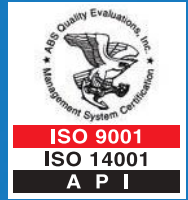




SAMWOO KJS TEC CO., LTD.
株式会社 三又 KJS TEC

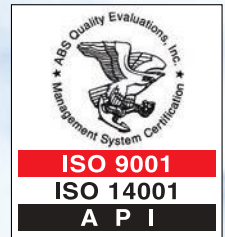


VALVES

CARBON & ALLOY STEEL VALVES
STAINLESS STEEL VALVES
CRYOGENIC VALVES
BELLOWS VALVES
GATE, GLOBE, CHECK,
THROUGH CONDUIT GATE
BALL VALVES



GLOBAL CHAMPION KJS VALVES



Quality Endorsed Company

Samwoo KJS Tec

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QUALITY ASSURANCE

Samwoo KJS Tec Co., Ltd's ("KJS") unparalleled Quality Assurance programs translate into "Peace of Mind" for our respected customers. KJS well operates under ISO 9001 / ISO 14001 registration. All valves are compliant to the industry standards of API, ASTM & ASME. Inspection & Test is maintained throughout the manufacturing process to verify compliance to these standards as well as any specific customer requirements.

QUALITY APPROVAL

We have gained a reputation for manufacturing high performance valves with our quality assurance system being amazingly effective.

ISO 9001 by **BVQI**. (Bureau Veritas Quality International Limited)

Jan. 1993 and renewed in Jan. 1996.

ISO 14001 by BVQI. Nov. 1991.

API 6D (American Petroleum Institute)

Jan. 1992 and renewed in Feb. 1998.

MOST (Ministry of Science & Technology) Mar. 1992.

LR (Lloyd' s Register of Shipping) Jan. 1989.

DNV (Det Norske Veritas) July. 1989.

KR (Korean Register of Shipping) Oct. 1988.

BV (Bureau Veritas) Aug. 1993.

GL (Germanischer Lloyd) Aug. 1993 and renewed in July. 1997.

TUV Dec. 1999.

CE Jul. 2001.

ISO API 600 Jan. 2010

ISO 9001 & ISO 14001 by **ABS**. Nov. 2011.

품질보증

저희, (주)삼우케이제이에스텍은

미국석유협회규격(API), ISO 9001, ISO14001, 영국선급 LLOYD, 노르웨이선급 DNV,

과기처의 핵발전소용 주조업체인증, 독일선급 GL, 프랑스선급 BV, 독일공업규격(TUV),

압력용기(PED)제조업체인증등의 국제규격과 각종 국내규격을 확보하여 특별품질관리체계를 가지고 있습니다.

BRIEF HISTORY

- 1970** Mar. 1974 Established Han Sung Steel Ind. Co.
Mar. 1978 Supplementary registration for machinery Manufacturer.
July. 1978 Registered as manufacturer of parts for shipbuilding industry.
- 1980** Mar. 1983 Removed all facilities and factory to Jang-Ji Ri, Ham-An Gun, Kyungnam, Korea.
Jun. 1985 Renamed to KOOKJAE STEEL IND. CO., LTD.
Sep. 1986 Set about equipping with the metallic mould cast line for exploitation of Bronze Castings with KIMM.
Dec. 1987 Removed to Changwon Industrial complex (Present Location)
May. 1988 Completed the building of steel castings shop & the installation of high frequency induction furnace.
Oct. 1988 Approved steel Casting Manufacturer by K.R. (Korean Register of Shipping)
Jan. 1989 Approved steel Casting Manufacturer by L.R. (Lloyd's Register of Shipping)
Jun. 1989 Completed the machining shop construction and establishment of machinery.
July. 1989 Approved steel Casting Manufacturer by D.N.V. (Det Norske Veritas)
- 1990** Mar. 1992 Approved Casting valve manufacturer for nuclear power plant by MOST (Ministry of Science & Technology)
Dec. 1992 Audited Casting valve manufacturer for ISO 9001 by BVQI. (Bureau Veritas Quality International Limited)
Feb. 1993 Approved Casting valve manufacturer for ISO 9001 by BVQI. (Bureau Veritas Quality International Limited)
Aug. 1993 Approved Steel Casting Manufacturer by G.L. (Germanischer Lloyd) : Re Approved (July. 1997)
Aug. 1993 Approved Steel Casting Manufacturer by B.V. (Bureau Veritas)
Feb. 1996 Re-Approved as Casting valve manufacturer for ISO 9001 by BVQ.
Aug. 1997 Re-Approved as Casting valve manufacturer for nuclear power plant by Korean Government.
Feb. 1998 Re-Approved as Casting valve(6D) manufacturer by API.
Nov. 1999 Approved as casting valve manufacturer in KJS's site for ISO 14001 by B.V.Q.I
Dec. 1999 Approved as casting manufacturer by TÜV
- 2000** Jul. 2001 Approved as casting valve manufacturer for P.E.D (pressure Equipment Directive) by TÜV
Oct. 2004 Renamed to Samwool KJS Tec Co., Ltd.
Dec. 2006 Award of a Silver Industry Medal from the President of Korea
Dec. 2007 Achieved Goal of Sales Volume of USD 35,000,000
Nov. 2008 Awarded a prize of "USD 20,000,000 - Export Tower" from the President of Korea.
- 2010** Jan. 2010 Approved as casting valve API Standard 600
Nov. 2011 Re-Approved as casting valve manufacturer for ISO 9001 & 14001 by ABS.

COMPANY OUTLINE

Capital US \$ 5,500,000

Site area 17,955m²

Shop & Office area 11,523m²

Production Capacity (Monthly Output)

Casting 370ton/m

Valves 4,000sets



Pattern Shop



Foundry Shop



Machining Shop

- 1970**
 - 1974 한성철강으로 발족
 - 1978 기계제조업으로 등록
 - 1978 조선사업의 부품제조업체로 등록
- 1980**
 - 1983 경남 함안군 장지리로 이전
 - 1985 국제스틸공업 주식회사로 개명
 - 1986 청동주물주조에 관한 금형주조설비 구축
 - 1987 창원공단(현위치)로 이전
 - 1988 주조공장 완공 및 고주파 유도로 설치
 - 1988 한국선급의 주조업체로 인증
 - 1989 영국선급 로이드의 주조업체로 인증
 - 1989 가공공장 완공
 - 1989 노르웨이 선급 DNV의 주조업체로 인증
- 1990**
 - 1992 과기처의 핵발전소용 주조업체로 인증
 - 1993 ISO 9001 (프랑스BVQI주관) 인증획득
 - 1993 독일선급 GL의 주조업체로 인증
 - 1993 프랑스선급 BV의 주조업체로 인증
 - 1996 ISO 9001 (프랑스BVQI주관) 재인증
 - 1997 과기처의 핵발전소용 주조업체로 재인증
 - 1998 미국석유협회 (API)의 밸브제조업체로 인증
 - 1999 ISO 14001 (프랑스BVQI주관) 인증
 - 1999 독일공업규격(TÜV) 인증
- 2000**
 - 2001 독일공업규격(TÜV)에 의한 압력용기(PED)제조업체로 인증
 - 2004 주식회사 삼우KJS텍으로 상호변경
 - 2006 은탑산업훈장 대통령 표창
 - 2007 매출 350억원 달성
 - 2008 이천만불 수출탑 대통령 표창
- 2010**
 - 2010 미국석유협회 API Standard 600 인증
 - 2011 ISO 9001 & ISO 14001(ABS주관) 재인증

회사개요

- 자본금 55억원
- 부지면적 17,955㎡
- 건물연면적 11,523㎡
- 생산능력 주조 370톤/월
- 조립생산 4,000세트/월

MANUFACTURING PROCESS

Samwoo KJS Tec Co., Ltd.'s ("KJS") manufacturing process has only a goal to produce high quality of valves to meet the demand of clients' exacting standards with up-date equipments / facilities & well skilled workers supported by highly qualified technical engineering staffs.

KJS have been well organized to perform all clients' requirements with In-house Production system of Drawing, Casting (RT / MT / PT / UT), Machining, Assembling, Testing, Inspection, Painting & Packing.

제조공정

삼우KJS텍은 최신설비와 고도의 숙련된 기술과 인원으로 오로지 고객의 품질표준을 만족시키는 것을 목표로 설계, 주조, 가공, 조립, 검사, 도장 및 포장등 엄격한 생산 및 품질관리를 하고 있습니다.

Design ▶



Casting ▶



Chemical analysis ▶



Inspection of casting item ▲



◀ Packing



Lathe Machining



Drilling



◀ Painting



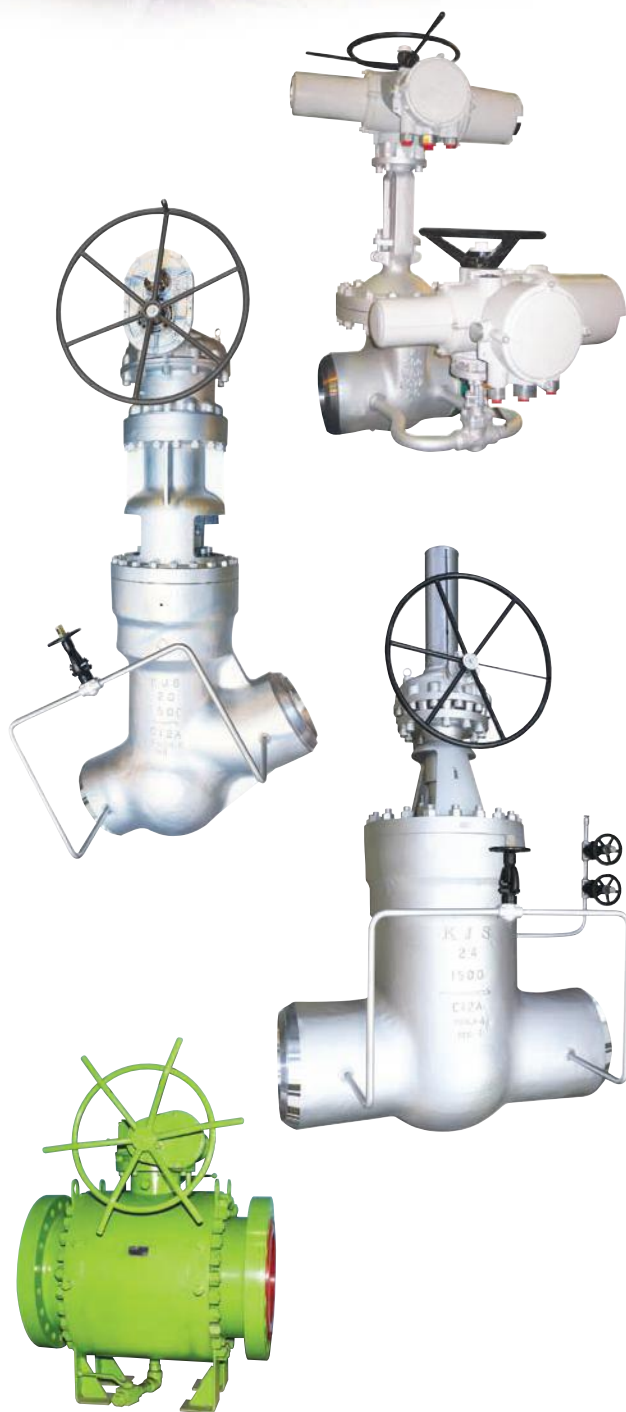
◀ Pressure test



▲ Machining

MAIN PRODUCTION ITEM

Advanced techniques are applied to every stage of valve production.



GATE VALVES

	150	300	600	900	1500	2500
BB	2"~56"	2"~48"	2"~42"	2"~24"	2"~24"	2"~12"
PB	-	-	2"~24"	2"~24"	2"~24"	2"~18"

GLOBE VALVES

	150	300	600	900	1500	2500
BB	2"~18"	2"~16"	2"~16"	2"~16"	2"~16"	2"~12"
PB	-	-	2"~16"	2"~16"	2"~14"	2"~12"

CHECK VALVES

	150	300	600	900	1500	2500
BB	2"~36"	2"~36"	2"~30"	2"~30"	2"~24"	2"~16"
PB	-	-	2"~24"	2"~24"	2"~24"	2"~20"

THROUGH CONDUIT GATE VALVES

	150	300	600
BB	4"~24"	4"~24"	4"~24"

NON RETURN VALVES

	600	900	1500	2500
BB	2"~16"	2"~16"	2"~14"	2"~12"

PARALLEL GATE VALVES

	600	900	1500	2500
BB	2"~24"	2"~24"	2"~24"	2"~24"

TILTING CHECK VALVES

	600	900	1500	2500
BB	2"~24"	2"~24"	2"~24"	2"~24"

BELLOWS GATE VALVES

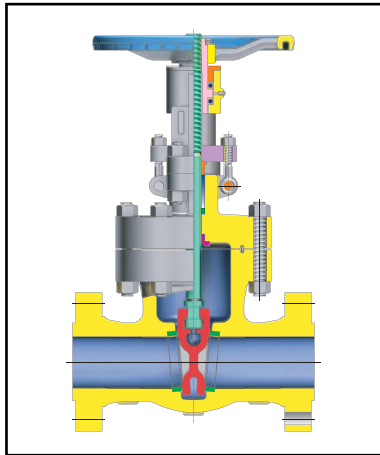
	150	300
BB	2"~20"	2"~20"

BELLOWS GLOBE VALVES

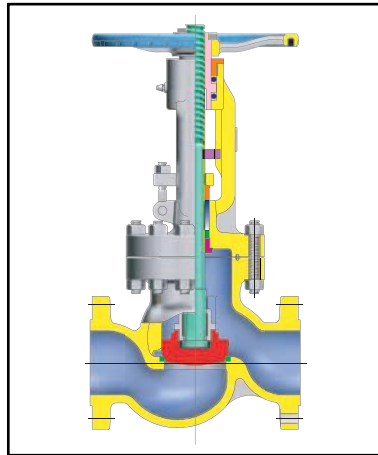
	150	300
BB	2"~12"	2"~12"

BALL VALVES

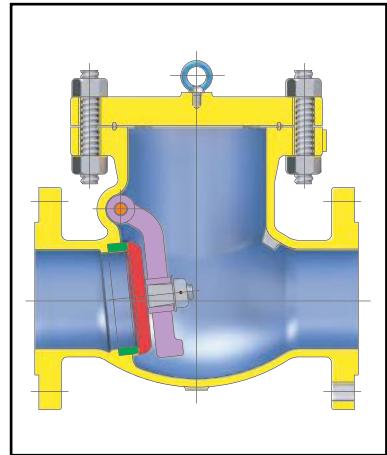
	150	300	600	900	1500	2500
BF	1/2"~12"	1/2"~10"	1/2"~6"	1/2"~2"	1/2"~2"	1/2"~2"
BT	6"~36"	4"~36"	2"~24"	2"~16"	2"~12"	2"~10"



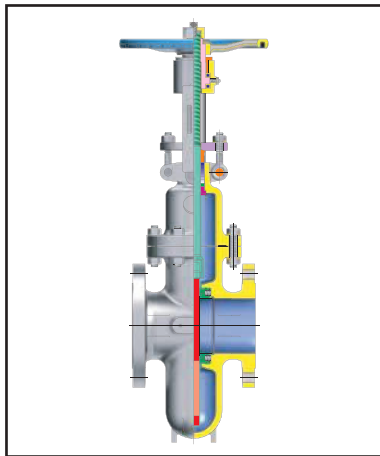
GATE VALVE



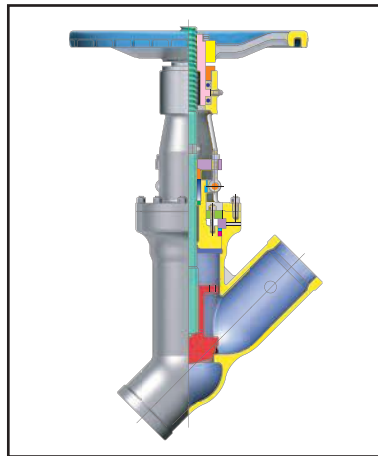
GLOBE VALVE



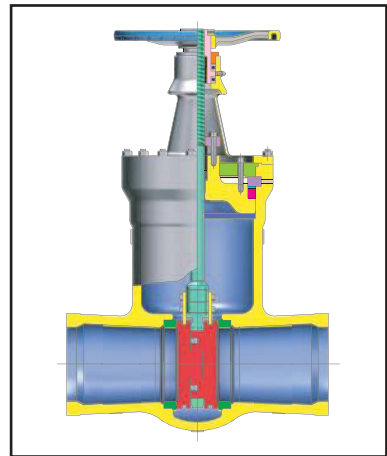
CHECK VALVE



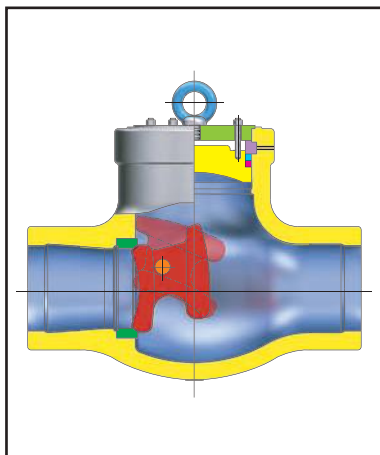
THROUGH CONDUIT GATE VALVE



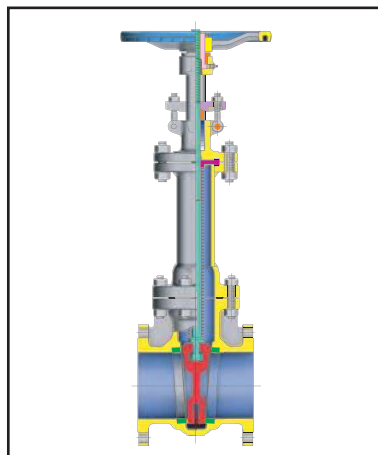
NON RETURN VALVE



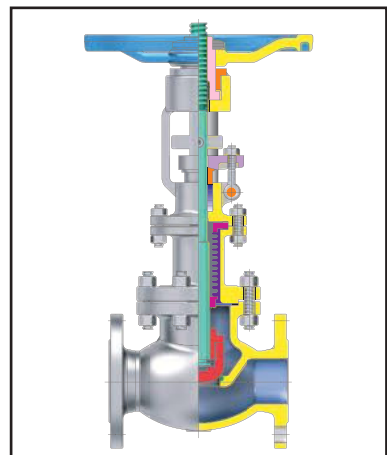
PARALLEL GATE VALVE



TILTING CHECK VALVE



BELLOWS GATE VALVE



BELLOWS GLOBE VALVE

Other valves not listed here can also be manufactured depending on the customer's specifications.

- Pressure-temperature ratings:
ASME Class 150 to 2500
- Size : 2 inch to 56 inch
- Temperature range : -196 °C to 650 °C
- Manufacturing standards : API, ANSI, JPI, JIS, BS, DIN, GOST, MSS, ASME, ASTM, ISO and other user's specifications.
- Materials : Carbon steel, Alloy steel, Stainless steel, Monel, Forged steel, Cast iron and others.

FIGURE NUMBER ABBREVIATIONS

FIG. 16F-CB2*

End Connections

F=Flanged(Raised face)
 W=Butt Weld
 J=RTJ
 S=Socket Weld
 T=Threaded
 B=Wafer
 X=Special(Customer to specify)

Pressure Class

1 =150
 3 =300
 6 =600
 9 =900
 15=1500
 25=2500

Type

1=Gate, OS&Y
 2=Globe, OS&Y
 3=Swing Check
 4=Tilting Check
 5=Non Return
 6=Parallel Gate
 7=Angle, OS&Y
 8=Through Conduit Gate

BODY/BONNET MATERIAL

CB =ASTM A216, WCB =Cast Carbon Steel
 C5 =ASTM A217, C5 =Cast Alloy Steel(5% Chrome, 1/2% Moly)
 C6 =ASTM A217, WC6 =Cast Alloy Steel(1 1/4% Chrome, 1/2% Moly)
 C9 =ASTM A217, WC9 =Cast Alloy Steel(2 1/4% Chrome, 1% Moly)
 C12 =ASTM A217, C12 =Cast Alloy Steel(9% Chrome, 1% Moly)
 LCB =ASTM A352, LCB =Cast Low Temperature Carbon Steel
 LC3 =ASTM A352, LC3 =Cast Low Temperature 31/2% Nickel Steel
 CF8 =ASTM A351, CF8 =Cast 304 Stainless Steel
 C8M =ASTM A351, CF8M =Cast 316 Stainless Steel
 A20 =ASTM A351, CN7M =Cast Alloy 20
 MO =ASTM A296, M35 =Cast NI CU(Monel**)
 SPL =Special(Customer to specify)

SUFFIX LETTERS

BP=By-Pass
 BS=Bellows Seal
 CL=Chlorine Service
 CR=Cryogenic Service
 FP=Full Port
 FS=Firesafe
 GI=Grease Injection
 GO=Gear Operator
 HL=High Lift
 HO=Hydraulic Operator
 HP=Horizontal Piston Check
 MO=Motor Operator
 N1=Material to NACE MR-01-75
 NR=Non-Return
 OL=Outside Weight & Lever
 OX=Oxygen Service
 PD=Parabolic Disc
 PO=Pneumatic Operator
 PSB=Pressure Seal Bonnet
 PT=PTFE Seats
 RP=Regular Port

Trim Materials

Trim Number	Nominal Trim	Material Type
1	F6	13Cr
2	304	18Cr - 8Ni
3	F310	25Cr - 20Ni
4	Hard F6	Hard 13Cr
5	Hardfaced	Co - Cr A
5A	Hardfaced	Ni - Cr
6	F6 and Cu-Ni	13Cr Cu - Ni
7	F6 and Hard F6	13Cr Hard 13Cr
8	F6 and Hardfaced	13Cr Co - Cr A
8A	F6 and Hardfaced	13Cr Ni - Cr
9	Monel**	Ni - Cu alloy
10	316	18Cr - 8Ni
11	Monel and Hardfaced	Ni - Cu alloy Trim 5 or 5A
12	316 and Hardfaced	18Cr - 8Ni Trim 6 or 5A
13	Alloy 20	19Cr - 29Ni
14	Alloy 20 and Hardfaced	19Cr - 29Ni Trim 5 or 5A

For End Connections, Body Materials and Trims not listed, please specify.

Please order by size, figure number(which specifies type), pressure class, end connections, materials and special features, as shown above.

SC=Stop-Check
 SG=Solid Wedge, Gate
 SL=Special Lining
 SO=Safe-o-Seal Bonnet
 ST=Socket Weld x Threaded
 TD=Tilting Disc Check
 TF=Teflon* Insert
 UB=Union Bonnet
 VT=Viton* Insert
 WB=Welded Bonnet

*Viton and Teflon are registered trademarks of DuPont Company.

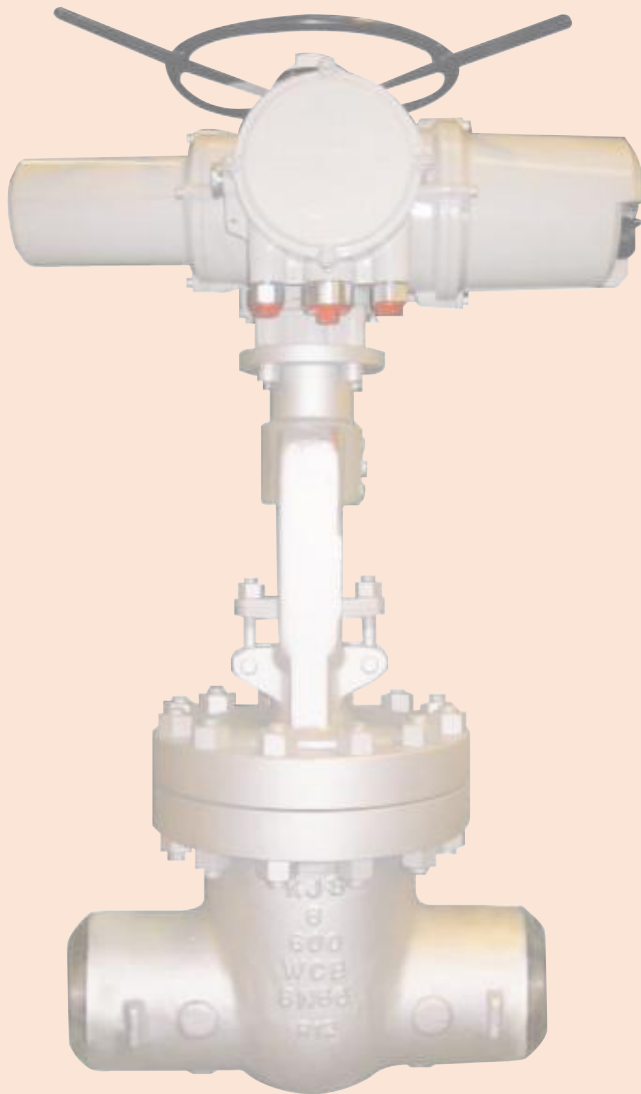
**Monel is a registered trademark of International Nickel Company.

ABBREVIATIONS

AARH	Arithmetical Average Roughness Height	PT	Liquid Penetrant Test
ASB	Asbestos	PTFE	Poly Tetra Fluoro Ethylene
BB	Bolted Bonnet	PVC	Poly Vinyl Chloride
BC	Bolted Cap	RF	Raised Face
BE	Bevel End	RS	Rising Stem
BG-1	Bolted Gland	RT	Radiograph Test
BG-2	Bevel Gear	RTJ	Ring Type Joint
BW	Butt Weld	SB	Screwed Bonnet
CL	Class	S.BOLT	Stud Bolt
EB	Extension Bonnet	SC	Screwed Cap
EC	External Coating	SCH	Schedule
EPDM	Ethylene Propylene Diene Monomer	SCRD	Screwed
FEP	Fluorinated Ethylene Propylene	SDNR	Stem Down Non Return
FF	Flat Face	SF.1	Smooth Finish
FLGD	Flanged	SF.2	Stellite Facing
HF.1	Hard Facing	SG	Spur Gear
HF.2	HALF	SMF	Smooth Finish
IC	Internal Coating	SMLS	Seamless Product
LB	Long Bonnet	STD	Standard
M. BOLT	Machine Bolt	STF	Stock Finish
MF	Male & Female	STL	STELLITE
MT	Magnetic particle Test	SW	Socket Weld
NRV	Non Return Valve	TFE	Tetra Fluoro Ethylene
NBR	Nitrile or Buna-N Rubber	TG	Tongue & Groove
NPT	Nominal Pipe Thread	UB	Union Bonnet
NRS	Non Rising Stem	UC	Union Cap
OCT	Octagonal Ring Gasket	UT	Ultrasonic flaw detecting Test
OS & Y	Outside Screw & Yoke	WB	Welded Bonnet
OVAL	Oval Ring Gasket	WC	Welded Cap
PSB	Pressure Seal Bonnet	WG	Worm Gear
PC	Pressure Seal Cover	WN	Welding Neck

GATE VALVES

BOLTED BONNET



CAST STEEL

BOLTED BONNET

GATE VALVES

YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150°C (2100°F) dissolution point in accordance with API Std. specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2.

BONNET

The bonnet and valve body have the same wall thickness. The body-bonnet flange drilling is spot-faced to exactly meet stud-bolt nuts. The bonnet back seat bushing guarantees packing replacement even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API specifications.

STEM

The machined forged stem comes with a T-shape head, which connects the slot of the wedge. The spherically shaped contacting surface of the head gives greater strength and durability. The stem dimensions are in accordance with API Std. 600 specifications. The heat treated stem delivers adequate mechanical properties as well as excellent surface hardness. Further, opening/shutting friction is minimized by accurate machining and lapping.

SEAT RING

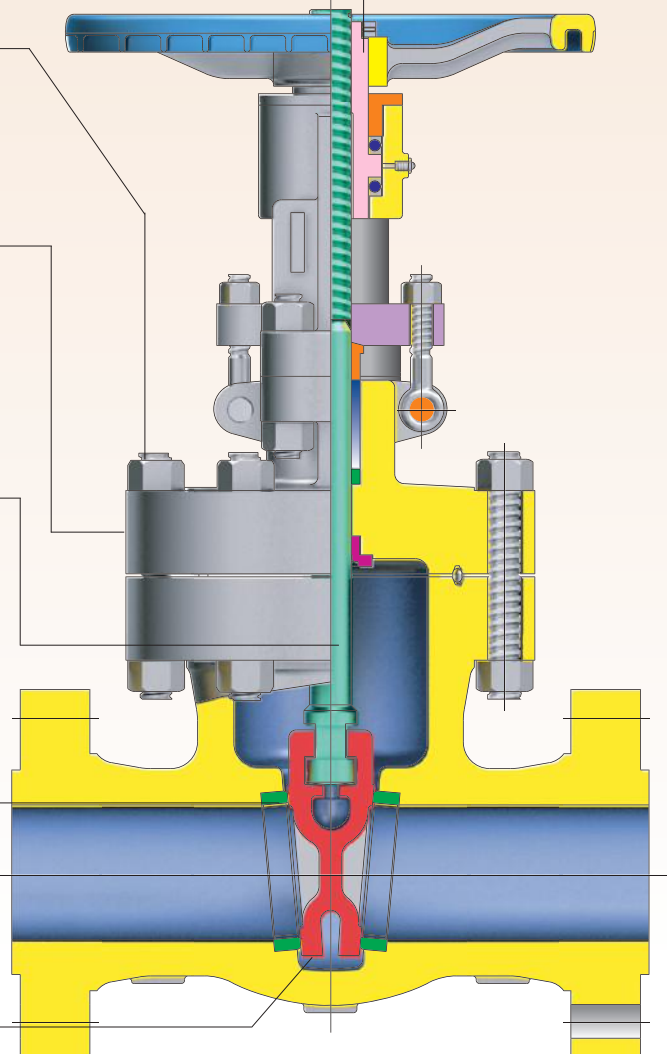
Bottom seated type seat rings are welded or screwed into the body. The seating surface is finished by lapping. They are forgings that have been heat treated to deliver the best mechanical properties and required hardness. The difference in hardness between seats and wedge is in accordance with API specifications.

FLEXIBLE WEDGE

The standard disc of our valves is a one-piece flexible wedge. Slots are machined on both sides of the wedge to allow it to travel correctly in the integrally cast body guides. The wedge seating surfaces have been accurately machined, grind and lapped to a mirror finish to prevent leakage and eliminate galling.

BODY

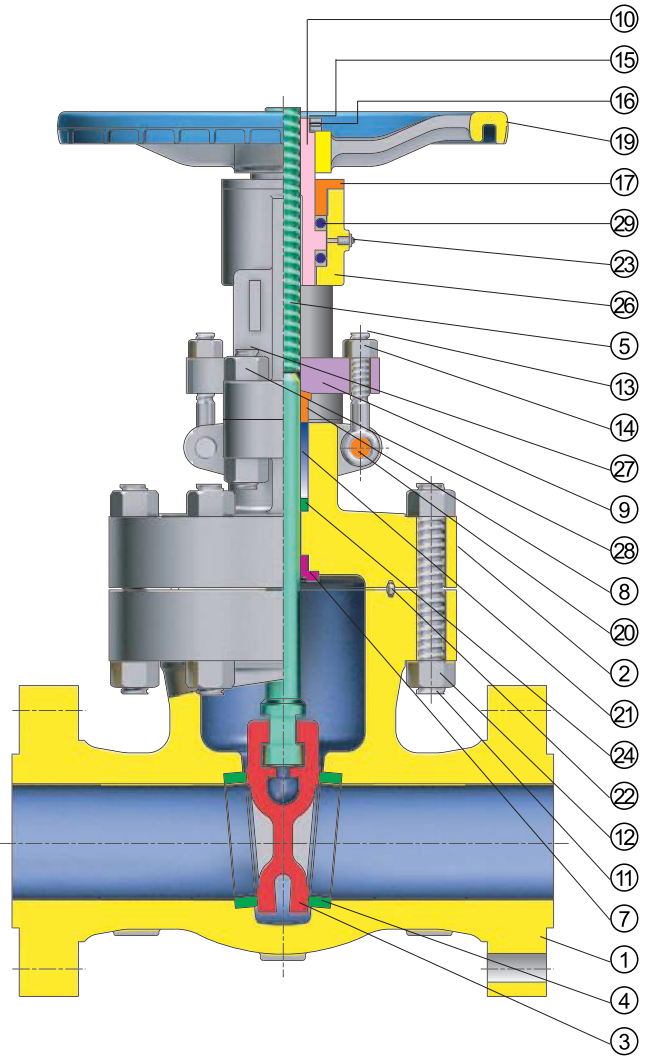
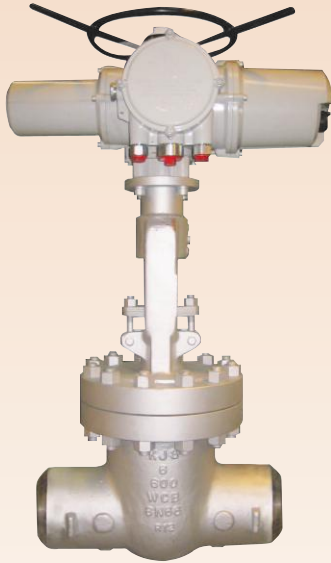
The cast steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 600. Special care has been taken with the design of the Class 150 valve body so that the elliptically shaped center section is free from intensified stresses in the critical area. The body of above Class 300 are made circular in shape as much as possible to minimize distortion even under extreme operating conditions. Inlet and outlet port dimensions conform with ASME B16.34 Pipe Fitting. The welded-in type seat ring is standard to insure interchangeability. Except for Class 150, the standard body-bonnet joint is male and female.



CAST STEEL

BOLTED BONNET

GATE VALVES



NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BEARING	COMMERCIAL

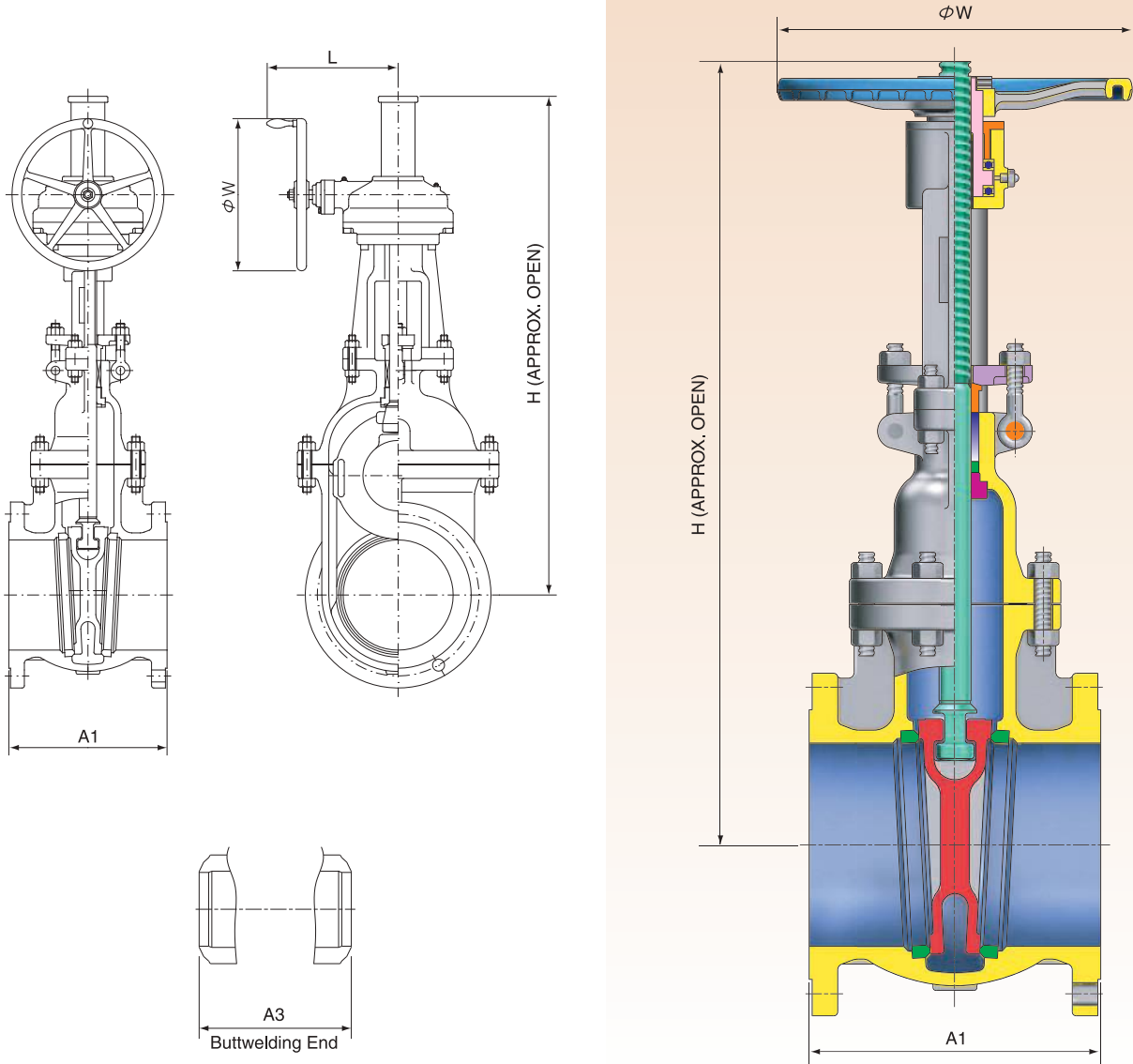
NO	NAME OF PART	ASTM SPECIFICATION												
		STANDARD	HIGH TEMPERATURE SERVICE					LOW TEMPERATURE SERVICE		STAINLESS STEEL				ALLOY STEEL
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	*DISC	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A350-LF2	A350-LF2	A240-304	A240-316	A240-304L	A240-316L	ALLOY 20	A182-F51
5	STEM	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	BONNET BUSH	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A276-304
8	PACKING GLAND	A479-410							A276-304				A276-304	
9	GLAND FLANGE	A105 or A283-D							AISI 304				AISI 304	
10	YOKE SLEEVE	A439-D2							A439-D2				A439-D2	
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A320-L7	A320-L7	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8
12	BONNET NUT	A194-2H	A194-2H	A194-4	A194-4	A194-4	A194-4L	A194-4L	A194-8	A194-8	A194-8	A194-8	A194-8	A194-8
13	GLAND BOLT	A307-B							A193-B8				A193-B8	
14	GLAND NUT	A194-2H							A194-8				A194-8	
20	HINGE PIN	A108-1020							A276-304				A276-304	
24	LANTERN	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
26	YOKE	A216-WCB							A351-CF8				A351-CF8	
27	YOKE BOLT	A193-B7							A193-B8				A193-B8	
28	YOKE NUT	A194-2H							A194-8				A194-8	

*Note : In case of 12" and larger size, we'll use trim material overlaid one on the same or equivalent material of the Body.

