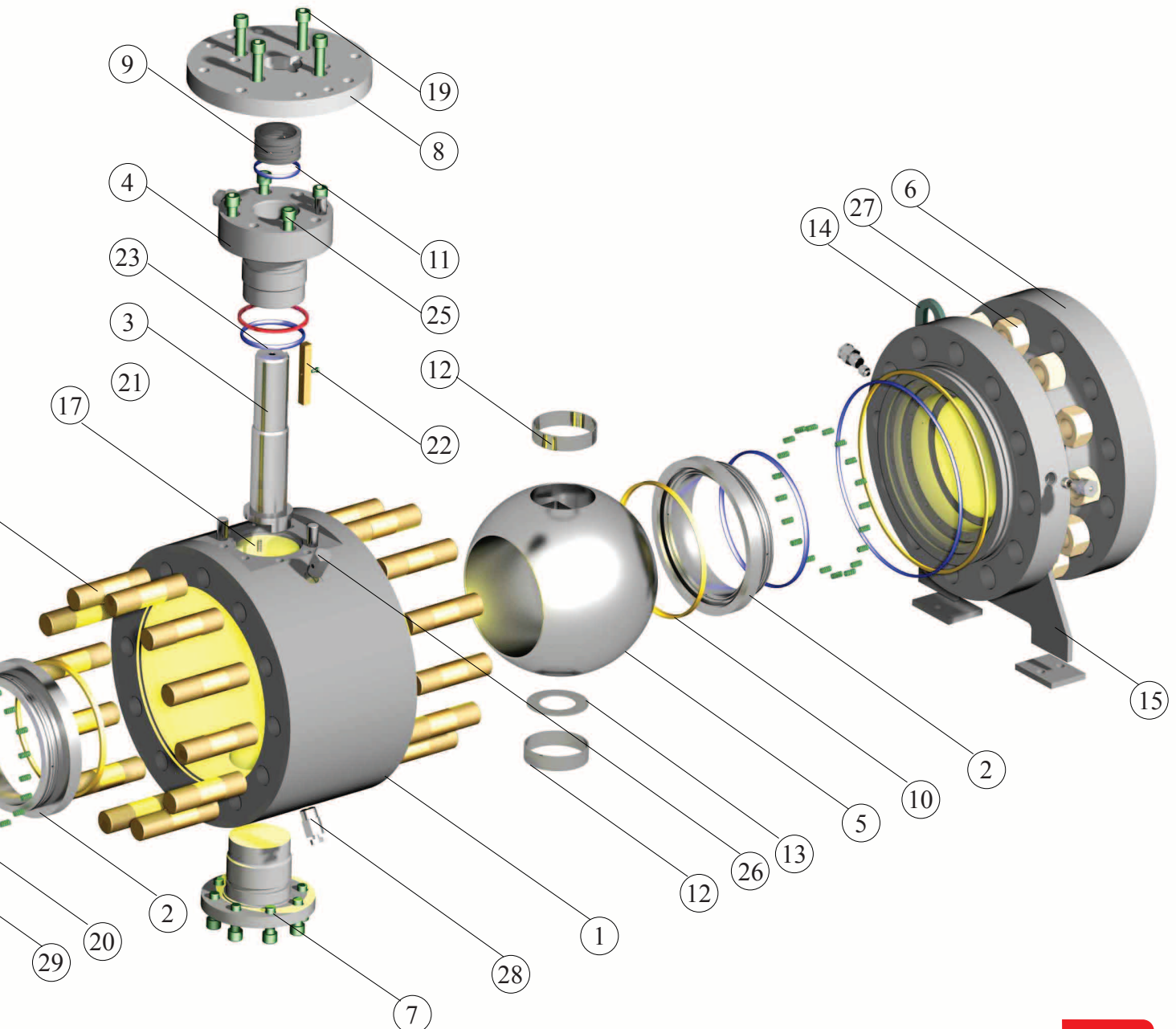
Type :PBT-31H

Accessories & Features

API 6D Desing and Construction	Standard
API approval	On Request
Fire Safe Design	On Request
Primary Metal Seat - Secondary Soft Seat	Standard
Metal to Metal Seat	On Request
Single Piston Seat Effect	Standard
Double Piston Seat Effect	On Request
Double Block & Bleed	On Request
Valve Ends RF,RTJ,BW ,etc.	On Request
Antistatic Design	Standard

Accessories & Features

Anti blow-Out Stem	Standard
Drain Plug	Standard
Vent System	Standard
Emergency Sealant Injection on Stem	On Request
Emergency Sealant Injection on Seats	On Request
Extended Stem for Underground Installation	On Request
NACE Compliance	On Request
Locking Device	On Request
Manual or Motorized	On Request
In-line Maintenance	N/A
On site Maintenance	Standard



Part Materials

The PISHGAM produce Trunnion ball valves using a full range of carbon, alloy and stainless steel materials.

All the materials are supplied by the best available steel mills, forged by well experienced forgeries with the most up to date equipment and can be certified in the chemical composition and the mechanical characteristic.

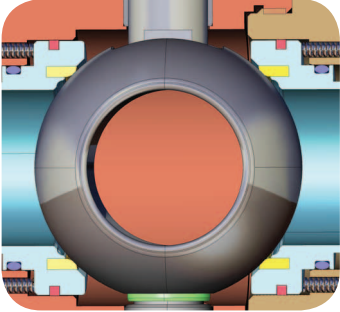
Parts	Carbon Steel	Low Temp. Steel	Sour Service NACE MR-01-75	Stainless Steel
Body and Closure	ASTM A105 ASTM A216 Gr-WCB	ASTM A350-LCB ASTM A350 Gr LF2	ASTM A105 ASTM A216-WCB ASTM A350 LF2	ASTM A182-F316 ASTM A351-CF8M
Ball	ASTM A105	ASTM A350 LF2 ASTM A182-F316	A564 Gr630 ASTM A350LF2 ASTM A105	ASTM A350-LF2
Seat Seals	PTFE RPTFE DEVLON VITON	PTFE RPTFE DEVLON VITON	PTFE RPTFE DEVLON VITON	PTFE RPTFE DEVLON VITON
Stem	ASTM A184-F304 ASTM A105 AISI 4140	ASTM A184-F304 ASTM A350 LF2-M ASTM A182 F316 AISI 4140	ASTM A350 LF2 ASTM A564 Gr630 ASTM A182-F6a	ASTM A184-F304 ASTM A184-F316
Body Nuts	ASTM A194-2H	ASTM A194 -7M	ASTM A194-2HM	ASTM A194-8
Stud Bolts	ASTM A193-B7	ASTM A320-17M	ASTM A193-B7M	ASTM A193-B8
Body Gasket	316SS+ Graphite	316SS+ Graphite	316SS+ Graphite	316SS+Graphite
Packing	PTFE Graphite	PTFE Graphite	PTFE Graphite	PTFE Graphite

NACE Construction Valves for Sour Gas Applications

NACE, the National Association of Corrosion Engineers, has published a report outlining acceptable materials for valves for sour service. The current outline is Publication MR0175-2009, and is a guide to the manufacturers and users of valves based on the latest metallurgical knowledge. The basic problem is that whenever even a small amount of hydrogen sulfide (H₂S) is encountered in natural gas or under oil pressure, a corrosion phenomenon may occur, known as hydrogen sulfide embrittlement or sulfide stress cracking. Actually, the steel part is absorbing hydrogen. This causes ductility, and when other stresses are added, may result in failure of the part.

The PISHGAM Ball Valves can be supplied in conformance to standards enumerated in the NACE governing documentation sour gas application. In some cases, a more sophisticated construction may be required because of other corrosive elements in the flow stream. All major components are heat-treated to a controlled hardness of 22 or lower on the Rockwell C scale.

Principal Features

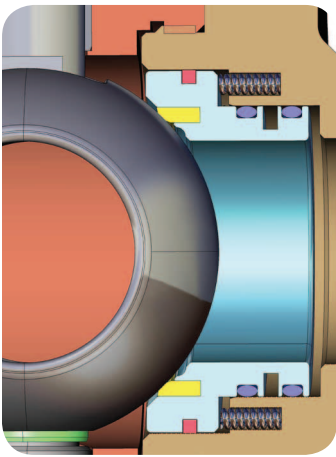


1) Double Block and Bleed (DBB)

The ball and the seats meet the requirements for DBB design, which means that the ball valve has two seats (double block) – an upstream seat and a downstream seat.

The inner space between the ball and the body cavity can be vented (bled) by means of a venting valve (or plug).

In this way it is possible to check the closure tightness in CLOSED position or in OPEN position.



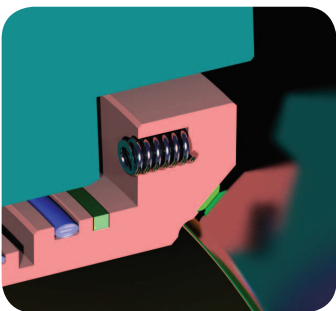
2) Seat Design

bubble-tight sealing

In PISHGAM Floating Ball Valves bubble-tight sealing is achieved by the use of two rigid seats firmly secured in the valve body on either side of the ball. Media flow is cut off on the downstream side by upstream pressure pushing against the ball.

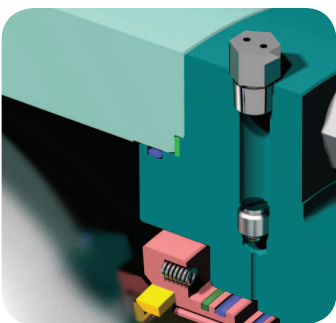
Seat design (PMSS)

Two independent floating seat rings ensure the required bidirectional tightness of the valve. The seat rings are spring loaded to achieve the required tightness even at very low pressure. On soft seated ball valves a resilient seat seal is inserted into the seat ring to provide a secondary soft seating in addition to the primary metal to metal seating between the ball and the seat. The sealing between the seat and the closures is achieved by the means of O-rings and graphite gaskets.



3) Metal To Metal Seated Valves

The PISHGAM Trunnion Mounted Ball Valves designed for abrasive service, feature a metal to metal sealing between the ball and the seat rings. The sealing between the seat and the closure is achieved by means of O-rings, graphite gaskets, lip seals or bellows seals depending on the service conditions. The ball and the seat rings are hard-faced using different coating mediums such as Electro-less Nickel, Chrome Carbide, Tungsten Carbide and Stellite depending on fluid to be handled

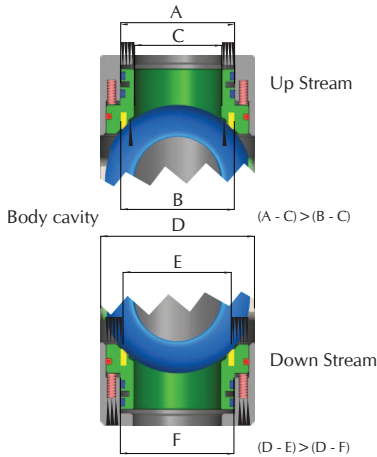


4) Emergency Sealant Injection - Seat

The design and the built-in quality of PISHGAAM Trunnion Mounted Ball Valves do not require the use of sealant injection to grant the perfect tightness and therefore the provision for emergency grease injection in the seat sealing area is considered as an option available for sizes 2" up to 4" on customer requests and a standard feature for other trunnion mounted valves.

These systems are made available for the sole purpose of providing a temporary seal to a damaged area.

Principal Features



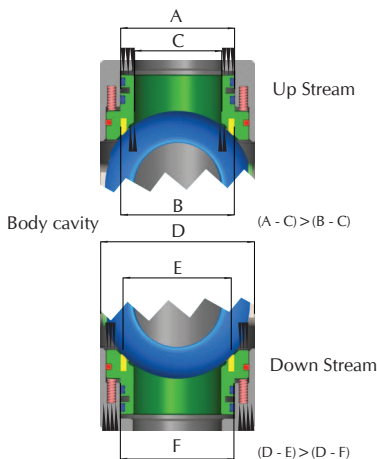
5) Single Piston Effect

In the standard design of PISHGAM Trunnion Mounted Ball Valves, each seat ring performs the "SINGLE PISTON" action.

In this case the pressure acting on the external side of the seat ring results in a force pushing the same against the ball while the pressure acting on the internal side of the seat rings results in a force pushing the same away from the ball.

Therefore, while both seat rings grant the required tightness when the pressure is applied on their external side, they are "SELF RELIEVING".

This allows any over pressure acting in the body cavity to be discharged in the line as soon as the force caused by the pressure overcomes the one provided by the springs.