GATE VALVES

BOLTED BONNET

GT CLASS 150

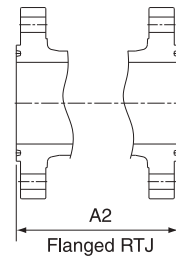
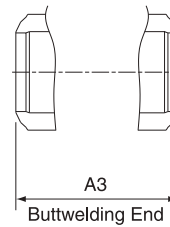
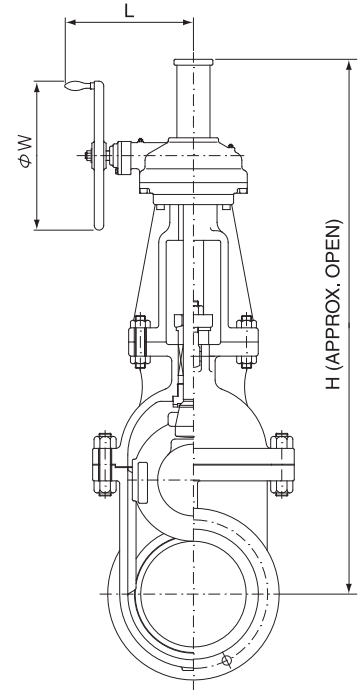
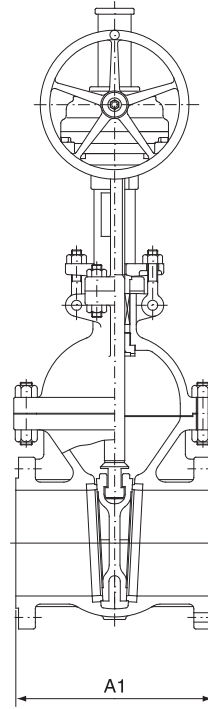
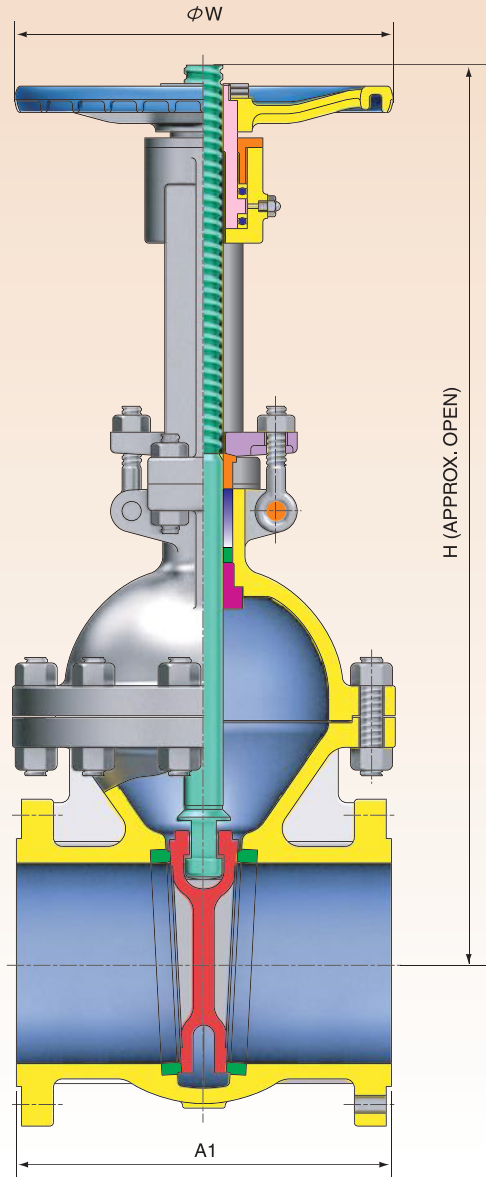


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	40	42	48	52	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	1000	1050	1200	1300	
A1	in	7.0	7.5	8.0	9.0	10.5	11.5	13.0	14.0	15.0	16.0	17.0	18.0	20.0	24.0	24.0	28.0	30.0	32.0	34.0	36.0	
	mm	178	190	203	229	267	292	330	356	381	406	432	457	508	610	610	711	762	813	864	914	
A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	22.5	24.0	26.0	28.0	32.0	36.0	36.0	40.0	42.0	43.0	41.9	54.0	
	mm	216	241	282	305	403	419	457	502	572	610	660	711	813	914	914	1016	1067	1092	1064	1372	
H	in	13.7	16.6	18.0	22.3	29.5	36.7	46.3	52.2	60.0	71.2	87.2	99.3	112.2	129.3	139.0	156.7	169.0	181.1	204.7	224.4	
	mm	347	422	457	566	749	931	1176	1326	1525	1809	2214	2522	2850	3284	3530	3980	4292	4600	5200	5700	
W	in	7.9	7.9	7.9	9.8	11.8	14.0	15.7	17.7	19.7	22.0	19.7	24.8	24.8	28.0	28.0	31.5	35.4	35.4	35.4	39.4	
	mm	200	200	200	250	300	355	400	450	500	560	500	630	630	710	710	800	900	900	900	1000	
L	in	-	-	-	-	-	-	-	-	-	-	13.5	15.3	15.3	16.0	16.0	18.1	19.1	19.1	20.8	23.2	
	mm	-	-	-	-	-	-	-	-	-	-	342	389	389	406	406	461	486	486	529	590	
WEIGHT	RF	lb	37.5	55.1	61.7	90.4	152.1	238.1	357.1	513.7	815.7	1177.3	1587.3	1851.9	3423.8	4817.1	5092.7	9740.0	10368.3	10445.5	15674.9	18739.3
		kg	17	25	28	41	69	108	162	233	370	534	720	840	1553	2185	2310	4418	4703	4738	7110	8500
	BW	lb	35.3	46.3	57.3	83.8	132.3	202.8	310.9	467.4	749.6	1111.1	1397.7	1611.6	3090.9	4634.1	4916.3	9438.0	9322	9978.1	14107.4	16865.4
		kg	16	21	26	38	60	92	141	212	340	504	634	731	1402	2102	2230	4281	4233	4526	6399	7650

GATE VALVES

BOLTED BONNET

GT CLASS 300

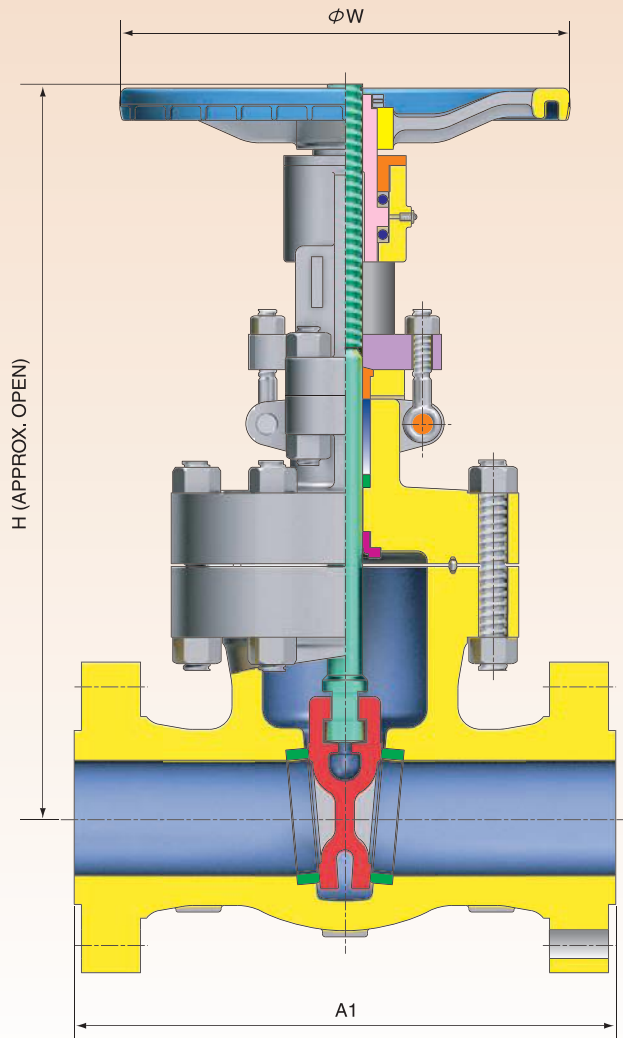
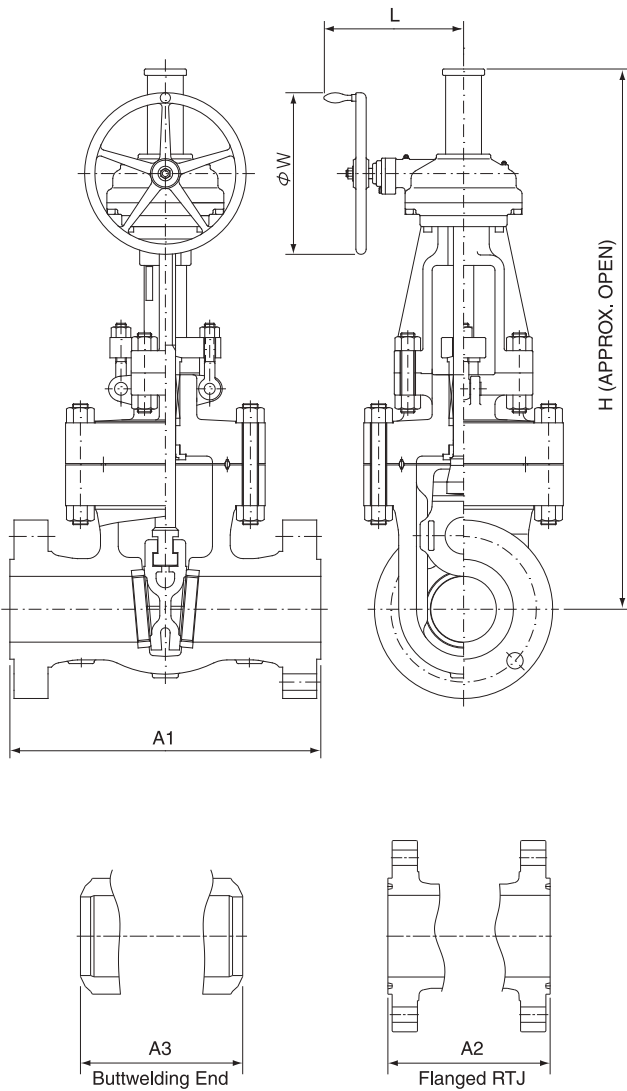


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	40	42	48	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	1000	1050	1200	
A1 & A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	30.0	33.0	36.0	39.0	45.0	53.0	55.0	68.0	76.0	78.0	87.2	
	mm	216	241	282	305	403	419	457	502	762	838	914	991	1143	1346	1397	1727	1930	1981	2215	
A2	in	9.1	10.1	11.7	12.6	16.5	17.1	18.6	20.4	30.6	33.6	36.6	39.8	45.9	54.0	56.0	69.1	-	-	-	
	mm	232	257	298	321	419	435	473	518	778	854	930	1010	1165	1372	1422	1756	-	-	-	
H	in	14.8	18.0	18.7	23.1	30.6	37.9	46.4	55.8	68.1	77.0	89.3	95.0	109.6	136.2	137.8	156.4	188.6	174.4	217.4	
	mm	375	456	475	586	776	963	1179	1417	1730	1955	2267	2414	2785	3460	3501	3973	4791	4430	5522	
W	in	7.9	7.9	8.9	9.8	14.0	15.7	17.7	19.7	19.7	19.7	24.8	24.8	31.5	35.4	35.4	35.4	39.4	39.4	39.4	
	mm	200	200	225	250	355	400	450	500	500	500	630	630	800	900	900	900	1000	1000	1000	
L	in	-	-	-	-	-	-	-	-	13.5	13.5	15.3	15.3	18.1	19.1	19.1	20.8	23.2	23.2	23.2	
	mm	-	-	-	-	-	-	-	-	342	342	389	389	461	486	486	529	590	590	590	
WEIGHT	RF	lb	50.7	83.8	88.2	134.5	269.0	412.3	604.1	1005.3	1593.9	2392.0	3082.1	3518.6	5304.3	8068.9	9678.3	15101.7	18651.1	20943.9	27337.3
		kg	23	38	40	61	122	187	274	456	723	1085	1398	1596	2406	3660	4390	6850	8460	9500	12400
	BW	lb	46.3	70.5	77.2	92.6	260.1	330.7	480.6	802.5	1210.3	1907.0	2638.9	2985.1	4440.1	6865.2	8842.7	13066.8	13580.5	14991.4	19841.6
		kg	21	32	35	42	118	150	218	364	549	865	1197	1354	2014	3114	4011	5927	6160	6800	9000

GATE VALVES

BOLTED BONNET

GT CLASS 600

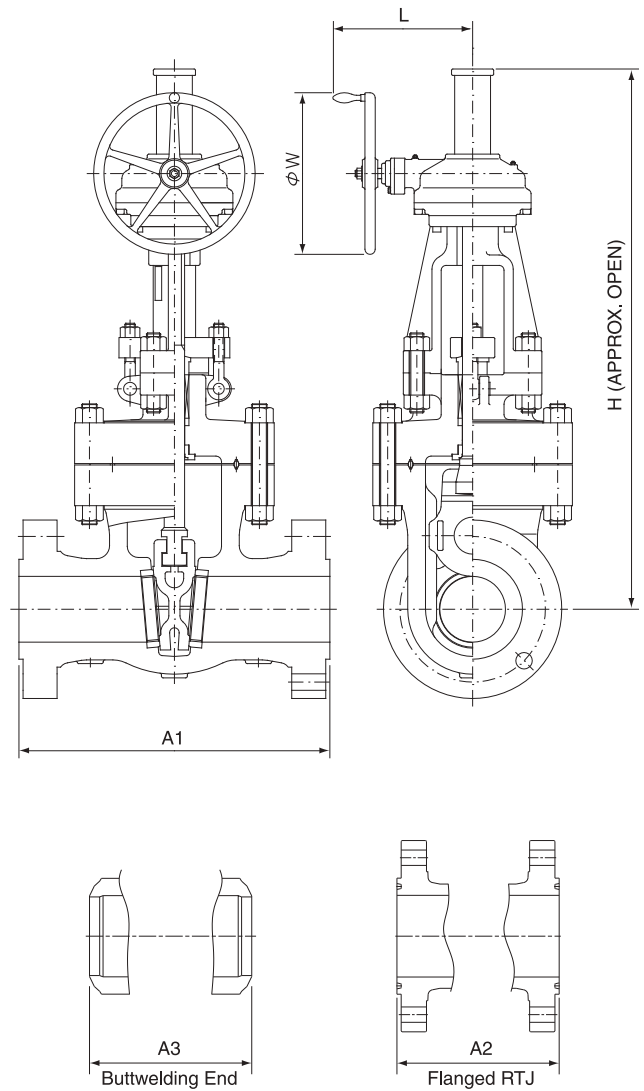
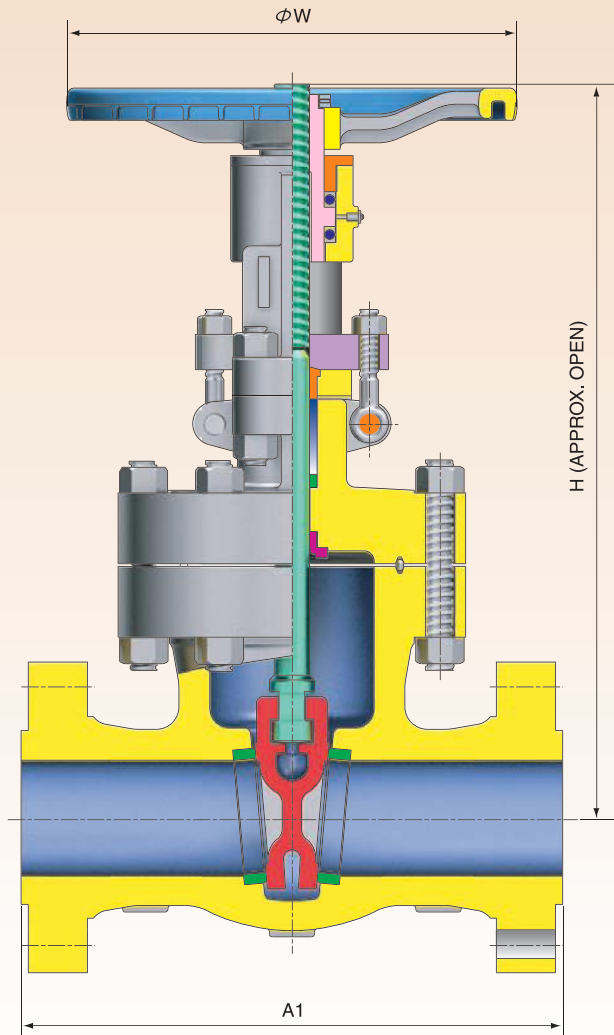


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	40	42	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	1000	1050	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	61.0	65.0	82.0	94.0	96.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	1549	1651	2083	2387	2438	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	61.5	65.5	82.6	-	-	
	mm	295	333	359	435	562	663	790	841	892	994	1095	1200	1407	1562	1663	2098	-	-	
H	in	18.5	19.4	22.0	26.9	37.4	42.6	49.8	66.9	73.0	84.3	103.0	108.2	111.1	128.8	138.6	179.5	207.6	240.1	
	mm	471	494	558	682	951	1081	1264	1699	1855	2140	2616	2749	2823	3272	3521	4560	5273	6098	
W	in	8.8	8.8	9.8	11.8	17.7	19.7	24.8	24.8	24.8	28.0	31.5	31.5	35.4	35.4	39.4	39.4	39.4	39.4	
	mm	224	224	250	300	450	500	630	630	630	710	800	800	900	900	1000	1000	1000	1000	
L	in	-	-	-	-	-	-	-	15.3	15.3	16.0	18.1	18.1	19.1	20.8	23.2	23.2	23.2	24.4	
	mm	-	-	-	-	-	-	-	389	389	406	461	461	486	529	590	590	590	619	
WEIGHT	RF	lb	94.8	132.3	154.3	295.4	628.3	987.7	1499.1	2398.6	2892.5	4146.9	5216.1	7050.4	10472.0	13340.2	15311.1	21473.0	23258.8	24140.6
		kg	43	60	70	134	285	448	680	1088	1312	1881	2366	3198	4750	6051	6945	9740	10550	10950
	BW	lb	61.7	99.2	132.3	229.3	451.9	690.0	1179.5	2151.7	2471.4	3558.3	4499.6	6139.9	9171.2	12202.6	13276.2	17945.6	18827.5	21539.2
		kg	28	45	60	104	205	313	535	976	1121	1614	2041	2785	4160	5535	6022	8140	8540	9770

GATE VALVES

BOLTED BONNET

GT CLASS 900

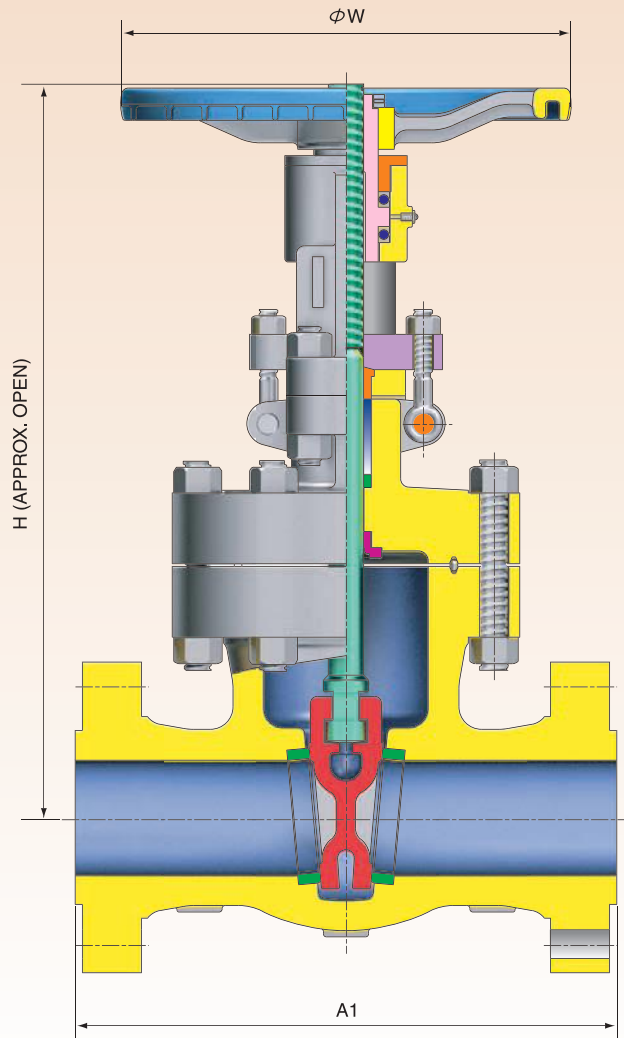
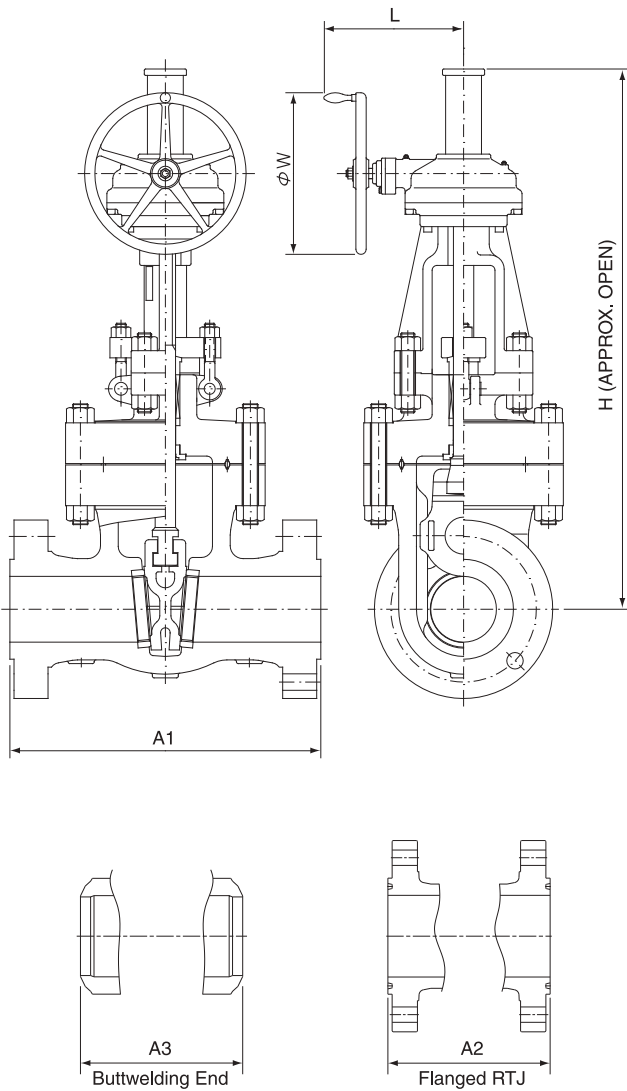


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1 & A3	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	
	mm	368	419	381	457	610	737	838	965	1029	1130	1219	1321	1549	
A2	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	
	mm	371	422	384	460	613	740	841	968	1038	1140	1232	1334	1568	
H	in	21.0	26.4	26.6	30.8	35.0	48.8	71.2	75.7	72.0	80.2	86.4	110.2	124.0	
	mm	534	671	676	783	888	1239	1808	1923	1830	2036	2195	2800	3150	
W	in	11.8	11.8	14.0	15.7	22.0	19.7	24.8	28.0	28.0	31.5	35.4	35.4	39.4	
	mm	300	300	355	400	560	500	630	710	710	800	900	900	1000	
L	in	-	-	-	-	-	13.5	15.3	16.0	16.0	18.1	19.1	23.2	23.2	
	mm	-	-	-	-	-	342	389	406	406	461	486	590	590	
WEIGHT	RF	lb	180.8	341.7	363.8	383.6	998.7	1829.8	3042.4	3399.5	4894.3	6613.9	8531.9	10714.5	16093.7
		kg	82	155	165	174	453	830	1380	1542	2220	3000	3870	4860	7300
	BW	lb	130.1	286.6	291.0	295.4	822.3	1536.6	2627.9	2844.0	4166.7	5881.9	7275.3	8928.7	13492.3
		kg	59	130	132	134	373	697	1192	1290	1890	2668	3300	4050	6120

GATE VALVES

BOLTED BONNET

GT CLASS 1500

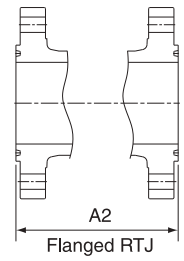
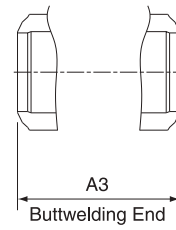
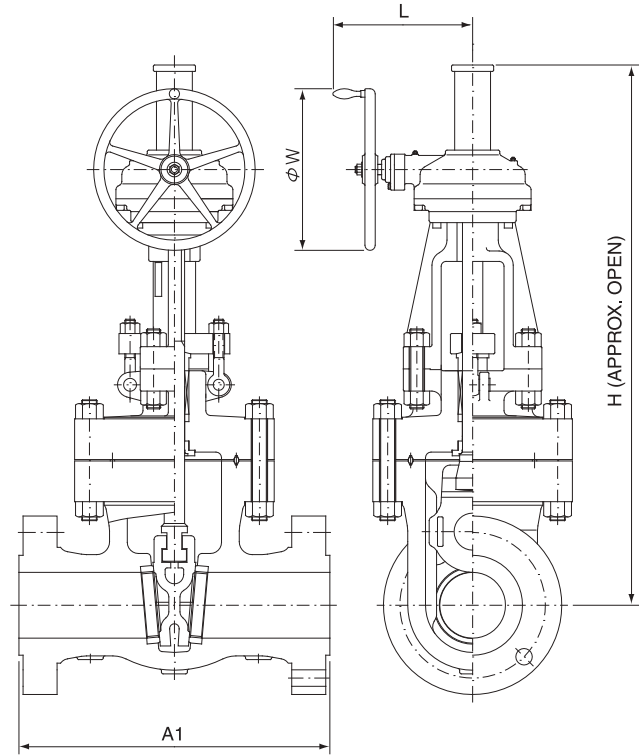
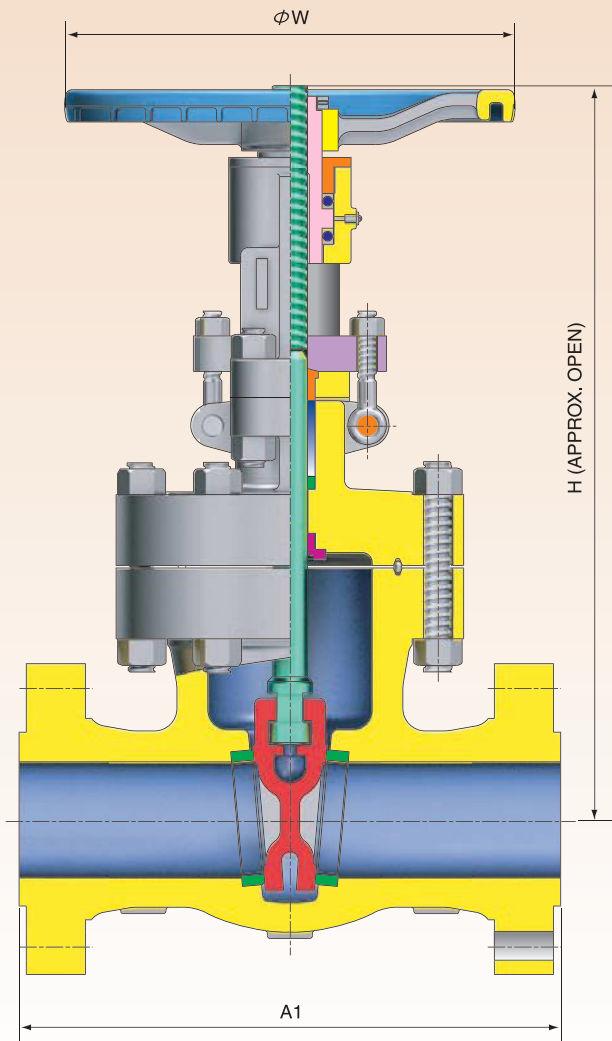


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1 & A3	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.5	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1384	1537	1664	1943	
A2	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.4	61.4	66.4	77.6	
	mm	371	422	473	549	711	842	1000	1146	1276	1406	1559	1686	1971	
H	in	21.0	26.4	29.1	30.8	51.9	63.0	66.4	82.3	85.1	97.9	108.7	122.1	146.5	
	mm	534	671	738	783	1318	1600	1686	2090	2162	2486	2762	3102	3721	
W	in	11.8	11.8	15.7	19.7	19.7	28.0	28.0	35.4	35.4	35.4	39.4	39.4	39.4	
	mm	300	300	400	500	500	710	710	900	900	900	1000	1000	1000	
L	in	-	-	-	-	13.5	16.0	16.0	19.1	20.8	20.8	23.2	23.2	24.4	
	mm	-	-	-	-	342	406	406	486	529	529	590	590	619	
WEIGHT	RF	lb	180.8	341.7	370.4	573.2	1360.3	3284.9	4411.4	8412.8	9072.0	15322.1	19841.6	24537.4	35869.2
		kg	82	155	168	260	617	1490	2001	3816	4115	6950	9000	11130	16270
	BW	lb	130.1	286.6	286.6	352.7	974.4	2755.8	3540.6	7079.0	7054.8	13227.7	17063.8	21076.2	30357.6
		kg	59	130	130	160	442	1250	1606	3211	3200	6000	7740	9560	13770

GATE VALVES

BOLTED BONNET

GT CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1 & A3	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	
	mm	451	508	578	673	914	1022	1270	1422	
A2	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	
	mm	454	514	584	683	927	1038	1292	1444	
H	in	24.4	31.9	31.9	42.3	57.1	63.0	82.5	90.2	
	mm	619	809	809	1074	1451	1600	2096	2292	
W	in	11.8	17.7	17.7	24.8	24.8	28.0	31.5	35.4	
	mm	300	450	450	630	630	710	800	900	
L	in	-	-	-	-	15.3	16.0	18.1	20.8	
	mm	-	-	-	-	389	406	461	529	
WEIGHT	RF	lb	205.0	330.7	443.1	1336.0	3505.3	5379.3	10083.9	15829.2
		kg	93	150	201	606	1590	2440	4574	7180
	BW	lb	127.9	220.5	288.8	1082.5	2866.0	4409.2	8377.6	13227.7
		kg	58	100	131	491	1300	2000	3800	6000

GLOBE VALVES

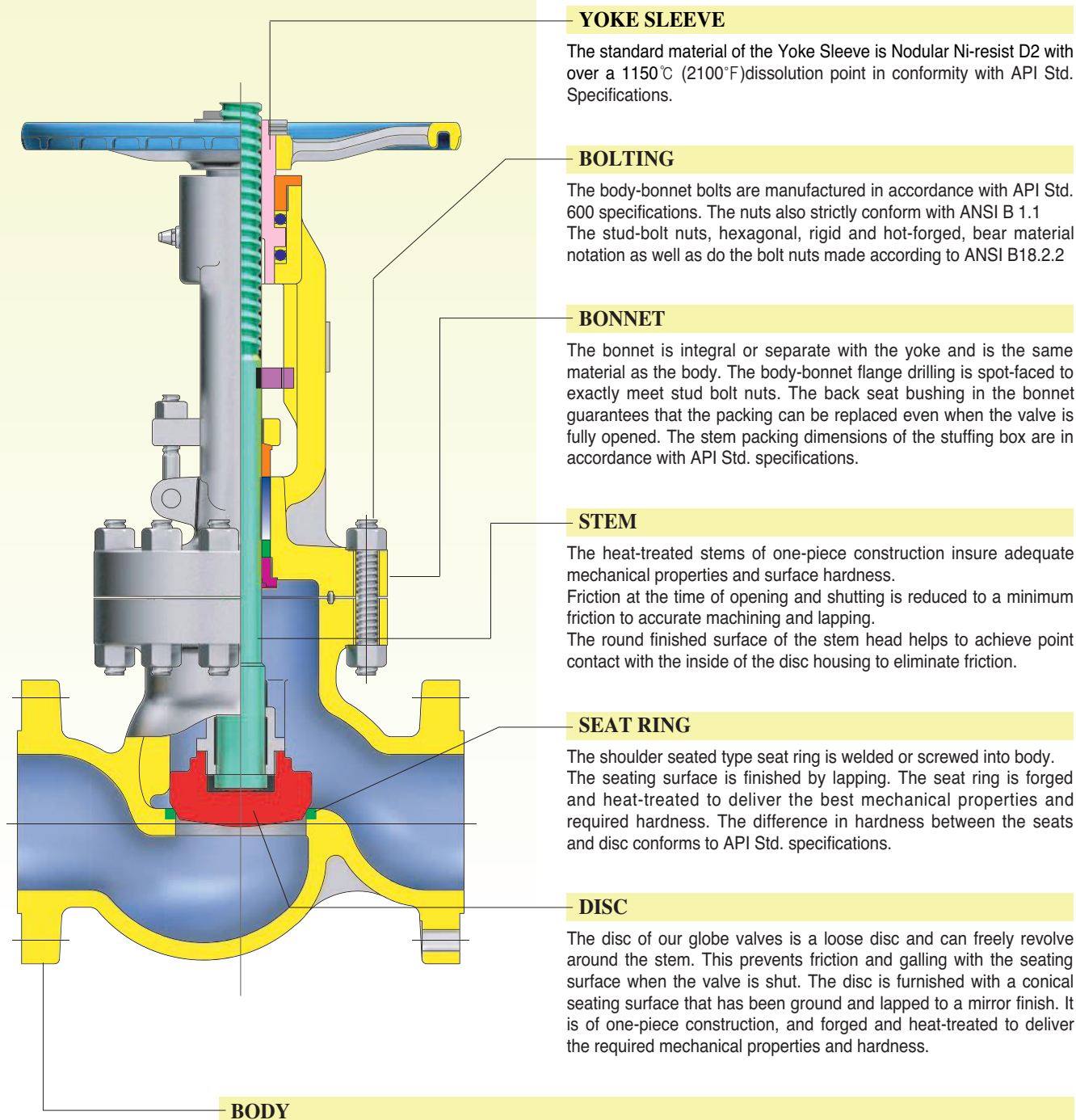
BOLTED BONNET



CAST STEEL

BOLTED BONNET

GLOBE VALVES



YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over a 1150°C (2100°F) dissolution point in conformity with API Std. Specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2

BONNET

The bonnet is integral or separate with the yoke and is the same material as the body. The body-bonnet flange drilling is spot-faced to exactly meet stud bolt nuts. The back seat bushing in the bonnet guarantees that the packing can be replaced even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API Std. specifications.

STEM

The heat-treated stems of one-piece construction insure adequate mechanical properties and surface hardness. Friction at the time of opening and shutting is reduced to a minimum friction to accurate machining and lapping. The round finished surface of the stem head helps to achieve point contact with the inside of the disc housing to eliminate friction.

SEAT RING

The shoulder seated type seat ring is welded or screwed into body. The seating surface is finished by lapping. The seat ring is forged and heat-treated to deliver the best mechanical properties and required hardness. The difference in hardness between the seats and disc conforms to API Std. specifications.

DISC

The disc of our globe valves is a loose disc and can freely revolve around the stem. This prevents friction and galling with the seating surface when the valve is shut. The disc is furnished with a conical seating surface that has been ground and lapped to a mirror finish. It is of one-piece construction, and forged and heat-treated to deliver the required mechanical properties and hardness.

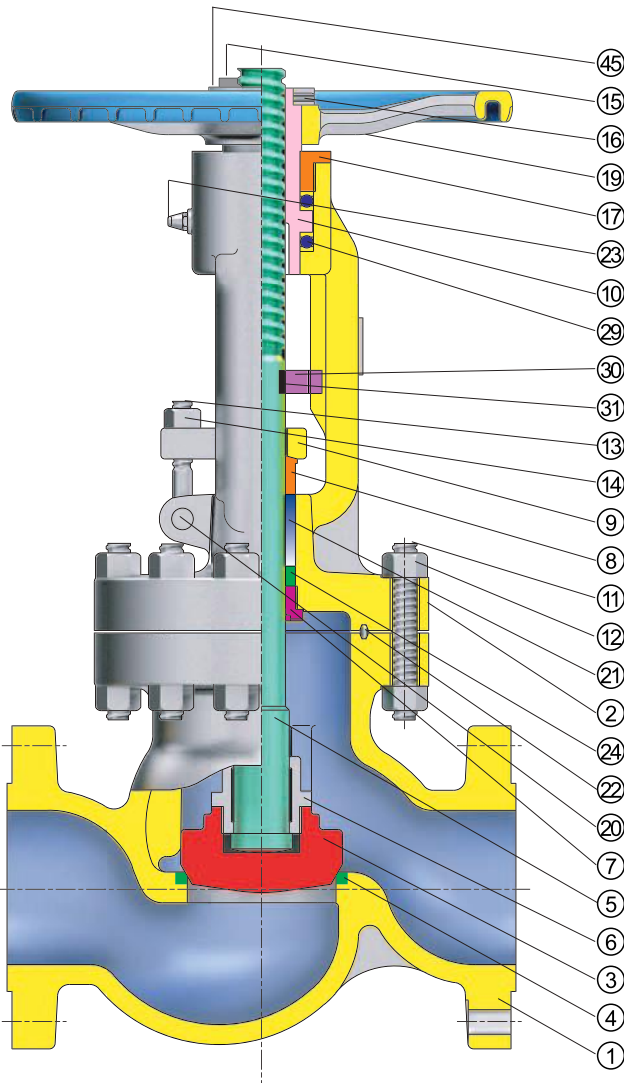
BODY

The cast steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 600. Port and seat passage dimensions conform to ASME B16.34. The welded-in type seat ring is standard to allow interchangeability. The standard body-bonnet joint is male-female, and the flange is round for all valves. Accurate machining insures perfect coaxiality of the valve ends and seat ring in addition to exact perpendicularity of the body-bonnet flanges.

CAST STEEL

BOLTED BONNET

GLOBE VALVES



NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BEARING	A295-52100
30	STOPPER	A283-D
31	KEY	STEEL
45	WASHER	STEEL

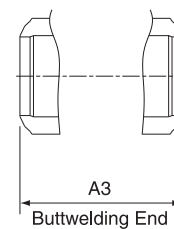
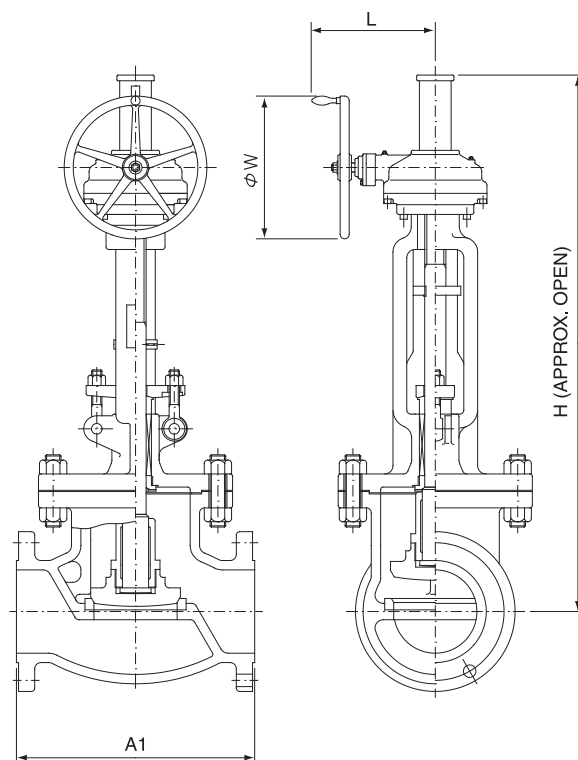
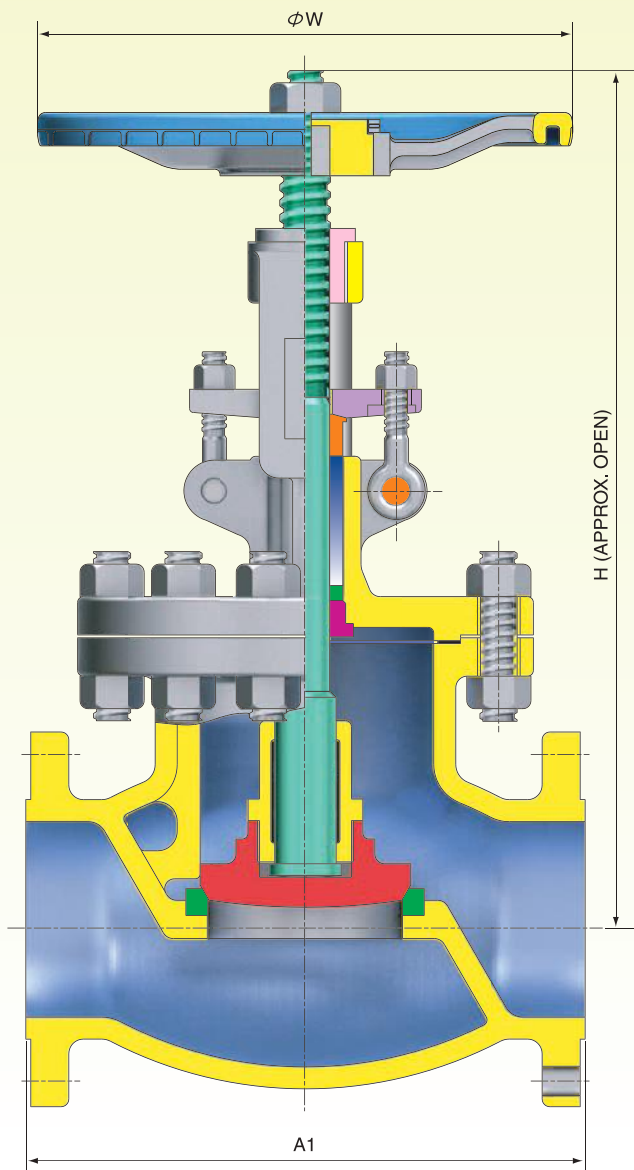
NO	NAME OF PART	ASTM SPECIFICATION												
		STANDARD					HIGH TEMPERATURE SERVICE		LOW TEMPERATURE SERVICE		STAINLESS STEEL			ALLOY STEEL
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/1LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/1LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	*DISC	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A350-LF2	A350-LF2	A240-304	A240-316	A240-304L	A240-316L	ALLOY 20	A182-F51
5	STEM	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
6	DISC GLAND	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	BONNET BUSH	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A276-304
8	PACKING GLAND	A479-410					A276-304		A276-304			A276-304		
9	GLAND FLANGE	A105 or A283-D							AISI 304			AISI 304		
10	YOKE SLEEVE	A439-D2							A439-D2			A439-D2		
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A320-L7	A320-L7	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8
12	BONNET NUT	A194-2H	A194-2H	A194-4	A194-4	A194-4	A194-4L	A194-4L	A194-8	A194-8	A194-8	A194-8	A194-8	A194-8
13	GLAND BOLT	A307-B							A193-B8			A193-B8		
14	GLAND NUT	A194-2H							A194-8			A194-8		
20	HINGE PIN	A108-1020							A276-304			A276-304		
24	PACKING RING	A479-410					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51

*Note : In case of 12" and larger size, we'll use trim material overlaid one on the same or equivalent material of the Body.

GLOBE VALVES

BOLTED BONNET

GL CLASS 150

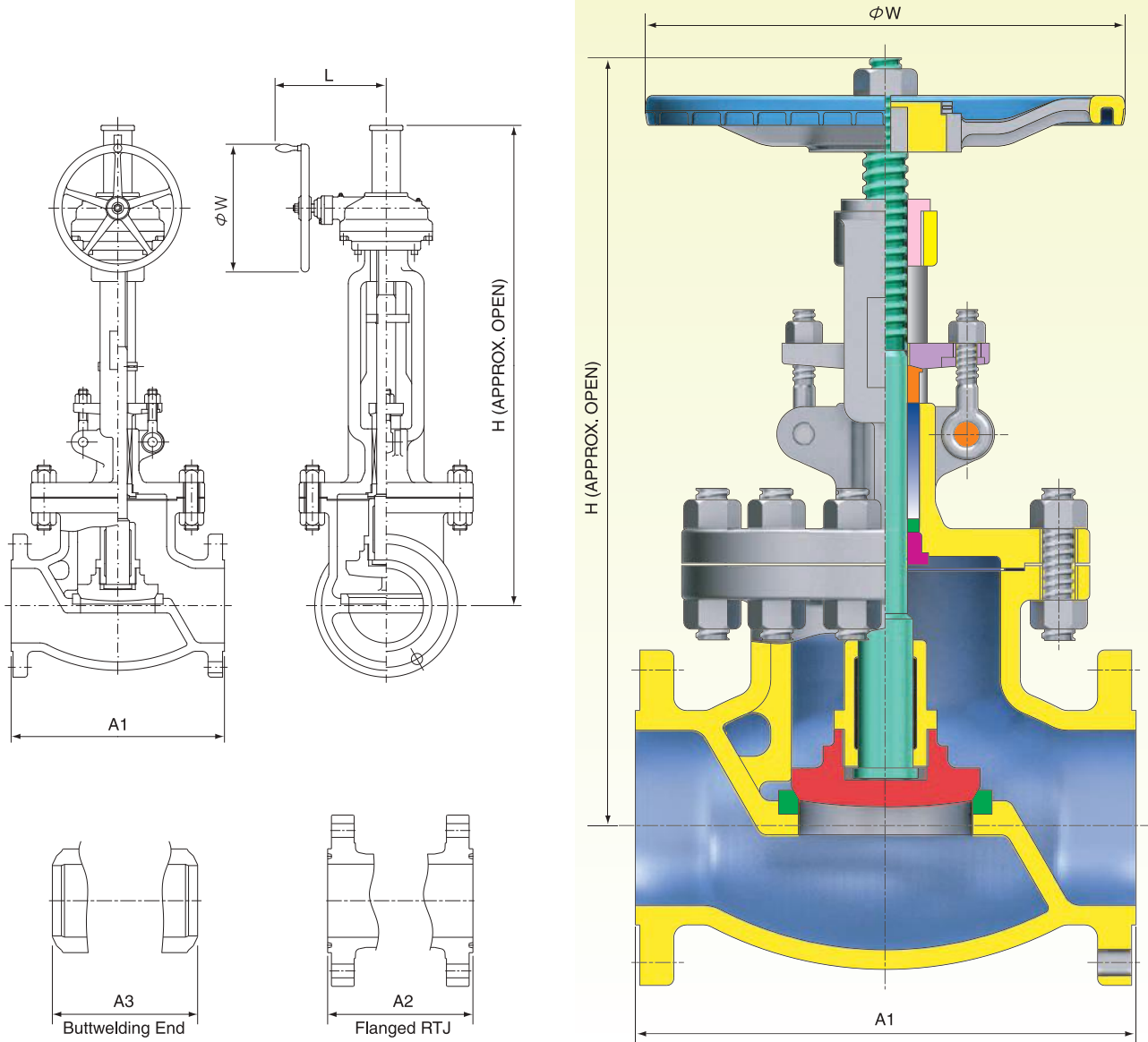


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1 & A3	in	8.0	8.5	9.5	11.5	16.0	19.5	24.5	27.5	31.0	36.0	38.5	
	mm	203	216	241	292	406	495	622	699	787	914	978	
H	in	15.3	15.2	17.1	19.8	23.0	28.3	31.4	39.8	53.1	56.7	78.0	
	mm	388	387	434	503	585	718	798	1011	1349	1440	1980	
W	in	7.9	8.8	8.8	9.8	14.0	14.0	17.7	19.7	28.0	28.0	28.0	
	mm	200	224	224	250	355	355	450	500	710	710	710	
L	in	-	-	-	-	-	-	-	-	16.0	16.0	16.0	
	mm	-	-	-	-	-	-	-	-	406	407	407	
WEIGHT	RF	lb	44.1	77.2	88.2	123.5	229.3	401.3	650.5	903	1466	1975	3969
		kg	20	35	40	56	104	182	295	410	665	896	1800
	BW	lb	35.3	66.2	75	99.2	196.2	350.5	579.8	802.5	1327.2	1799	3889
		kg	16	30	34	45	89	159	263	364	602	816	1764

GLOBE VALVES

BOLTED BONNET

GL CLASS 300

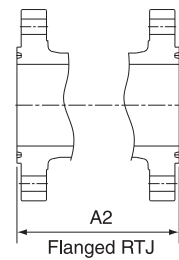
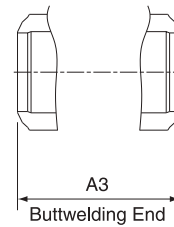
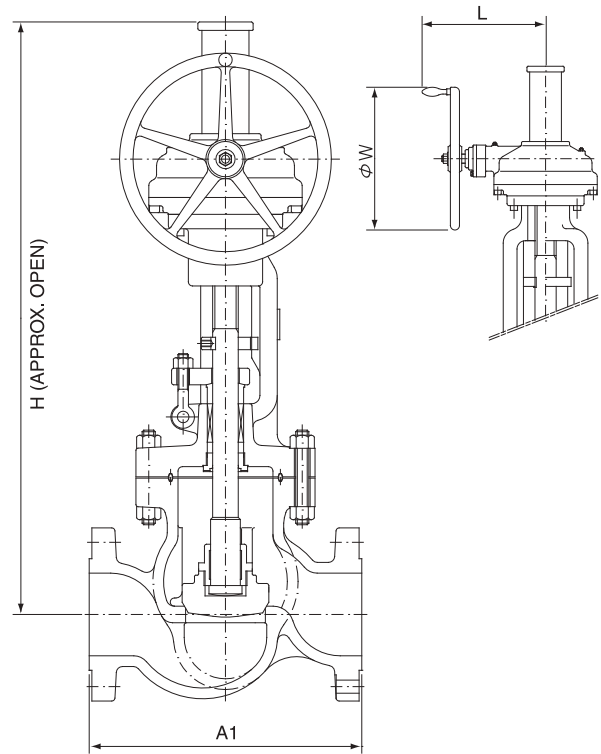
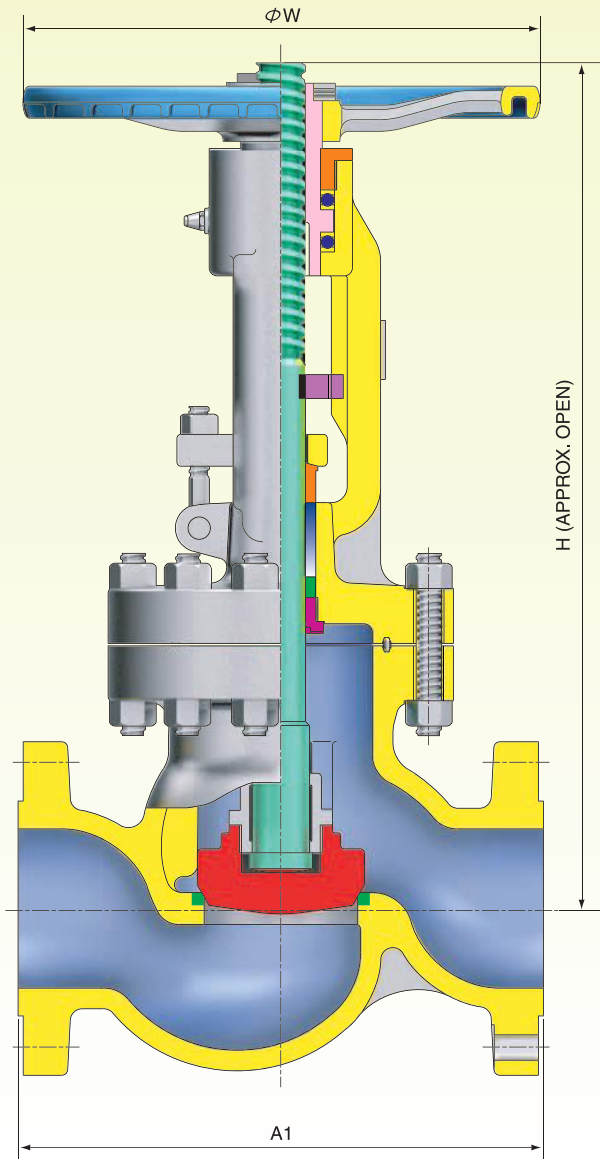


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	22.0	24.5	28.0	33.0	36.0	
	mm	267	292	318	356	444	559	622	711	838	914	
A2	in	11.1	12.1	13.1	14.6	18.1	22.6	25.1	28.6	33.6	36.6	
	mm	283	308	333	371	460	575	638	727	854	929	
H	in	15.5	16.8	18.1	21.7	29.4	31.7	46.3	50.7	62.5	64.4	
	mm	393	427	461	552	746	806	1176	1287	1588	1635	
W	in	7.9	8.8	9.8	14.0	17.7	22.0	28.0	28.0	35.4	31.5	
	mm	200	224	250	355	450	560	710	710	900	800	
L	in	-	-	-	-	-	-	16.0	16.0	20.8	21.0	
	mm	-	-	-	-	-	-	406	406	529	534	
WEIGHT	RF	lb	70.6	92.6	141	220.5	419	595.4	1283	2416.3	2546.8	3748.5
		kg	32	42	64	100	190	270	582	1096	1155	1700
	BW	lb	57.3	72.8	114.6	178.6	352.7	498.2	1137.6	2209	2262	3393
		kg	26	33	52	81	160	226	516	1002	1026	1539

GLOBE VALVES

BOLTED BONNET

GL CLASS 600

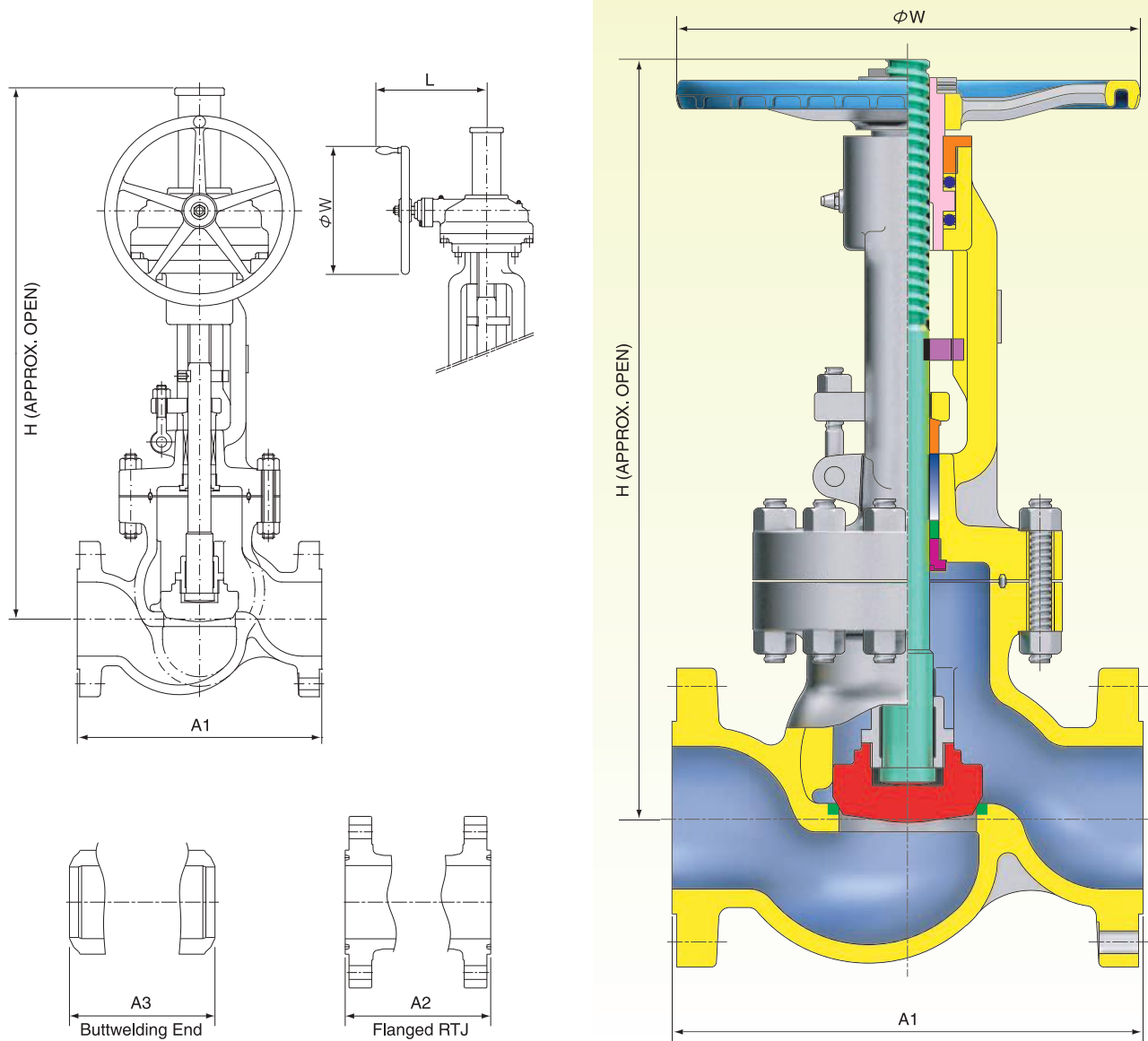


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	
	mm	292	330	356	432	559	660	787	838	889	991	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	
	mm	295	333	359	435	562	664	791	841	892	994	
H	in	16.8	16.4	20.9	23.7	31.4	51.4	66.9	72.5	71.0	74.8	
	mm	426	416	530	601	798	1306	1700	1842	1804	1900	
W	in	8.8	8.8	11.0	14.0	17.7	31.5	39.4	39.4	39.4	39.4	
	mm	224	224	280	355	450	800	1000	1000	1000	1000	
L	in	-	-	-	-	-	18.1	23.2	23.2	23.2	24.4	
	mm	-	-	-	-	-	461	590	590	590	619	
WEIGHT	RF	lb	94.8	154.4	172	300	619.6	1473	2024	5842.2	5953.5	7938
		kg	43	70	78	136	281	668	918	2650	2700	3600
	BW	lb	64	66	104	216.1	410	1102	1753	3518.6	5534.6	7386.8
		kg	29	30	47	98	186	500	795	1596	2510	3350

GLOBE VALVES

BOLTED BONNET

GL CLASS 900

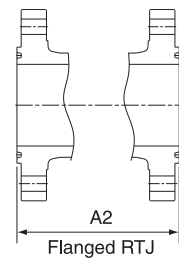
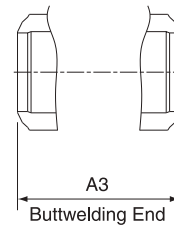
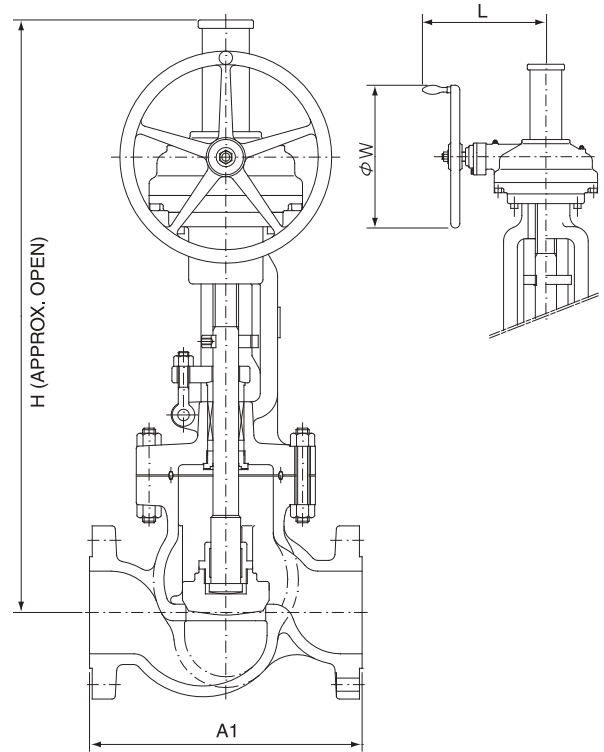
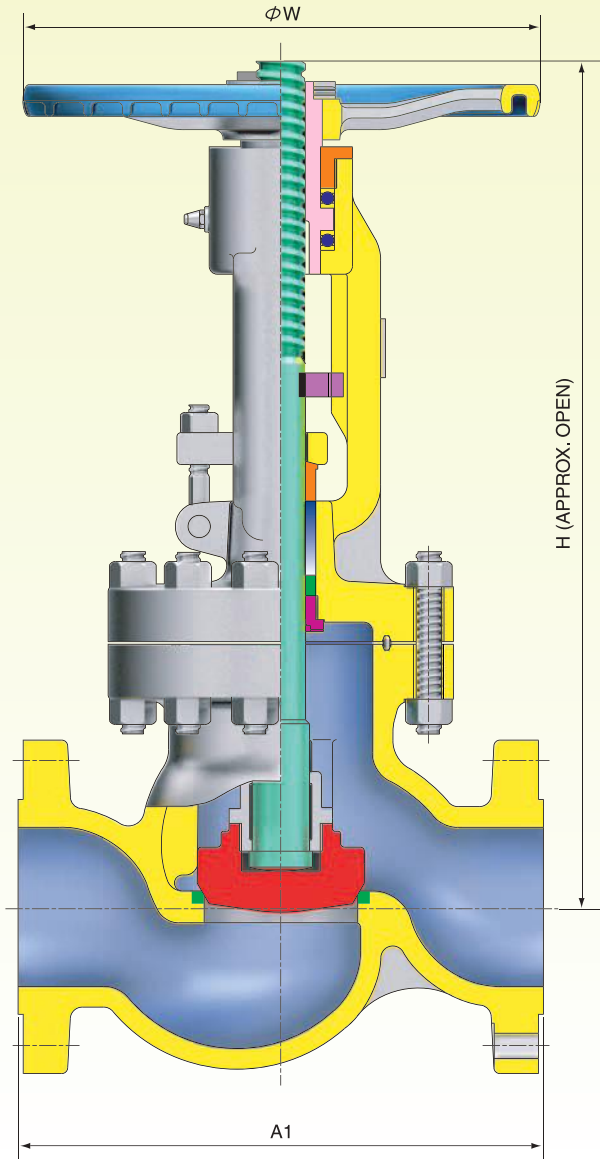


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	
	mm	368	419	381	457	610	737	838	965	1029	1130	
A2	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	
	mm	371	422	384	460	613	740	841	968	1038	1140	
H	in	27.2	27.0	30.2	34.6	53.9	67.7	69.5	67.1	87.0	103.1	
	mm	690	686	768	880	1370	1719	1765	1705	2210	2620	
W	in	15.7	15.7	15.7	15.7	28.0	35.4	31.5	35.4	35.4	35.4	
	mm	400	400	400	400	710	900	800	900	900	900	
L	in	-	-	-	-	16.0	20.8	12.2	26.4	26.4	26.4	
	mm	-	-	-	-	406	529	310	670	670	670	
WEIGHT	RF	lb	271.2	341.8	390	441	1208	2844	4520.3	5842	8048.3	9481.5
		kg	123	155	177	200	548	1290	2050	2650	3650	4300
	BW	lb	157	264.6	295.4	326	712	2425.5	4123.4	5292	7386.8	8600
		kg	71	120	134	148	323	1100	1870	2400	3350	3900

GLOBE VALVES

BOLTED BONNET

GL CLASS 1500

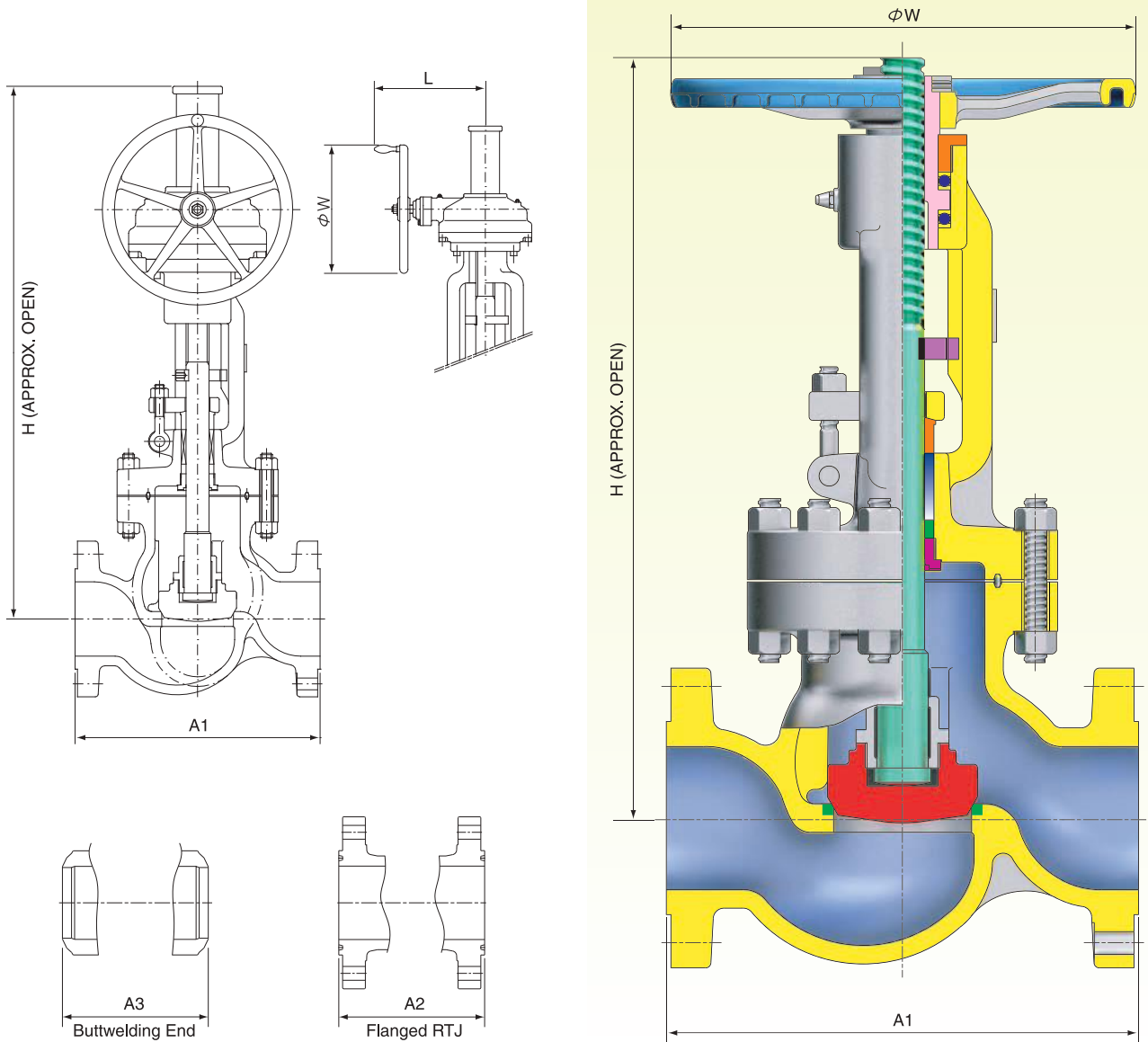


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.5	
	mm	368	419	470	546	705	832	991	1130	1257	1384	
A2	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.4	
	mm	371	422	473	549	711	841	1000	1146	1276	1407	
H	in	27.2	27.0	31.5	39.8	53.0	77.2	90.9	105.1	126.0	160.0	
	mm	690	686	801	1012	1345	1960	2310	2670	3200	4064	
W	in	15.7	15.7	19.7	19.7	35.4	28.0	29.9	29.9	29.9	29.9	
	mm	400	400	500	500	900	710	760	760	760	760	
L	in	-	-	-	-	20.8	18.4	20.2	20.2	22.3	22.3	
	mm	-	-	-	-	529	468	512	512	567	567	
WEIGHT	RF	lb	271.2	315	456	749.7	1482	4630.5	7056	9702	11907	14773.5
		kg	123	143	207	340	672	2100	3200	4400	5400	6700
	BW	lb	205.1	260	421	621.8	12171	4190	6174	8379	10363.5	12789
		kg	93	118	191	282	552	1900	2800	3800	4700	5800

GLOBE VALVES

BOLTED BONNET

GL CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1 & A3	in	17.8	20.0	22.8	26.5	36.0	40.3	50.0	56.0	
	mm	451	508	578	673	914	1022	1270	1422	
A2	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	
	mm	454	514	584	682	927	1038	1292	1444	
H	in	23.9	31.5	32.8	49.6	75.0	97.0	110.2	138.0	
	mm	606	800	834	1260	1905	2465	2800	3505	
W	in	15.7	19.7	19.7	24.0	24.0	29.9	29.9	29.9	
	mm	400	500	500	610	610	760	760	760	
L	in	-	-	-	20.2	17.0	22.3	22.3	22.3	
	mm	-	-	-	512	432	567	567	567	
WEIGHT	RF	lb	419	661.5	771.8	1852.2	5071.5	10584	14994	18742.5
		kg	190	300	350	840	2300	4800	6800	8500
	BW	lb	352.8	529.2	617.4	1521.5	4410	9702	13230	16537.5
		kg	160	240	280	690	2000	4400	6000	7500

SWING CHECK VALVES

BOLTED COVER



CAST STEEL

BOLTED COVER

SWING CHECK VALVES

BOLTING

The body-cover bolting conforms with ANSI B.1.1
The nuts are manufactured to conform with ANSI B18.2.2

COVER

The cover material is identical to the body.
Depending on the valve size and pressure class, either a casting or a forging is used.

HINGE PIN

The hinge pin is inserted into the valve and held in position by plug.
The larger size valves are provided with bolted flanges instead of plugs.

ARM

The arm material is identical to the body.
Hinge bushing is provided in the larger valve sizes to minimize friction and eliminate seizing.

SEAT RING

The bottom seated type seat ring is welded or screwed into the body.
The seating surface is finished by lapping.
The forged seat ring is heat-treated to deliver the best mechanical properties and required hardness.

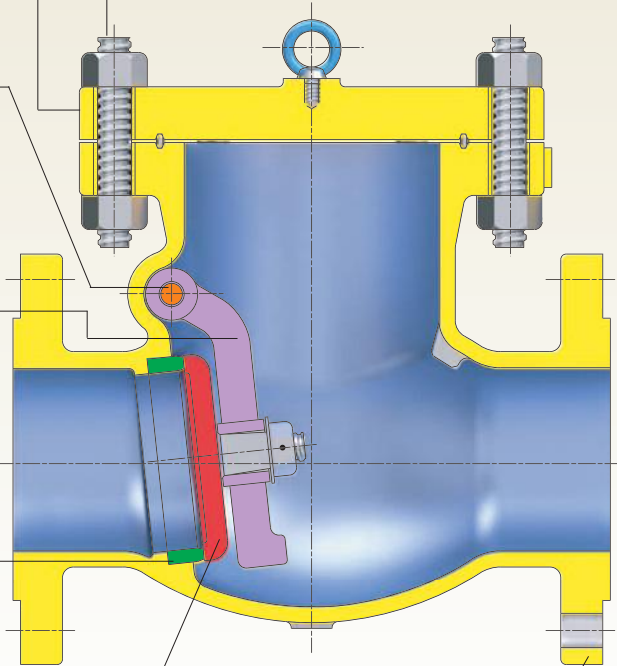
DISC

The disc has a sufficient seating surface area which is ground and lapped to a mirror finish.
It is of one-piece construction and is heat treated to deliver the required mechanical properties and hardness.

BODY

The cast steel body is designed with a wall thickness which is greater at any point than the minimum requirement provided by API Std. 600 or API 6D. Port and seat passage dimensions conform to ASME B16.34. The welded-in type seat ring is standard to allow interchangeability.

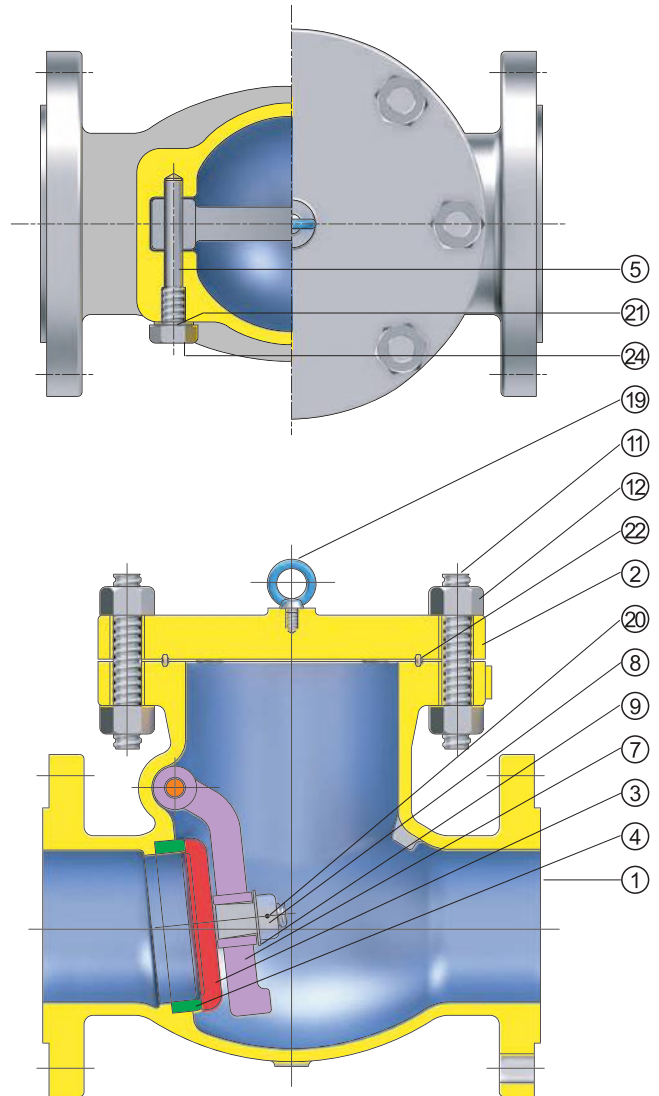
The standard body-bonnet joint is male-female, and the flange is round for all valves.



CAST STEEL

BOLTED COVER

SWING CHECK VALVES



NO	NAME OF PART	ASTM SPECIFICATION
8	DISC NUT	A194-8
9	DISC WASHER	A240-304
19	EVE BOLT	A105
20	SPLIT PIN	A580-304
21	PLUG GASKET	COMMERCIAL
22	GASKET	COMMERCIAL
24	PLUG	A105

Swing check valves can be supplied with the following accessories.

- outside weight and lever
- slam retarders
- assisting springs
- position switches/indicators
- pneumatic safety control

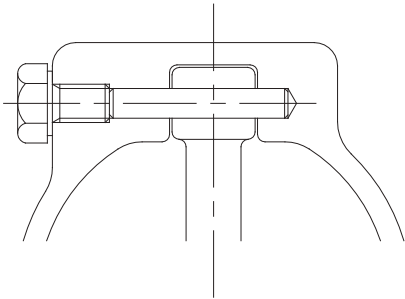
NO	NAME OF PART	ASTM SPECIFICATION												
		STANDARD	HIGH TEMPERATURE SERVICE				LOW TEMPERATURE SERVICE		STAINLESS STEEL				ALLOY STEEL	
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	352-LC1/LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	COVER	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	352-LC1/LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	*DISC	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A350-LF2	A350-LF2	A240-304	A240-316	A240-304L	A240-316L	ALLOY 20	A182-F51
5	HINGE PIN	A479-304					A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	ARM	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	352-LC1/LC2/LC3	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A320-L7	A320-L7	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8
12	BONNET NUT	A194-2H	A194-2H	A194-4	A194-4	A194-4	A194-4L	A194-4L	A194-8	A194-8	A194-8	A194-8	A194-8	A194-8

*Note : In case of 12" and larger size, we'll use trim material overlaid one on the same or equivalent material of the Body.

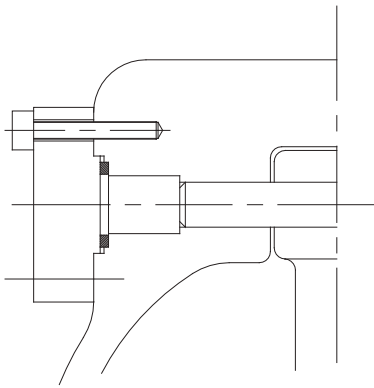
SWING CHECK VALVES

BOLTED COVER

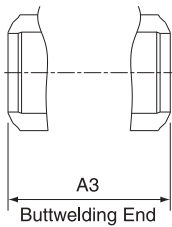
SW/CH CLASS 150



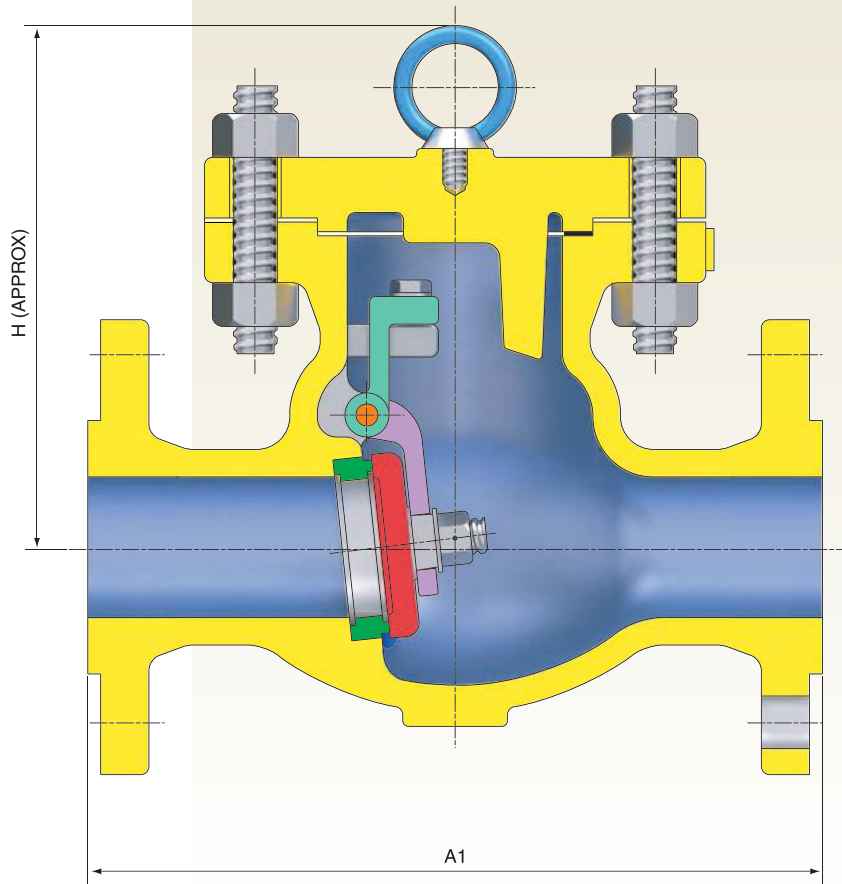
14" Thru 18"



20" & Larger



A3
Buttwelding End

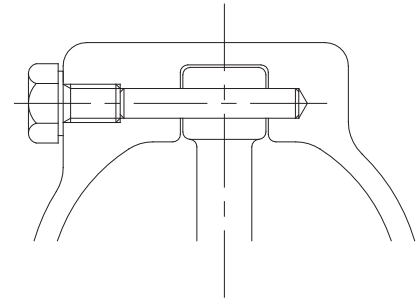
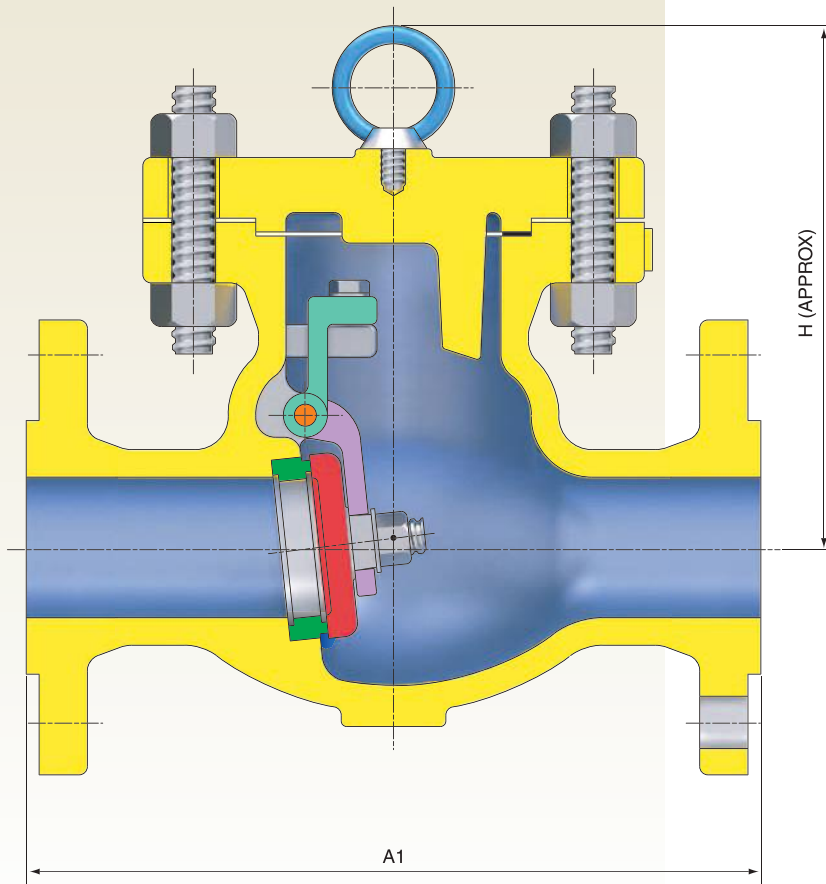


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	650	700	750	800	900	
A1 & A3	in	8.0	8.5	9.5	11.5	14.0	19.5	24.5	27.5	31.0	34.0	38.5	38.5	51.0	51.0	57.0	60.0	60.0	77.0	
	mm	203	216	241	292	356	495	622	698	787	864	978	978	1295	1295	1448	1524	1524	1956	
H	in	5.8	6.4	6.9	8.0	11.4	13.8	16.9	19.6	23.9	25.6	30.7	25.5	31.5	33.5	40.0	35.0	37.0	53.1	
	mm	147	163	176	204	290	350	428	499	606	650	781	647	800	852	1017	888	941	1349	
WEIGHT	RF	lb	35.3	48.5	66.1	97.0	172.0	260.1	520.3	758.4	930.3	1397.7	1798.9	2164.9	3924.2	3637.6	3825.0	4647.3	5291.0	7385.4
		kg	16	22	30	44	78	118	236	344	422	634	816	982	1780	1650	1735	2108	2400	3350
	BW	lb	28.7	33.1	46.3	57.3	136.7	200.6	449.7	645.9	661.4	1276.5	1547.6	1878.3	3584.7	3306.9	3223.1	4426.8	4960.3	6944.5
		kg	13	15	21	26	62	91	204	293	300	579	702	852	1626	1500	1462	2008	2250	3150

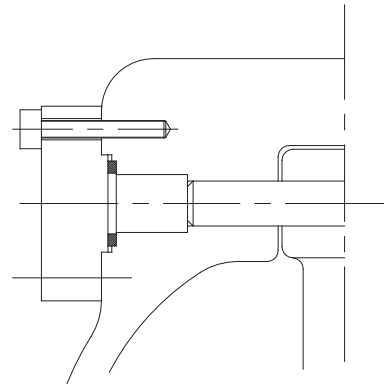
SWING CHECK VALVES

BOLTED COVER

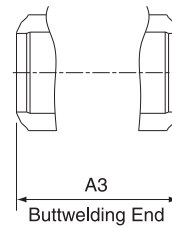
SW/CH CLASS 300



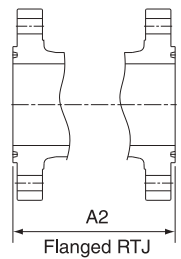
14" Thru 16"