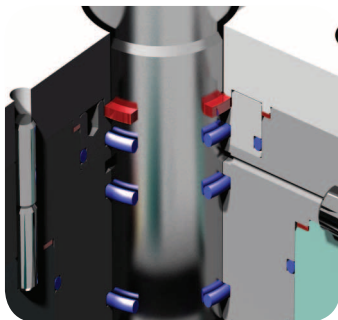


6) Double Piston Effect

On request, the seat rings design may be modified to perform the "DOUBLE PISTON EFFECT" action.

In this case the pressure acting on both the external and internal side of the seat rings, results in a force pushing the same against the ball.

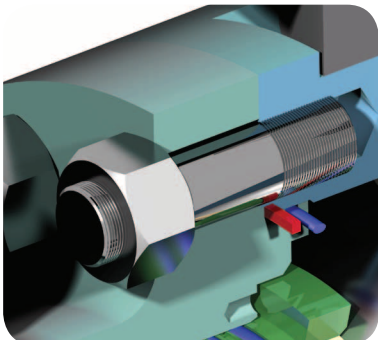
Therefore, each seat ring grants the required tightness even if the pressure is applied in the body cavity. This feature adds an extra sealing feature to the valve, but to release the possible over pressure developed into the body cavity it may be necessary to use an external safety relief valve.



7) Replace Stem Seal

The stem seal is achieved by the use of two O-rings and a graphite gasket retained by the gland plate. Valve sizes 4" and larger have a provision for an emergency sealant injection facility between the upper O-ring and the graphite gasket. The graphite gasket can be replaced with the valve in line and the ball in any position by removing the gland plate, after having released through the grease injection fitting hole, the possible pressure existing in the space between the upper O-ring and the graphite gasket.

The stem seals can be replaced with the valve in line, providing that the ball is in the fully closed or fully open position and the pressure in the body cavity has been completely released.



8) Body Seal

Perfect sealing and fire safe features are granted by the double sealing action of O-rings and graphite gaskets or spiral-wound gasket in all the static joints of the body components.

Principal Features

9) Fire Safe Design



Due to PISHGAM Ball Valve basic design such as quarter-turn, shut-off-operation and pressure supported sealing system ball valves guarantee the best technical prerequisites for fire safe application. At trunnion mounted ball valves internal sealing is affected at the upstream position. Under pressure the seat ring will be pressed against the fixed ball. To ensure safe external sealing at stem and body valves are additionally fitted with heat resistant elastic graphite seals.

At floating ball valve full metal to metal contact is attained at all sealing areas after the primary soft seals have been destroyed during a fire.

The PISHGAM ball valves have been designed to comply with the fire safety standard of API 6FA, fire safe qualifications tests witnessed by independent inspection authorities covering all the production range.

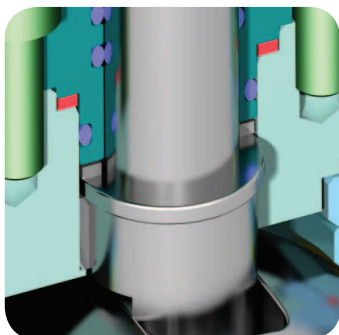
10) Anti-Static Design



If the fluid handled by the valve is flammable, the valve must be provided with an antistatic device which achieves electrical continuity between the ball, stem and the valve body.

A coil spring thrusts a little sphere, providing earthed continuity between stem and other metallic components of valve (ball and body) in order to avoid sparks during tuning of the stem for opening and closing the valve and prevent problems in case of use with flammable fluids and gas.

11) Anti blow-out Stem

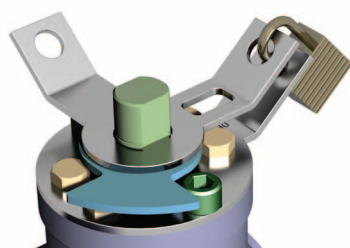


This design ensures the valve stem cannot be blown out of the body in the event of the gland being removed while the valve is under pressure.

To prevent stem blow-out from body, the stem has a shoulder in the lower part and so constructs that it may not blow out upwards.

This design offers safety features superior to those of top-entry stem designs where the line pressure works to break the stem seating.

12) Locking Device



A simple range of locking and interlocking devices is available for most wrench operated flanged valves. They enable the wrench to be locked in either the OPEN or SHUT position or, if desired, in both positions.

Specify which is required when ordering.

Locking devices to prevent unauthorized operation of a valve can be fitted to most PISHGAM ball valves on customer requests. similar provisions can be made for gear operated valves.

Accessories

Extended Stem Arrangement

The PISHGAM Ball Valves can be supplied with stem extension arrangement, which finds application in buried services or where the valve operation is operated at a considerable depth/height. The height of the extension from the valve center-line or from the valve cover flange top should be specified by the customer. Where applicable, vent/drain connections and sealant connections are brought up close to the operator through suitable pipes for ease of access.

Operating Devices

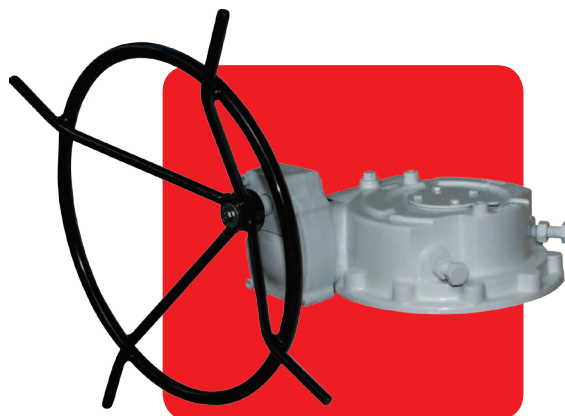
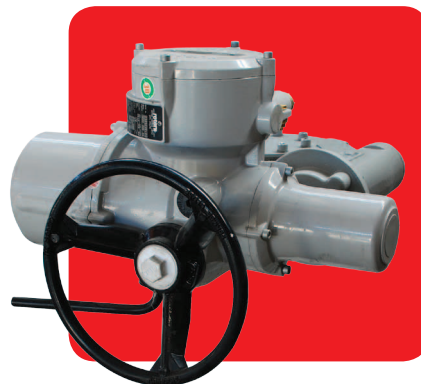
The PISHGAM Ball Valves can be provided with any of the following operating devices:

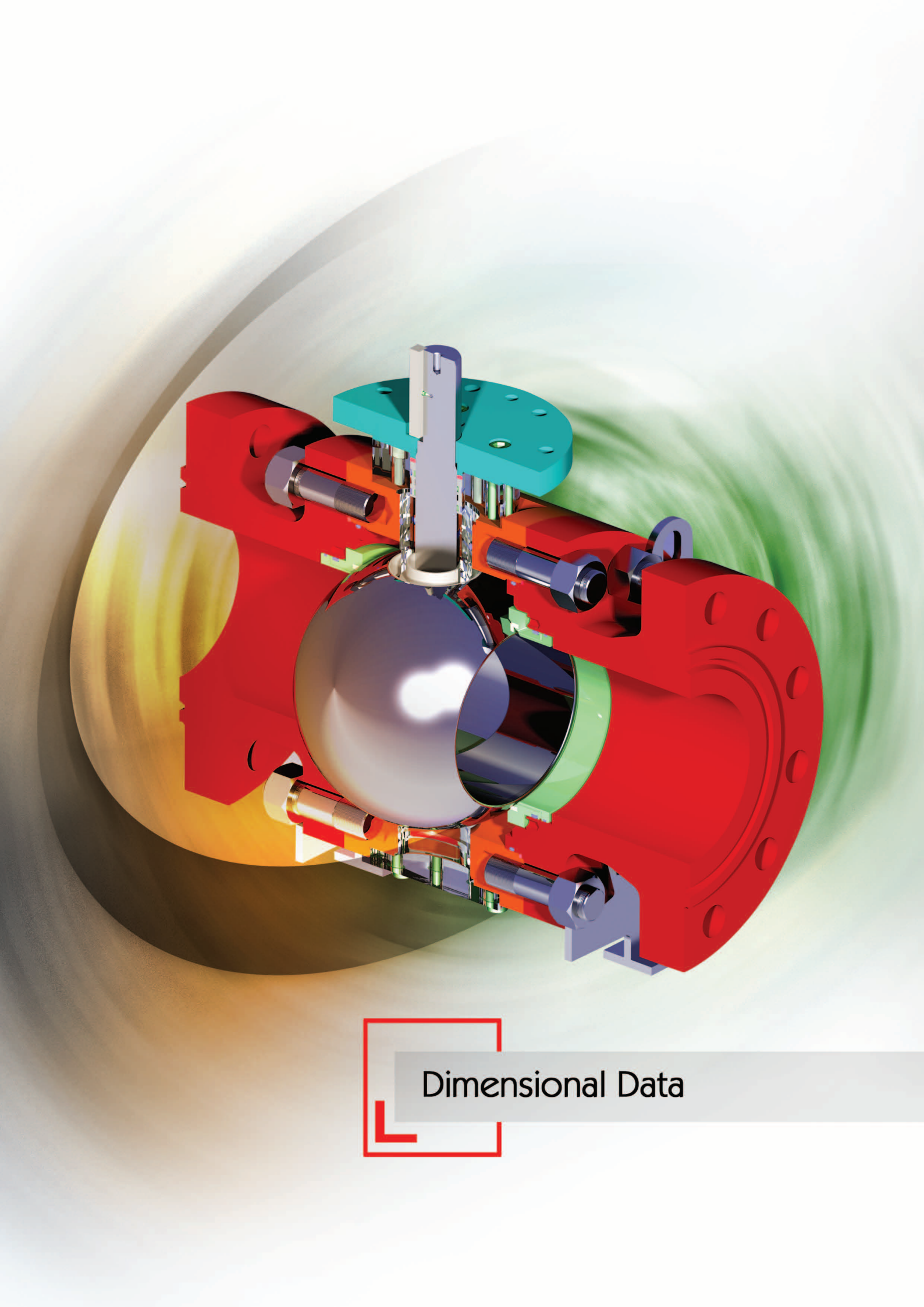
Wrench/gear operated for manual operation, electrical actuators, gas/pneumatic actuators and gas-over-oil actuators.

FAT (Factory Acceptance Test) is conducted on these valves with actuators at PISHGAM's facility. Of these actuators, the gas-over-oil variant finds applications mostly in cross-country pipelines where compressed air supply is unavailable. This actuator functions by using the gas from the pipeline. The PISHGAM has gained in-depth experience in supplying actuated valves for several projects, particularly for Shut-Down Valves (SDVs) and Emergency Shut-Down Valves (ESDV).

Pup piece / Transition Pipe

Butt-weld end valves can be welded with pup pieces for ease of valve installation at site. This results in minimal heat transfer to the valve internals while welding it to the pipeline.