18" & Larger



Buttwelding End



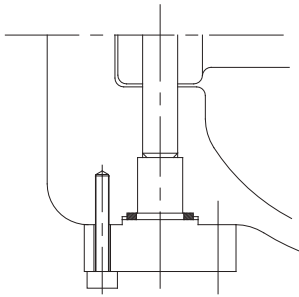
Flanged RTJ

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	21.0	24.5	28.0	33.0	34.0	38.5	40.0	53.0	59.0	62.8	82.0	
	mm	267	292	318	356	444	533	622	711	838	864	978	1016	1346	1499	1594	2083	
A2	in	11.1	12.1	13.1	14.6	18.1	21.6	25.1	28.6	33.6	34.6	39.1	40.7	53.9	60.0	63.7	83.1	
	mm	283	308	333	371	460	549	638	727	854	880	994	1035	1368	1524	1619	2111	
H	in	6.4	7.1	7.8	8.7	13.1	15.0	18.8	21.1	22.8	27.4	31.4	30.5	40.4	45.2	50.0	46.1	
	mm	163	180	197	220	332	380	477	535	580	695	797	775	1025	1149	1270	1171	
WEIGHT	RF	lb	52.9	81.6	99.2	149.9	302.0	485.0	595.2	1091.3	1499.1	2094.4	2645.5	3306.9	4850.1	6172.9	7495.6	11022.9
		kg	24	37	45	68	137	220	270	495	680	950	1200	1500	2200	2800	3400	5000
	BW	lb	46.3	66.1	77.2	112.4	242.5	401.2	463.0	925.9	1157.4	1763.7	2202.4	2689.6	4060.9	5291.0	6503.5	9063.1
		kg	21	30	35	51	110	182	210	420	525	800	999	1220	1842	2400	2950	4111

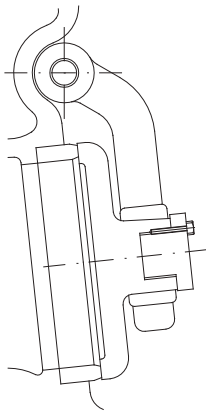
SWING CHECK VALVES

BOLTED COVER

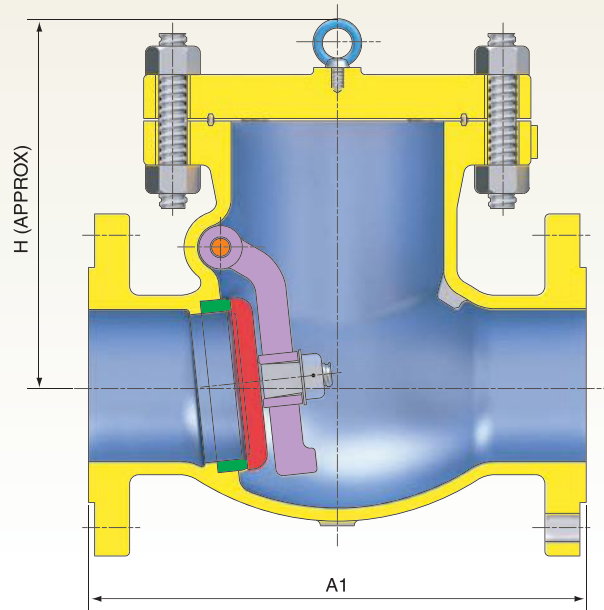
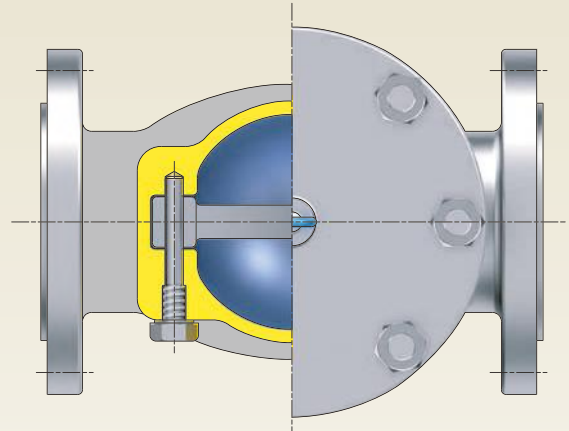
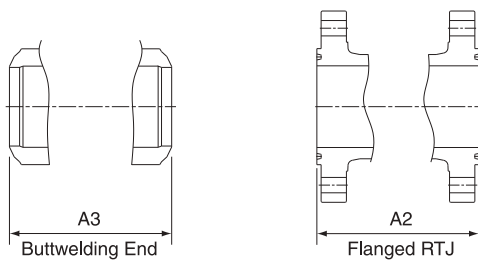
SW/CH CLASS 600



16" & Lager



18" & Lager

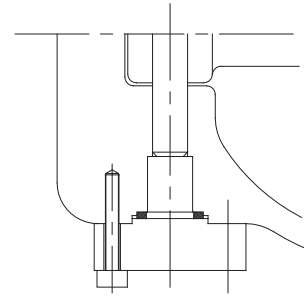
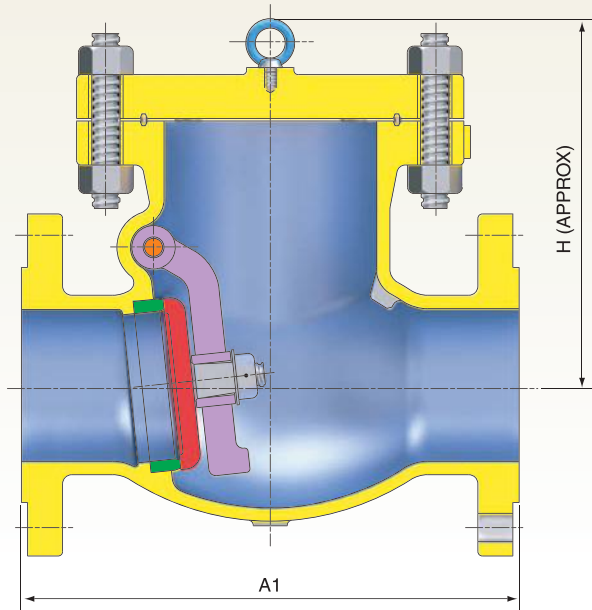
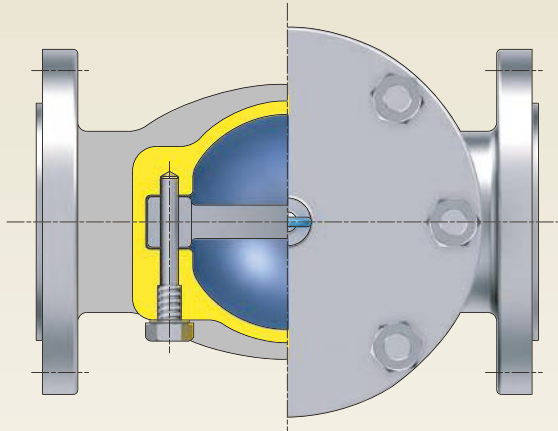


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	63.0	65.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	1600	1651	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	63.5	65.5	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1407	1613	1664	
H	in	8.3	8.6	10.5	12.2	15.5	21.2	24.6	24.4	26.8	32.0	37.8	40.5	47.3	54.6	51.7	
	mm	210	219	267	310	393	538	625	620	680	812	960	1029	1202	1388	1313	
WEIGHT	RF	lb	88.2	121.3	158.7	253.5	551.1	925.9	1349.2	1785.7	1984.1	2971.8	4448.9	5264.6	7195.8	9038.8	11022.9
		kg	40	55	72	115	250	420	612	810	900	1348	2018	2388	3264	4100	5000
	BW	lb	83.8	99.2	138.9	176.4	451.9	762.8	1078.0	1472.7	1940.0	2464.7	3798.5	4437.8	6011.9	7716.1	9261.5
		kg	38	45	63	80	205	346	489	668	880	1118	1723	2013	2727	3500	4201

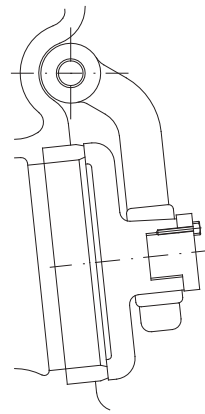
SWING CHECK VALVES

BOLTED COVER

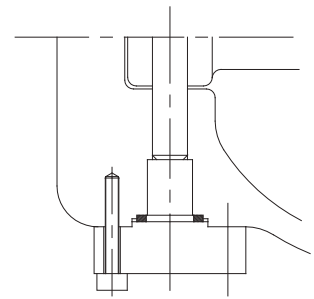
SW/CH CLASS 900



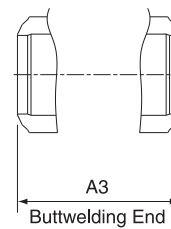
10" & Under



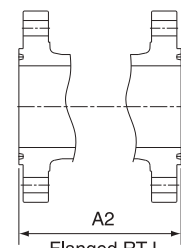
10" & Larger



12" & Larger



Buttwelding End



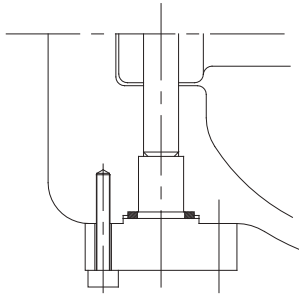
Flanged RTJ

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	
A1 & A3	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	69.0	73.0	
	mm	368	419	381	457	610	737	838	965	1029	1130	1219	1321	1549	1753	1854	
A2	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	69.9	73.9	
	mm	371	422	384	460	613	740	841	968	1038	1140	1232	1333	1568	1775	1876	
H	in	12.2	13.0	8.1	15.3	17.9	22.2	28.7	30.7	29.8	34.3	36.3	41.4	47.2	55.1	61.8	
	mm	309	331	207	389	454	565	729	781	756	870	921	1051	1200	1400	1569	
WEIGHT	RF	lb	160.9	242.5	180.8	471.8	837.7	1375.7	2535.3	3196.7	3858.0	5335.1	7164.9	8818.4	12786.6	17195.8	19951.5
		kg	73	110	82	214	380	624	1150	1450	1750	2420	3250	4000	5800	7800	9050
	BW	lb	119.0	191.8	136.7	383.6	502.6	1089.1	2094.4	2601.4	3196.7	4519.4	5952.4	7275.1	9920.7	14660.5	16865.1
		kg	54	87	62	174	228	494	950	1180	1450	2050	2700	3300	4500	6650	7650

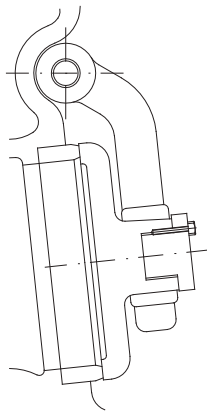
SWING CHECK VALVES

BOLTED COVER

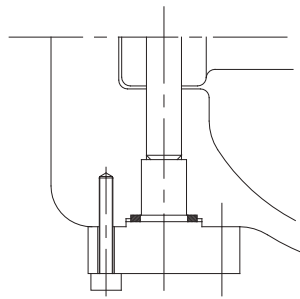
SW/CH CLASS 1500



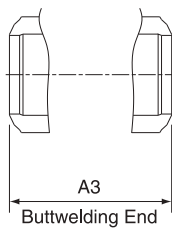
8" & Under



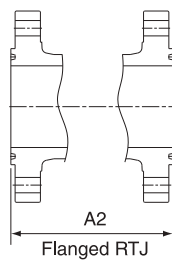
8" & Lager



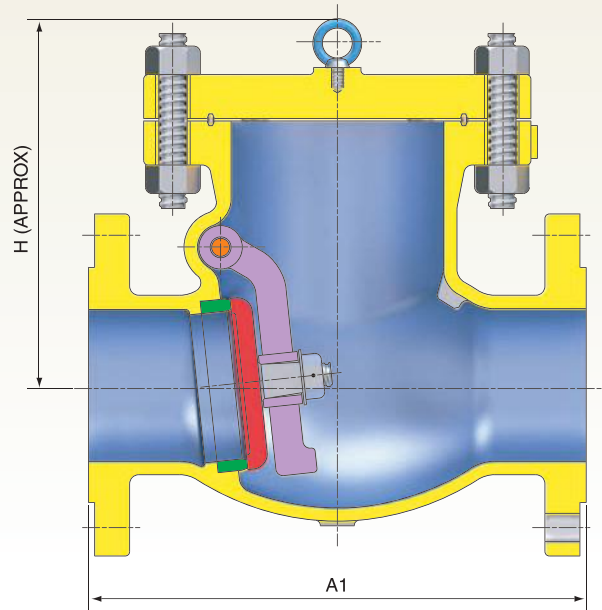
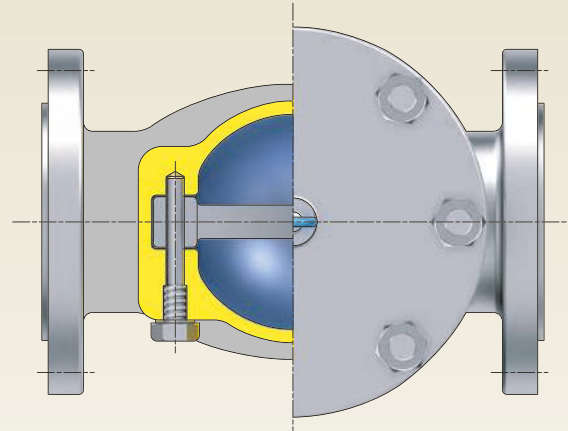
10" & Lager



A3
Buttwelding End



A2
Flanged RTJ

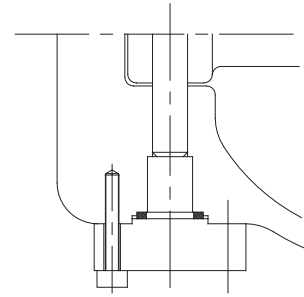
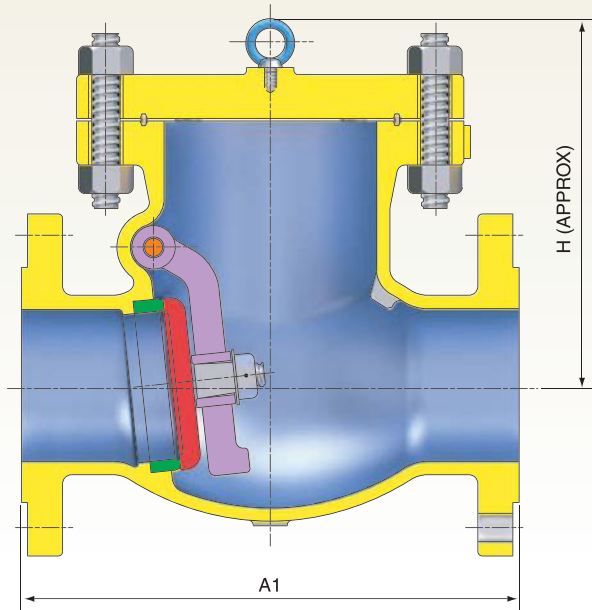
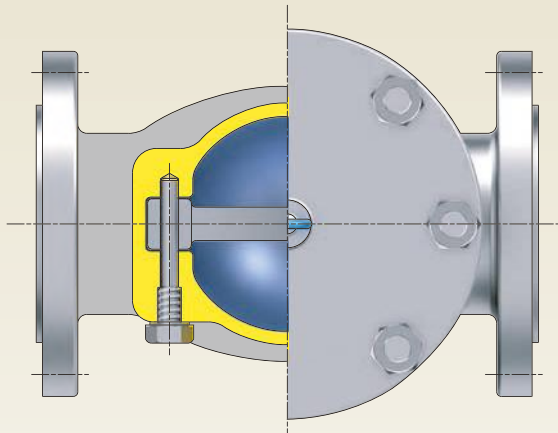


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1 & A3	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.4	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1383	1537	1664	1943	
A2	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.3	61.4	66.4	77.6	
	mm	371	422	473	549	711	841	1000	1146	1276	1405	1559	1686	1972	
H	in	12.2	13.0	14.8	17.0	22.3	26.3	28.9	35.6	40.7	42.0	47.1	51.1	57.1	
	mm	309	331	375	433	567	668	734	904	1035	1067	1197	1299	1451	
WEIGHT	RF	lb	154.3	220.5	374.8	467.4	1067.0	2623.5	4078.5	7341.3	7936.5	10802.5	14550.3	17967.4	25903.9
		kg	70	100	170	212	484	1190	1850	3330	3600	4900	6600	8150	11750
	BW	lb	112.4	191.8	308.6	361.6	813.5	2127.4	3262.8	6084.7	6250.0	8597.9	11574.1	14219.6	19841.3
		kg	51	87	140	164	369	965	1480	2760	2835	3900	5250	6450	9000

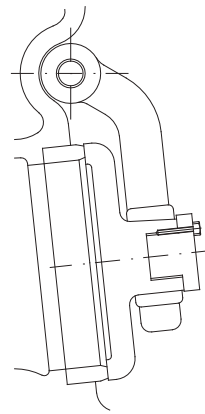
SWING CHECK VALVES

BOLTED COVER

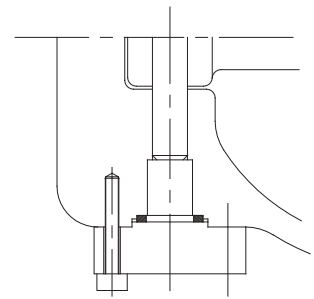
SW/CH CLASS 2500



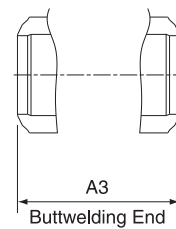
8" & Under



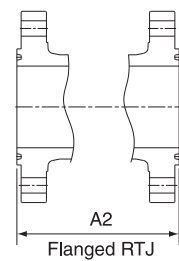
8" & Larger



10" & Larger



Buttwelding End



Flanged RTJ

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	62.0	68.0	
	mm	451	508	578	673	914	1022	1270	1422	1574.8	1727.2	
A2	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	-	-	
	mm	454	514	584	683	927	1038	1292	1444	-	-	
H	in	16.4	16.5	17.4	21.3	28.9	28.4	33.5	39.4	47.2	51.1	
	mm	416	419	441	541	733	722	851	1000	1200	1299	
WEIGHT	RF	lb	330.7	529.1	771.6	1433.0	3196.7	5621.7	8708.1	12566.2	-	-
		kg	150	240	350	650	1450	2550	3950	5700	-	-
	BW	lb	264.6	429.9	617.3	1190.5	2645.5	4850.1	6944.5	10030.9	13668.5	17857.2
		kg	120	195	280	540	1200	2200	3150	4550	6200	8100

GATE VALVES

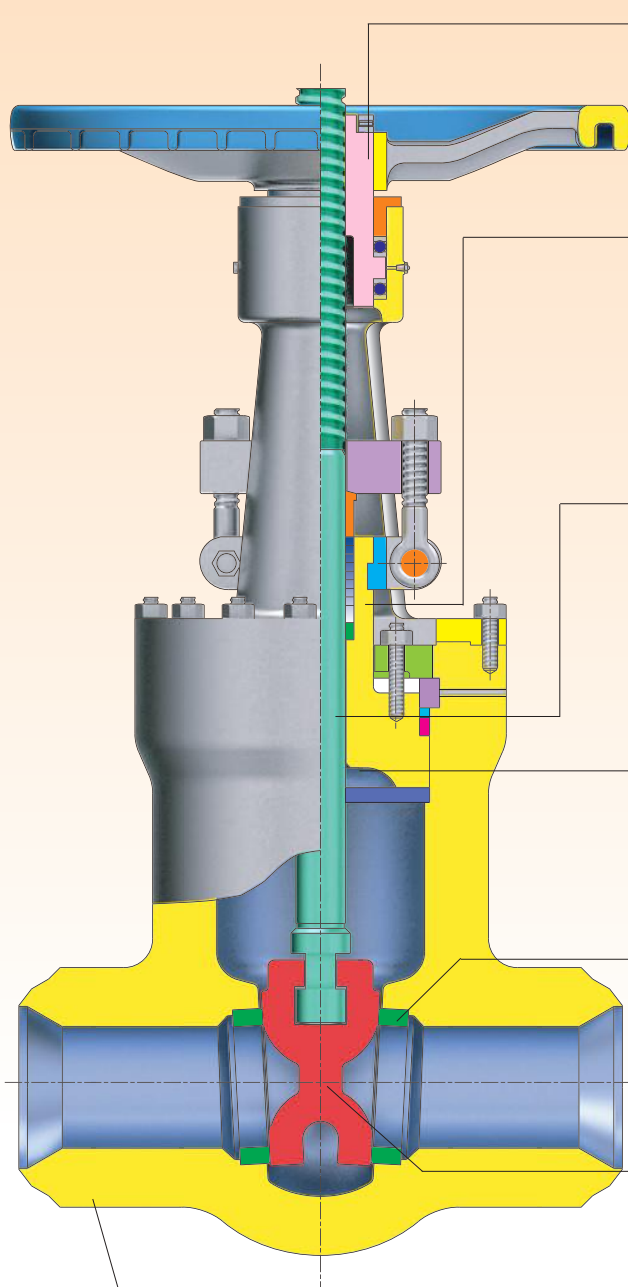
PRESSURE SEAL BONNET



CAST STEEL

PRESSURE SEAL BONNET

GATE VALVES



YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150°C (2100°F) dissolution point in accordance with API Std. specifications.

BONNET

The bonnet is of a steel forging identical to the body to insure high reliability. The bonnet has a perfect body-bonnet seal and both ease of dismantling and reassembly are ensured. The bodies and bonnets of the valve are machined by special purpose machines to achieve perfect coaxiality and eliminate any misalignment which may damage the stems.

STEM

The machined forged stem comes with a T-shape head, which connects the slot of the wedge. The contacting surface of the head is spherically shaped, thereby giving it greater strength and durability. It is heat treated to give it adequate mechanical properties and surface hardness. Accurate machining and lapping insure minimized friction during opening and shutting.

BACK SEAT

All of our valves are provided with positive backseat, and packing replacement can be done with the valve fully open. The conical seat and the guide are integrally stellite faced.

SEAT RING

The Stellite 6 surface of the seat ring is integrally applied to the body by means of welding in all valve sizes. Lapping applied to the seating surface ensures perfect mating with the wedge surfaces.

FLEXIBLE WEDGE

The flexible wedge designed to absorb thermally-induced body distortion, thereby making it ideal for high temperature steam or water supply piping. A Stellite 6 layer is applied to the seating surface, and this deposit is subjected to a special heat treatment to secure required hardness and soundness. The lapped finish then insures perfect mating with the seats.

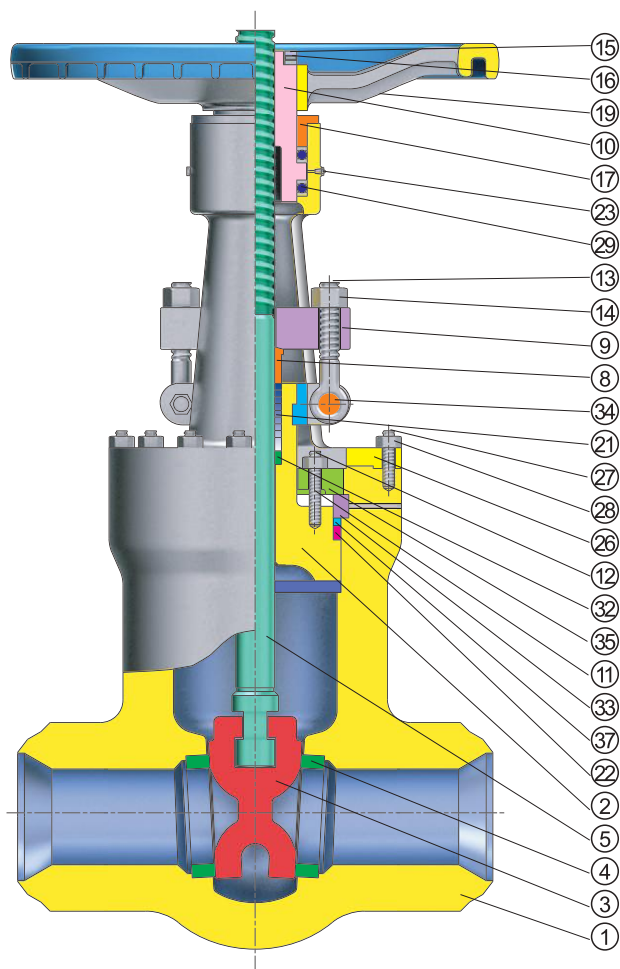
BODY

The valve body is cylindrically shaped to prevent distortion or undue stress during extreme working conditions. In addition, adequate padding helps to achieve a sound cast structure in critical area. The wall thickness is greater than, or in accordance with API, ANSI and ASME requirements. The contact surfaces ensure that a minimum specific pressure is achieved. The area contacting the pressure seal gasket has a stainless steel 18/8 inlay to eliminate corrosion or wire drawing and to insure easy dismantling at all times. The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.

CAST STEEL

PRESSURE SEAL BONNET

GATE VALVES



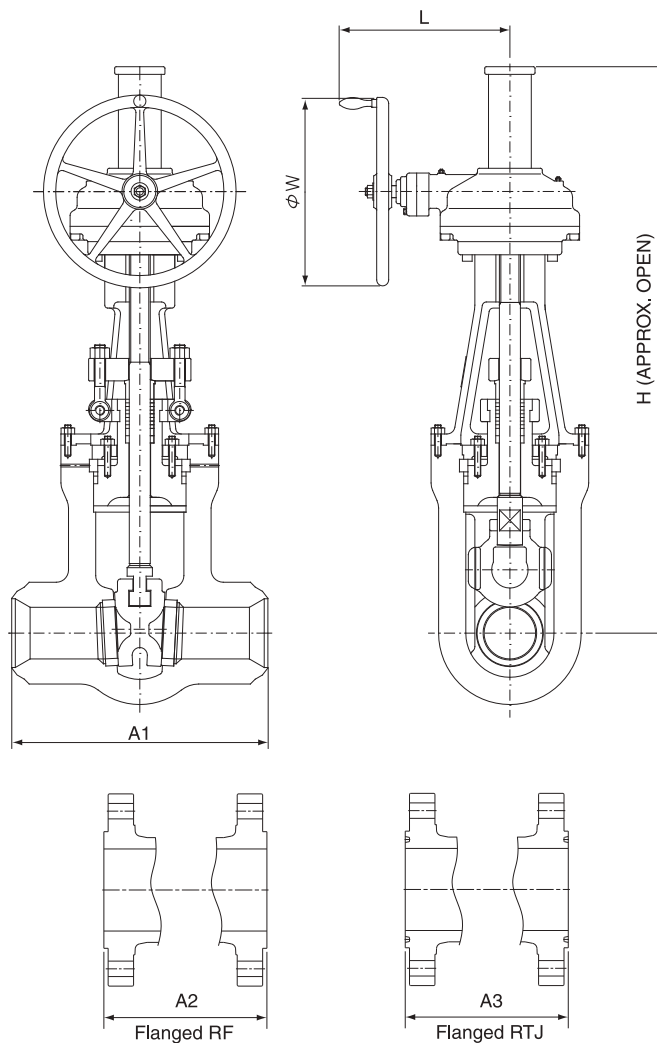
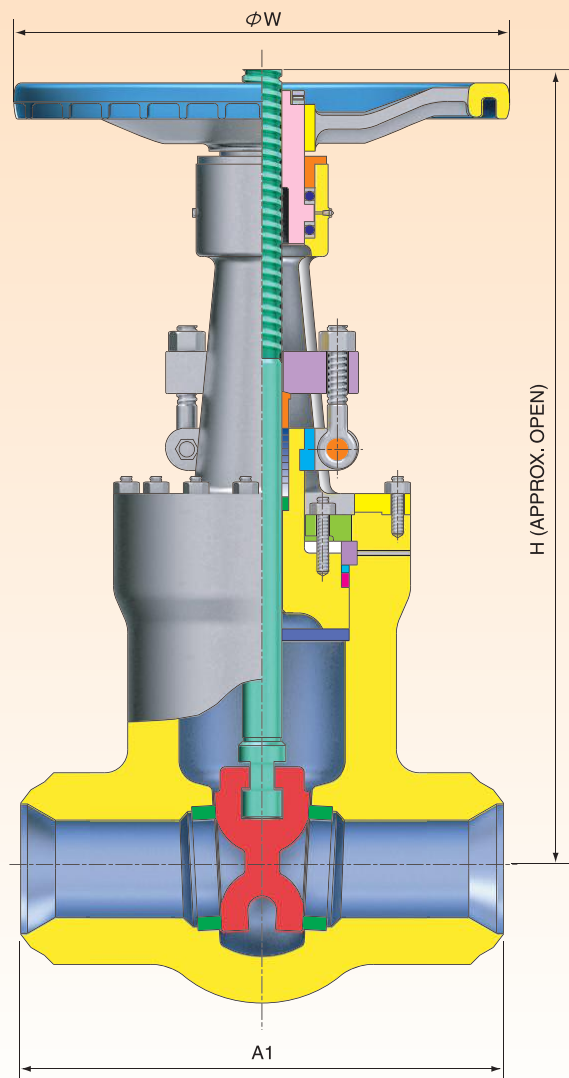
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BEARING	COMMERCIAL

NO	NAME OF PART	ASTM SPECIFICATION										
		STANDARD	HIGH TEMPERATURE SERVICE					STAINLESS STEEL				
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A182-F9	A182-F91	A182-F304	A182-F316	A182-F304L	A182-F316L
5	STEM				A479-410				A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND				A479-410				A276-304			
9	GLAND FLANGE				A105 or A283-D				AISI 304			
10	YOKE SLEEVE				A439-D2				A439-D2			
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A193-B16	A193-B16	A193-B8			
12	BONNET NUT	A194-2H	A194-2H	A194-4	A194-4	A194-4	A194-4	A194-4	A194-8			
13	GLAND BOLT				A193-B7				A193-B8			
14	GLAND NUT				A194-2H				A194-8			
26	YOKE				A216-WCB				A351-CF8			
27	YOKE BOLT				A193-B7				A193-B8			
28	YOKE NUT				A194-2H				A194-8			
32	PACKING RING				A479-410				A276-304	A276-316	A276-304L	A276-316L
33	RETAINER	A29-1045+Cr. PLATED			A240-304				A240-304L			
34	HINGE CLAMP				A216-WCB				A351-CF8			
35	BONNET CLAMP				A29-1045				A240-304			
37	GASKET SPACER	A29-1045+Cr. PLATED			A240-304				A240-304			

GATE VALVES

PRESSURE SEAL BONNET

GT CLASS 600

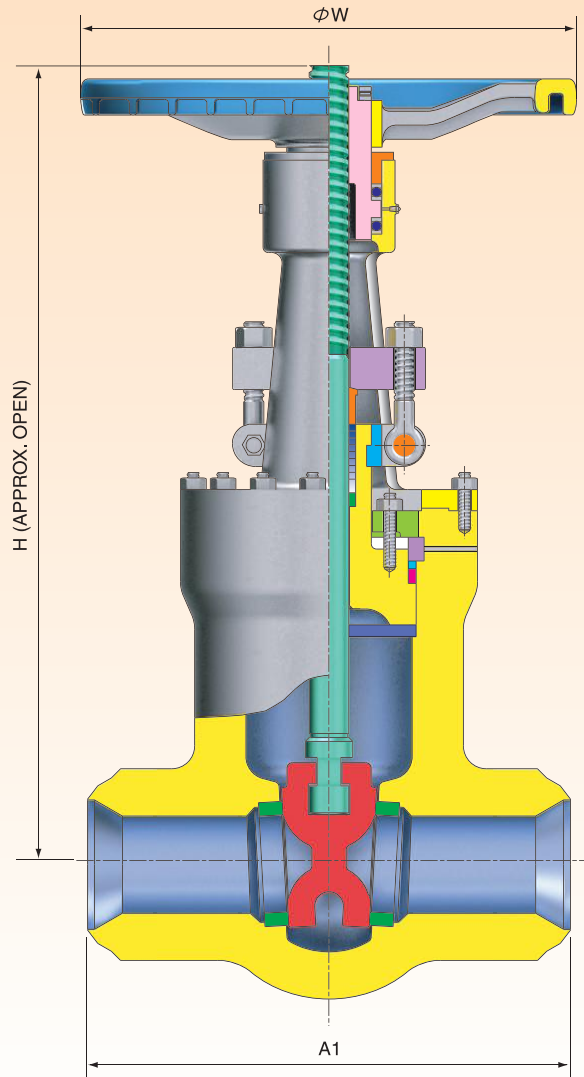
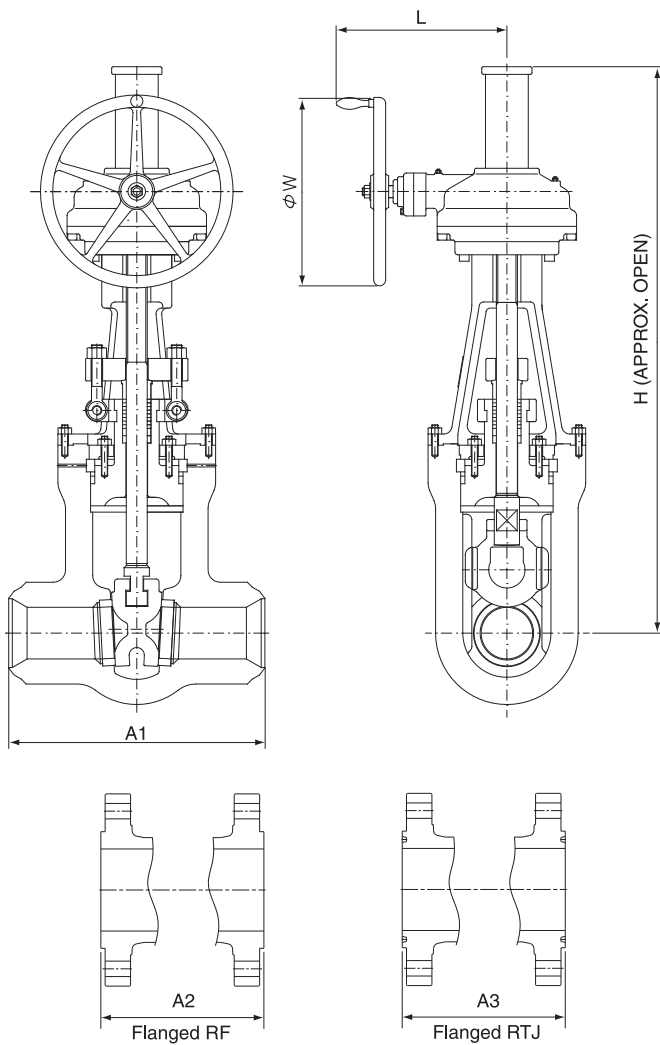


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	11.5	8.5	10.0	12.0	18.0	23.0	28.0	32.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	216	254	305	457	584	711	813	889	991	1092	1194	1397	
A2	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	333	359	435	562	663	790	841	892	994	1095	1200	1407	
H	in	23.1	21.1	19.9	23.4	37.0	43.3	49.1	66.9	71.6	80.3	96.1	101.1	109.9	
	mm	586	535	505	594	941	1100	1248	1700	1818	2040	2442	2567	2792	
W	in	19.7	11.8	9.8	11.8	17.3	19.7	24.8	24.8	24.8	28.0	31.5	31.5	35.4	
	mm	500	300	250	300	440	500	630	630	630	710	800	800	900	
L	in	-	-	-	-	-	-	-	15.3	15.3	16.0	18.1	18.1	19.1	
	mm	-	-	-	-	-	-	-	389	389	406	461	461	486	
WEIGHT	RF	lb	154.3	209.4	220.5	326.3	555.6	705.5	1071.4	1642.4	1962.1	3104.1	4321.1	5820.2	7407.5
		kg	70	95	100	148	252	320	486	745	890	1408	1960	2640	3360
	BW	lb	136.7	176.4	185.2	253.5	416.7	648.2	974.4	1492.5	1785.7	2821.9	3924.2	4850.2	6172.9
		kg	62	80	84	115	189	294	442	677	810	1280	1780	2200	2800

GATE VALVES

PRESSURE SEAL BONNET

GT CLASS 900

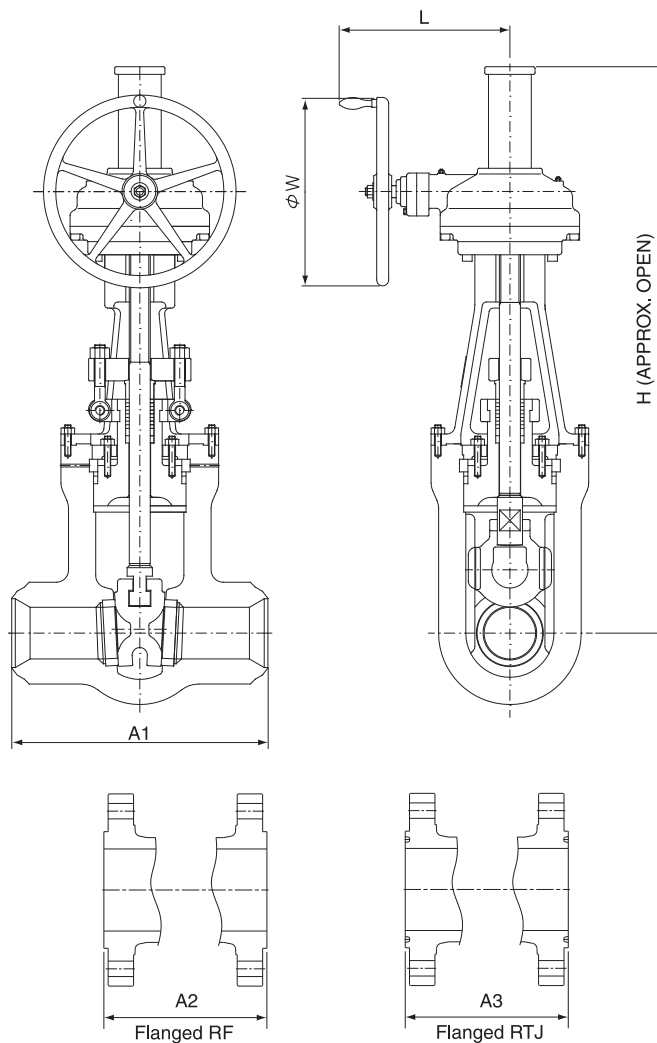
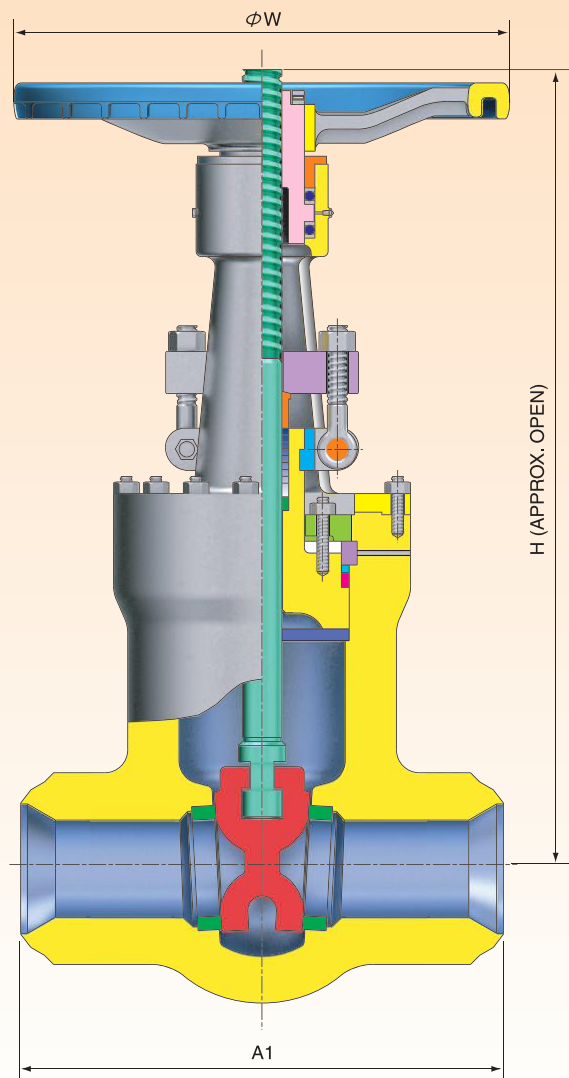


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	12.0	14.0	20.0	26.0	31.0	36.0	39.0	43.0	48.0	52.0	61.0	
	mm	216	254	305	356	508	660	787	914	991	1092	1219	1321	1549	
A2	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	
	mm	368	419	381	457	610	737	838	965	1029	1130	1219	1321	1549	
A3	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	
	mm	371	422	384	460	613	740	841	968	1039	1140	1232	1334	1568	
H	in	23.1	21.1	26.2	31.4	40.8	53.3	62.2	70.6	73.2	85.9	97.2	100.2	119.5	
	mm	586	535	666	798	1036	1353	1581	1792	1860	2181	2470	2546	3036	
W	in	19.7	11.8	19.7	19.7	22.0	19.7	24.8	28.0	28.0	31.5	35.4	35.4	39.4	
	mm	500	300	500	500	560	500	630	710	710	800	900	900	1000	
L	in	-	-	-	-	-	13.5	15.3	16.0	16.0	18.1	19.1	20.8	23.2	
	mm	-	-	-	-	-	342	389	406	406	461	486	529	590	
WEIGHT	RF	lb	132.3	207.2	224.9	330.7	617.3	1455.1	2116.4	2976.2	3747.9	5291.1	7319.3	9700.3	14925.3
		kg	60	94	102	150	280	660	960	1350	1700	2400	3320	4400	6770
	BW	lb	88.2	141.1	176.4	220.5	407.9	1091.3	1620.4	2314.9	3086.5	4299.0	6018.6	8124.0	11971.1
		kg	40	64	80	100	185	495	735	1050	1400	1950	2730	3685	5430