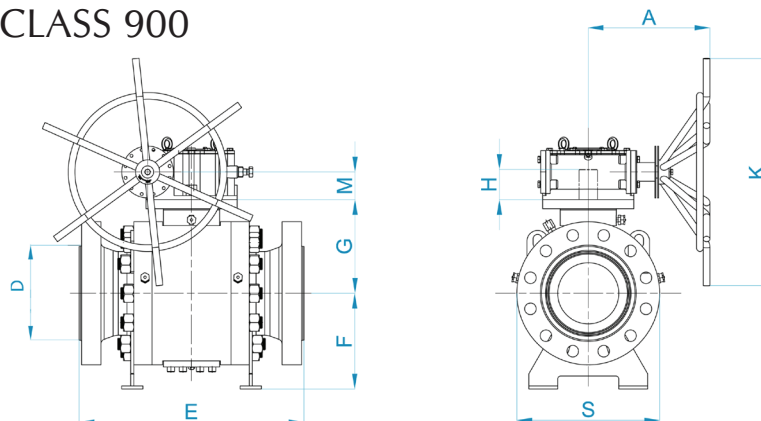




Dimensional Data

Dimensional Data

ASME CLASS 900



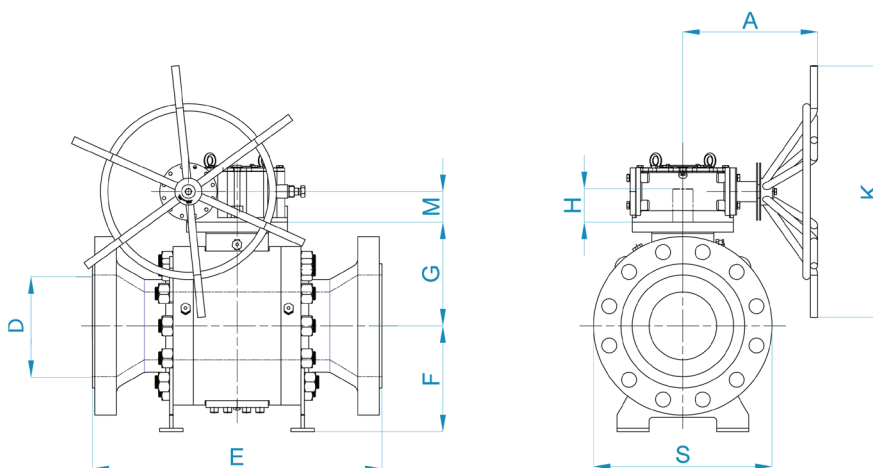
FULL BORE

SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
1 1/2	1 1/2	12	12	12	4	4 1/2	5 1/8	7/8	13 1/2	-	-	-	44	68
(40)	(38)	(305)	(305)	(305)	(102)	(114)	(130)	(22)	(343)	-	-	-	(20)	(31)
2	2	14 1/2	14 1/2	14 5/8	4 1/2	4 7/8	6 3/8	7/8	22	-	-	-	77	130
(50)	(51)	(368)	(368)	(372)	(114)	(124)	(162)	(22)	(559)	-	-	-	(35)	(59)
3	3	15	15	15 1/8	5 5/8	6 1/8	8 3/8	1 1/8	35 7/8	-	-	-	157	187
(80)	(76)	(381)	(143)	(359)	(143)	(156)	(213)	(28)	(911)	-	-	-	(71)	(85)
4	4	18	18	18 1/8	6 7/8	7 1/2	11 1/2	2 1/8	-	10 7/8	23 5/8	1 3/4	353	390
(100)	(102)	(457)	(457)	(460)	(175)	(191)	(292)	(54)	-	(276)	(600)	(44)	(160)	(177)
6	6	24	24	24 1/8	9 7/8	9 1/2	13 1/4	3 3/4	-	11 1/2	13 3/4	3	720	850
(150)	(152)	(610)	(610)	(613)	(251)	(241)	(337)	(95)	-	(292)	(349)	(76)	(327)	(386)
8	8	29	29	29 1/8	11 3/8	10 7/8	16 1/2	3 3/4	-	11 1/2	13 3/4	3	1190	1410
(200)	(203)	(737)	(737)	(740)	(289)	(276)	(419)	(95)	-	(292)	(349)	(76)	(540)	(640)
10	10	33	33	33 1/8	13 5/8	12 1/2	20 1/8	4 1/2	-	11 1/2	13 3/4	3	1760	2110
(250)	(254)	(838)	(838)	(841)	(346)	(318)	(511)	(114)	-	(292)	(349)	(76)	(798)	(957)
12	12	38	38	38 1/8	15 3/8	14 3/8	23 5/8	4 1/2	-	11 1/2	13 3/4	3	2440	2930
(300)	(305)	(965)	(965)	(968)	(391)	(365)	(600)	(114)	-	(292)	(349)	(67)	(1107)	(1329)
14	12 3/4	40 1/2	40 1/2	40 7/8	17 3/4	15 3/8	26 3/4	4 1/2	-	15 3/4	23 5/8	4 3/8	3020	3610
(350)	(324)	(1029)	(1029)	(1038)	(451)	(391)	(679)	(114)	-	(400)	(600)	(111)	(1370)	(1637)
16	14 3/4	44 1/2	44 1/2	44 7/8	19 5/8	16 7/8	30 3/8	7 1/8	-	21 5/8	31 1/2	4 3/8	3630	4360
(400)	(375)	(1130)	(1130)	(1140)	(499)	(429)	(772)	(181)	-	(549)	(800)	(111)	(1647)	(1978)
18	16 3/4	48	48	48 1/2	21 5/8	19 1/8	33 1/2	7 1/8	-	21 5/8	31 1/2	5 3/8	5090	6100
(450)	(425)	(1219)	(1219)	(1232)	(549)	(486)	(851)	(181)	-	(549)	(800)	(137)	(2309)	(2767)
20	18 5/8	52	52	52 1/2	23 1/4	20 7/8	36 1/4	8 1/8	-	21 3/4	23 5/8	6 1/4	6870	8240
(500)	473	1321	1321	1334	(591)	(530)	(921)	(206)	-	(552)	(600)	(159)	(3116)	(3738)
22	20 5/8	(1)	(1)	(1)	25 3/4	21 7/8	40 1/2	8 1/8	-	22 7/8	23 5/8	6 1/4	8530	10220
(500)	(524)				(654)	(556)	(1029)	(206)	-	(581)	(600)	(159)	(3869)	(4636)
24	22 1/2	61	61	61 3/4	27 1/2	24 3/8	43 3/4	9 5/8	-	22 7/8	23 5/8	6 1/4	10220	12250
(600)	(572)	(1549)	(1549)	(1568)	(699)	(619)	(1111)	(245)	-	(581)	(600)	(159)	(4636)	(5557)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

Dimensional Data

ASME CLASS 900

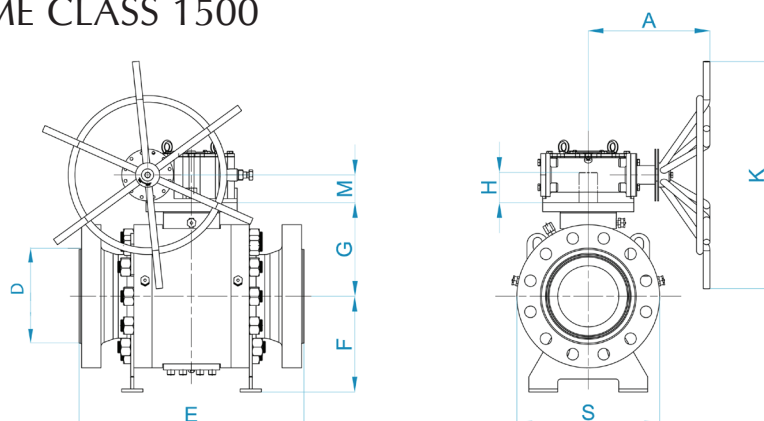


REDUCED BORE														
SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
2 x 1 1/2 x 2	1 1/2	14 1/2	14 1/2	14 5/8	4	4 1/2	5 1/8	7/8	13 1/2	-	-	-	49	95
(50 x 40 x 50)	(38)	(368)	(368)	(372)	(102)	(114)	(130)	(22)	(343)	-	-	-	(22)	(43)
3 x 2 x 3	2	15	15	15 1/8	4 1/2	4 7/8	6 3/8	7/8	22	-	-	-	108	143
(80 x 50 x 80)	(51)	(381)	(381)	(359)	(114)	(124)	(162)	(22)	(559)	-	-	-	(49)	(65)
4 x 3 x 4	3	18	18	18 1/8	5 5/8	6 1/8	8 3/8	1 1/8	35 7/8	-	-	-	159	240
(100 x 80 x 100)	(79)	(457)	(457)	(460)	(143)	(156)	(213)	(28)	(911)	-	-	-	(72)	(109)
6 x 4 x 6	4	24	24	24 1/8	6 7/8	7 1/2	10 1/4	2 1/8	-	10 7/8	23 5/8	1 3/4	357	489
(150 x 100 x 150)	(102)	(610)	(610)	(613)	(175)	(191)	(260)	(54)	-	(276)	(600)	(44)	(162)	(222)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

Dimensional Data

ASME CLASS 1500



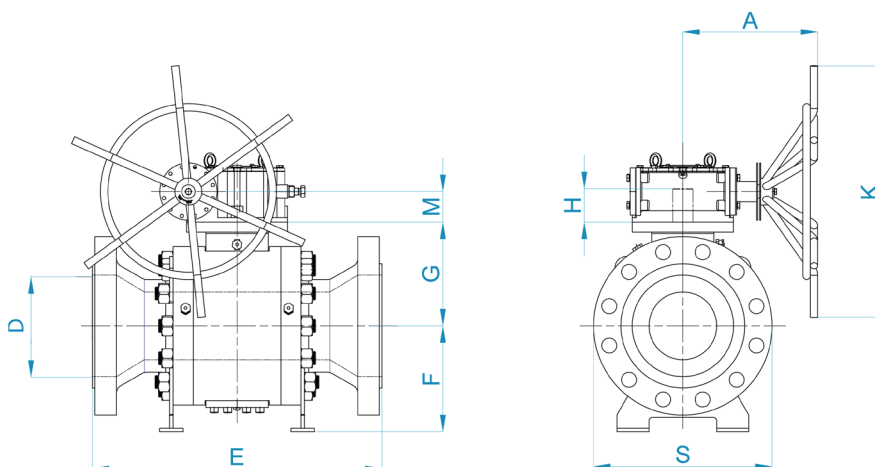
FULL BORE

SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
1 1/2	1 1/2	12	12	12	4	4 1/2	5 1/8	7/8	15 7/8	-	-	-	44	68
(40)	(38)	(305)	(305)	(305)	(102)	(114)	(130)	(22)	(430)	-	-	-	(20)	(31)
2	2	14 1/2	14 1/2	14 5/8	4 1/2	4 7/8	6 3/8	7/8	24 1/4	-	-	-	77	130
(50)	(51)	(368)	(368)	(372)	(114)	(124)	(162)	(22)	(616)	-	-	-	(35)	(59)
3	3	18 1/2	18 1/2	18 5/8	5 5/8	6 1/8	8 3/8	2 1/8	-	6 3/4	11 3/4	1 1/4	179	240
(80)	(76)	(470)	(470)	(473)	(143)	(156)	(213)	(54)	-	(171)	(298)	(32)	(81)	(109)
4	4	21 1/2	21 1/2	21 5/8	6 7/8	7 1/2	12 1/4	2 1/8	-	10 7/8	23 5/8	1 3/4	355	399
(100)	(102)	(546)	(546)	(549)	(175)	(191)	(311)	(54)	-	(276)	(600)	(44)	(161)	(181)
6	5 3/4	27 3/4	27 3/4	28	12 5/8	11	16 7/8	3 3/4	-	11 1/2	13 3/4	3	850	1010
(150)	(146)	(705)	(705)	(711)	(321)	(279)	(429)	(95)	-	(292)	(349)	(76)	(386)	(458)
8	7 5/8	32 3/4	32 3/4	33 1/8	14 5/8	12 7/8	21 1/8	4 1/2	-	11 1/2	13 3/4	3	1410	1670
(200)	(194)	(832)	(832)	(841)	(372)	(327)	(537)	(114)	-	(292)	(349)	(76)	(640)	(757)
10	9 1/2	39	39	39 3/8	17 3/8	15 3/8	25 3/4	4 1/2	-	11 1/2	13 3/4	3	2110	2530
(250)	(241)	(991)	(991)	(1000)	(441)	(391)	(654)	(114)	-	292	(349)	(76)	(957)	(1148)
12	11 3/8	44 1/2	44 1/2	45 1/8	19 5/8	16 5/8	30 1/4	4 1/2	-	11 1/2	13 3/4	3	2930	3500
(300)	(289)	(1130)	(1130)	(1146)	(499)	(422)	(768)	(114)	-	(292)	(349)	(67)	(1329)	(1610)
14	12 1/2	49 1/2	49 1/2	50 1/4	22 5/8	19 5/8	34 1/4	7 1/8	-	15 3/4	23 5/8	4 3/8	3610	4320
(350)	(318)	(1257)	(1257)	(1276)	(575)	(499)	(870)	(181)	-	(400)	(600)	(111)	(1637)	(1960)
16	14 1/4	54 1/2	54 1/2	55 3/8	25 1/4	22	38 3/4	7 1/8	-	21 5/8	31 1/2	4 3/8	4360	5220
(400)	(362)	(1384)	(1384)	(1407)	(641)	(559)	(984)	(181)	-	(549)	(800)	(111)	(1978)	(2368)
18	16 1/4	(1)	(1)	(1)	27 3/4	23 1/4	42 7/8	8 1/8	-	21 5/8	31 1/2	4 3/8	6100	7310
(450)	(413)				(705)	(591)	(1089)	(206)		(549)	(800)	(111)	(2767)	(3316)
20	18	(1)	(1)	(1)	29 7/8	28 1/2	46 3/8	9 5/8		21 3/4	23 5/8	5 3/8	8240	9870
(500)	(457)				(759)	(724)	(1178)	(245)		(552)	(600)	(137)	(3738)	(4477)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

Dimensional Data

ASME CLASS 1500



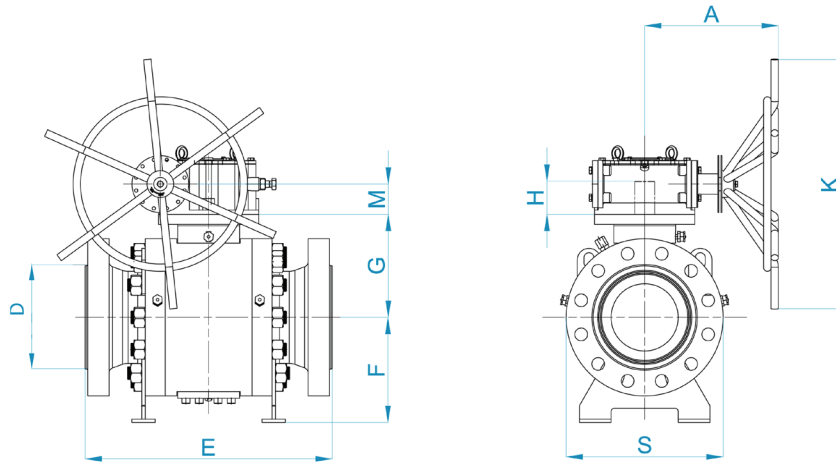
REDUCED BORE

SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
2 x 1 1/2 x 2	1 1/2	14 1/2	14 1/2	14 5/8	4	4 1/2	5 1/8	7/8	15 7/8	-	-	-	49	95
(50 x 40 x 50)	(38)	(368)	(368)	(379)	(102)	(114)	(130)	(22)	(403)	-	-	-	(22)	(43)
3 x 2 x 3	2	18 1/2	18 1/2	18 5/8	4 1/2	4 7/8	6 3/8	7/8	24 1/4	-	-	-	108	165
(80 x 50 x 80)	(51)	(470)	(470)	(473)	(114)	(124)	(162)	(22)	(616)	-	-	-	(49)	(76)
4 x 3 x 4	3	21 1/2	21 1/2	21 5/8	5 5/8	6 1/8	8 3/8	2 1/8	-	6 3/4	11 3/4	1 1/4	185	311
(100 x 80 x 100)	(76)	(546)	(546)	(549)	(143)	(156)	(213)	(54)	-	(171)	(298)	(32)	(84)	(141)
6 x 4 x 6	4	27 3/4	27 3/4	28	6 7/8	7 1/2	10 1/4	2 1/8	-	10 7/8	23 5/8	1 3/4	366	628
(150 x 100 x 150)	(102)	(705)	(705)	(711)	(175)	(191)	(260)	(54)	-	(276)	(600)	(44)	(166)	(285)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

Dimensional Data

ASME CLASS 2500



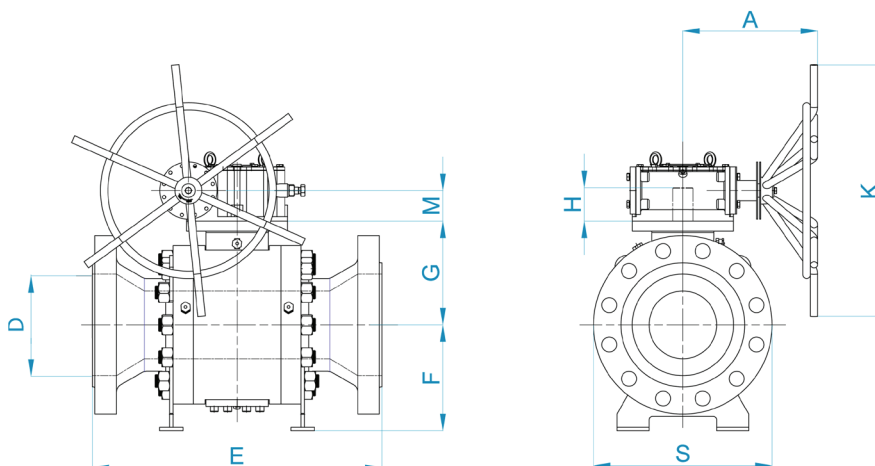
FULL BORE

SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
1 1/2	1 1/4	15 1/8	15 1/8	15 1/4	3 7/8	5 1/2	6 7/8	2 3/8	-	7 1/2	7 7/8	1 3/4	80	130
(40)	(32)	(384)	(384)	(387)	(98)	(140)	(175)	(60)	-	(191)	(200)	(44)	(36)	(59)
2	1 3/4	17 3/4	17 3/4	17 7/8	4 3/8	6 1/4	7 7/8	2 3/8	-	7 1/2	7 7/8	1 3/4	150	260
(50)	(44)	(451)	(451)	(454)	(111)	(159)	(200)	(60)	-	(191)	(200)	(44)	(68)	(118)
3	2 1/2	22 3/4	22 3/4	23	5 1/2	7 1/8	9 7/8	2 1/2	-	8 3/4	13 3/4	2 5/8	350	480
(80)	(64)	(578)	(578)	(584)	(140)	(181)	(251)	(64)	-	(222)	(349)	(67)	(159)	(218)
4	3 1/2	26 1/2	26 1/2	26 7/8	9 7/8	7 7/8	14 5/8	3	-	11 1/2	13 3/4	3	700	790
(100)	(89)	(673)	(673)	(683)	(251)	(200)	(372)	(76)	-	(292)	(349)	(76)	(318)	(358)
6	5 1/4	36	36	36 1/2	11 3/8	9 1/4	16 7/8	4 5/8	-	11 1/2	13 3/4	3	1480	1650
(150)	(133)	(914)	(914)	(927)	(289)	(235)	(429)	(118)	-	(292)	(349)	(76)	(671)	(748)
8	7 1/8	40 1/4	40 1/4	40 7/8	15 1/8	15 1/2	26	4 5/8	-	15 3/4	23 5/8	4 3/8	3650	4340
(200)	(181)	(1022)	(1022)	(1038)	(384)	(394)	(660)	(118)	-	(400)	(600)	(111)	(1656)	(1969)
10	8 7/8	50	50	50 7/8	17 1/8	18 1/4	31 1/8	5 1/2	-	21 5/8	31 1/2	4 3/8	5480	6590
(250)	(226)	(1270)	(1270)	(1292)	(435)	(464)	(790)	(140)	-	(549)	(800)	(111)	(2486)	(2989)
12	10 1/2	56	56	56 7/8	19 5/8	20 1/2	34 1/4	5 1/2	-	21 5/8	31 1/2	4 3/8	7600	9100
(300)	(267)	(1422)	(1422)	(1445)	(499)	(521)	(870)	(140)	-	(549)	(800)	(111)	(3447)	(4128)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