GATE VALVES

PRESSURE SEAL BONNET

GT CLASS 1500

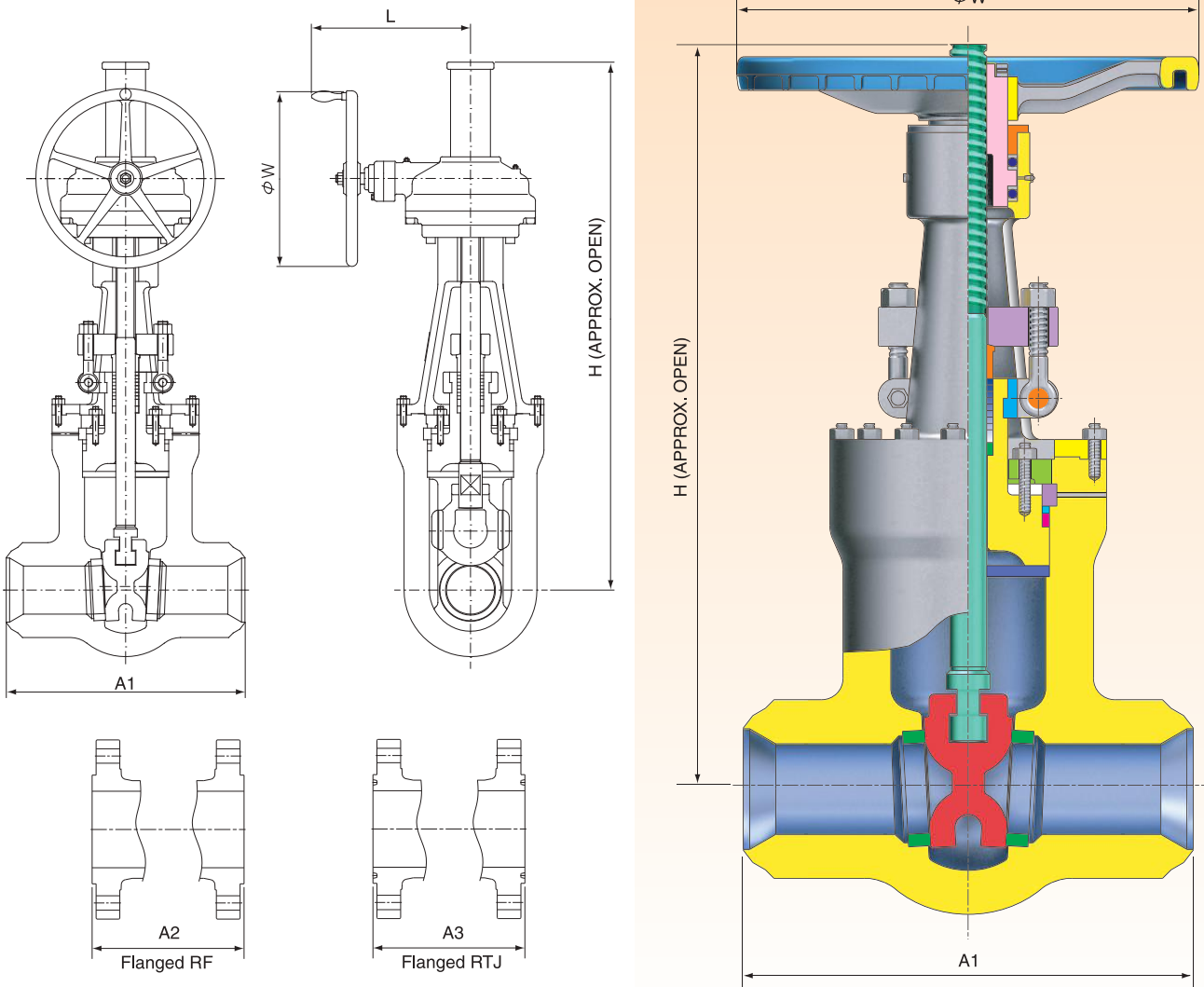


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	12.0	16.0	22.0	28.0	34.0	39.0	42.0	47.0	53.0	58.0	64.0	
	mm	216	254	305	406	559	711	864	991	1067	1194	1346	1473	1626	
A2	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.5	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1384	1537	1664	1943	
A3	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.4	61.4	66.4	77.6	
	mm	371	422	473	549	711	842	1000	1146	1276	1406	1559	1686	1971	
H	in	23.1	21.1	26.2	32.0	53.7	56.1	62.3	66.7	79.6	91.8	111.1	101.5	116.3	
	mm	586	535	666	812	1363	1426	1583	1694	2023	2331	2823	2579	2955	
W	in	19.7	11.8	19.7	19.7	19.7	24.8	28.0	28.0	35.4	35.4	39.4	39.4	39.4	
	mm	500	300	500	500	500	630	710	710	900	900	1000	1000	1000	
L	in	-	-	-	-	13.5	15.3	16.0	16.0	20.8	20.8	23.2	23.2	24.4	
	mm	-	-	-	-	342	389	406	406	529	529	590	590	619	
WEIGHT	RF	lb	132.3	207.2	264.6	458.6	1058.2	2006.2	3108.5	4585.6	5754.1	7936.6	13139.5	16248.1	23391.0
		kg	60	94	120	208	480	910	1410	2080	2610	3600	5960	7370	10610
	BW	lb	88.2	141.1	185.2	308.6	749.6	1499.1	1984.2	3196.7	3968.3	6062.7	10207.4	12610.4	18166.1
		kg	40	64	84	140	340	680	900	1450	1800	2750	4630	5720	8240

GATE VALVES

PRESSURE SEAL BONNET

GT CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1	in	11.0	13.0	14.5	18.0	24.0	30.0	36.0	41.0	44.0	49.0	55.0	
	mm	279	330	368	457	610	762	914	1041	1118	1245	1397	
A2	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	-	-	-	
	mm	451	508	578	673	914	1022	1270	1422	-	-	-	
A3	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	-	-	-	
	mm	454	514	584	683	927	1038	1292	1444	-	-	-	
H	in	24.4	25.9	31.9	29.5	46.1	55.0	60.9	76.5	72.7	97.2	116.1	
	mm	619	659	809	750	1170	1397	1548	1942	1846	2470	2950	
W	in	11.8	14.0	17.7	19.7	19.7	28.0	31.5	35.4	35.4	39.4	39.4	
	mm	300	355	450	500	500	710	800	900	900	1000	1000	
L	in	-	-	-	-	13.5	16.0	18.1	20.8	20.8	24.4	24.4	
	mm	-	-	-	-	342	406	461	529	529	619	619	
WEIGHT	RF	lb	187.4	297.6	363.8	765.0	1785.7	2910.1	5233.8	7539.8	-	-	-
		kg	85	135	165	347	810	1320	2374	3420	-	-	-
	BW	lb	110.2	198.4	253.5	418.9	1146.4	1631.4	3527.4	6613.9	7495.7	9259.4	11023.1
		kg	50	90	115	190	520	740	1600	3000	3400	4200	5000

GLOBE VALVES

PRESSURE SEAL BONNET



CAST STEEL

PRESSURE SEAL BONNET

GLOBE VALVES

YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150 °C (2100 °F) dissolution point in conformity with API Std. specifications.

BONNET

The bonnet is of a steel forging identical to the body to insure high reliability. The bonnet has a perfect body-bonnet seal and both ease of dismantling and reassembly are ensured. The body and bonnets of our valve are carefully machined to achieve perfect coaxiality and eliminate any misalignment which may cause damage stems.

STEM

The stem of one-piece construction, is heat treated to secure the adequate mechanical properties and surface, hardness. Accurate machining and grinding insure that there is minimized friction during valve opening/shutting. The round head of the stem gives a point contact with the inside of the disc housing and thus prevents galling.

BACK SEAT

All of our valves are equipped with a backseat to allow packing replacement with the valve fully opened. The conical shape contact seat in the bonnet assembly in integrally stellite faced.

DISC

The disc of our globes is a loose disc which freely revolves around the stem, thereby preventing friction and galling with the seating surface when the valve is shut. The outside diameter of the disc is accurately finished and cylindrical in shape to travel along the body guides. A stellite 6 layer is applied to the conical seating surface of the disc. This deposit undergoes a special heat treatment to secure the required hardness and soundness. In addition, the lapped finish insures a perfect mating with the seats.

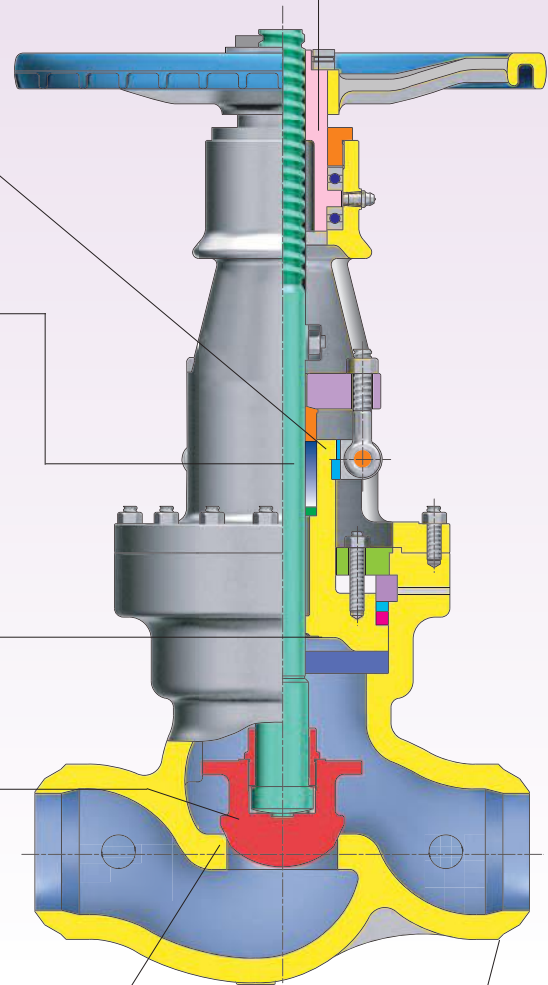
SEAT

The Stellite 6 seating surface is integrally applied to the body by means of welding in all valve sizes. Perfect mating of the disc surfaces is achieved by lapping applied to the seating surface.

BODY

The cylindrically shaped valve body prevents distortion or undue stress under extreme working conditions. In addition, adequate padding ensures a sound cast structure in the critical areas. The wall thickness is greater than, or in accordance with API, ANSI and ASME requirements.

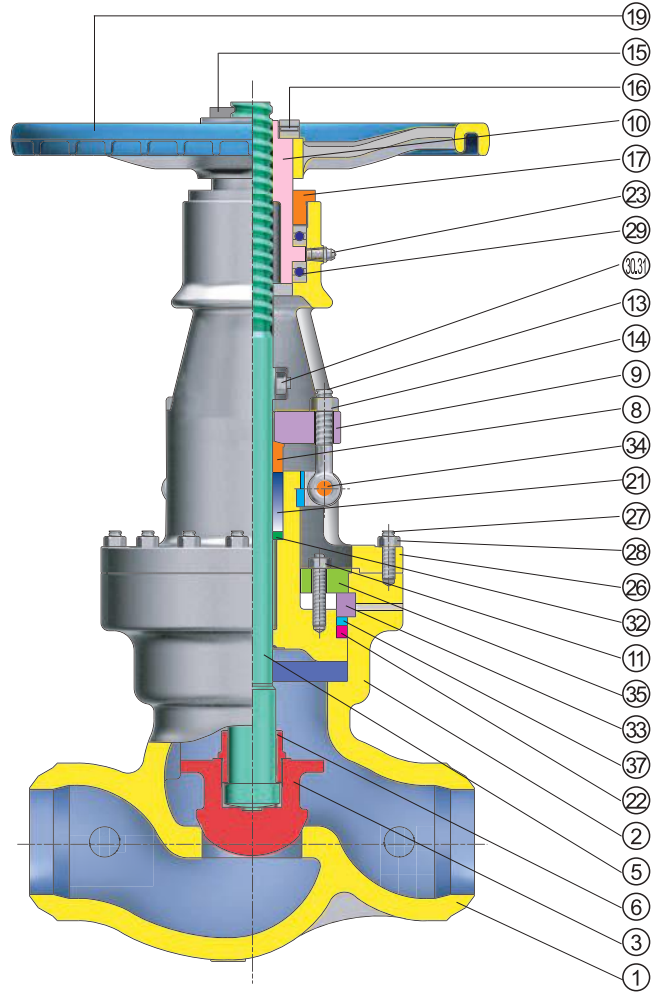
The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.



CAST STEEL

PRESSURE SEAL BONNET

GLOBE VALVES



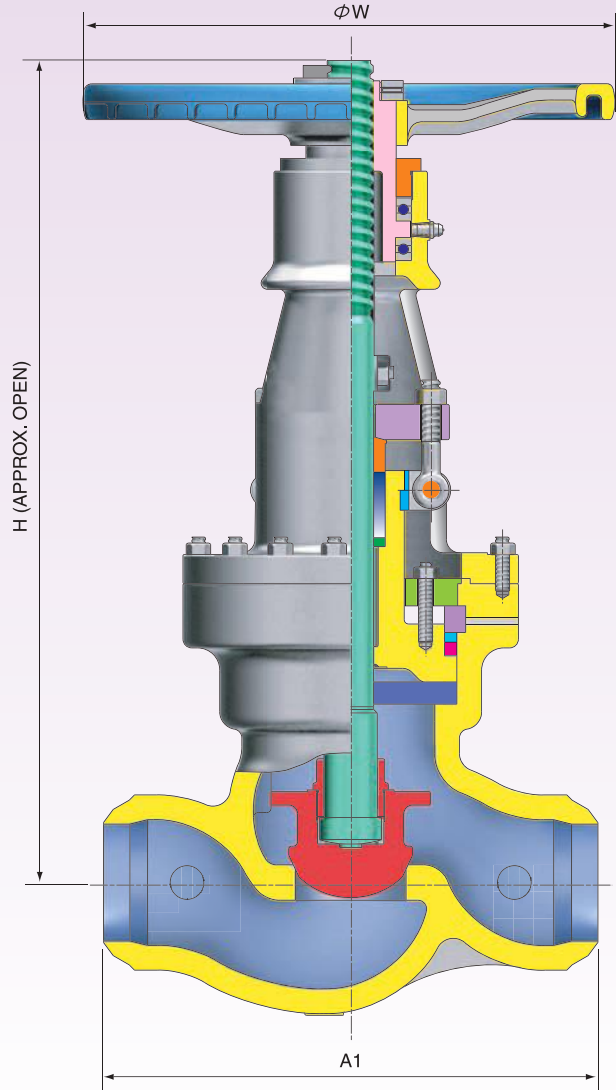
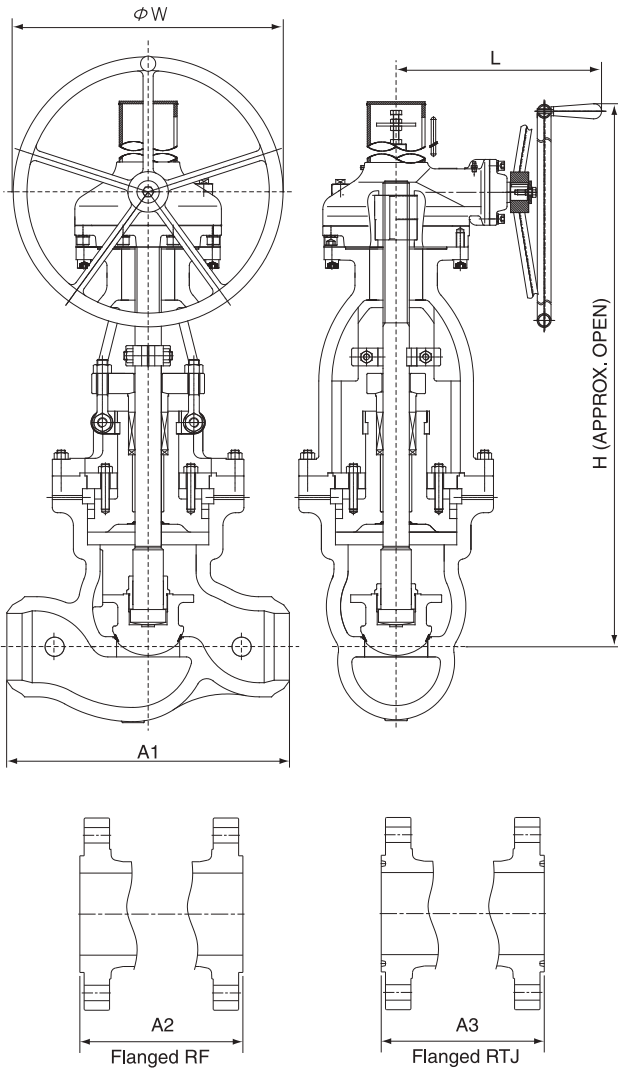
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
30	STOPPER	A283-D

NO	NAME OF PART	ASTM SPECIFICATION										
		STANDARD	HIGH TEMPERATURE SERVICE						STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
5	STEM		A479-410						A276-304	A276-316	A276-304L	A276-316L
6	DISC GLAND		A217-CA15						A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND		A479-410						A276-304			
9	GLAND FLANGE		A105 or A283-D						A351-CF8			
10	YOKE SLEEVE		A439-D2						A439-D2			
11	BONNET BOLT/NUT	A193-B7 / A194-2H	A193-B16 / A194-4						A193-B8 / A194-8			
13	GLAND BOLT		A193-B7						A193-B8			
14	GLAND NUT		A194-2H						A194-8			
26	YOKE		A216-WCB						A351-CF8			
27	YOKE BOLT		A193-B7						A193-B8			
28	YOKE NUT		A194-2H						A194-8			
31	STOPPER PIN		A193-B7						A29-1045			
32	PACKING RING		A479-410						A276-304	A276-316	A276-304L	A276-316L
33	RETAINER	A29-1045+Cr.PLATED	A240-304						A240-304L			
34	HINGE CLAMP		A216-WCB						A351-CF8			
35	BONNET CLAMP		A29-1045						A240-304			
37	GASKET SPACER	A29-1045+Cr.PLATED	A240-304						A240-304			

GLOBE VALVES

PRESSURE SEAL BONNET

GL CLASS 600

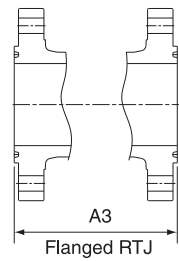
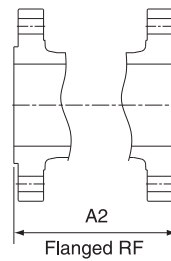
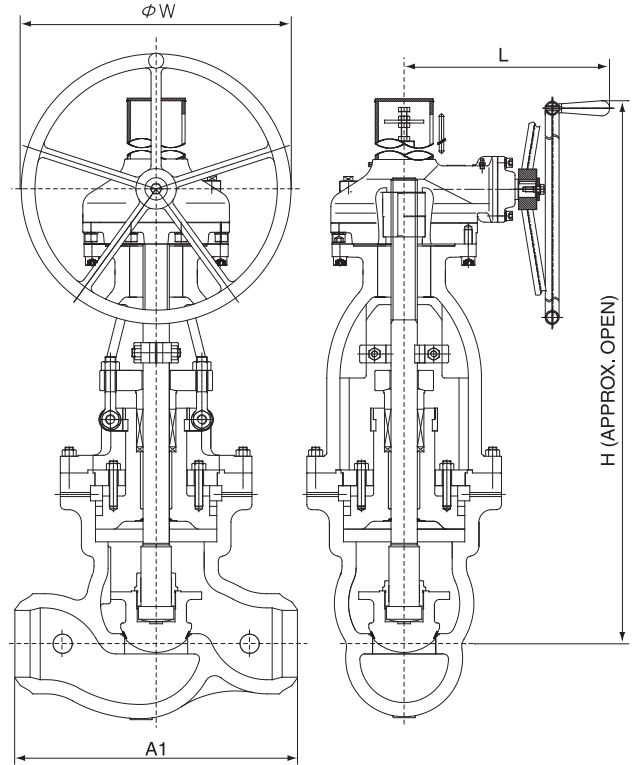
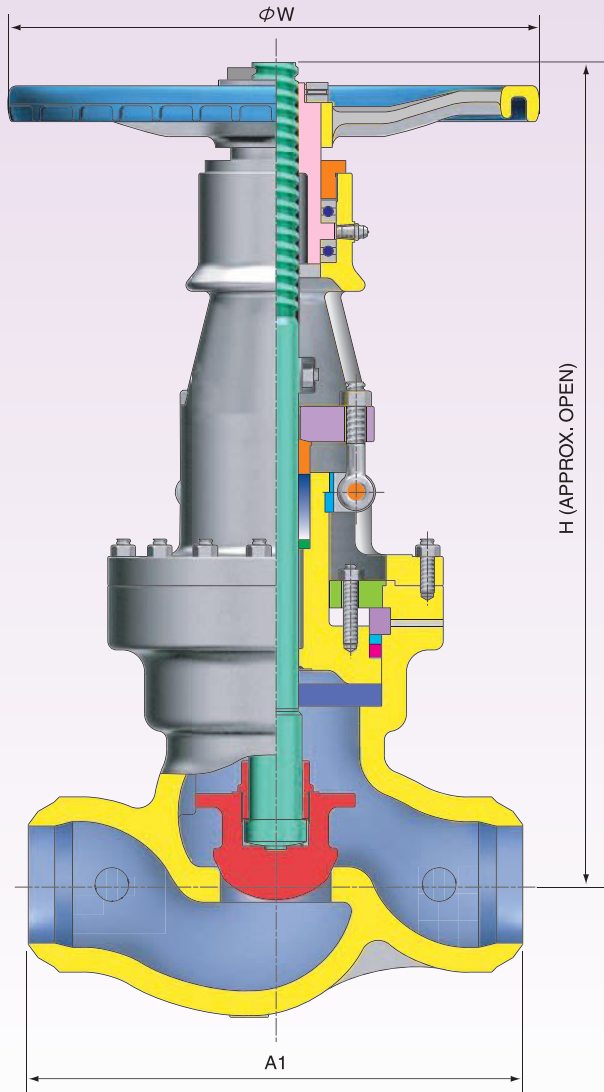


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1	in	11.5	13.0	14.0	17.0	22.0	23.0	28.0	32.0	35.0	39.0	
	mm	292	330	356	432	559	584	711	813	889	991	
A2	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	32.2	35.0	39.0	
	mm	292	330	356	432	559	660	787	818	889	991	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	
	mm	295	333	359	435	562	664	791	841	892	994	
H	in	19.7	20.8	24.8	25.6	37.6	42.4	55.1	61.0	70.9	85.0	
	mm	500	529	630	650	955	1076	1400	1550	1800	2160	
W	in	19.7	19.7	15.7	17.7	24.8	24.8	24.0	24.0	24.0	29.9	
	mm	500	500	400	450	630	630	610	610	610	760	
L	in	-	-	-	-	15.3	15.3	17.0	20.2	20.2	22.3	
	mm	-	-	-	-	389	389	432	512	512	567	
WEIGHT	RF	lb	99.2	121.2	187.4	297.7	672.5	1367.1	2888.6	4189.5	5997.6	6945.8
		kg	45	55	85	135	305	620	1310	1900	2720	3150
	BW	lb	77.2	99.2	132.3	209.5	507.2	1190.7	2535.8	3792.6	5578.7	6394.5
		kg	35	45	60	95	230	540	1150	1720	2530	2900

GLOBE VALVES

PRESSURE SEAL BONNET

GL CLASS 900

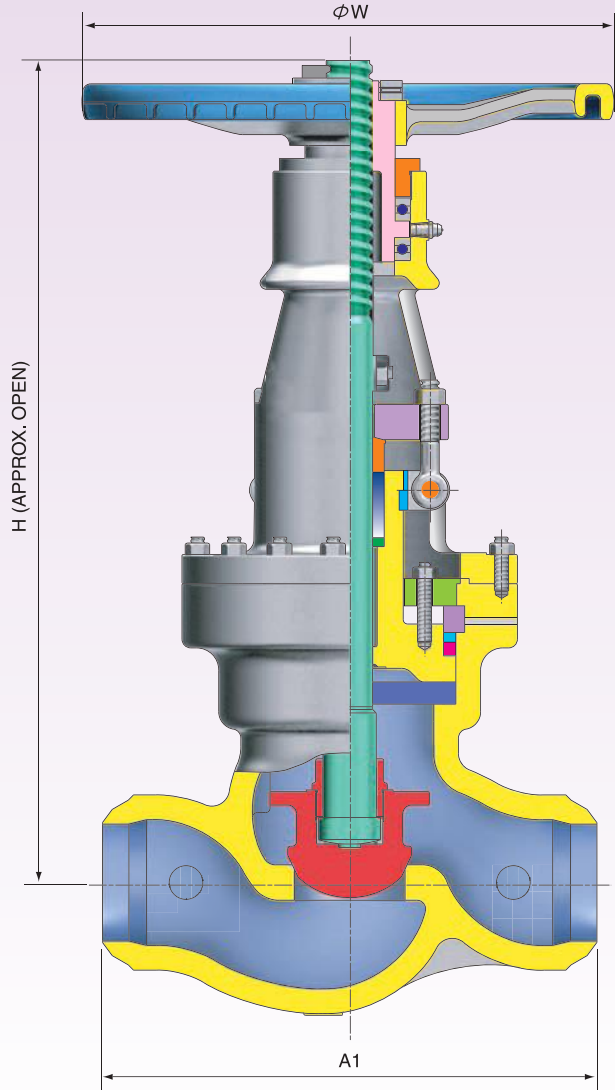
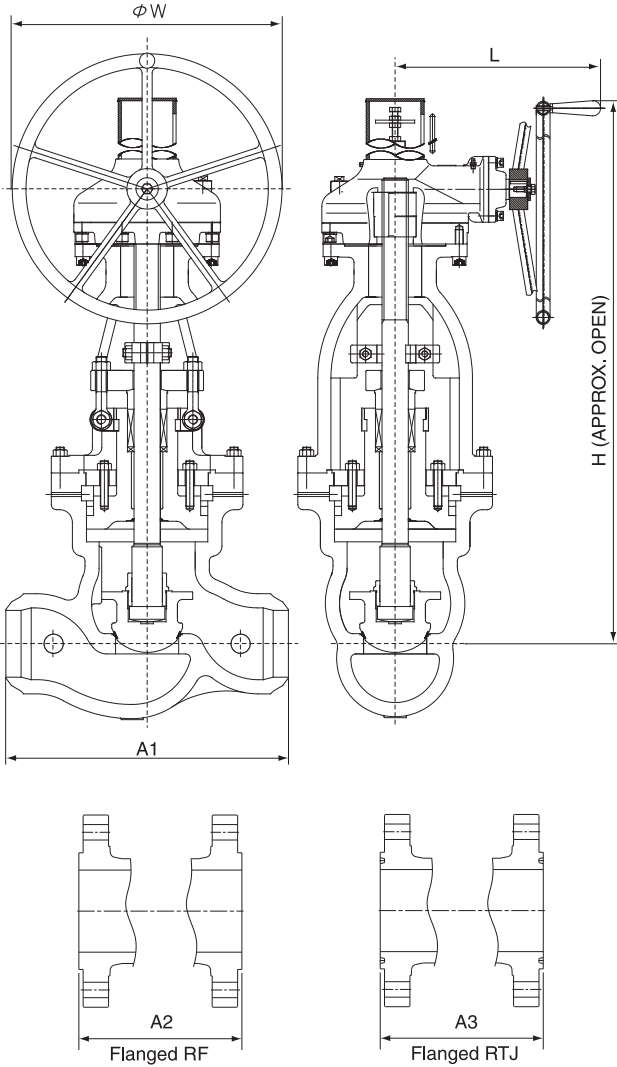


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1	in	14.5	16.5	15.0	18.0	20.0	26.0	31.0	36.0	39.0	43.0	
	mm	368	419	381	457	508	660	787	914	991	1092	
A2	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	
	mm	368	419	381	457	610	737	838	965	1029	1130	
A3	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	
	mm	371	422	384	460	613	740	841	968	1038	1140	
H	in	20.7	26.1	24.9	27.0	53.3	53.1	61.0	68.9	78.7	90.9	
	mm	525	663	633	687	1355	1350	1550	1750	2000	2310	
W	in	19.7	19.7	19.7	19.7	28.0	24.0	24.0	24.0	29.9	29.9	
	mm	500	500	500	500	710	610	610	610	760	760	
L	in	-	-	-	-	16.0	17.0	20.2	20.2	22.3	22.3	
	mm	-	-	-	-	406	432	512	512	567	567	
WEIGHT	RF	lb	176.4	242.6	231.5	374.9	926.1	2205	3792.6	5071.5	7386.8	8820
		kg	80	110	105	170	420	1000	1720	2300	3350	4000
	BW	lb	121.3	176.4	176.4	286.7	793.8	1984.5	3351.6	4520.3	6725.3	7938
		kg	55	80	80	130	360	900	1520	2050	3050	3600

GLOBE VALVES

PRESSURE SEAL BONNET

GL CLASS 1500

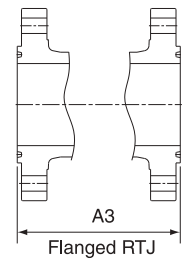
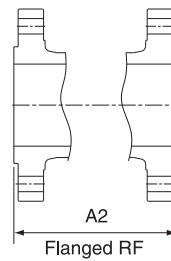
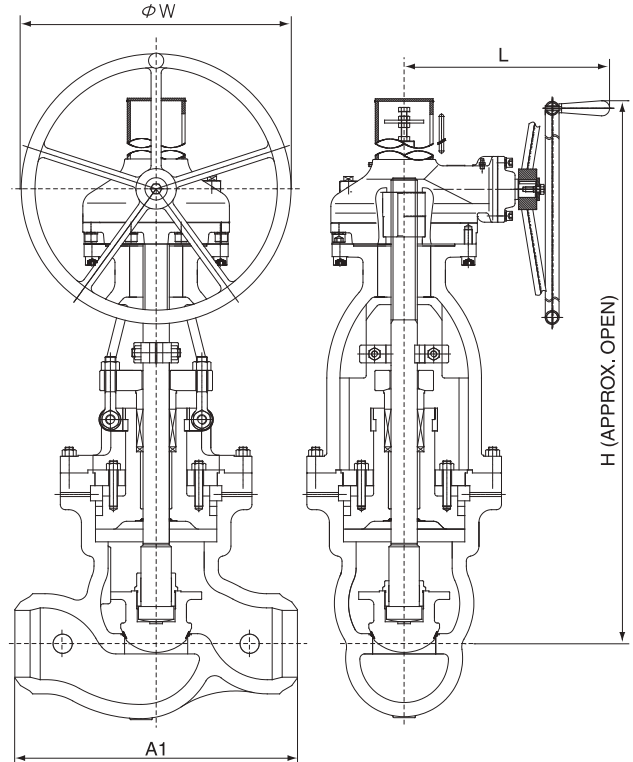
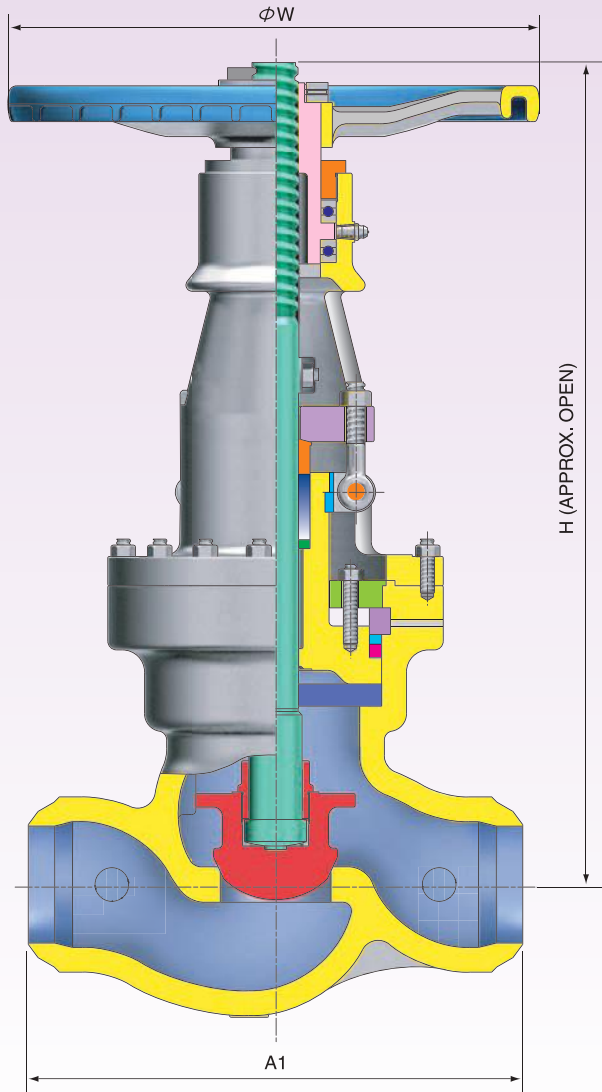


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	
	mm	50	65	80	100	150	200	250	300	350	
A1	in	8.5	10.0	12.0	16.0	22.0	28.0	34.0	39.0	42.0	
	mm	368	419	305	406	559	711	864	991	1067	
A2	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	
	mm	368	419	470	546	705	832	991	1130	1257	
A3	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	
	mm	371	422	473	549	711	841	1000	1146	1276	
H	in	20.7	26.1	26.4	34.5	45.9	70.9	78.7	91.0	105.9	
	mm	525	663	671	876	1167	1800	2000	2311	2691	
W	in	19.7	19.7	19.7	19.7	31.5	24.0	29.9	29.9	29.9	
	mm	500	500	500	500	800	610	760	760	760	
L	in	-	-	-	-	18.1	20.2	20.2	20.2	22.3	
	mm	-	-	-	-	461	512	512	512	567	
WEIGHT	RF	lb	176.4	242.6	299.9	496.1	1433.3	3704.4	5909.4	7497	9481.5
		kg	80	110	136	225	650	1680	2680	3400	4300
	BW	lb	121.3	176.4	209.5	352.8	1146.6	3153.2	5027.4	6240.2	7938
		kg	55	80	95	160	520	1430	2280	2830	3600

GLOBE VALVES

PRESSURE SEAL BONNET

GL CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1	in	11.0	13.0	14.5	18.0	24.0	30.0	36.0	41.0	
	mm	279	330	368	457	610	762	914	1041	
A2	in	17.8	20.0	22.8	26.5	36.0	40.3	50.0	56.0	
	mm	451	508	578	673	914	1022	1270	1422	
A3	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	
	mm	454	514	584	682	927	1038	1292	1444	
H	in	25.1	28.3	29.3	47.4	53.0	85.0	100.0	106.0	
	mm	637	719	743	1205	1345	2160	2540	2692	
W	in	19.7	19.7	22.8	28.0	35.4	29.9	29.9	29.9	
	mm	500	500	580	710	900	760	760	760	
L	in	-	-	-	16.0	19.1	22.3	22.3	22.3	
	mm	-	-	-	406	486	567	567	567	
WEIGHT	RF	lb	220.5	341.8	463.1	1102.5	2756.3	5292	7276.5	9261
		kg	100	155	210	500	1250	2400	3300	4200
	BW	lb	154.4	242.6	308.7	771.8	2094.8	4410	5512.5	7276.5
		kg	70	110	140	350	950	2000	2500	3300

SWING CHECK VALVES

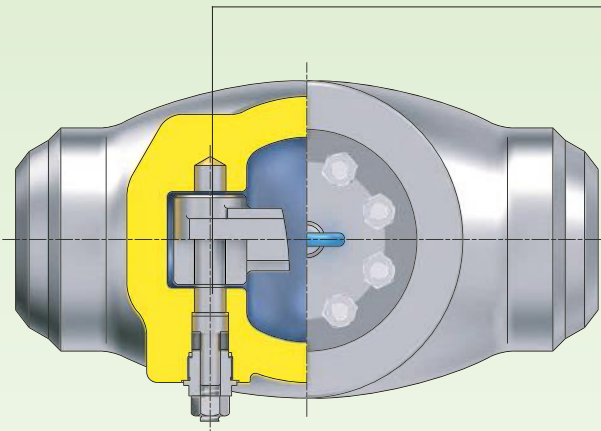
PRESSURE SEAL COVER



CAST STEEL

PRESSURE SEAL COVER

SWING CHECK VALVES



HINGE PIN

The hinge pin is inserted into the valve body to achieve pressure seal construction.

COVER

The cover material is a steel forging identical to the body to insure high dependability. The cover construction has a perfect body-cover tightness and ease of dismantling and reassembly are ensured.

ARM

The arm is of a steel material identical to the body. Larger sized valves are provided with a hinge bushing to reduce friction and to prevent galling.

DISC

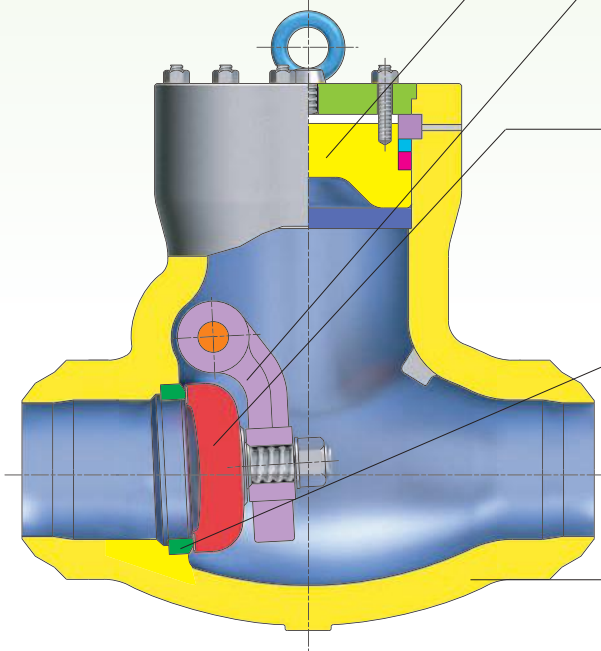
The disc has a sufficient seating surface area which is ground and lapped to a mirror finish. It is of one-piece construction and is heat treated to deliver the required mechanical properties and hardness.

SEAT RING

The Stellite 6 surface of the seat ring is integrally applied to the body by means of welding in all valve sizes. Perfect mating with the DISC surfaces attained by a lapping finish applied to the seating.

BODY

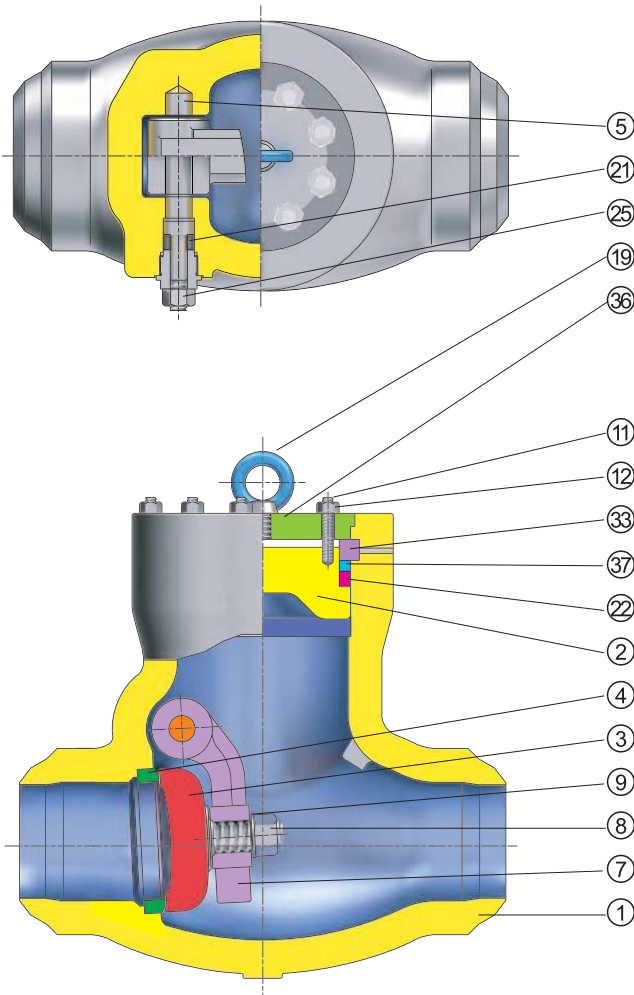
The cylindrically shaped valve body prevents distortion or undue stress under extreme working conditions. Padding is also provided to achieve a sound cast structure in the critical areas. The wall thickness is greater than, or in accordance with, API, ANSI and ASME requirements. The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.