Dimensional Data

ASME CLASS 2500

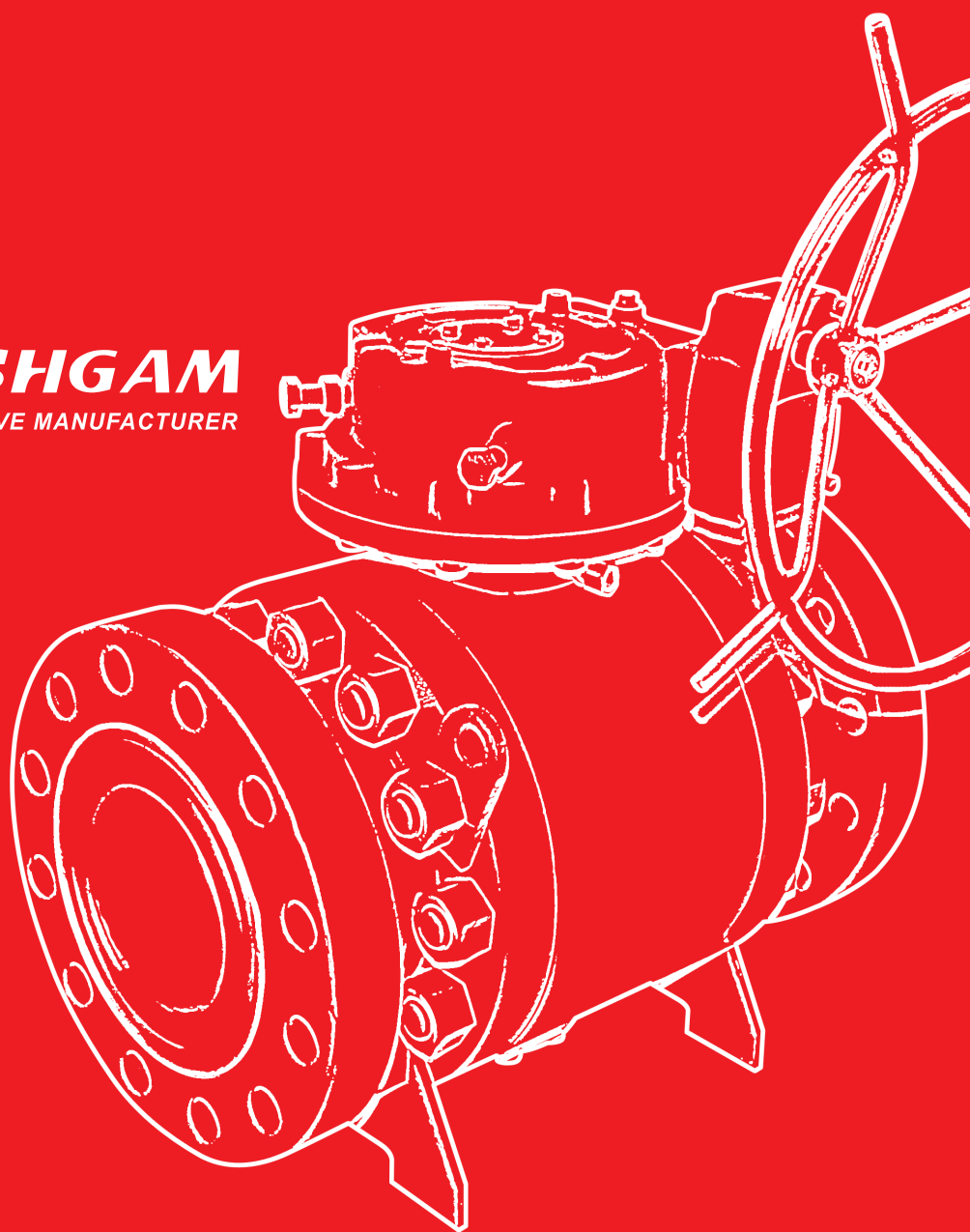


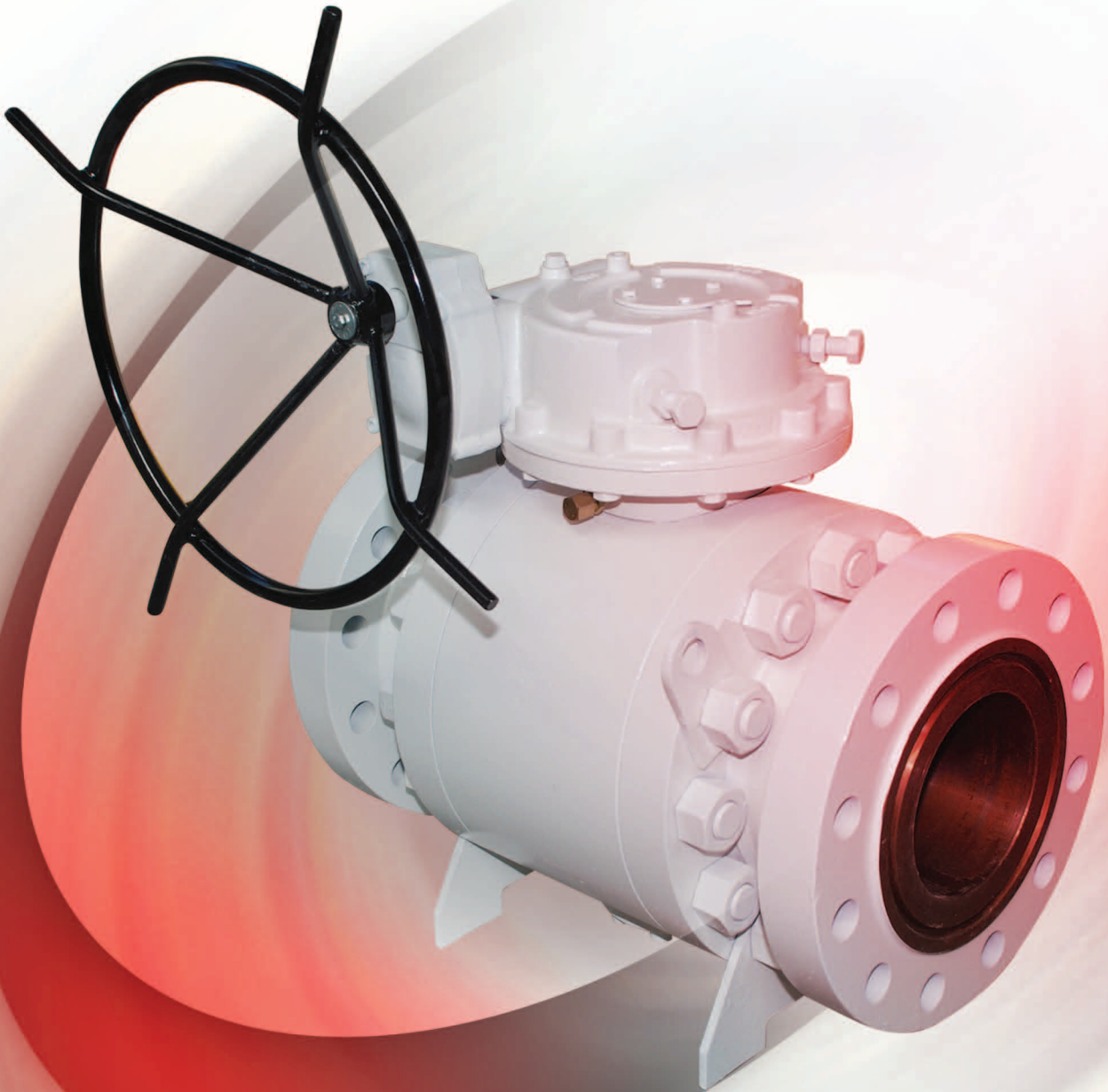
REDUCED BORE

SIZE in.	D	E			F	G	S	H	L	A	K	M	WEIGHT lb. (kg)	
(mm)		WE	RF	RTJ									WE	RF/RTJ
2 x 1 1/2 x 2	1 1/4	17 3/4	17 3/4	17 7/8	3 7/8	5 1/2	6 7/8	2 3/8	-	7 1/2	7 7/8	1 3/4	90	1 80
(50 x 40 x 50)	(32)	(451)	(451)	(454)	(98)	(140)	(175)	(60)	-	(191)	(200)	(44)	(41)	(82)
3 x 2 x 3	1 3/4	22 3/4	22 3/4	23	4 3/8	6 1/4	7 7/8	2 3/8	-	7 1/2	7 7/8	1 3/4	210	330
(80 x 50 x 80)	(44)	(578)	(578)	(584)	(111)	(159)	(200)	(60)	-	(191)	(200)	(44)	(95)	(150)
4 x 3 x 4	2 1/2	26 1/2	26 1/2	26 7/8	5 1/2	7 1/8	9 7/8	2 1/2	-	8 3/4	13 3/4	2 5/8	370	620
(100 x 80 x 100)	(64)	(673)	(673)	(683)	(140)	(181)	(251)	(64)	-	(222)	(349)	(67)	(168)	(281)
6 x 4 x 6	3 1/2	36	36	36 1/2	9 7/8	7 7/8	14 5/8	3	-	11 1/2	13 3/4	3	730	1250
(150 x 100 x 150)	(89)	(914)	(914)	(927)	(251)	(200)	(372)	(76)	-	(292)	(349)	(76)	(331)	(567)
8 x 6 x 8	5 1/4	40 1/4	40 1/4	40 7/8	11 3/8	9 1/4	16 7/8	4 5/8	-	11 1/2	13 3/4	3	1890	2180
(200 x 150 x 200)	(133)	(1022)	(1022)	(1038)	(289)	(235)	(429)	(118)	-	(292)	(349)	(76)	(857)	(989)

Note : - The information provided in the table does not bring any compulsion for the manufacturer

 **PISHGAM**
BALL VALVE MANUFACTURER

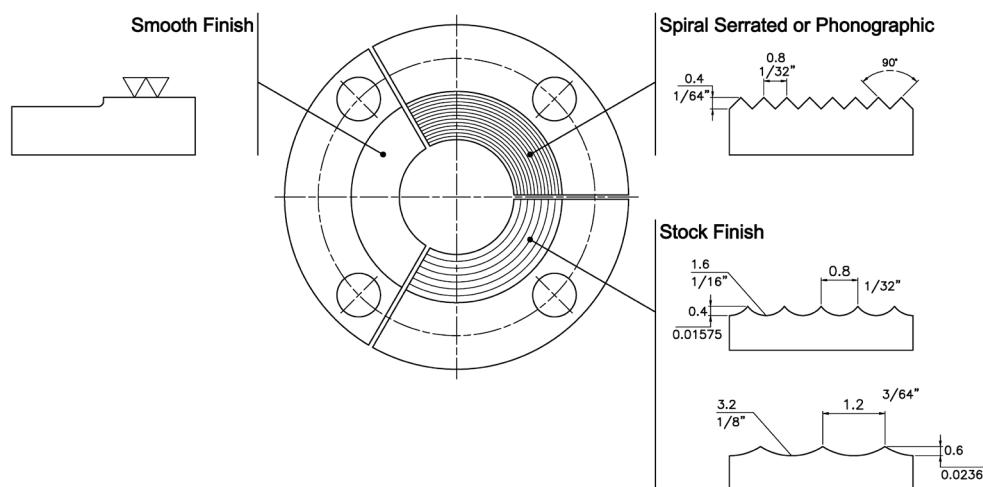




Engineering Data

Engineering Data

1 Standard Flange Finish [MSS SP-6]



2 Calculation of Flow

The flow Coefficient of a valve is the flow rate of water (gallons/minute) through a fully open valve, with a pressure drop of 1 psi across the valve. to find the flow of liquid through the valve from the Cv use the followong formulas;

Liquid Flow

QL = Flow rate of liquid (gal./min.)

ΔP = Differential pressure across the valve (psi)

G = Specific gravity of liquid (for water, G = 1)

$$Q_L = C_v \sqrt{\frac{\Delta P}{G}}$$

Gas Flow

Qg = Flow rate of gas (CFH at STP)

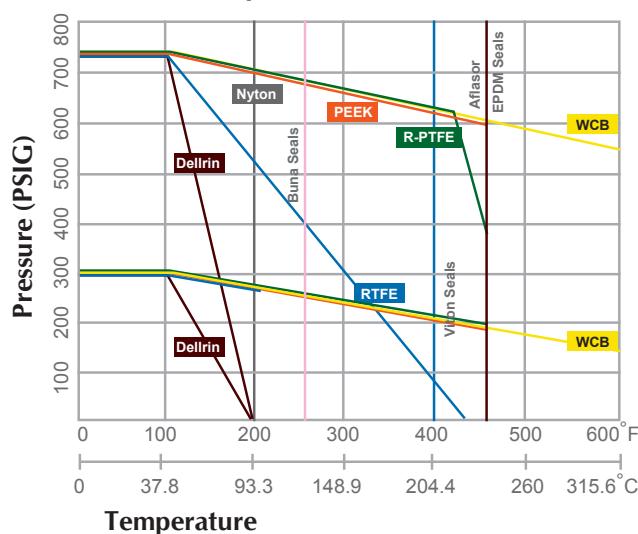
P2 = Outlet pressure (psia)

g = Specific gravity of gas (for air, g = 1.000)

$$Q_g = 61 C_v \sqrt{\frac{P_2 \Delta P}{g}}$$

3 Pressures-Temperatures

Pressure-temperature Chart



4 Face-to-face and end-to-end dimensions

API Specification 6D-2008																			
DN	NPS	PN 20 (Class 150)						PN 50 (Class 300)						PN64 (Class400)			PN100 (Class 600)		
		Full-bore and reduced-bore			Short-pattern, full-bore and reduced-bore			Full-bore and reduced-bore			Short-pattern, full-bore and reduced-bore			Full-bore and reduced-bore			Full-bore and reduced-bore		
		Raised face A	Welding end B	Ring Joint C	Raised face A	Welding end B	Ring Joint C	Raised face A	Welding end B	Ring Joint C	Raised face A	Welding end B	Ring Joint C	Raised face A	Welding end B	Ring Joint C	Raised face A	Welding end B	Ring Joint C
50	2	178	216	191	-	-	-	216	216	232	-	-	-	-	-	-	292	292	295
65	2 1/2	191	241	203	-	-	-	241	241	257	-	-	-	-	-	-	330	330	333
80	3	203	283	216	-	-	-	283	283	298	-	-	-	-	-	-	356	356	359
100	4	229	305	241	-	-	-	305	305	321	-	-	-	406	406	410	432	432	435
150	6	394	457	406	267	403	279	457	457	419	-	-	-	495	495	498	559	559	562
200	8	457	521	470	292	419	305	502	521	518	419	419	435	597	597	600	660	660	664
250	10	533	559	546	330	457	343	568	559	584	457	457	473	673	673	676	787	787	791
300	12	610	635	622	356	502	368	648	635	664	502	502	518	762	762	765	838	838	841
350	14	686	762	699	-	-	-	762	762	778	-	-	-	826	826	829	889	889	892
400	16	762	838	775	-	-	-	838	838	854	-	-	-	902	902	905	991	991	994
450	18	864	914	876	-	-	-	914	914	930	-	-	-	978	978	981	1092	1092	1095
500	20	914	991	927	-	-	-	991	991	1010	-	-	-	1054	1054	1060	1194	1194	1200
550	22	-	-	-	-	-	-	1092	1092	1114	-	-	-	1143	1143	1153	1295	1295	1305
600	24	1067	1143	1080	-	-	-	1143	1143	1165	-	-	-	1232	1232	1241	1397	1397	1407
650	26	1143	1245	-	-	-	-	1245	1245	1270	-	-	-	1308	1308	1321	1448	1448	1461
700	28	1245	1346	-	-	-	-	1346	1346	1372	-	-	-	1397	1397	1410	1549	1549	1562
750	30	1295	1397	-	-	-	-	1397	1397	1422	-	-	-	1524	1524	1537	1651	1651	1664
800	32	1372	1524	-	-	-	-	1524	1524	1553	-	-	-	1651	1651	1667	1778	1778	1794
850	34	1473	1626	-	-	-	-	1626	1626	1654	-	-	-	1778	1778	1794	1930	1930	1946
900	36	1524	1727	-	-	-	-	1727	1727	1756	-	-	-	1880	1880	1895	2083	2083	2099

Note: Dimensions In Millimeters

Engineering Data

5 Minimum bore for full-opening valves

API Specification 6D-2008					
DN	NPS	Minimum bore by class mm			
		PN 20 to 100 (Class 150 to 600)	PN 150 (Class 900)	PN 250 (Class 1500)	PN 420 (Class 2500)
15	1/2	13	13	13	13
20	3/4	19	19	19	19
25	1	25	25	25	25
32	1 1/4	32	32	32	32
40	1 1/2	38	38	38	38
50	2	49	49	49	42
65	2 1/2	62	62	62	52
80	3	74	74	74	62
100	4	100	100	100	87
150	6	150	150	144	131
200	8	201	201	192	179
250	10	252	252	239	223
300	12	303	303	287	265
350	14	334	322	315	292
400	16	385	373	360	333
450	18	436	423	406	374
500	20	487	471	454	419
550	22	538	522	500	-
600	24	589	570	546	-
650	26	633	617	594	-
700	28	684	665	641	-
750	30	735	712	686	-
800	32	779	760	730	-
850	34	830	808	775	-
900	36	874	855	819	-

6 Material

Casting Material

Chemical Properties						
Classification	High-temp steel		Low-temp steel		Stainless Steel	
Specification	ASTM A-216		ASTM A-352		ASTM A-351	
Grade	Gr-WCA	Gr-WCB	Gr-LCB	Gr-LCC	Gr-CF8	Gr-CF8M
C % MAX	A 0.25	0.30	A 0.30	A 0.25	0.08	0.08
Si	0.60	0.60	A 0.60	0.60	2.0	1.50
Mn	A 0.70	1.00	A 1.0	A 1.20	1.5	1.50
P	0.040	0.04	0.04	0.04	0.04	0.04
S	0.045	0.045	0.045	0.045	0.04	0.04
Ni	0.50 max	0.5 max	0.5	0.50	8.0 ~ 11.0	9.0 ~ 12.0
Cr	0.50 max	0.5 max	0.50	0.50	18.0 ~ 21.0	18.0 ~ 21.0
Mo	0.20 max	0.2 max	0.20	0.20	0.50	2.0 ~ 3.0
Cu	0.30 max	0.3 max	0.30	-	-	-
V	0.03 max	0.03 max	0.30	0.30	-	-

A: For each reduction of 0.01% below the specified maximum carbon content , an increase of 0.040% manganese above the specified maximum will be permitted up to a max of 1.10% for LCA , 1.28% for LCB , and 1.4% for LCC.

Physical Properties							
Classification		WCA	WCB	LCB	LCC	CF8	CF8M
Tensile Strength	KPA	60 ~ 85	70~95	65.0 ~ 90.0	70.0 ~ 95.0	Min 70	Min 70
	Mpa	415 ~ 585	485~655	450 ~ 620	485 ~ 655	485	485
Yield Strength @ min	KPA	30	36	35.0	40.0	Min 30	Min30
	MPa	205	250	240	275	205	205
Elongation 2" or 50 mm	min %	24	22	24	22	35.0	30.0
Reduction of area	min %	35	35	35	35	-	-

C: Determine by either 0.2% offset method or 0.5% extension-under load method

Engineering Data

6 Material (continue)

Wrought Materials

Chemical Properties						
Specification	A-105	A-182	A-276			
Grade		F6a-1	304	304L	316	316L
C	0.02	0.15 max	0.08 max	0.030 max	0.08 max	0.030 max
Mn	0.04 to 0.06	1.00 max	2.00 max	2.00 max	2.00 max	2.00 max
P	0.008	0.04	0.04	0.045	0.045	0.045
S	0.010	0.030	0.030	0.030	0.030	0.030
Si	0.03	1.00 max	1.00 max	1.00 max	1.00 max	1.00 max
Ni	0.03	0.50 max	8.0 ~ 11.0	8.0 ~ 13.0	10.0 ~ 14.0	10.0 ~ 15.0
Cr	0.041	11.5 ~ 13.5	18.0 ~ 20.0	18.0 ~ 20.0	16.0 ~ 18.0	16.0 ~ 18.0
Mo	0.01				2.00 ~ 3.00	2.00 ~ 3.00
V	0.01					

NACE Hardness: All material Maximum HB 235 (HRC 22 maximum)

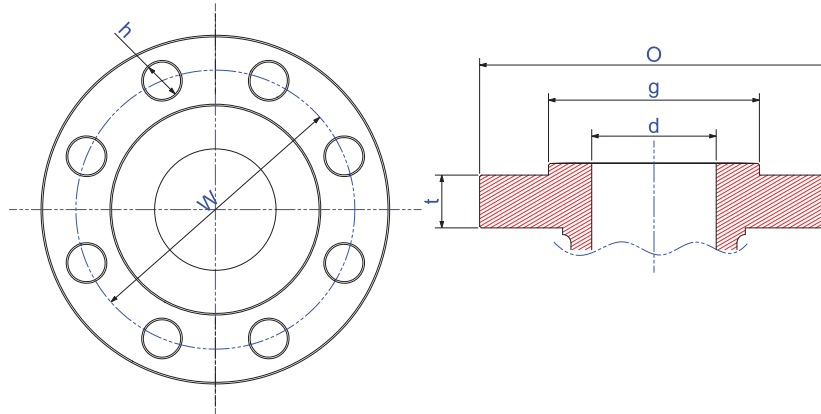
PHYSICAL PROPERTIES							
Classification		A105 ©	® F6a	® 304	® 304L	® 316	® 316L
Tensile Strength	KSi	70	70	75	70	75	70
	MPa	485	485	515	485	515	485
Yield Strength © min	KSi	36	40	30	25	30	25
	MPa	250	275	205	170	205	170
Elongation 2" or 50 mm	min %	30	18	30	30	30	30
Reduction of area	min %	22	35	50	50	50	50

©-A: Determined by either the 0.2% offset method or the 0.5% extension-under load method

© -R: Determined by the 0.2% offset method for ferritic steel only 0.5% extension
-under load method may also be used

7 Pipe Flanges and Flanged Fittings

ASME B16.5-2009



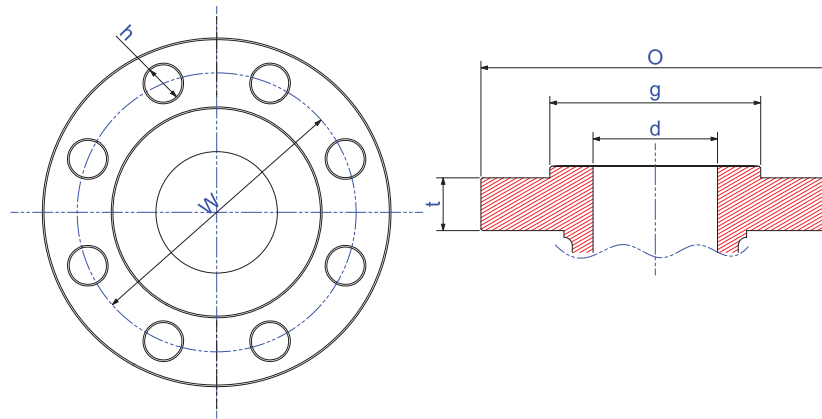
Dimensions of Class 150 Flanges

Drilling								
Nominal Pipe size, NPS	Outside Diameter of Flange O	Diameter of Bolt Circle W	Diameter of Bolt Holes in. h	Number of Bolts	Diameter of Bolts in.	Thickness of Flange Min. t	Inside diameter of Fitting, d	2mm Raised Face Large Male, g
1/2	90	60.3	5/8	4	1/2	8.0	13	34.9
3/4	100	69.9	5/8	4	1/2	8.9	19	42.9
1	110	79.4	5/8	4	1/2	9.6	25	50.8
1 1/4	115	88.9	5/8	4	1/2	11.2	32	63.5
1 1/2	125	98.4	5/8	4	1/2	12.7	38	73.0
2	150	120.7	3/4	4	5/8	14.3	51	92.1
2 1/2	180	139.7	3/4	4	5/8	15.9	64	104.8
3	190	152.4	3/4	4	5/8	17.5	76	127
3 1/2	215	177.8	3/4	8	5/8	19.1	89	139.7
4	230	190.5	3/4	8	5/8	22.3	102	157.2
5	255	215.9	7/8	8	3/4	22.3	127	185.7
6	280	241.3	7/8	8	3/4	23.9	152	215.9
8	345	298.5	7/8	8	3/4	27.0	203	269.9
10	405	362.0	1	12	7/8	28.6	254	323.8
12	485	431.8	1	12	7/8	30.2	305	381.0
14	535	476.3	1 1/8	12	1	33.4	337	412.8
16	595	539.8	1 1/8	16	1	35.0	387	469.9
18	635	577.9	1 1/4	16	1 1/8	38.1	438	533.4
20	700	635.0	1 1/4	20	1 1/8	41.3	489	584.2
24	815	749.3	1 3/8	20	1 1/4	46.1	591	692.2

Engineering Data

7 Pipe Flanges and Flanged Fittings (continue)

ASME B16.5-2009

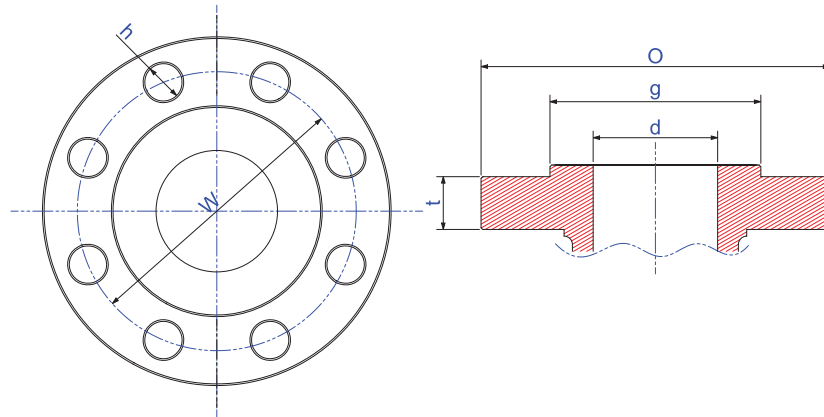


Dimensions of Class 300 Flanges

Drilling								
Nominal Pipe size, NPS	Outside Diameter of Flange O	Diameter of Bolt Circle W	Diameter of Bolt Holes in. h	Number of Bolts	Diameter of Bolts in.	Thickness of Flange Min. t	Inside diameter of Fitting, d	2mm Raised Face Large Male, g
1/2	95	66.7	5/8	4	1/2			34.9
3/4	115	82.6	3/4	4	5/8			42.9
1	125	88.9	3/4	4	5/8	15.9	25	50.8
1 1/4	135	98.4	3/4	4	5/8	17.5	32	63.5
1 1/2	155	114.3	7/8	4	3/4	19.1	38	73.0
2	165	127.0	3/4	8	5/8	20.7	51	92.1
2 1/2	190	149.2	7/8	8	3/4	23.9	64	104.8
3	210	168.3	7/8	8	3/4	27.0	76	127.0
3 1/2	230	184.2	7/8	8	3/4	28.6	89	139.7
4	255	200.0	7/8	8	3/4	30.2	102	157.2
5	280	235.0	7/8	8	3/4	33.4	127	185.7
6	320	269.9	7/8	12	3/4	35.0	152	215.9
8	380	330.2	1	12	7/8	39.7	203	269.9
10	445	387.4	1 1/8	16	1	46.1	254	323.8
12	520	450.8	1 1/4	16	1 1/8	49.3	305	381.0
14	585	514.4	1 1/4	20	1 1/8	52.4	337	412.8
16	650	571.5	1 3/8	20	1 1/4	55.6	387	469.9
18	710	628.6	1 3/8	24	1 1/4	58.8	432	533.4
20	775	685.8	1 3/8	24	1 1/4	62.0	483	584.2
24	915	812.8	1 5/8	24	1 1/2	68.3	584	692.2

7 Pipe Flanges and Flanged Fittings (continue)

ASME B16.5-2009



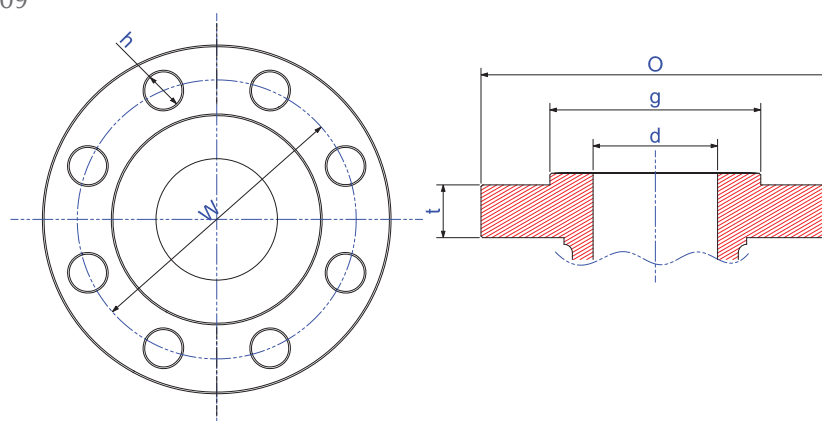
Dimensions of Class 600 Flanges

Drilling							
Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Diameter of Bolt Circle, W	Diameter of Bolt Holes, h	No. of Bolts	Diameter of Bolt, in.	Thickness of flange min, t	Raised Face Large Male, g
1/2	95	66.7	5/8	4	1/2	14.3	34.9
3/4	115	82.6	3/4	4	5/8	15.9	42.9
1	125	88.9	3/4	4	5/8	17.5	50.8
1 1/4	135	98.4	3/4	4	5/8	27.0	63.5
1 1/2	155	114.3	7/8	4	3/4	22.3	73.0
2	165	127.0	3/4	8	5/8	25.4	92.1
2 1/2	190	149.2	7/8	8	3/4	28.6	104.8
3	210	168.3	7/8	8	3/4	31.8	127.0
3 1/2	230	184.2	1	8	7/8	35.0	139.7
4	275	215.9	1	8	7/8	38.1	157.2
5	330	266.7	1 1/8	8	1	44.5	185.7
6	355	292.1	1 1/8	12	1	47.7	215.9
8	420	394.2	1 1/4	12	1 1/8	55.6	269.9
10	510	431.8	1 3/8	16	1 1/4	63.5	323.8
12	560	489.0	1 3/8	20	1 1/4	66.7	381.0
14	605	527.0	1 1/2	20	1 3/8	69.9	412.8
16	685	603.2	1 5/8	20	1 1/2	76.2	469.9
18	745	654.0	1 3/4	20	1 5/8	82.6	533.4
20	815	723.9	1 3/4	24	1 5/8	88.9	584.2
24	940	838.2	2	24	1 7/8	101.6	692.2