CAST STEEL

PRESSURE SEAL COVER

SWING CHECK VALVES



NO	NAME OF PART	ASTM SPECIFICATION
8	DISC NUT	A194-8
9	WASHER	A240-304
19	EVE BOLT	A 105
21	PLUG GASKET	COMMERCIAL
22	GASKET	COMMERCIAL

Swing check valves can be supplied with the following accessories.

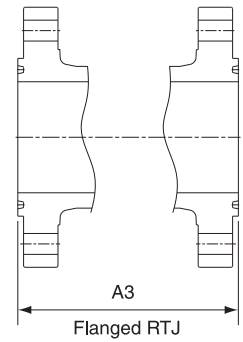
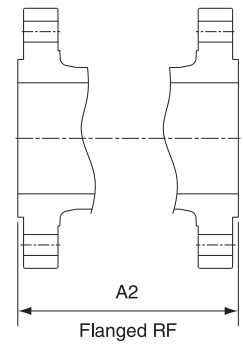
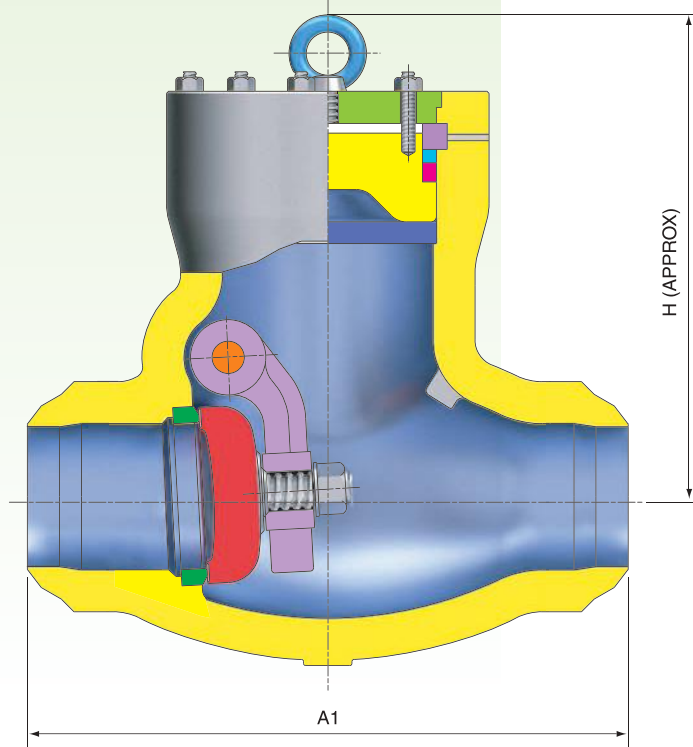
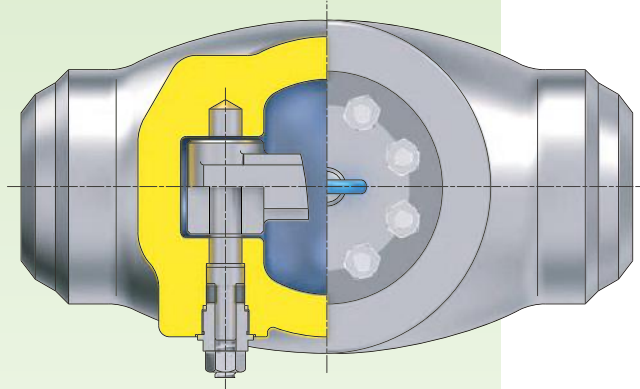
- outside weight and lever
- slam retarders
- assisting springs
- position switches/indicators
- pneumatic safety control

NO	NAME OF PART	ASTM SPECIFICATION										
		STANDARD	HIGH TEMPERATURE SERVICE						STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	COVER	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A217-CA15	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A182-F9	A182-F91	A240-304	A240-316	A240-304L	A240-316L
5	HINGE PIN	A479-410							A276-304	A276-316	A276-304L	A276-316L
7	ARM	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
11	BONNET BOLT	A193-B7			A193-B16				A193-B8			
12	BONNET NUT	A194-2H			A194-4				A194-8			
25	PLUG	A105	A479-410						A276-304	A276-316	A276-304L	A276-316L
33	RETAINER	A29-1045+Cr.PLATED		A240-304				A240-304				
36	BONNET CLAMP	A29-1045		A240-304				A240-304				
37	GASKET SPACER	A29-1045+Cr.PLATED		A240-304				A240-304				

SWING CHECK VALVES

PRESSURE SEAL COVER

SW/CH CLASS 600

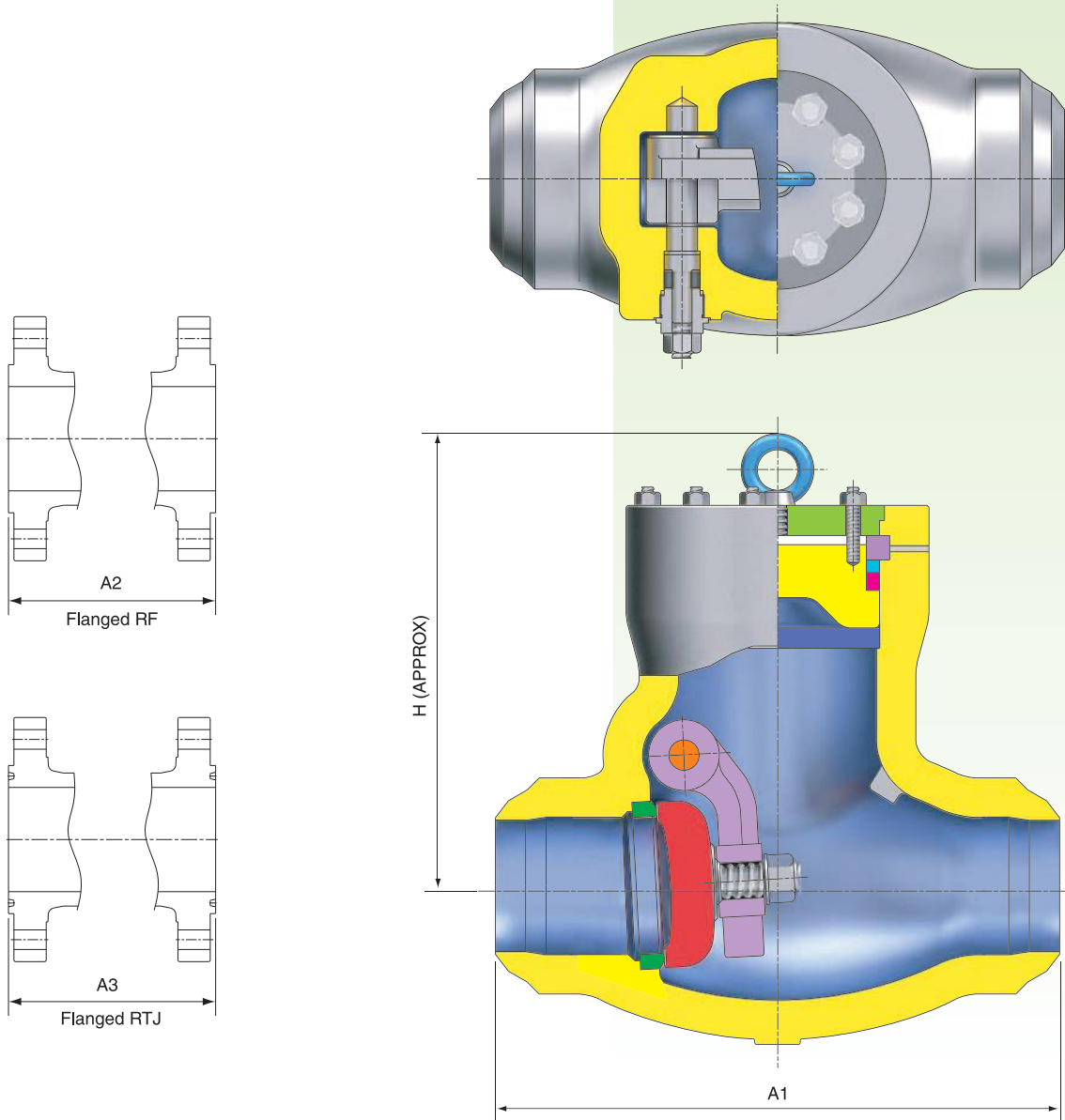


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	11.5	13.0	10.0	12.0	18.0	23.0	28.0	32.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	254	305	457	584	711	813	889	991	1092	1194	1397	
A2	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	333	359	435	562	663	790	841	892	994	1095	1200	1407	
H	in	11.4	13.5	8.1	10.2	12.8	17.1	23.9	27.4	29.5	28.7	28.7	32.2	37.4	
	mm	289	343	205	260	325	434	606	695	749	730	730	819	949	
WEIGHT	RF	lb	59.5	77.2	99.2	187.4	418.9	771.6	1102.3	1477.1	1940.0	2535.3	3262.8	4144.6	5731.9
		kg	27	35	45	85	190	350	500	670	880	1150	1480	1880	2600
	BW	lb	39.7	55.1	70.5	75.0	271.2	573.2	815.7	1080.2	1455.0	1873.9	2425.0	3284.8	4497.4
		kg	18	25	32	34	123	260	370	490	660	850	1100	1490	2040

SWING CHECK VALVES

PRESSURE SEAL COVER

SW/CH CLASS 900

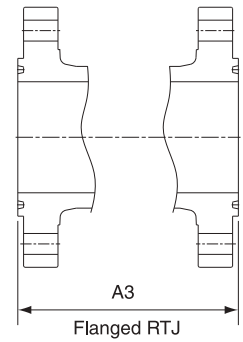
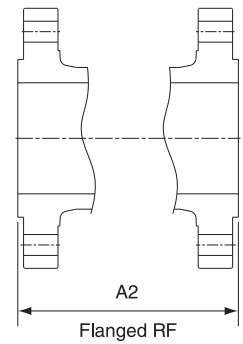
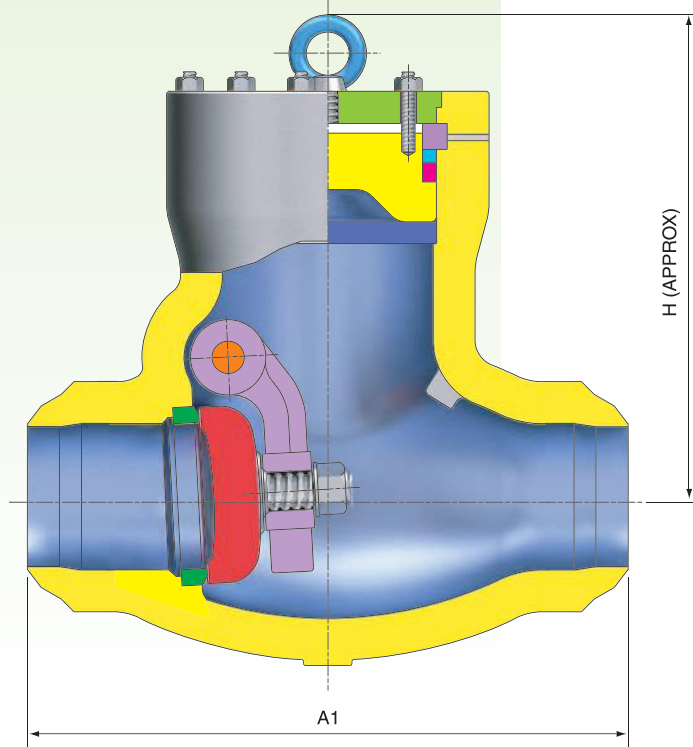
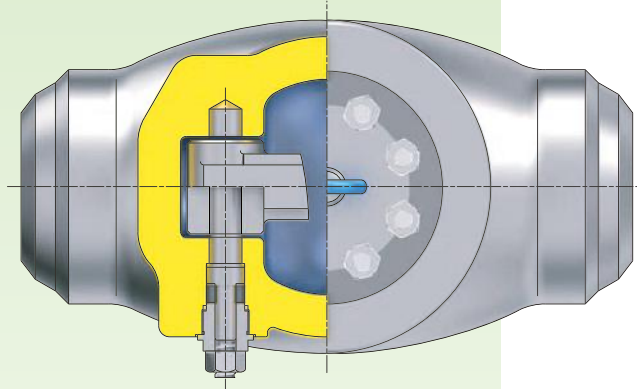


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	14.5	16.5	12.0	14.0	20.0	26.0	31.0	36.0	39.0	43.0	46.5	50.5	59.5	
	mm	368	419	305	356	508	660	787	914	991	1092	1181	1283	1511	
A2	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	
	mm	368	419	381	457	610	737	838	965	1029	1130	1219	1321	1549	
A3	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	
	mm	371	422	384	460	613	740	841	968	1039	1140	1232	1334	1568	
H	in	11.4	13.5	8.1	15.0	15.9	23.1	23.9	27.4	29.5	28.7	33.5	34.0	37.8	
	mm	289	343	205	381	403	587	606	695	749	730	851	864	959	
WEIGHT	RF	lb	88.2	121.3	114.6	231.5	507.1	1256.6	1873.9	2866.0	3417.1	3637.6	5070.6	6613.8	9038.8
		kg	40	55	52	105	230	570	850	1300	1550	1650	2300	3000	4100
	BW	lb	44.1	70.5	66.1	143.3	352.7	970.0	1521.2	2248.7	2645.5	2976.2	4078.5	5291.0	6393.3
		kg	20	32	30	65	160	440	690	1020	1200	1350	1850	2400	2900

SWING CHECK VALVES

PRESSURE SEAL COVER

SW/CH CLASS 1500

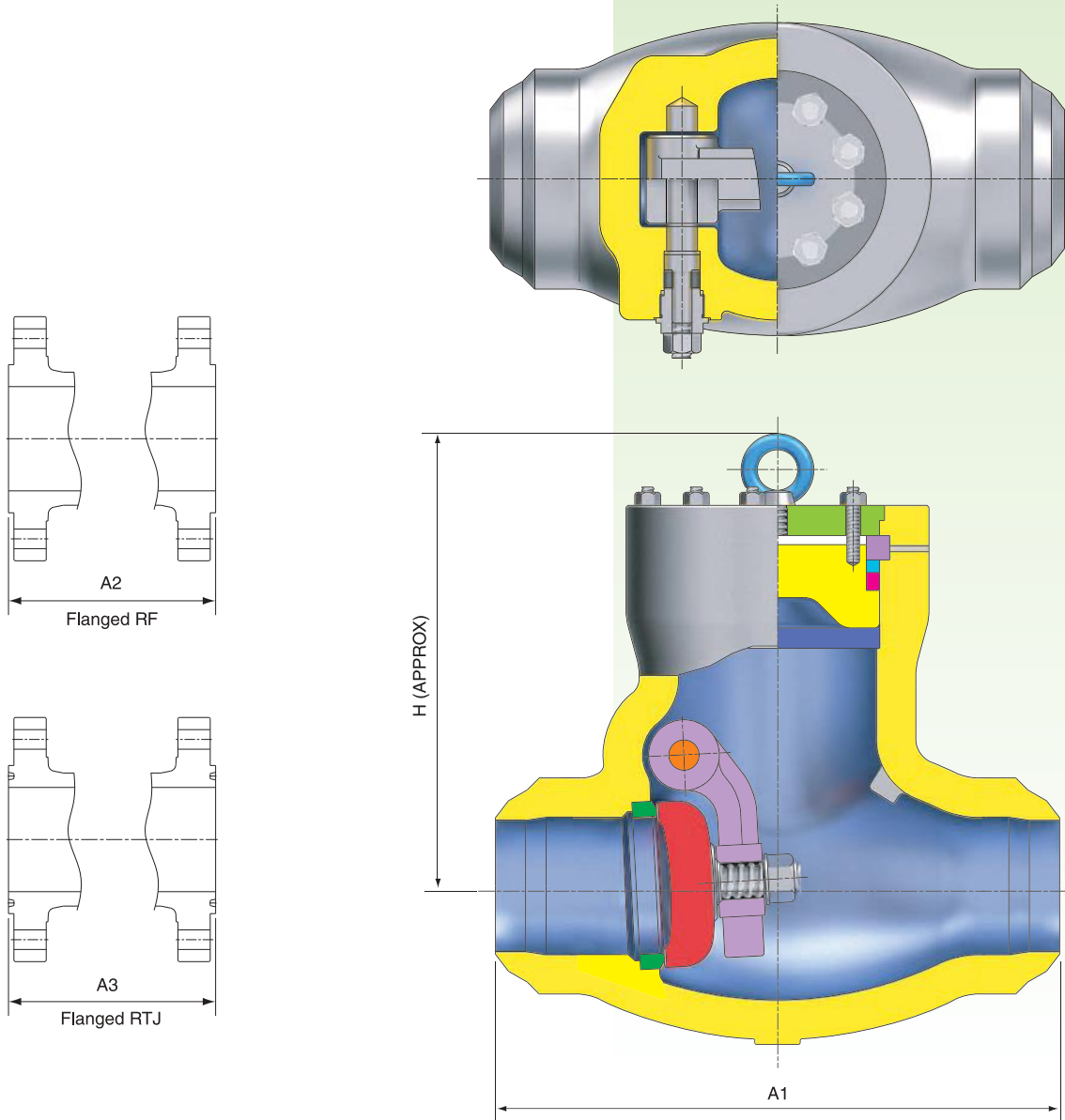


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	14.5	16.5	18.5	16.0	22.0	28.0	34.0	39.0	42.0	47.0	53.0	58.0	64.0	
	mm	368	419	470	406	559	711	864	991	1067	1194	1346	1473	1626	
A2	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.4	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1383	1537	1664	1943	
A3	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.3	61.4	66.4	77.6	
	mm	371	422	473	549	711	842	1001	1146	1276	1405	1559	1686	1972	
H	in	11.4	13.5	15.1	14.8	17.6	19.7	23.5	25.4	28.0	29.5	34.6	37.4	43.3	
	mm	289	343	383	376	448	500	598	645	711	749	880	949	1099	
WEIGHT	RF	lb	88.2	121.3	220.5	308.6	881.8	1344.8	2314.8	3417.1	4629.6	5731.9	7275.1	9259.3	13227.5
		kg	40	55	100	140	400	610	1050	1550	2100	2600	3300	4200	6000
	BW	lb	44.1	70.5	88.2	154.3	617.3	1058.2	1631.4	2425.0	3108.5	3527.3	4629.6	5731.9	7716.1
		kg	20	32	40	70	280	480	740	1100	1410	1600	2100	2600	3500

SWING CHECK VALVES

PRESSURE SEAL COVER

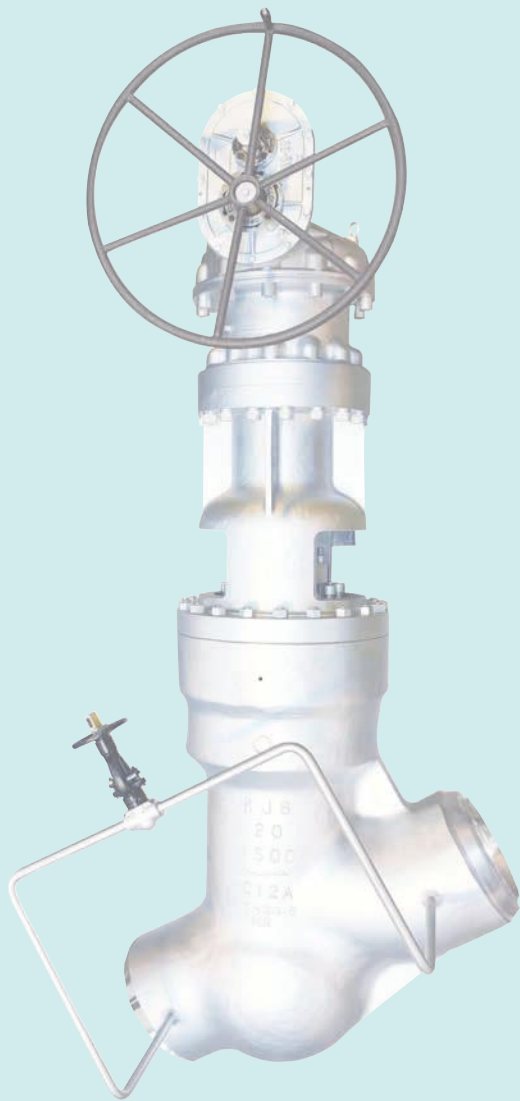
SW/CH CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	
A1	in	17.8	20.0	22.8	18.0	24.0	30.0	36.0	41.0	44.0	49.0	55.0	55.0	
	mm	451	508	578	457	610	762	914	1041	1118	1245	1397	1397	
A2	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	62.0	68.0	-	-	
	mm	451	508	578	673	914	1022	1270	1422	1575	1727	-	-	
A3	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	-	-	-	-	
	mm	454	514	584	683	927	1038	1292	1444	-	-	-	-	
H	in	11.4	11.4	15.1	15.5	22.4	24.4	29.7	27.5	33.9	42.4	39.4	54.3	
	mm	289	289	383	393	570	619	754	699	860	1076	1000	1378	
WEIGHT	RF	lb	187.4	260.1	341.7	628.3	1653.4	2976.2	4739.9	6613.8	9215.2	11155.2	16490.3	17636.7
		kg	85	118	155	285	750	1350	2150	3000	4180	5060	7480	8000
	BW	lb	110.2	154.3	187.4	363.8	1014.1	1984.1	2866.0	3968.3	5401.2	7054.7	8928.6	11023.0
		kg	50	70	85	165	460	900	1300	1800	2450	3200	4050	5000

PRESSURE SEAL NON RETURN VALVES

PRESSURE SEAL BONNET



CAST STEEL

PRESSURE SEAL NON RETURN

PRESSURE SEAL NON RETURN VALVES

YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150 °C (2100 °F) dissolution point in conformity with API Std. specifications.

BONNET

The bonnet is of a steel forging identical to the body to insure high reliability. The bonnet has a perfect body-bonnet seal and both ease of dismantling and reassembly are ensured. The body and bonnets of our valve are carefully machined to achieve perfect coaxiality and eliminate any misalignment which may cause damage stems.

STEM

The stem, of one-piece construction, is heat treated to secure the adequate mechanical properties and surface hardness. Accurate machining and grinding insure that there is minimized friction during valve opening/shutting. The round head of the stem gives a point contact with the inside of the disc housing and thus prevents galling.

BACK SEAT

All of our valves are equipped with a backseat to allow packing replacement with the valve fully opened. The conical shape contact seat in the bonnet assembly is integrally stellite faced.

DISC

The disc of our globes is a loose disc which freely revolves around the stem, thereby preventing friction and galling with the seating surface when the valve is shut. The outside diameter of the disc is accurately finished and cylindrical in shape to travel along the body guides. A stellite 6 layer is applied to the conical seating surface of the disc. This deposit undergoes a special heat treatment to secure the required hardness and soundness. In addition, the lapped finish insures a perfect mating with the seats.

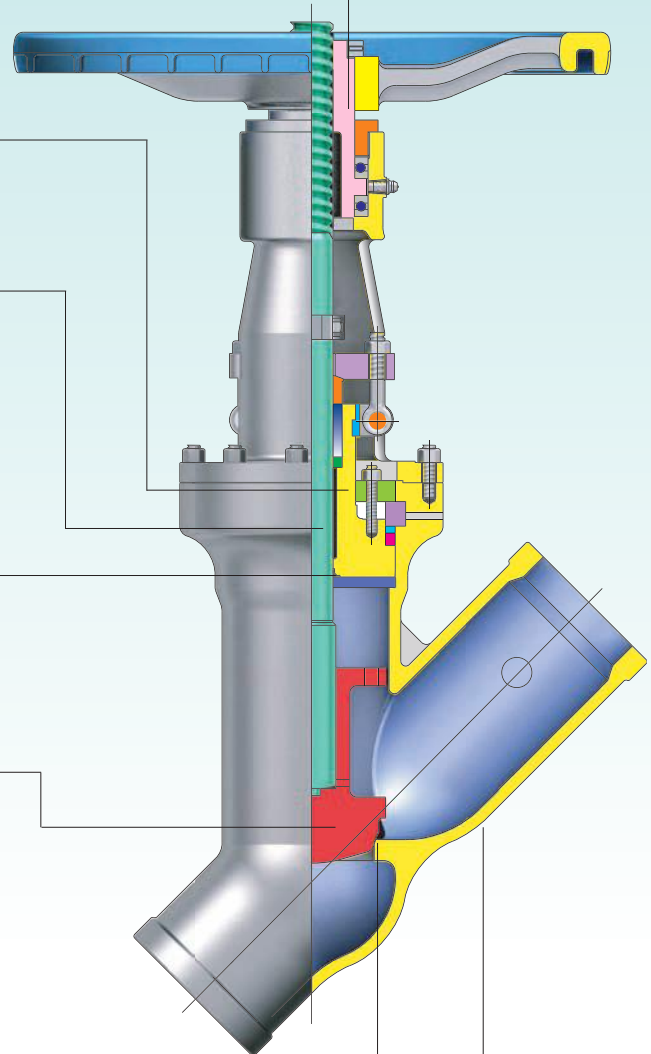
SEAT

The Stellite 6 seating surface is integrally applied to the body by means of welding in all valve sizes. Perfect mating of the disc surfaces is achieved by lapping applied to the seating surface.

BODY

The cylindrically shaped valve body prevents distortion or undue stress under extreme working conditions. In addition, adequate padding ensures a sound cast structure in the critical areas. The wall thickness is greater than, or in accordance with API, ANSI and ASME requirements.

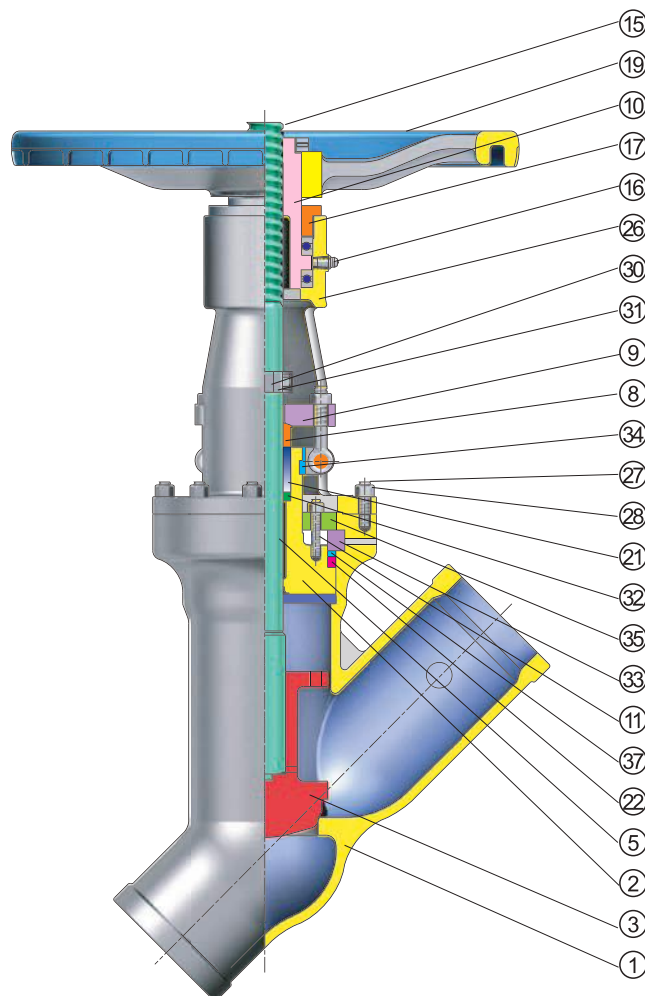
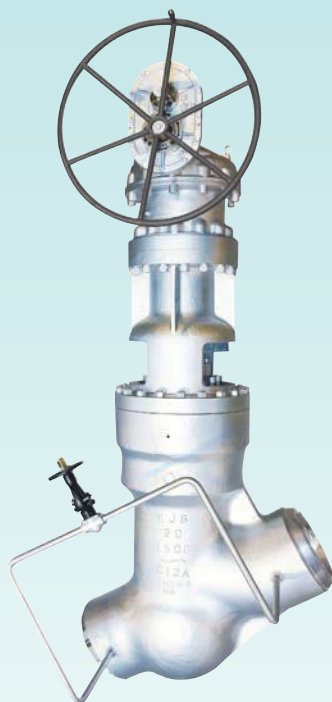
The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.



CAST STEEL

PRESSURE SEAL NON RETURN

PRESSURE SEAL NON RETURN VALVES



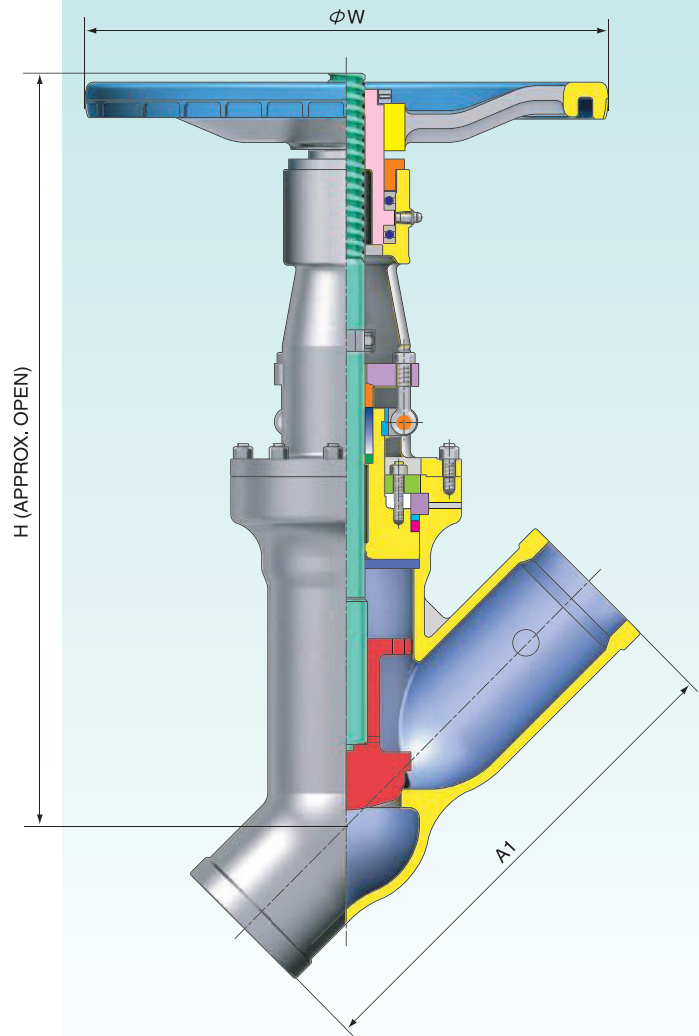
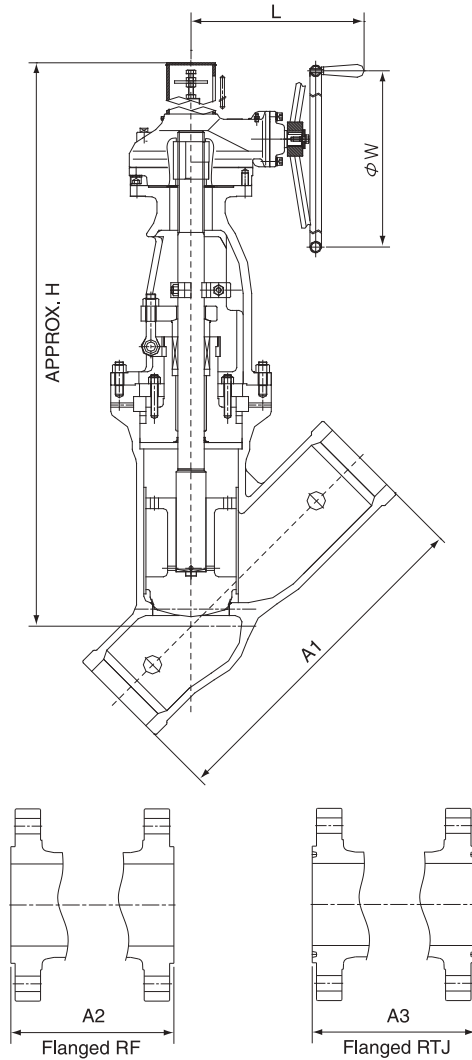
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
30	STOPPER	A283-D / AISI 304

NO	NAME OF PART	ASTM SPECIFICATION										
		STANDARD	HIGH TEMPERATURE SERVICE						STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A217-CA15	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
5	STEM	A479-410							A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND	A479-410							A276-304			
9	GLAND FLANGE	A105 or A283-D							AISI 304			
10	YOKE SLEEVE	A439-D2							A439-D2			
11	BONNET BOLT/NUT	A193-B7 / A194-2H		A193-B16 / A194-4					A193-B8 / A194-8			
13	GLAND BOLT	A193-B7							A193-B8			
14	GLAND NUT	A194-2H							A194-8			
26	YOKE	A216-WCB							A351-CF8			
27	YOKE BOLT	A193-B7							A193-B8			
28	YOKE NUT	A194-2H							A194-8			
31	STOPPER PIN	A194-2H							A194-8			
32	PACKING RING	A479-410							A276-304	A276-316	A276-304L	A276-316L
33	RETAINER	A29-1045+Cr.PLATED		A240-304					A240-304L			
34	HINGE CLAMP	A216-WCB							A351-CF8			
35	BONNET CLAMP	A29-1045							A240-304			
37	GASKET SPACER	A29-1045+Cr.PLATED		A240-304					A240-304			

NON RETURN VALVES

PRESSURE SEAL BONNET

NRV CLASS 600

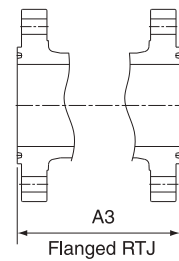
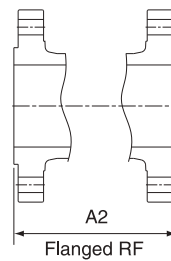
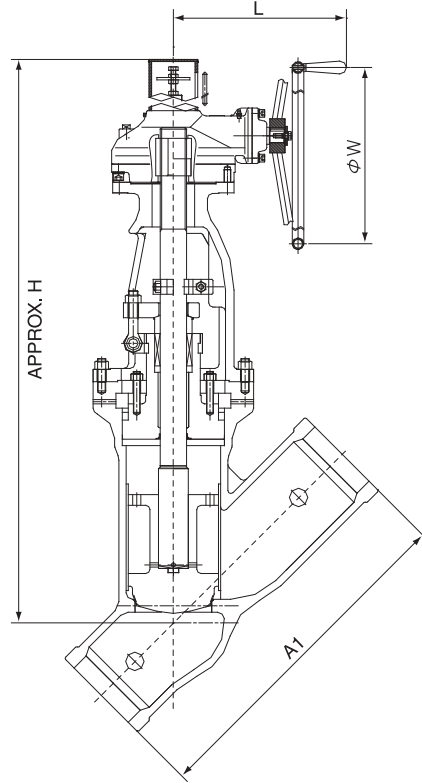
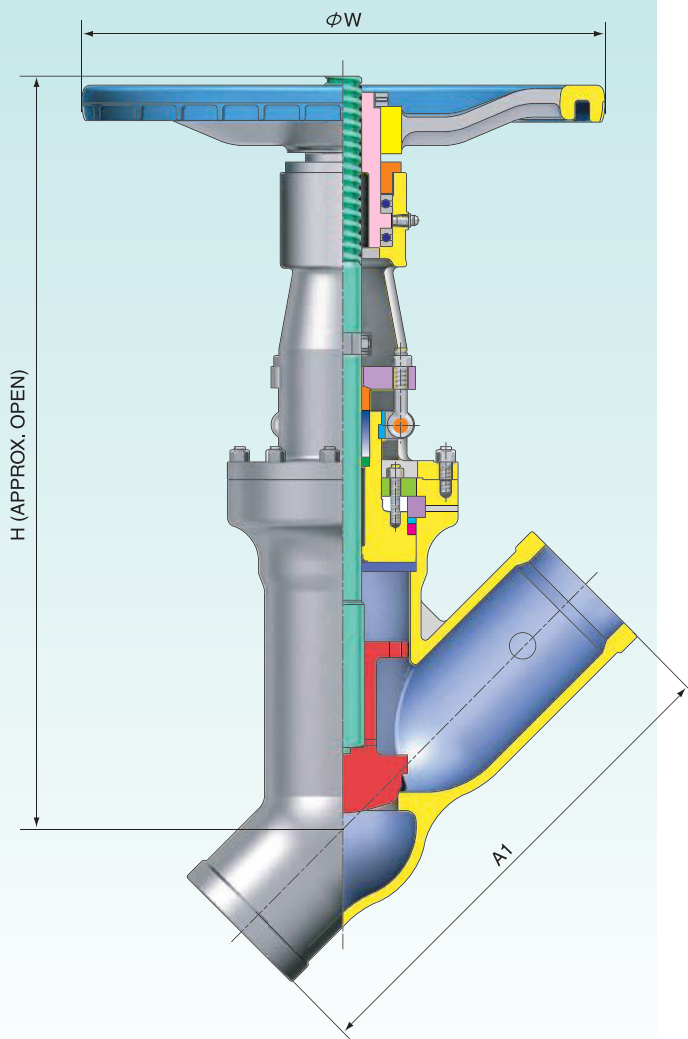


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	32.2	35.0	39.0	
	mm	292	331	356	432	559	660	787	818	889	991	
A2	in	13.78	15.75	18.90	21.65	25.59	31.50	39.37	45.28	48.43	51.57	
	mm	350	400	480	550	650	800	1000	1150	1230	1310	
A3	in	13.90	15.87	19.02	21.77	25.71	31.61	39.82	45.39	48.54	51.69	
	mm	353	403	483	553	653	803	1000	1153	1233	1313	
H	in	18.70	21.06	23.23	26.57	34.84	53.15	60.24	63.39	74.41	88.58	
	mm	475	535	590	675	885	1350	1530	1610	1890	2250	
W	in	9.84	11.81	11.81	17.72	23.62	27.95	31.50	35.43	35.43	39.37	
	mm	250	300	300	450	600	710	800	900	900	1000	
L	in	-	-	-	-	-	15.98	18.15	19.13	20.83	23.23	
	mm	-	-	-	-	-	406	461	486	529	590	
WEIGHT	RF	lb	152.1	187.4	295.4	628.3	1212.5	1510.2	1845.3	2634.5	3196.7	4299.0
		kg	69	85	134	285	550	685	837	1195	1450	1950
	BW	lb	130.1	165.3	240.3	540.1	1047.2	1333.8	1505.8	2228.9	2707.3	3622.2
		kg	59	75	109	245	475	605	683	1011	1228	1643

NON RETURN VALVES

PRESSURE SEAL BONNET

NRV CLASS 900

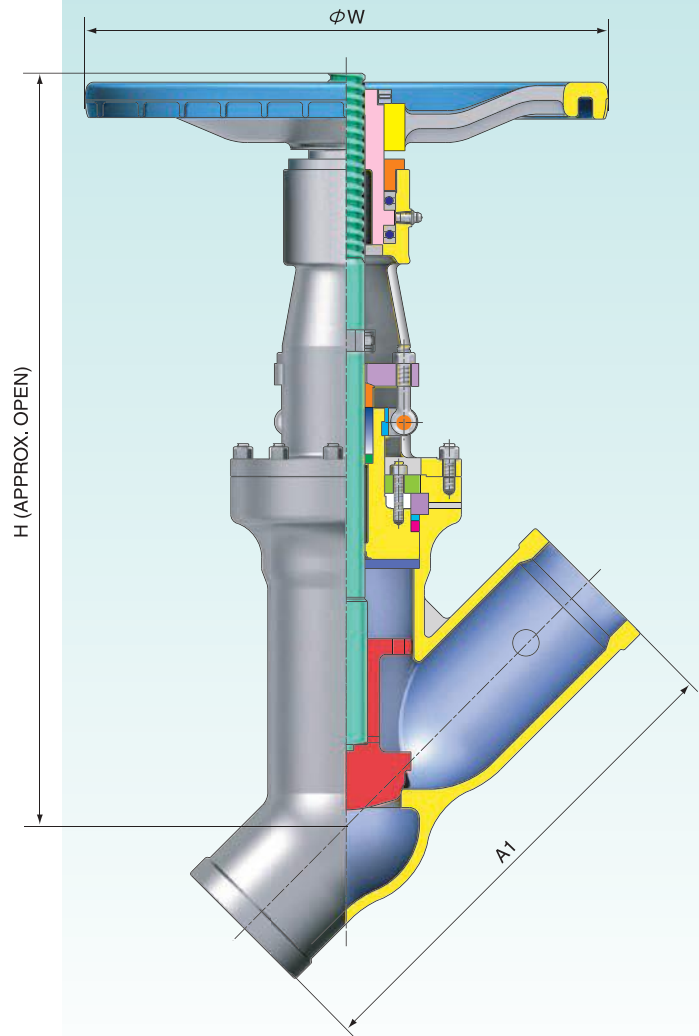
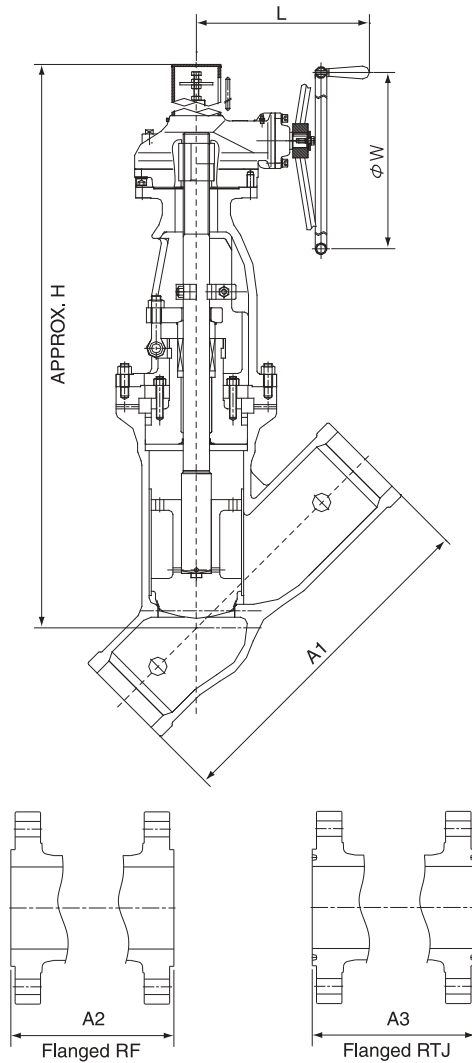