Engineering Data

7 Pipe Flanges and Flanged Fittings (continue)

ASME B16.5-2009



Dimensions of Class 900 Flanges

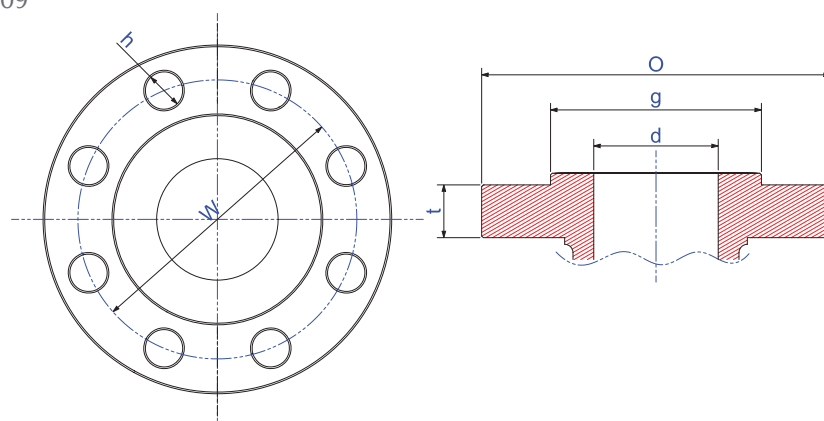
Drilling

Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Diameter of Bolt Circle, W	Diameter of Bolt Holes, h	No. of Bolts	Diameter of Bolt, in.	7-mm Raised Face	Ring joint	Min. Thickness of Flange
NPS								
3/4								
1								
1 1/4								
1 1/2								
2								
2 1/2								
3	240	190.5	1	8	7/8	145	145	38.1
4	290	235	1 1/4	8	1 1/8	170	170	44.5
6	380	317.5	1 1/4	12	1 1/8	190	195	55.6
8	470	393.7	1 1/2	12	1 3/8	220	220	63.5
10	545	469.9	1 1/2	16	1 3/8	235	235	69.9
12	610	533.4	1 1/2	20	1 3/8	255	255	79.4
14	640	558.8	1 5/8	20	1 1/2	275	280	85.8
16	705	616	1 3/4	20	1 5/8	285	290	88.9
18	785	685.8	2	20	1 7/8	325	335	101.6
20	855	749.3	2 1/8	20	2	350	360	108
24	1040	901.7	2 5/8	20	2 1/2	440	455	139.7

Use class 1500 dimensions in these sizes

7 Pipe Flanges and Flanged Fittings (continue)

ASME B16.5-2009



Dimensions of Class 1500 Flanges

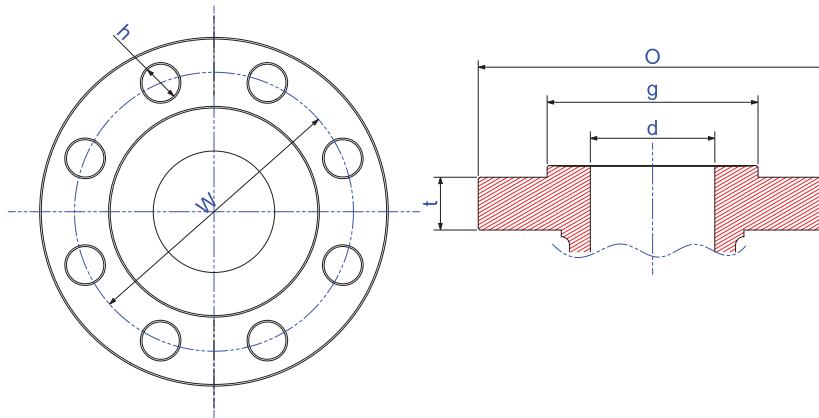
Drilling

Nominal Pipe Size, NPS	Outside Diameter of Flange, O	Diameter of Bolt Circle, W	Diameter of Bolt Holes, h	No. of Bolts	Diameter of Bolt, in.	7-mm Raised Face	Ring joint	Min. Thickness of Flange
1/2	120	82.6	7/8	4	3/4	110	110	22.3
3/4	130	88.9	7/8	4	3/4	115	115	25.4
1	150	101.6	1	4	7/8	125	125	28.6
1 1/4	160	111.1	1	4	7/8	125	125	28.6
1 1/2	180	123.8	1 1/8	4	1	140	140	31.8
2	215	165.1	1	8	7/8	145	145	38.1
2 1/2	245	190.5	1 1/8	8	1	160	160	41.3
3	265	203.2	1 1/4	8	1 1/8	180	180	47.7
4	310	241.3	1 3/8	8	1 1/4	195	195	54
6	395	317.5	1 1/2	12	1 3/8	260	265	82.6
8	485	393.7	1 3/4	12	1 5/8	290	300	92.1
10	585	482.6	2	12	1 7/8	335	345	108
12	675	571.5	2 1/8	16	2	375	385	123.9
14	750	635	2 3/8	16	2 1/4	405	425	133.4
16	825	704.8	2 5/8	16	2 1/2	445	470	146.1
18	915	774.7	2 7/8	16	2 3/4	495	525	162
20	985	831.8	3 1/8	16	3	540	565	177.8
24	1170	990.6	3 5/8	16	3 1/2	615	650	203.2

Engineering Data

7 Pipe Flanges and Flanged Fittings (continue)

ASME B16.5-2009



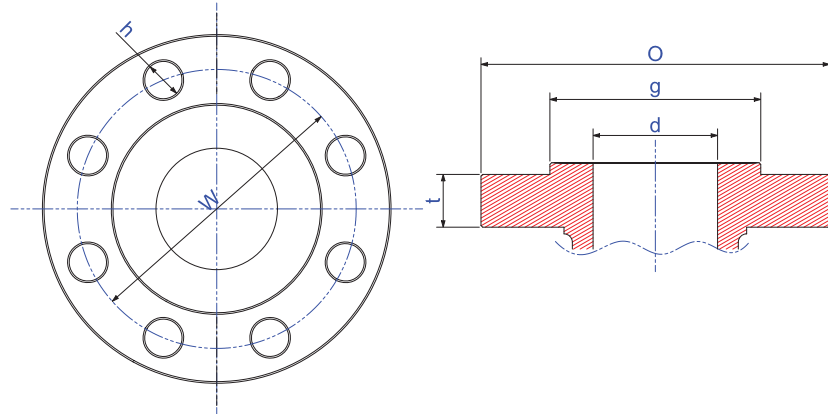
Dimensions of Class 2500 Flanges

Drilling

Nominal pip size, NPS	Outside Diameter of flange, O	Diameter of Bolt Circle, W	Diameter of Bolt Holes, in h	No. of Bolts	Diameter of Bolt, in.	"7-mm Raised Face"	Raised Face g	Min. Thickness of Flange t
1/2	135	88.9	7/8	4	3/4	120	120	30.2
3/4	140	95.2	7/8	4	3/4	125	125	31.8
1	160	108	1	4	7/8	140	140	35
1 1/4	185	130.2	1 1/8	4	1	150	150	38.1
1 1/2	205	146	1 1/4	4	1 1/8	170	170	44.5
2	235	171.4	1 1/8	8	1	180	180	50.9
2 1/2	265	196.8	1 1/4	8	1 1/8	195	205	57.2
3	305	228.6	1 3/8	8	1 1/4	220	230	66.7
4	355	273	1 5/8	8	1 1/2	255	260	76.2
6	485	368.3	2 1/8	8	2	345	355	108
8	550	438.2	2 1/8	12	2	380	395	127
10	675	539.8	2 5/8	12	2 1/2	490	510	165.1
12	760	619.1	2 7/8	12	2 3/4	540	560	184.2

7 Pipe Flanges and Flanged Fittings (continue)

ASME B 16.47



Class 150 Steel Pipe Flange Dimensions

Nominal Size		O		W		g		t		h (Bolt hole)		Bolt	
inch	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	Number	Diam.
26	650	34.25	870	31.75	806.5	29.50	749	2.69	68.4	1.38	35	24	1 1/4
28	700	36.50	927	34.00	863.5	31.50	800	2.81	71.4	1.38	35	28	1 1/4
30	750	38.75	984	36.00	914.5	33.75	857	2.94	74.7	1.38	35	28	1 1/4
32	800	41.75	1060	38.50	978.0	36.00	914	3.18	80.8	1.62	41	28	1 1/2
34	850	43.75	1111	40.50	1029.0	38.00	965	3.25	82.6	1.62	41	32	1 1/2
36	900	46.00	1168	42.75	1086.0	40.25	1022	3.56	90.5	1.62	41	32	1 1/2

Height of raised face is 0.06 inch (1.6 mm) each.

Class 300 Steel Pipe Flange Dimensions

Nominal Size		O		W		g		t		h (Bolt hole)		Bolt	
inch	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	number	Diam.
26	650	38.25	972	34.50	876.5	29.50	749	3.12	79.3	1.75	45	28	1 5/8
28	700	40.75	1035	37.00	940.0	31.50	800	3.38	85.9	1.75	45	28	1 5/8
30	750	43.00	1092	39.25	997.0	33.75	857	3.62	92.0	1.88	48	28	1 3/4
32	800	45.25	1149	41.50	1054.0	36.00	914	3.88	98.6	2.00	51	28	1 7/8
34	850	47.50	1207	43.50	1105.0	38.00	965	4.00	101.6	2.00	51	28	1 7/8
36	900	50.00	1270	46.00	1168.5	40.25	1022	4.12	104.7	2.12	54	32	2

Height of raised face is 0.06 inch (1.6 mm) each.

Class 600 Steel Pipe Flange Dimensions

Nominal Size		O		W		g		t		h (Bolt hole)		Bolt	
inch	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	number	Diam.
26	650	40.00	1016	36.00	914.5	29.50	749	4.25	108.0	2.00	51	28	1 7/8
28	700	42.25	1073	38.00	965.0	31.50	800	4.38	111.3	2.12	54	28	2
30	750	44.50	1130	40.25	1022.5	33.75	857	4.50	114.3	2.12	54	28	2

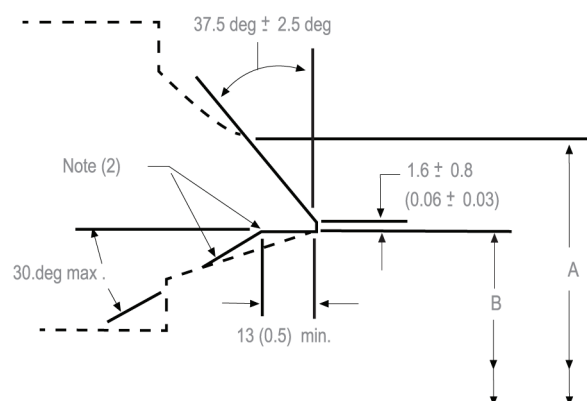
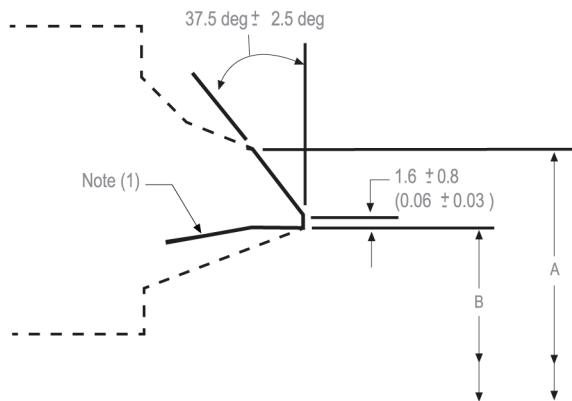
Height of raised face is 0.25 inch (6.4 mm) each.