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	
	mm	368	419	381	457	610	737	838	965	1029	1130	
A2	in	20.39	22.40	20.91	23.90	29.92	34.92	38.90	43.90	46.42	50.39	
	mm	518	569	531	607	760	887	988	1115	1179	1280	
A3	in	20.51	22.52	21.02	24.02	30.04	35.04	39.02	44.02	46.77	50.79	
	mm	521	572	534	610	763	890	991	1118	1188	1290	
H	in	23.23	24.80	27.36	28.54	47.05	54.53	62.20	66.54	75.98	108.27	
	mm	590	630	695	725	1195	1385	1580	1690	1930	2750	
W	in	15.75	15.75	15.75	19.69	27.95	27.95	31.50	35.43	35.43	39.37	
	mm	400	400	400	500	710	710	800	900	900	1000	
L	in	-	-	-	-	15.98	15.98	18.15	20.83	20.83	23.23	
	mm	-	-	-	-	406	406	461	529	529	590	
WEIGHT	RF	lb	196.2	275.6	313.1	705.5	1276.5	1752.7	2976.2	3858.1	5842.2	7605.9
		kg	89	125	142	320	579	795	1350	1750	2650	3450
	BW	lb	141.1	209.4	253.5	617.3	1124.4	1510.2	2535.3	3306.9	5236.0	6624.9
		kg	64	95	115	280	510	685	1150	1500	2375	3005

NON RETURN VALVES

PRESSURE SEAL BONNET

NRV CLASS 1500

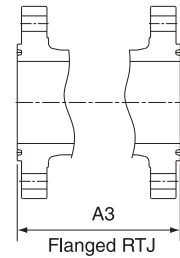
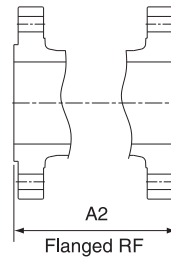
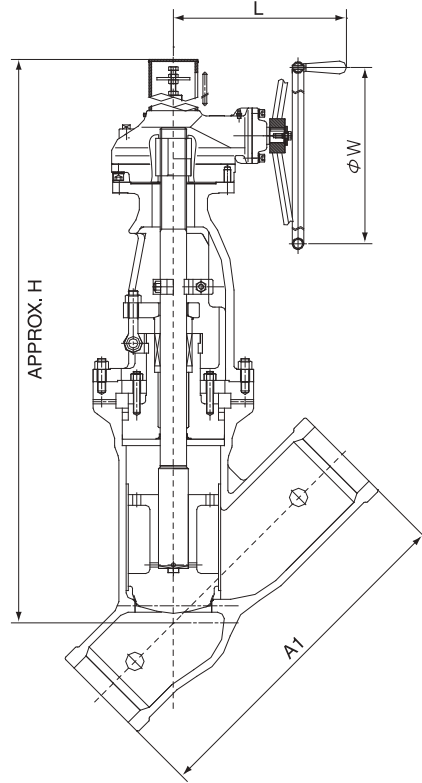
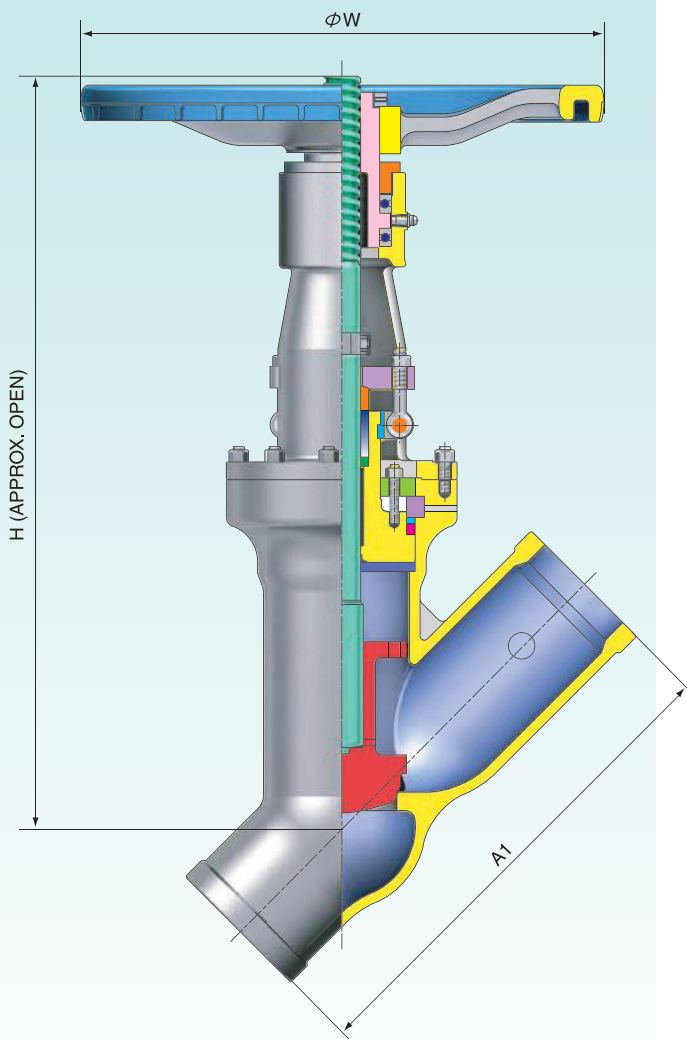


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	
	mm	50	65	80	100	150	200	250	300	350	
A1	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	
	mm	368	419	470	546	705	832	991	1130	1257	
A2	in	20.39	22.40	24.41	27.40	33.66	38.66	44.92	50.39	55.39	
	mm	518	569	620	696	855	982	1141	1280	1407	
A3	in	20.51	22.52	24.53	27.52	33.90	39.02	45.28	51.02	56.14	
	mm	521	572	623	699	861	991	1150	1296	1426	
H	in	23.23	24.80	27.95	30.12	48.62	54.72	66.14	75.98	87.80	
	mm	590	630	710	765	1235	1390	1680	1930	2230	
W	in	15.75	15.75	19.69	19.69	27.95	31.50	35.43	35.43	39.37	
	mm	400	400	500	500	710	800	900	900	1000	
L	in	-	-	-	-	15.98	18.15	20.83	20.83	23.23	
	mm	-	-	-	-	406	461	529	529	590	
WEIGHT	RF	lb	196.2	56.7	341.7	771.6	1494.7	2083.4	3483.3	4960.4	9149.2
		kg	89	125	155	350	678	945	1580	2250	4150
	BW	lb	141.1	209.4	251.3	628.3	1208.1	1752.7	2932.1	4078.6	7605.9
		kg	64	95	114	285	548	795	1330	1850	3450

NON RETURN VALVES

PRESSURE SEAL BONNET

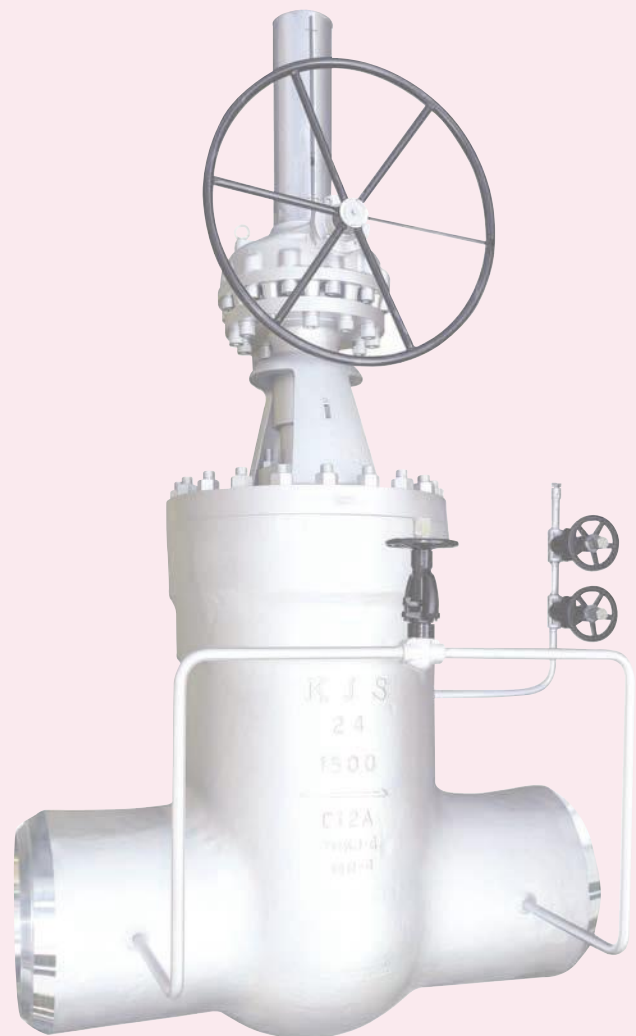
NRV CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm		50	65	80	100	150	200	250	300
A1	in		17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0
	mm		451	508	578	673	914	1022	1270	1422
A2	in		25.63	27.87	30.63	34.37	43.86	48.11	57.87	63.86
	mm		651	708	778	873	1114	1222	1470	1622
A3	in		25.75	28.11	30.87	34.76	44.37	48.74	58.74	64.76
	mm		654	714	784	883	1127	1238	1492	1645
H	in		23.23	30.12	31.10	46.85	51.57	76.77	83.86	96.46
	mm		590	765	790	1190	1310	1950	2130	2450
W	in		15.75	19.69	19.69	24.80	27.95	31.50	35.43	39.37
	mm		400	500	500	630	710	800	900	1000
L	in		-	-	-	15.31	15.98	18.15	20.83	23.23
	mm		-	-	-	389	406	461	529	590
WEIGHT	RF	lb	231.5	71.7	474.0	1058.2	2072.3	3626.6	5643.8	7165.0
		kg	105	158	215	480	940	1645	2560	3250
	BW	lb	165.3	49.9	319.7	727.5	1411.0	2744.8	3769.9	4530.5
		kg	75	110	145	330	640	1245	1710	2055

PRESSURE SEAL PARALLEL GATE VALVES

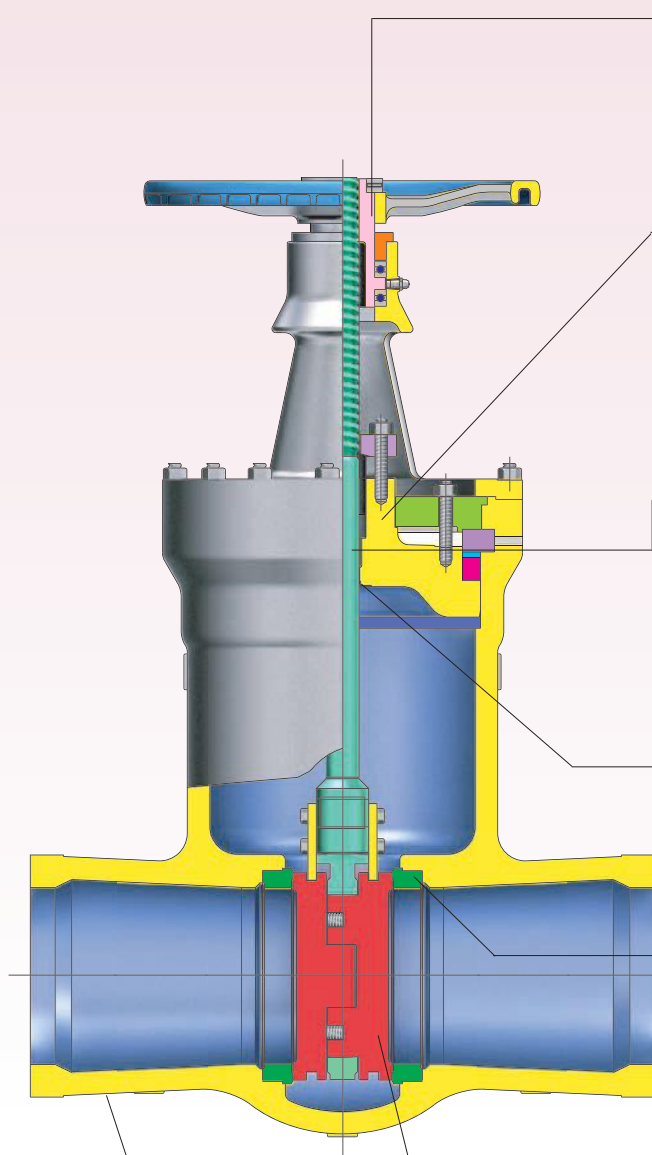
PRESSURE SEAL BONNET



CAST STEEL

PRESSURE SEAL BONNET

PRESSURE SEAL PARALLEL GATE VALVES



YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150°C (2100°F) dissolution point in accordance with API Std. specifications.

BONNET

The bonnet is of a steel forging identical to the body to insure high reliability. The bonnet has a perfect body-bonnet seal and both ease of dismantling and reassembly are ensured. The bodies and bonnets of the valve are machined by special purpose machines to achieve perfect coaxiality and eliminate any misalignment which may damage the stems.

STEM

The machined forged stem comes with a T-shape head, which connects the slot of the wedge. The contacting surface of the head is spherically shaped, thereby giving it greater strength and durability. It is heat treated to give it adequate mechanical properties and surface hardness. Accurate machining and lapping insure minimized friction during opening and shutting.

BACK SEAT

All of our valves are provided with positive backseat, and packing replacement can be done with the valve fully open. The conical seat and the guide are integrally stellite faced.

SEAT RING

The Stellite 6 surface of the seat ring is integrally applied to the body by means of welding in all valve sizes. Lapping applied to the seating surface ensures perfect mating with the wedge surfaces.

PARALLEL DISC

The parallel disc designed to absorb thermally-induced body distortion, thereby making it ideal for high temperature steam or water supply piping. A Stellite 6 layer is applied to the seating surface, and this deposit is subjected to a special heat treatment to secure required hardness and soundness. The lapped finish then insures perfect mating with the seats.

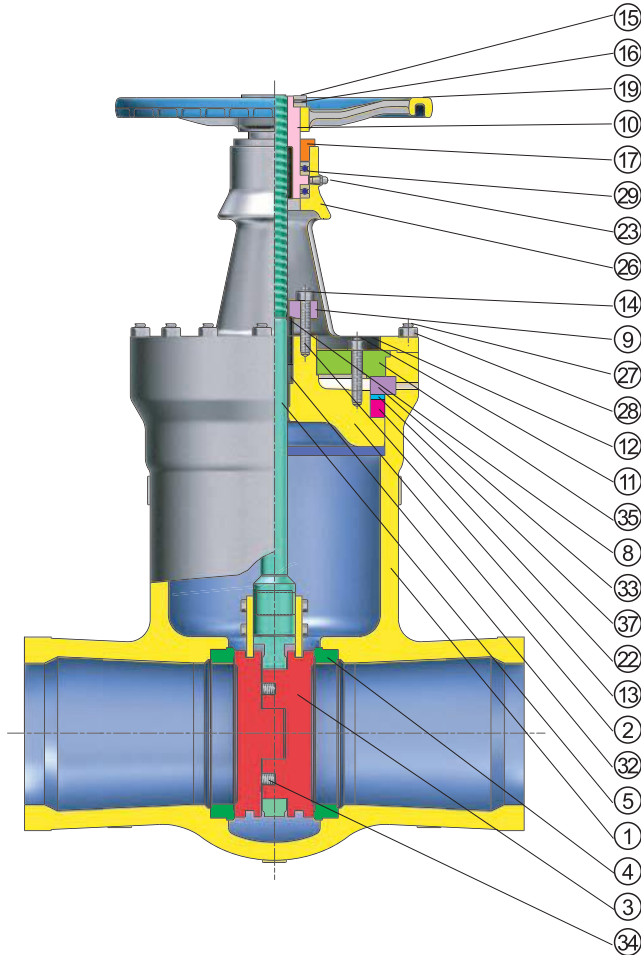
BODY

The valve body is cylindrically shaped to prevent distortion or undue stress during extreme working conditions. In addition, adequate padding helps to achieve a sound cast structure in critical area. The wall thickness is greater than, or in accordance with API, ANSI and ASME requirements. The contact surfaces ensure that a minimum specific pressure is achieved. The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.

CAST STEEL

PRESSURE SEAL BONNET

PRESSURE SEAL PARALLEL GATE VALVES



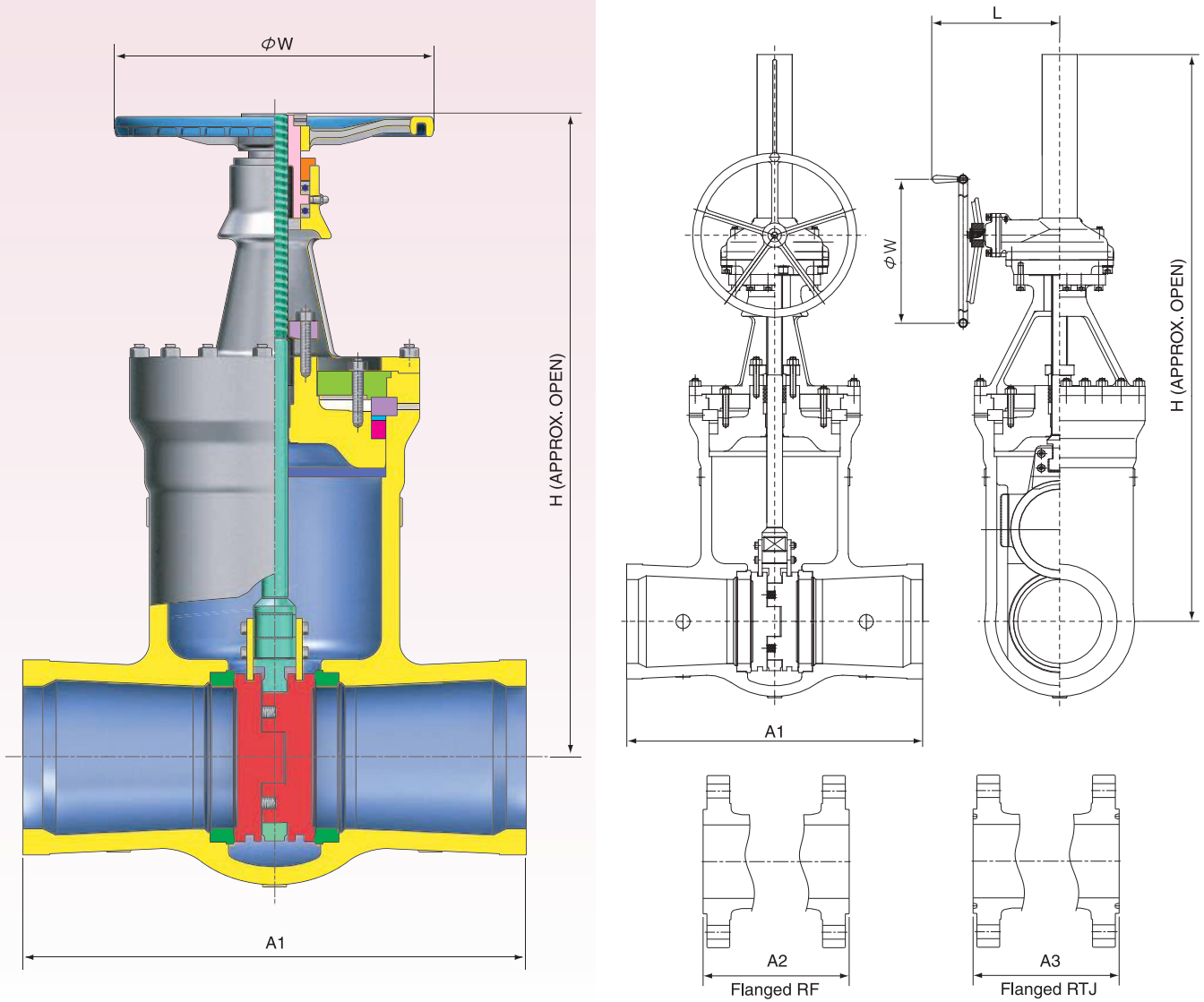
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BEARING	COMMERCIAL

NO	NAME OF PART	ASTM SPECIFICATION										
		STANDARD	HIGH TEMPERATURE SERVICE						STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A182-F9	A182-F91	A240-304	A240-316	A240-304L	A240-316L
5	STEM		A479-410						A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND		A479-410						A276-304			
9	GLAND FLANGE		A105 or A283-D						AISI 304			
10	YOKE SLEEVE		A439-D2						A439-D2			
11	BONNET BOLT	A193-B7	A193-B16						A193-B8			
12	BONNET NUT	A194-2H	A194-4						A194-8			
13	GLAND BOLT		A193-B7						A193-B8			
14	GLAND NUT		A194-2H						A194-8			
26	YOKE		A216-WCB						A351-CF8			
27	YOKE BOLT		A193-B7						A193-B8			
28	YOKE NUT		A194-2H						A194-8			
32	PACKING RING		A479-410						A276-304	A276-316	A276-304L	A276-316L
33	RETAINER	A29-1045+Cr PLATED	A240-304						A240-304L			
34	SPRING		INCONEL						INCONEL			
35	BONNET CLAMP		A29-1045						A240-304			
37	GASKET SPACER	A29-1045+Cr PLATED	A240-304						A240-304			

PARALLEL GATE VALVES

PRESSURE SEAL BONNET

PGT CLASS 600

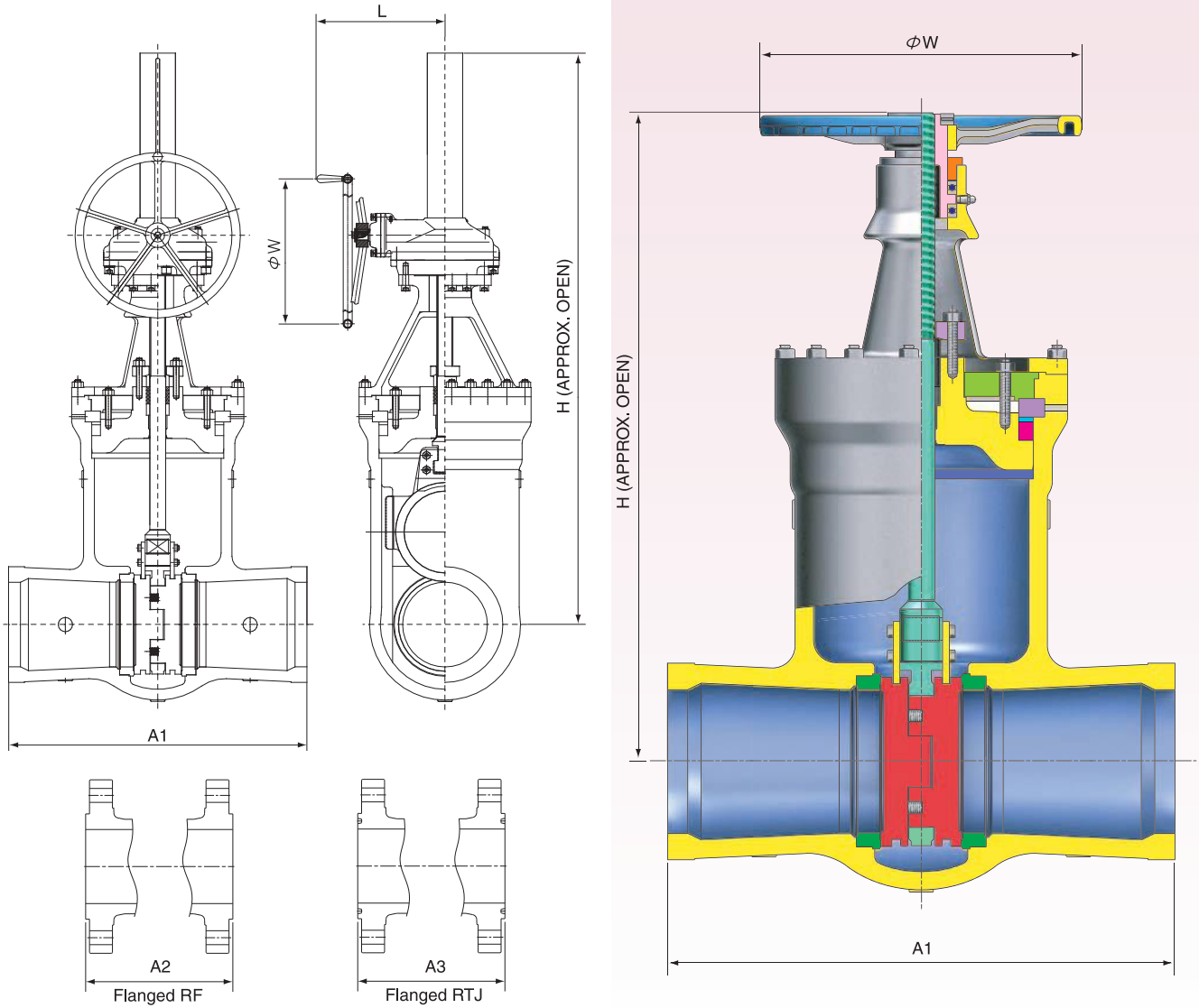


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	7.0	8.5	10.0	12.0	18.0	23.0	28.0	32.0	35.0	39.0	43.0	47.0	55.0	
	mm	178	216	254	305	457	584	711	813	889	991	1092	1194	1397	
A2	in	11.5	13.0	14.0	17.0	21.9	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	356	432	556	660	787	838	889	991	1092	1194	1397	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1406	
H	in	19.1	20.3	22.8	27.1	37.6	44.7	50.2	57.3	66.9	84.1	104.3	110.0	122.2	
	mm	485	515	578	689	955	1135	1275	1455	1698	2135	2650	2795	3105	
W	in	8.8	8.8	9.8	11.8	17.7	19.7	24.8	15.7	19.7	24.8	28.0	28.0	31.5	
	mm	224	224	250	300	450	500	630	400	500	630	710	710	800	
L	in	-	-	-	-	-	-	-	13.0	13.5	15.3	16.0	16.0	18.1	
	mm	-	-	-	-	-	-	-	330	342	389	406	406	461	
WEIGHT	RF	lb	99.2	123.5	134.5	216.1	571.0	881.8	1338.2	1944.5	2381.0	3626.6	5070.6	6757.2	8873.6
		kg	45	56	61	98	259	400	607	882	1080	1645	2300	3065	4025
	BW	lb	81.6	90.4	99.2	143.3	407.9	650.4	981.1	1510.2	1862.9	2888.1	4122.6	5533.6	7120.9
		kg	37	41	45	65	185	295	445	685	845	1310	1870	2510	3230

PARALLEL GATE VALVES

PRESSURE SEAL BONNET

PGT CLASS 900

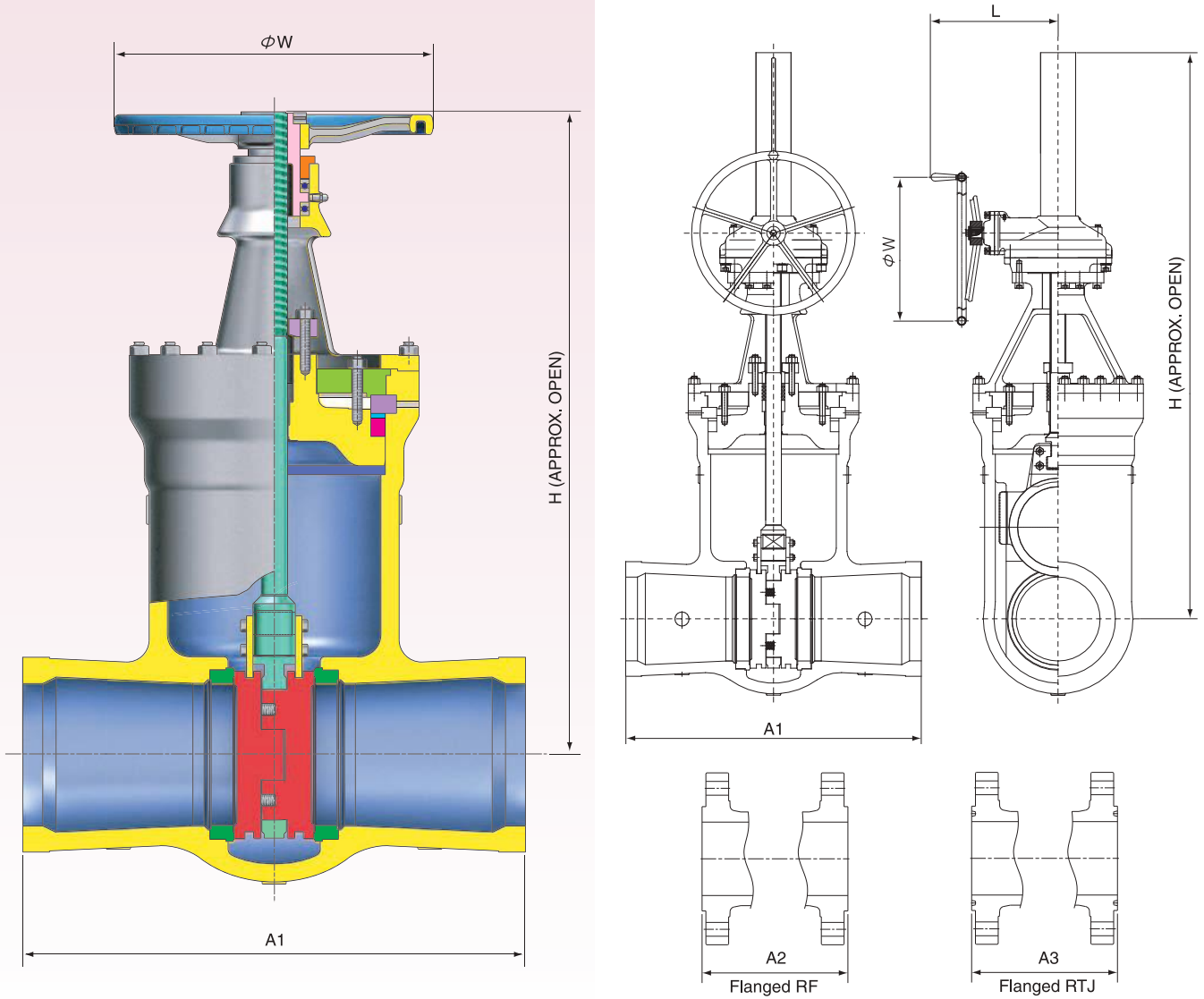


VALVE SIZE	in	2	2.5	2.5	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	65	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	10.0	14.0	20.0	26.0	31.0	32.0	39.0	43.0	46.5	50.5	59.5	
	mm	216	254	254	356	508	660	787	814	991	1092	1181	1283	1511	
A2	in	14.5	16.5	16.5	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	
	mm	368	419	419	457	610	737	838	965	1029	1130	1219	1321	1549	
A3	in	14.6	16.6	16.6	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	
	mm	371	422	422	460	612	740	841	968	1038	1140	1232	1333	1568	
H	in	21.3	24.4	24.4	31.1	42.7	49.2	55.9	65.6	72.8	80.9	85.2	89.8	111.4	
	mm	540	620	620	789	1085	1250	1420	1666	1850	2056	2165	2280	2830	
W	in	11.8	11.8	11.8	15.7	22.0	19.7	24.8	28.0	28.0	31.5	31.5	35.4	35.4	
	mm	300	300	300	400	560	500	630	710	710	800	800	900	900	
L	in	-	-	-	-	-	13.5	15.3	16.0	16.0	18.1	18.1	19.1	19.1	
	mm	-	-	-	-	-	342	389	406	406	461	461	486	486	
WEIGHT	RF	lb	141.1	160.9	160.9	280.0	937.0	1221.4	2030.5	2821.9	3216.5	5147.8	6655.8	9050	12930
		kg	64	73	73	127	425	554	921	1280	1459	2335	3019	4105	5865
	BW	lb	94.8	105.8	105.8	189.6	749.6	903.9	1576.3	2193.6	2491.2	4259.3	5401.3	7495.7	9920.8
		kg	43	48	48	86	340	410	715	995	1130	1932	2450	3400	4500

PARALLEL GATE VALVES

PRESSURE SEAL BONNET

PGT CLASS 1500

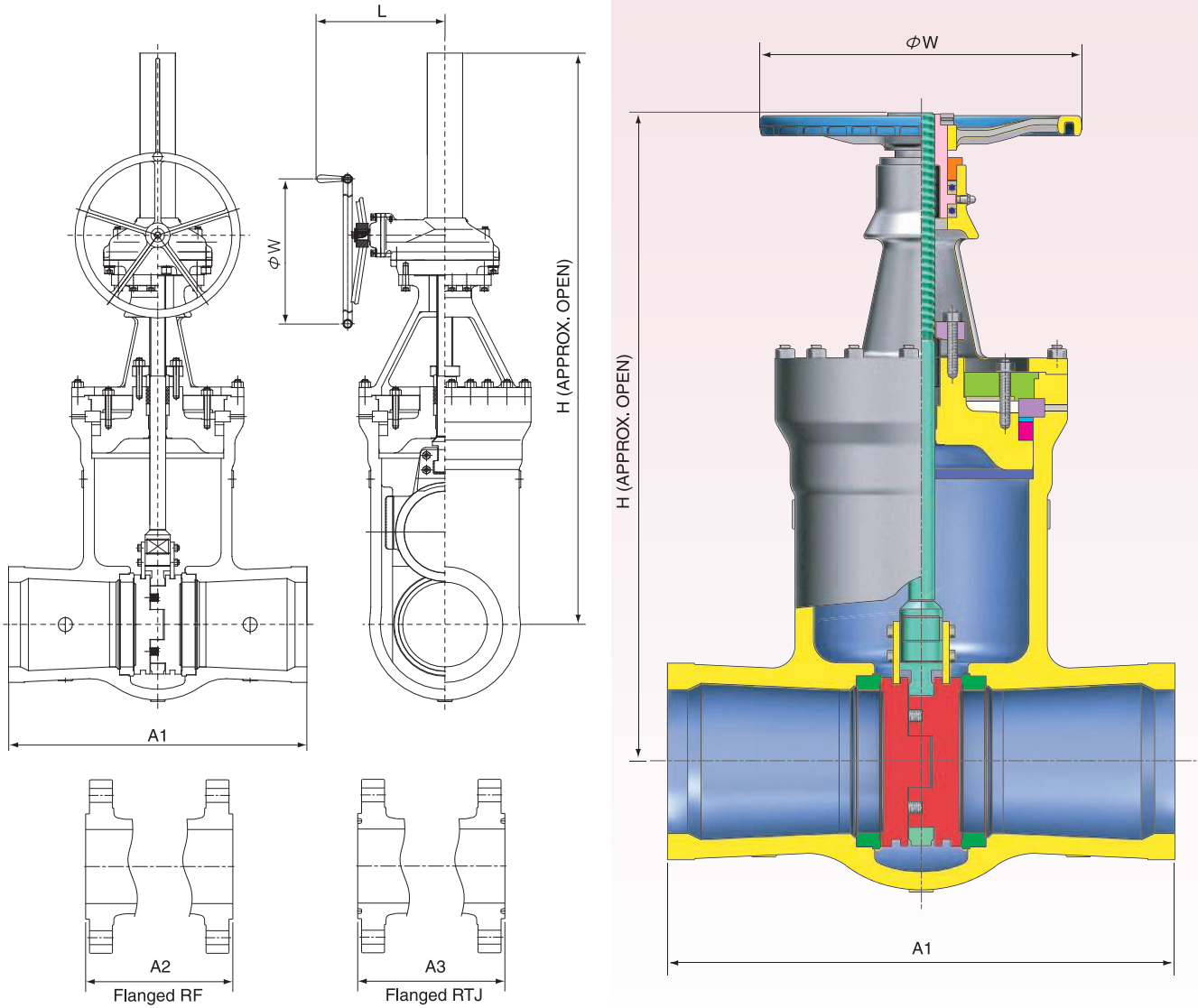


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	12.0	16.0	22.0	28.0	34.0	39.0	42.0	47.0	53.0	58.0	64.0	
	mm	216	254	305	406	559	711	864	991	1067	1194	1346	1473	1626	
A2	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.5	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1384	1536	1664	1943	
A3	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.4	61.4	66.4	77.6	
	mm	371	422	473	549	711	841	1000	1146	1276	1406	1559	1686	1972	
H	in	21.3	24.4	27.4	33.1	47.0	52.8	57.1	61.8	66.3	74.4	82.3	103.5	117.3	
	mm	540	620	695	840	1195	1340	1450	1570	1683	1890	2090	2630	2980	
W	in	11.8	11.8	15.7	19.7	19.7	24.8	28.0	31.5	31.5	35.4	35.4	39.4	39.4	
	mm	300	300	400	500	500	630	710	800	800	900	900	1000	1000	
L	in	-	-	-	-	13.5	15.3	16.0	18.1	18.1	19.1	19.1	23.2	24.4	
	mm	-	-	-	-	342	389	406	461	461	486	486	590	619	
WEIGHT	RF	lb	141.1	160.9	284.4	456.4	983.3	1671.1	2885.9	3926.4	4872.2	7198.1	11001	15013	22575
		kg	64	73	129	207	446	758	1309	1781	2210	3265	4990	6810	10240
	BW	lb	94.8	105.8	198.4	326.3	674.6	1168.4	2028.3	2634.5	3130.6	4925.1	7936.6	11188	16424
		kg	43	48	90	148	306	530	920	1195	1420	2234	3600	5075	7450

PARALLEL GATE VALVES

PRESSURE SEAL BONNET

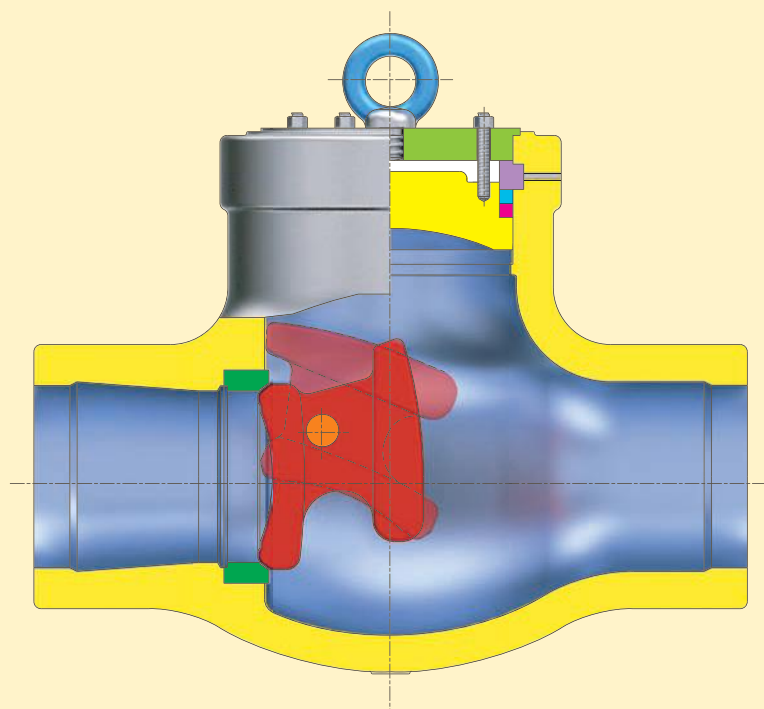
PGT CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	11.0	13.0	14.5	18.0	24.0	30.0	36.0	41.0	44.0	49.0	55.0	60.0	65.0	
	mm	279	330	368	457	610	762	914	1041	1118	1245	1397	1524	1650	
A2	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	-	-	-	-	-	
	mm	451	508	578	673	914	1022	1270	1422	-	-	-	-	-	
A3	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	-	-	-	-	-	
	mm	454	514	584	683	927	1038	1292	1445	-	-	-	-	-	
H	in	22.6	28.1	29.3	32.1	45.3	53.0	58.1	63.8	67.7	76.2	84.4	104.1	109.6	
	mm	575	715	745	815	1150	1345	1475	1620	1720	1935	2145	2645	2785	
W	in	11.8	15.7	19.7	19.7	24.8	28.0	31.5	31.5	35.4	35.4	39.4	39.4	39.4	
	mm	300	400	500	500	630	710	800	800	900	900	1000	1000	1000	
L	in	-	-	-	13.5	15.3	16.0	18.1	18.1	19.1	19.1	23.2	24.4	24.4	
	mm	-	-	-	342	389	406	461	461	486	486	590	619	619	
WEIGHT	RF	lb	227.1	295.4	405.7	615.1	1580.7	2275.2	4144.7	6128.8	-	-	-	-	-
		kg	103	134	184	279	717	1032	1880	2780	-	-	-	-	-
	BW	lb	154.3	187.4	242.5	363.8	937.0	1311.8	2259.7	3494.3	4166.7	6338.3	8587.0	12754	17538
		kg	70	85	110	165	425	595	1025	1585	1890	2875	3895	5785	7955

PRESSURE SEAL TILTING CHECK VALVES

PRESSURE SEAL COVER



CAST STEEL

PRESSURE SEAL COVER

PRESSURE SEAL TILTING CHECK VALVES

HINGE PIN

The hinge pin is inserted into the valve body to achieve pressure seal construction.