Engineering Data

8 Butt-Welding Dimensions

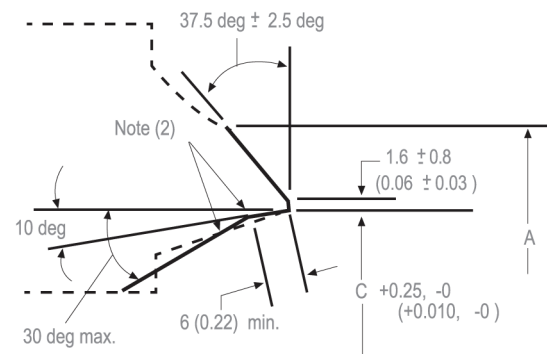
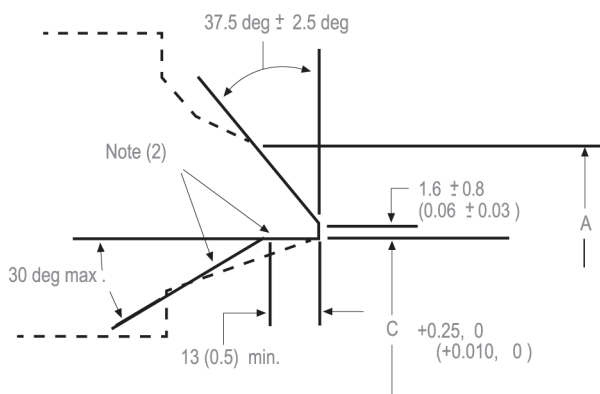
Bevels for wall thickness over 3 mm (0.12 in.) to 22 mm (0.88 in.)

ASME B16.25-2007



Bevels for wall thickness over 3 mm (0.12 in.) to 22 mm (0.88 in.)

(b) Welding End Detail for joint Using Split Rectangular Backing Ring



(c) Welding End Detail for joint Using Continuous Rectangular Backing Ring

(d) Welding End Detail for joint Using Continuous Tapered Backing Ring

GENERAL NOTES :

(a) Broken lines denote maximum envelope for transitions from welding bevel and root face into body of component . see fig . 1 for details .

(b) see section 5 for tolerances other than those given in these illustrations .

(c) purchase order must specify contour of any backing ring to be used .

(d) linear dimensione are in millimeters with inch values in parentheses .

NOTES:

(1) Internal surface may be as . formed or machined for dimension b at root face . contour within the envelope shall be in accordance with section 2 .

(2) Intersections should be slightly rounded .

8 Butt-Welding Dimensions (continue)

ASME B 16.25-2007

Nominal Pipe Size (NPS)	Schedule No. [Note (1)]	O.D at Welding Ends		B	C [Note (2)]	t
		Wrought or Fabricated, A [Note (1)]	Cast Components, A			
3	XXS	88.9	91	58.50	61.19	15.24
4	XXS	114.3	117	80.00	83.30	17.12
6	120	168.3	172	140.00	142.29	14.27
	160	168.3	172	132.00	135.31	18.26
	XXS	168.3	172	124.50	128.85	21.95
8	100	219.1	223	189.00	191.65	15.09
	120	219.1	223	182.50	186.11	18.26
	140	219.1	223	178.00	181.98	20.62
	XXS	219.1	223	174.50	179.16	22.23
	160	219.1	223	173.00	177.79	23.01
10	120	273.0	278	230.00	234.44	21.44
	140	273.0	278	222.00	227.51	25.40
	160	273.0	278	216.00	221.95	28.58
12	60	323.8	329	295.00	297.97	14.27
	80	323.8	329	289.00	292.17	17.48
	100	323.8	329	281.00	285.24	21.44
	120	323.8	329	273.00	278.31	25.40
	140	323.8	329	266.50	272.75	28.58
	160	323.8	329	257.00	264.45	33.32
16	60	406.4	413	373.00	376.21	16.66
	80	406.4	413	363.50	367.84	21.44
	100	406.4	413	354.00	359.53	26.19
	120	406.4	413	344.50	351.18	30.96
	140	406.4	413	333.50	341.43	36.53
	160	406.4	413	325.50	334.50	40.49
18	20	457.2	464	441.50	442.30	7.92
	30	457.2	464	435.00	436.68	11.13
	STD	457.2	464	438.00	439.48	9.53
	XS	457.2	464	432.00	433.94	12.70
	40	457.2	464	428.50	431.19	14.27
	60	457.2	464	419.00	422.82	19.05
	80	457.2	464	409.50	414.46	23.83
	100	457.2	464	398.50	404.78	29.36
	120	457.2	464	387.50	395.03	34.93
	140	457.2	464	378.00	386.77	39.67
	160	457.2	464	366.50	376.99	45.24

Engineering Data

8 Butt-Welding Dimensions (continue)

ASME B 16.25-2007

Nominal Pipe Size (NPS)	Schedule No. [Note (1)]	O.D at Welding Ends		B	C [Note (2)]	t
		Wrought or Fabricated, A [Note (1)]	Cast Components, A			
20	STD	508.0	516	489.00	490.28	9.53
	XS	508.0	516	482.50	484.74	12.70
	40	508.0	516	478.00	480.55	15.09
24	STD	609.6	619	590.50	591.88	12.7
	XS	609.6	619	584.00	586.34	9.53
	30	609.6	619	581.00	583.59	14.27
	40	609.6	619	574.50	577.97	17.48
	60	609.6	619	560.50	565.49	24.61
	80	609.6	619	547.50	554.38	30.96
	100	609.6	619	532.00	540.49	38.89
	120	609.6	619	517.50	528.03	46.02
	140	609.6	619	505.00	516.91	52.37
30	10	762.0	772	746.00	747.10	7.92
	STD	762.0	772	742.94	744.28	9.53
	20	762.0	772	736.50	738.74	12.70
	30	762.0	772	730.00	733.17	15.88
	40	762.0	772	723.50	726.69	19.05
36	10	914.4	927	898.50	899.50	7.92
	STD	914.4	927	895.34	896.68	9.53
	20	914.4	927	889.00	891.14	12.70
	30	914.4	927	882.50	885.57	15.88
	40	914.4	927	876.5	880.02	19.05

General rules :

(a) Dimensions are in millimeters.

(b) See Section 5 for tolerances.

NOTES:

(1) Data are from ASME B36.10M or more precise rounding of the inch dimensions from Table 1-1. Data in the table are also applicable to ASME B36.19M when the wall thickness conforms to ASME B 36.10m. Letter designations signify

(a) STD = Standard wall thickness

(b) XS = extra strong wall thickness

(c) XXS = double, extra strong wall thickness

(2) Internal machining for continuous bending rings for size NPS 2 and smaller is not contemplated see para. 4.2 for C dimension for sizes not listed.

9 Pressure - Temperature Ratings for Group 1. 1 Materials

ASME B16.5-2003

Nominal Designation	Forgings	Castings	Plates
C-Si	A105(1)	A216 Gr.WCB(1)	A515 Gr .70(1)
C-Mn-Si	A350Gr.LF2(1)		A516 Gr .70(1).(2)
C-Mn-Si -7	A350Gr.LF6CL.(4)		
31/2 Ni	A350Gr.LF3		A537 CL.1(3)

NOTES:

(1) Upon Prolonged exposure to temperatures above 425°C, the carbide phase of steel may be converted to graphsteel, Permissible but not recommended for prolonged use above 425°C

(2) Not to be used over 455°C.

(3) Not to be used over 370°C.

(4) Not to be used over 260°C.

Working Pressure by Classes , bar

Class Temp., C	150	300	400	600	900	1500	2500
-29 to 38	19.6	51.1	68.1	102.1	153.2	255.3	425.5
50	19.2	50.1	66.8	100.2	150.4	250.6	417.7
100	17.7	46.6	62.1	93.2	139.8	233.0	388.3
150	15.8	45.1	60.1	90.2	135.2	225.4	375.6
200	13.8	43.8	58.4	87.6	131.4	219.0	365.0
250	12.1	41.9	55.9	83.9	125.8	209.7	349.5
300	10.2	39.8	53.1	79.6	119.5	199.1	331.8
325	9.3	38.7	51.6	77.4	116.1	193.6	322.6
350	8.4	37.6	50.1	75.1	112.7	187.8	313.0
375	7.4	36.4	48.5	72.7	109.1	181.8	303.1
400	6.5	34.7	46.3	69.4	104.2	173.6	289.3
425	5.5	28.8	38.4	57.5	86.3	143.8	239.7
450	4.6	23.0	30.7	46.0	69.0	115.0	191.7
475	3.7	17.4	23.2	34.9	52.3	87.2	145.3
500	2.8	11.8	15.7	23.5	35.3	58.8	97.9
538	1.4	5.9	7.9	11.8	17.7	29.5	49.2

Working Pressure by Classes , Psig

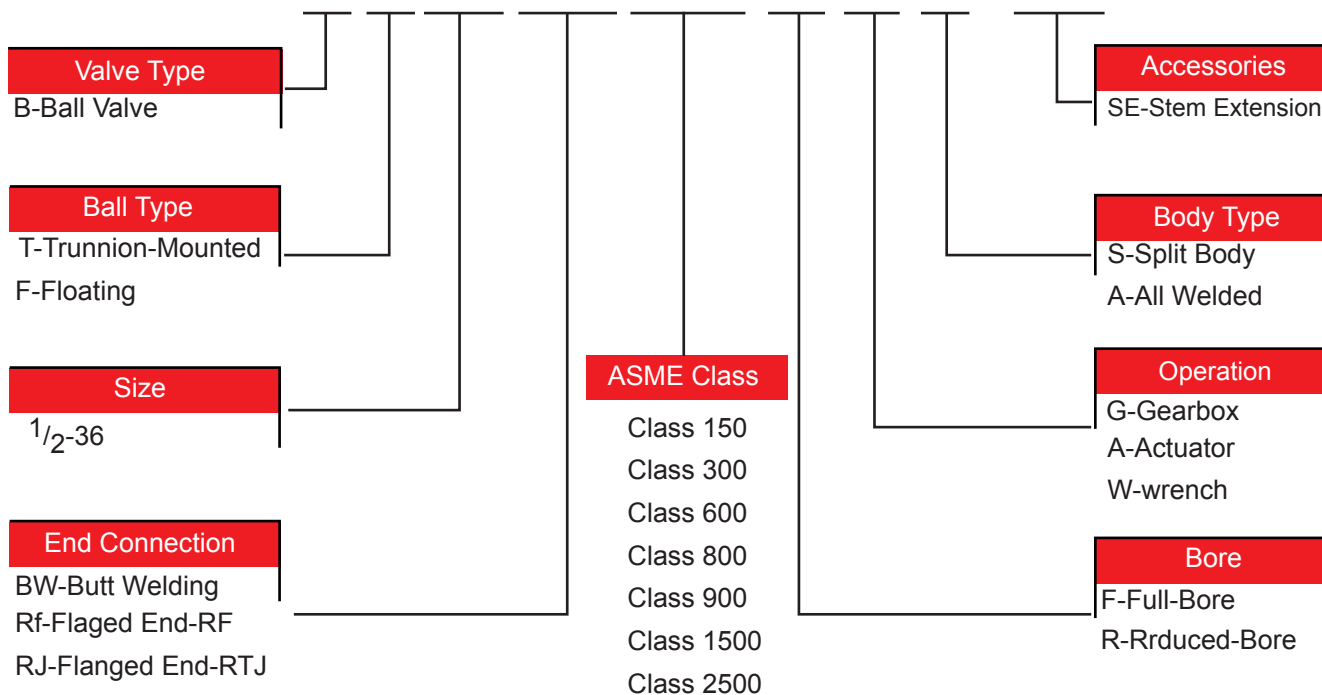
Class Temp., F	150	300	400	600	900	1500	2500
-20 to 100	285	740	985	1480	2220	3705	6170
200	260	680	905	1360	2035	3395	5655
300	230	655	870	1310	1965	3270	5450
400	200	635	845	1265	1900	3170	5280
500	170	605	805	1205	1810	3015	5025
600	140	570	755	1135	1705	2840	4730
650	125	550	730	1100	1560	2745	4575
700	110	530	710	1060	1590	2655	4425
750	95	505	675	1015	1520	2535	4230
800	80	410	550	825	1235	2055	3430
850	65	320	425	640	955	1595	2655
900	50	230	305	460	690	1150	1915
950	35	135	185	275	410	685	1145
1000	20	85	115	170	255	430	715

How to Order

Valve figure Number Explanation

Example:

BT08RF900FGS-SE



How to Read NamePlate		How to Read NamePlate	
1	valve serial Number	6	Ball material
2	Nominal Valve size (Inches)	7	Body material
3	ASME Pressure Class	8	Applied design code
4	Seat material	9	Maximum Operatong Pressure at Maximum Operating Temperature
5	Stem material	10	Maximum Operating Pressure at Minimum Operating Temperature

PISHGAM INDUSTRIAL EQUIPMENT DESIGNERS

BODY

BALL

STEM

SEAT

S/N

TSP API 6D