COVER

The cover material is a steel forging identical to the body to insure high dependability.
The cover construction has a perfect body-cover tightness and ease of dismantling and reassembly are ensured.

DISC

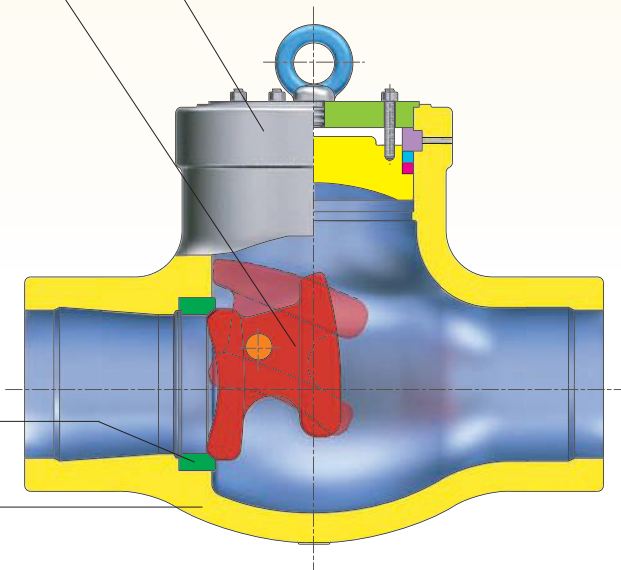
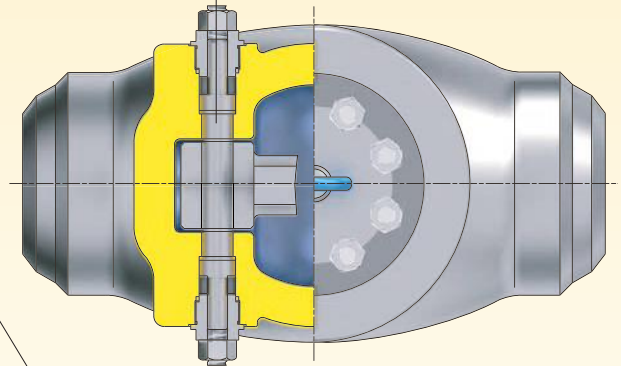
The disc has a sufficient seating surface area which is ground and lapped to a mirror finish.
It is of one-piece construction and is heat treated to deliver the required mechanical properties and hardness.

SEAT RING

The Stellite 6 surface of the seat ring is integrally applied to the body by means of welding in all valve sizes.
Perfect mating with the DISC surfaces attained by a lapping finish applied to the seating.

BODY

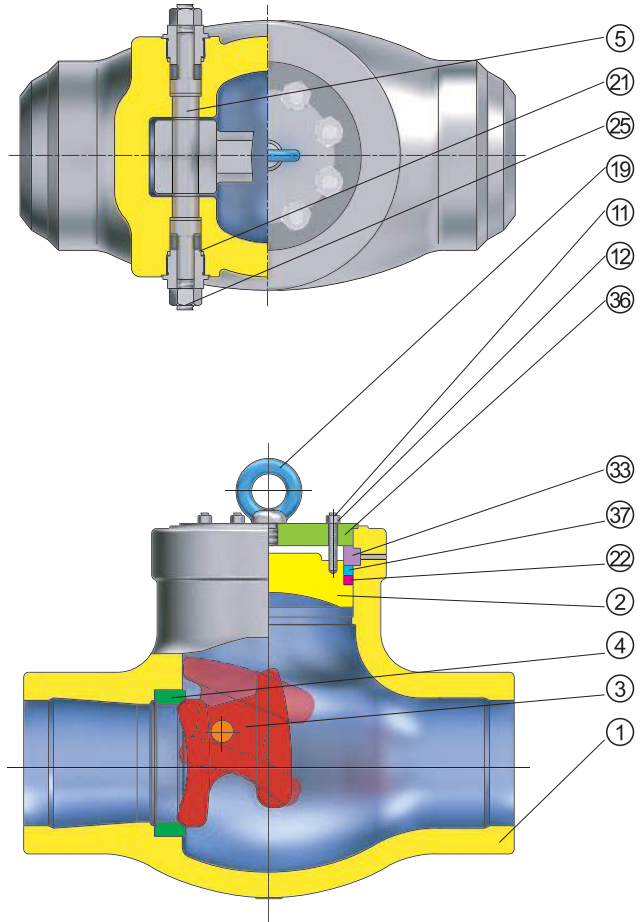
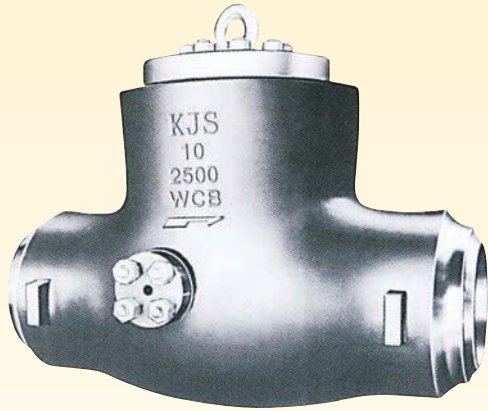
The cylindrically shaped valve body prevents distortion or undue stress under extreme working conditions. Padding is also provided to achieve a sound cast structure in the critical areas. The wall thickness is greater than, or in accordance with, API, ANSI and ASME requirements. The area contacting the pressure seal gasket has a stainless steel 18/8 inlay to eliminate corrosion or wire drawing. The close tolerances of the inside diameter of this area are attained by accurate machining and honing finish.



CAST STEEL

PRESSURE SEAL COVER

PRESSURE SEAL TILTING CHECK VALVES



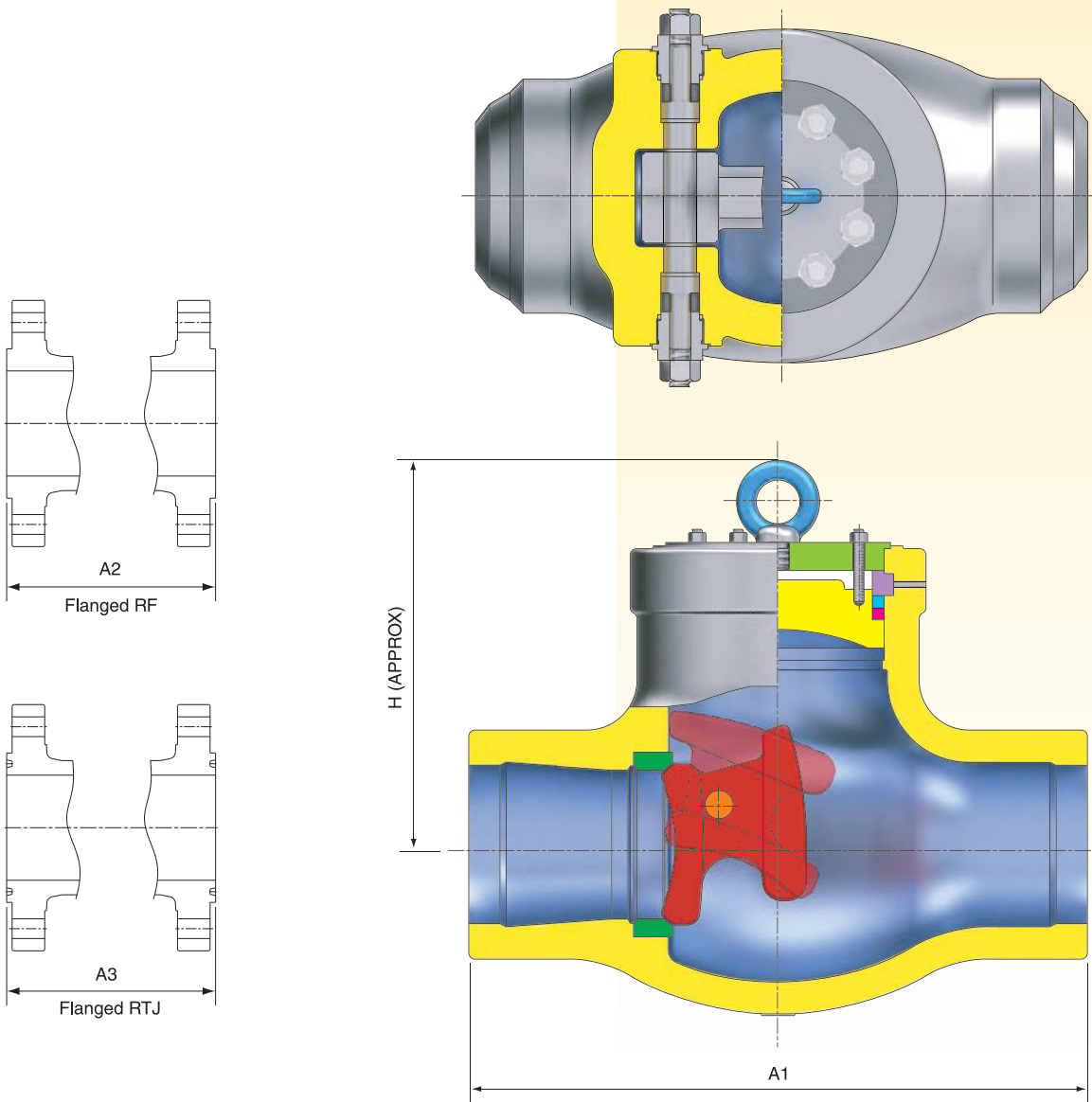
NO	NAME OF PART	ASTM SPECIFICATION
19	EVE BOLT	A 105
21	PLUG GASKET	COMMERCIAL
22	GASKET	COMMERCIAL

NO	NAME OF PART	ASTM SPECIFICATION											
		STANDARD	HIGH TEMPERATURE SERVICE				LOW TEMPERATURE SERVICE			STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	
2	COVER	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	
3	DISC	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A217-C12	A217-C12A	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A182-F9	A182-F91	A240-304	A240-316	A240-304L	A240-316L	
5	HINGE PIN	A479-410	A479-410	A479-410	A479-410	A479-410	A479-410	A479-410	A276-304	A276-316	A276-304L	A276-316L	
7	ARM	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A479-410	A479-410	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A193-B16			A193-B8			
12	BONNET NUT	A194-2H	A194-2H	A194-4	A194-4	A194-4	A194-4			A194-8			
25	PLUG	A105	A479-410				A479-410		A276-304	A276-316	A276-304L	A276-316L	
33	RETAINER	A29-1045Cr.PLATED	A240-304				A240-304			A240-304			
36	BONNET CLAMP	A29-1045				A29-1045			A240-304				
37	GASKET SPACER	A29-1045Cr.PLATED	A240-304				A240-304			A240-304			

TILTING CHECK VALVES

PRESSURE SEAL COVER

TC CLASS 600

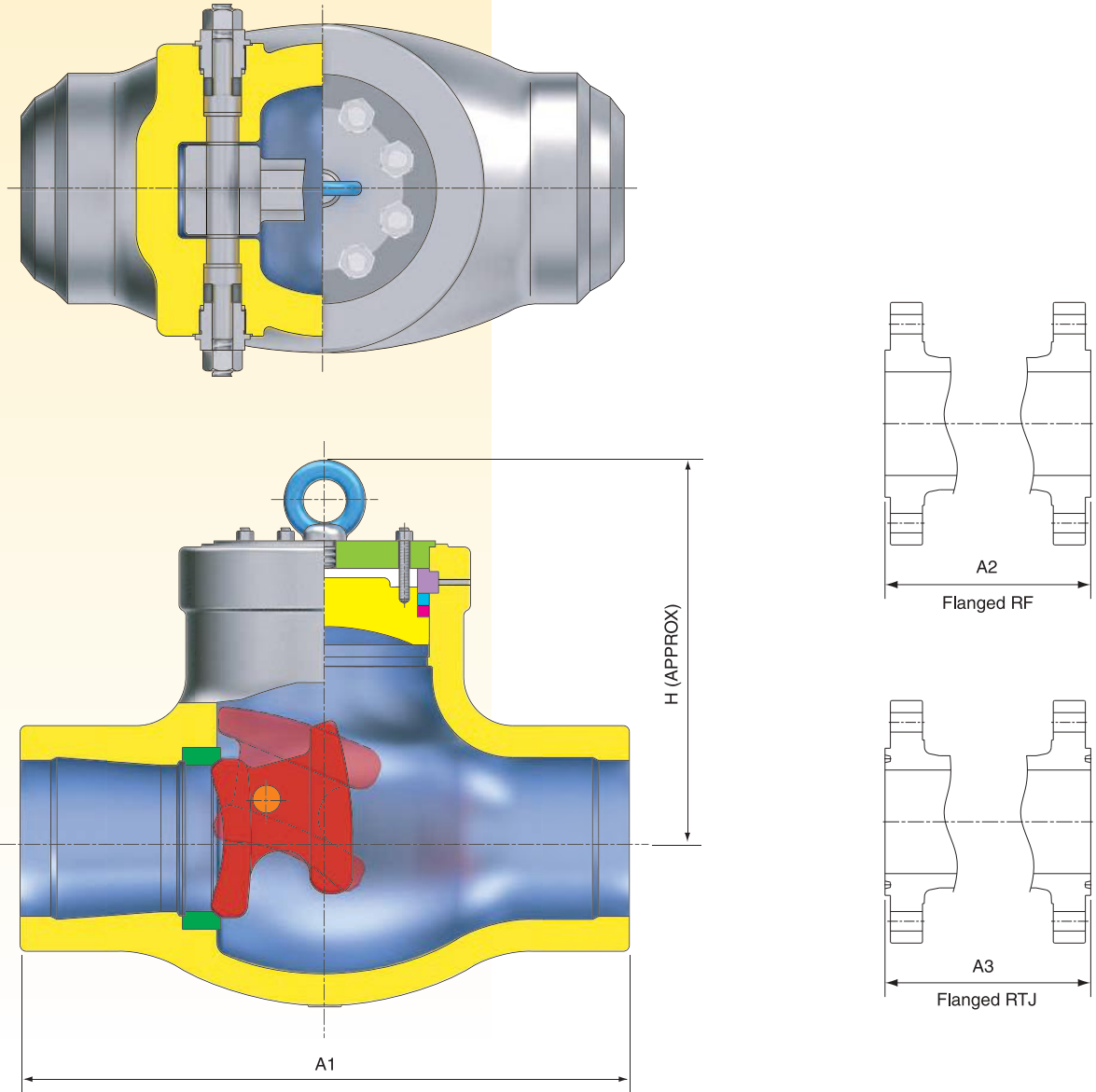


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	7.0	8.5	10.0	12.0	18.0	23.0	28.0	32.0	35.0	39.0	43.0	47.0	55.0	
	mm	178	216	254	305	457	584	711	813	889	991	1092	1194	1397	
A2	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1407	
H	in	7.7	7.9	8.2	9.8	12.2	15.0	17.7	22.8	26.0	30.7	33.0	34.6	36.4	
	mm	195	200	208	248	310	380	450	580	660	780	838	880	925	
WEIGHT	RF	lb	55.1	79.4	90.4	147.7	438.7	815.7	1106.7	1492.5	1929.0	2579.4	3384.1	4376.2	6272.1
		kg	25	36	41	67	199	370	502	677	875	1170	1535	1985	2845
	BW	lb	37.5	46.3	55.1	75.0	275.6	584.2	749.6	1058.2	1411.0	1840.9	2436.1	3152.6	4519.5
		kg	17	21	25	34	125	265	340	480	640	835	1105	1430	2050

TILTING CHECK VALVES

PRESSURE SEAL COVER

TC CLASS 900

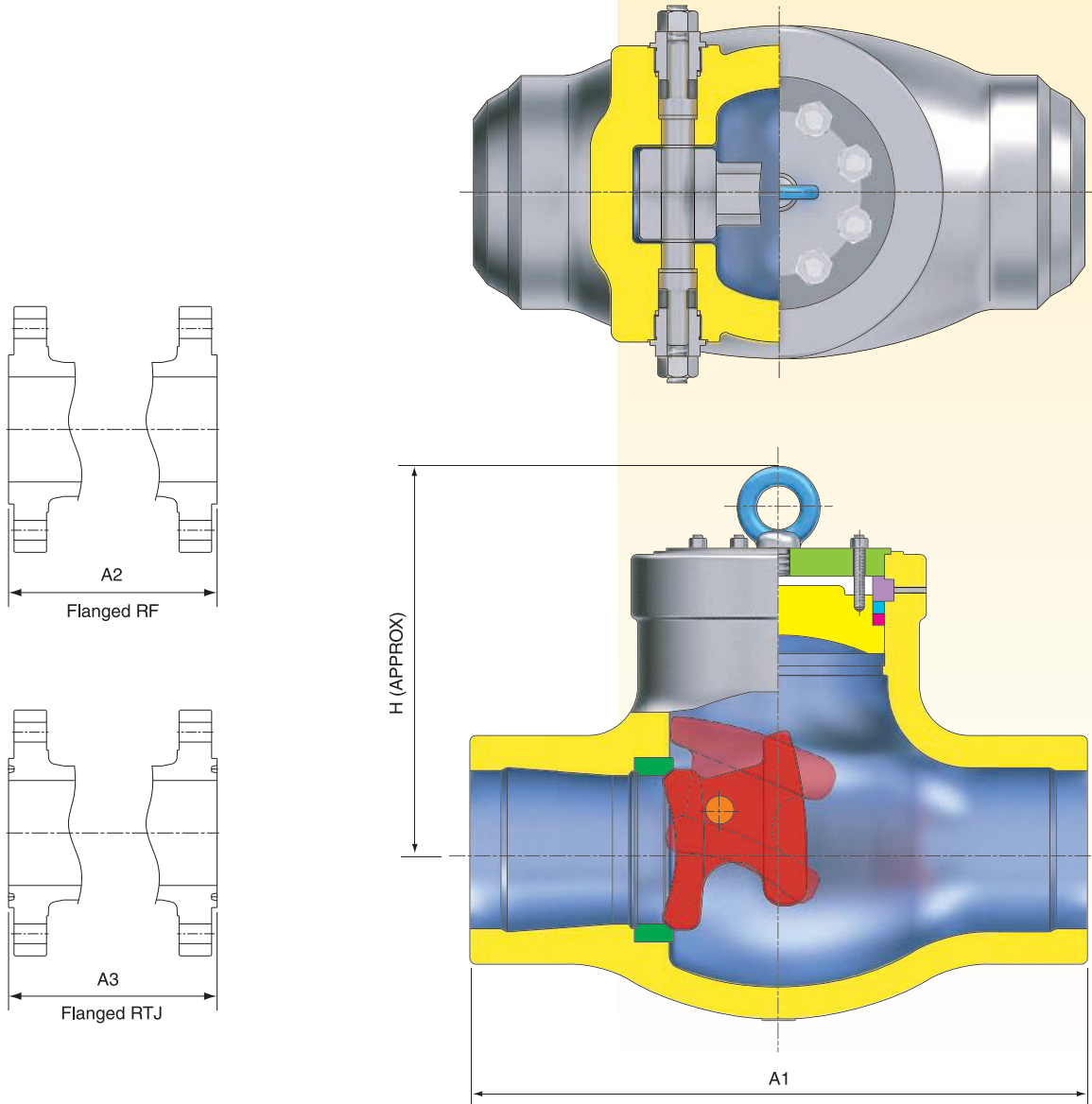


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	12.0	14.0	20.0	26.0	31.0	32.0	39.0	43.0	46.5	50.5	59.5	
	mm	216	254	305	356	508	660	787	814	991	1092	1181	1283	1511	
A2	in	14.5	16.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5	48.0	52.0	61.0	
	mm	368	419	381	457	610	737	838	965	1029	1130	1219	1321	1549	
A3	in	14.6	16.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9	48.5	52.5	61.7	
	mm	371	422	384	460	612	740	841	968	1038	1140	1232	1333	1568	
H	in	8.1	8.7	9.1	10.2	12.8	15.2	17.9	21.5	25.4	28.7	31.3	33.1	35.2	
	mm	205	220	230	258	325	385	455	545	645	730	795	842	895	
WEIGHT	RF	lb	90.4	123.5	123.5	233.7	540.1	1034.0	1280.9	2160.5	2896.9	3586.9	4407.0	5191.9	7290.7
		kg	41	56	56	106	245	469	581	980	1314	1627	1999	2355	3307
	BW	lb	44.1	68.3	66.1	143.3	352.7	716.5	826.7	1532.2	2171.6	2698.5	3152.6	3637.6	4281.4
		kg	20	31	30	65	160	325	375	695	985	1224	1430	1650	1942

TILTING CHECK VALVES

PRESSURE SEAL COVER

TC CLASS 1500

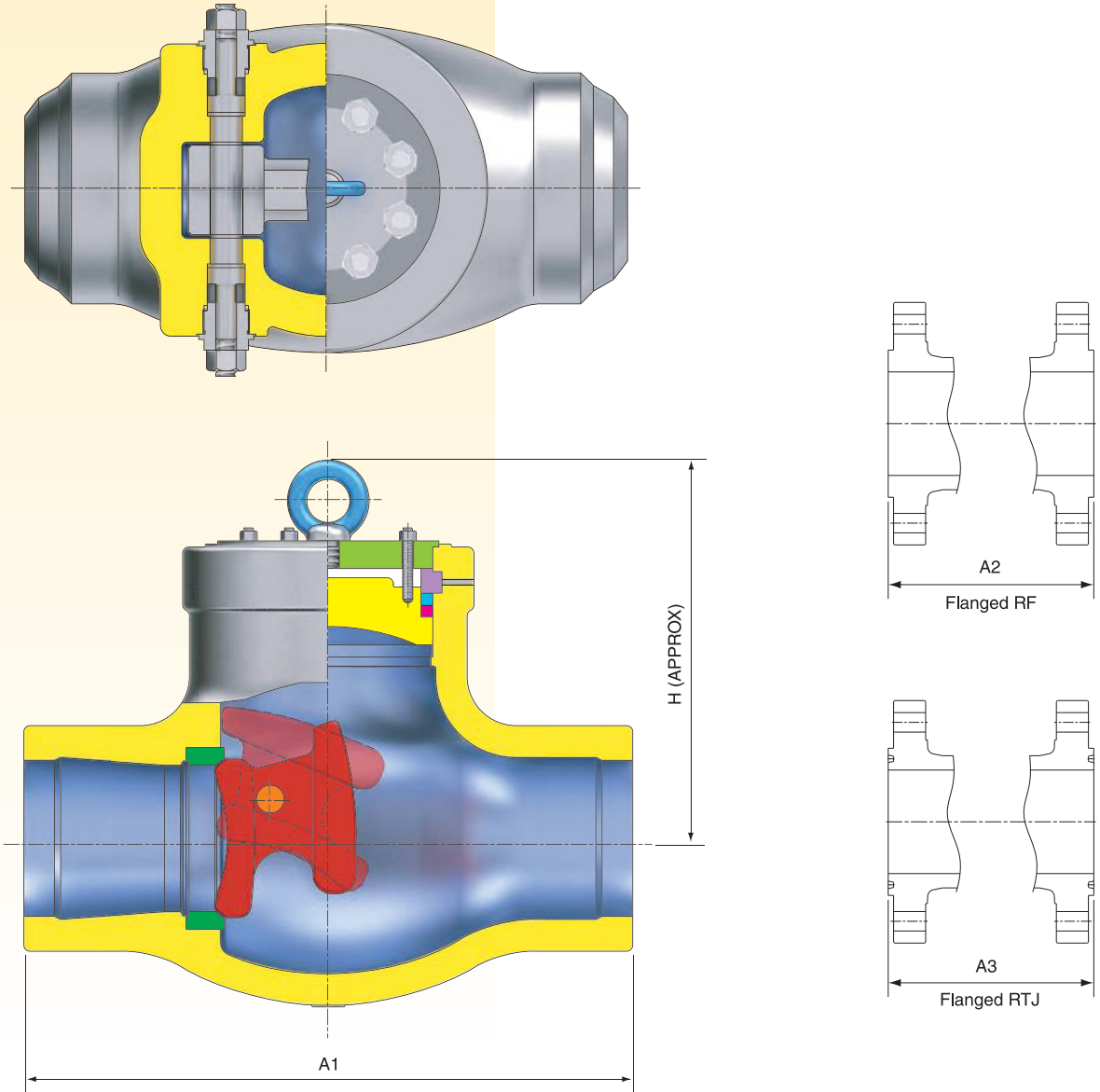


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	8.5	10.0	12.0	16.0	22.0	28.0	34.0	39.0	42.0	47.0	53.0	58.0	64.0	
	mm	216	254	305	406	559	711	864	991	1067	1194	1346	1473	1626	
A2	in	14.5	16.5	18.5	21.5	27.8	32.8	39.0	44.5	49.5	54.5	60.5	65.5	76.5	
	mm	368	419	470	546	705	832	991	1130	1257	1384	1536	1664	1943	
A3	in	14.6	16.6	18.6	21.6	28.0	33.1	39.4	45.1	50.2	55.4	61.4	66.4	77.6	
	mm	371	422	473	549	711	841	1000	1146	1276	1406	1559	1686	1972	
H	in	8.1	8.7	10.9	12.6	13.6	15.5	20.1	24.3	31.9	36.4	38.8	42.4	46.7	
	mm	205	220	278	320	345	394	510	616	810	925	985	1078	1185	
WEIGHT	RF	lb	90.4	123.5	191.8	266.8	509.3	718.7	1060.4	1514.6	2120.8	2610.3	3007.1	3897.8	4887.6
		kg	41	56	87	121	231	326	481	687	962	1184	1364	1768	2217
	BW	lb	44.1	81.6	105.8	180.8	423.3	632.7	974.4	1428.6	2034.9	2524.3	2921.1	3811.8	4801.7
		kg	20	37	48	82	192	287	442	648	923	1145	1325	1729	2178

TILTING CHECK VALVES

PRESSURE SEAL COVER

TC CLASS 2500



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1	in	11.0	13.0	14.5	18.0	24.0	30.0	36.0	41.0	44.0	49.0	55.0	60.0	65.0	
	mm	279	330	368	457	610	762	914	1041	1118	1245	1397	1524	1650	
A2	in	17.8	20.0	22.8	26.5	36.0	40.2	50.0	56.0	-	-	-	-	-	
	mm	451	508	578	673	914	1022	1270	1422	-	-	-	-	-	
A3	in	17.9	20.2	23.0	26.9	36.5	40.9	50.9	56.9	-	-	-	-	-	
	mm	454	514	584	683	927	1038	1292	1445	-	-	-	-	-	
H	in	10.6	11.5	16.2	17.0	18.7	22.5	24.4	27.4	32.8	36.7	39.1	42.6	50.6	
	mm	268	292	412	431	475	572	621	695	832	933	992	1083	1285	
WEIGHT	RF	lb	178.6	264.6	401.2	557.8	1071.4	1827.6	3483.3	5110.3	-	-	-	-	-
		kg	81	120	182	253	486	829	1580	2318	-	-	-	-	-
	BW	lb	105.8	156.5	238.1	306.4	427.7	864.2	1598.4	2475.8	3381.9	3979.3	4281.4	4722.3	5474.1
		kg	48	71	108	139	194	392	725	1123	1534	1805	1942	2142	2483

STAINLESS STEEL GATE VALVES

BOLTED BONNET



STAINLESS STEEL

BOLTED BONNET

GATE, GLOBE, CHECK



Stainless steel valves are designed and manufactured in compliance with API, ASME, BS and other recognized standards with the qualities to meet their stringent requirements for such industrial applications.

DESIGN SPECIFICATION

Flange Dimensions and temperature and Pressure Rating of valves are conformance with ASME B16.5 and ASME B16.34 and Class 150 and 300 valves are normally furnished with 0.06" (1.6mm) raised face flanged ends and Class 600 and higher valves are normally furnished with 0.25" (6.4mm) raised face flanged ends.

Face to Face Dimensions and End Dimensions, the former for flanged valves and the latter for weld-end, conform with ASME B16.10.

VALVE SHELL MATERIALS

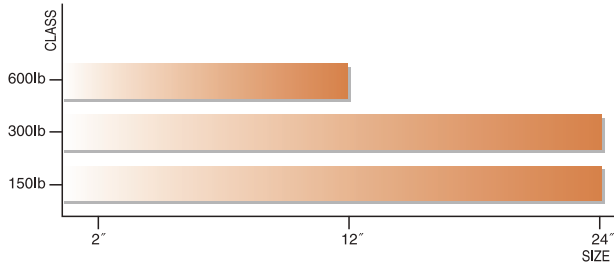
KJS Standard shell materials are ASTM A351 Grade CF8M and CF8, and other materials are available optionally.

ASTM MATERIALS	MAXIMUM WORKING TEMPERATURE*F (°C)	
	WELDING END	FLANGE END
ASTM A351 Gr CF8M	1500°F (816°C)	1000°F (538°C)
ASTM A351 Gr CF8	1500°F (816°C)	1000°F (538°C)
ASTM A351 Gr CF3M	850°F (454°C)	-
ASTM A351 Gr CF3	800°F (427°C)	-
ASTM A351 Gr CN7M	300°F (149°C)	-

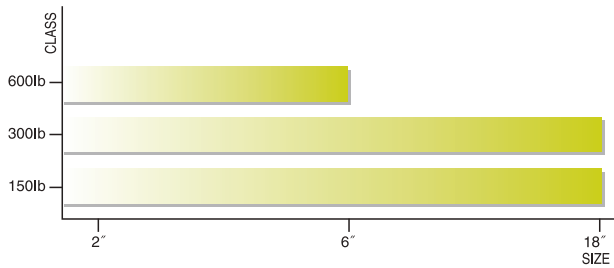
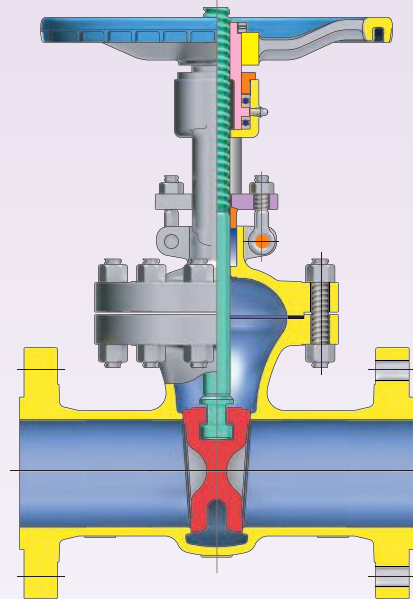
STAINLESS STEEL

BOLTED BONNET

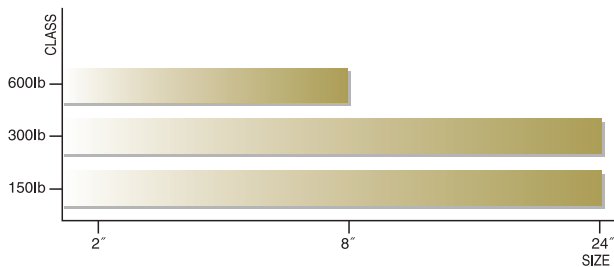
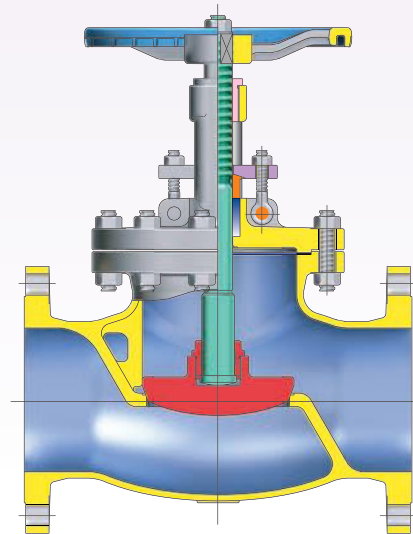
GATE, GLOBE, CHECK



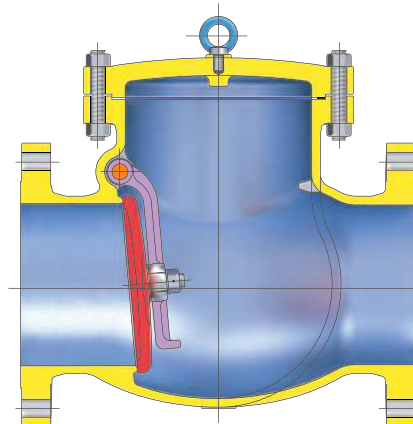
GATE VALVES



GLOBE VALVES



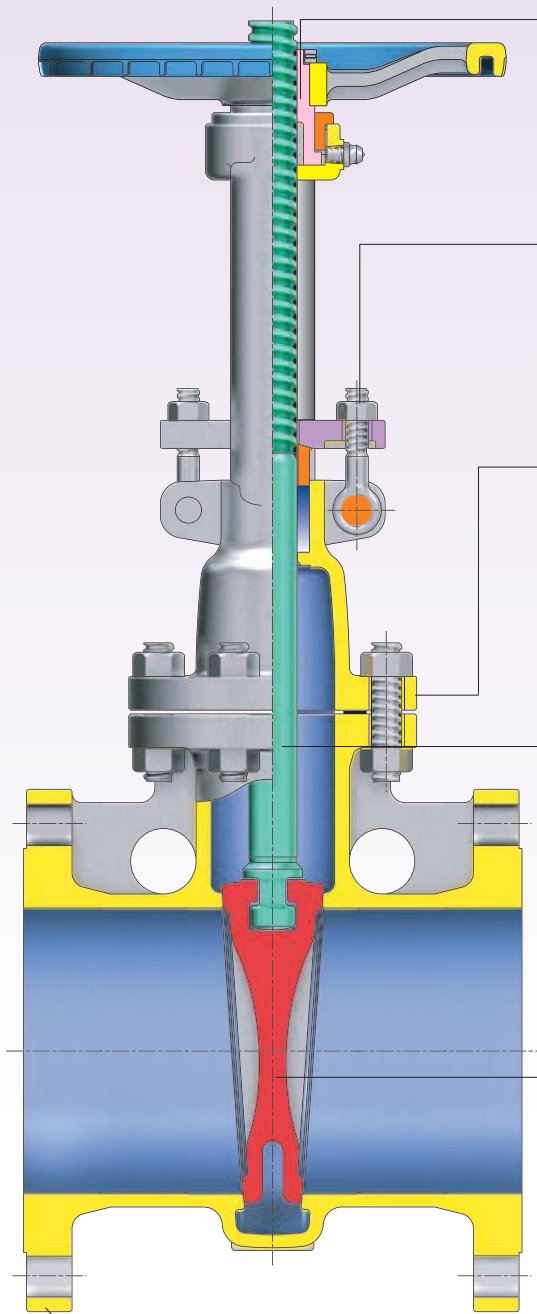
SWING CHECK VALVES



STAINLESS STEEL

BOLTED BONNET

GATE VALVES



YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150°C (2100°F) dissolution point in accordance with API Std. specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 603 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2.

BONNET

The bonnet and valve body have the same wall thickness. The body-bonnet flange drilling is spot-faced to exactly meet stud-bolt nuts. The bonnet back seat bushing guarantees packing replacement even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API specifications.

STEM

The machined forged stem comes with a T-shape head, which connects the slot of the wedge. The spherically shaped contacting surface of the head gives greater strength and durability. The stem dimensions are in accordance with API Std. 603 specifications. The stem delivers adequate mechanical properties as well as excellent surface hardness. Further, opening/shutting friction is minimized by accurate machining and lapping.

FLEXIBLE WEDGE

The standard disc of our valves is a one-piece flexible wedge. Slots are machined on both sides of the wedge to allow it to travel correctly in the integrally cast body guides. The wedge seating surfaces have been accurately machined, grind and lapped to a mirror finish to prevent leakage and eliminate galling.

BODY

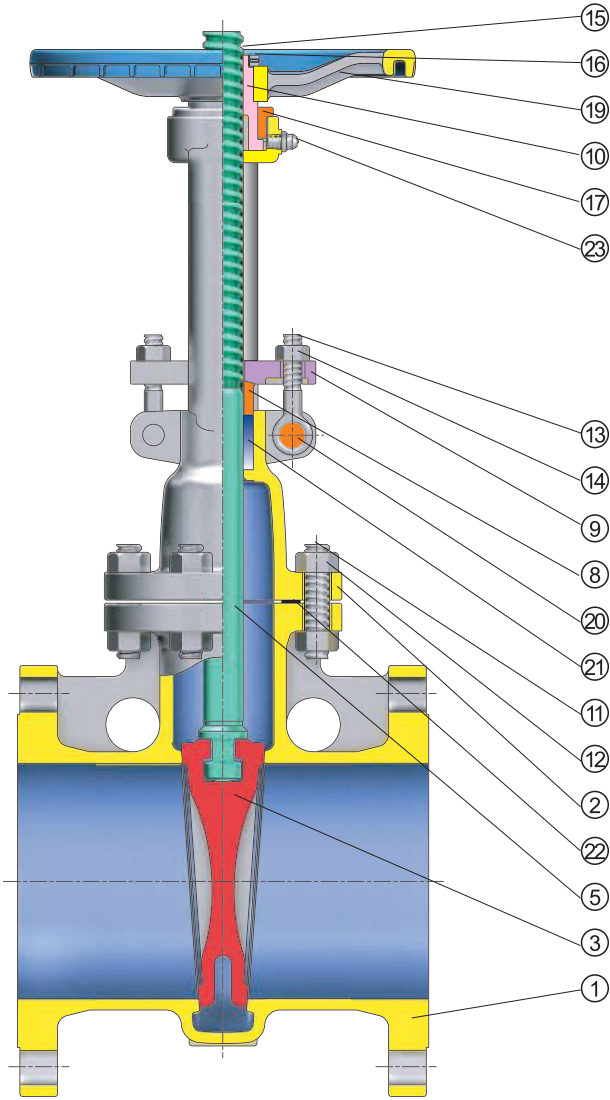
The cast stainless steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 603. Special care has been taken with the design of the Class 150 valve body so that the elliptically shaped center section is free from intensified stresses in the critical area.

The body of above Class 300 are made circular in shape as much as possible to minimize distortion even under extreme operating conditions. Inlet and outlet port dimensions conform with ASME B16.34 Pipe Fitting. The welded-in type seat ring is standard to insure interchangeability. Except for Class 150, the standard body-bonnet joint is male and female.

STAINLESS STEEL

BOLTED BONNET

GATE VALVES



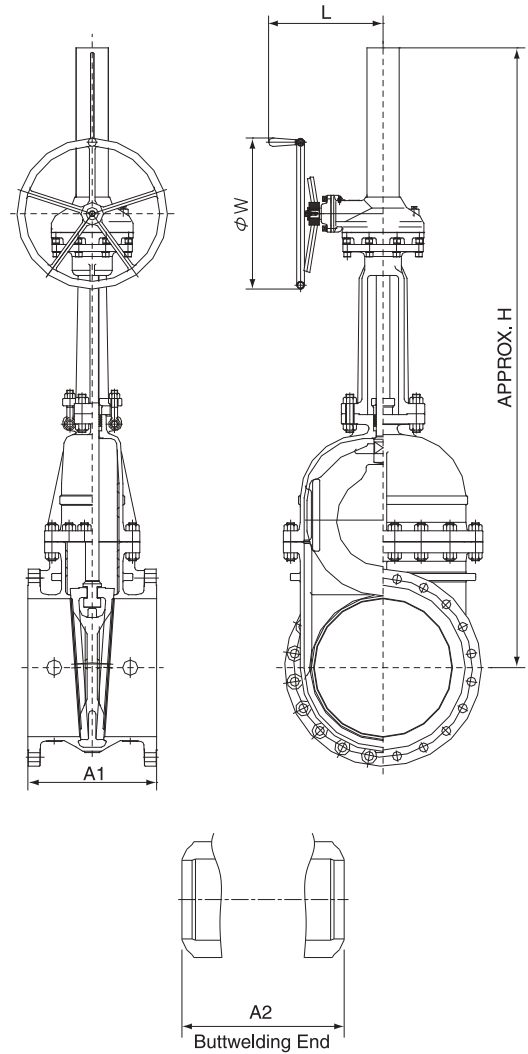
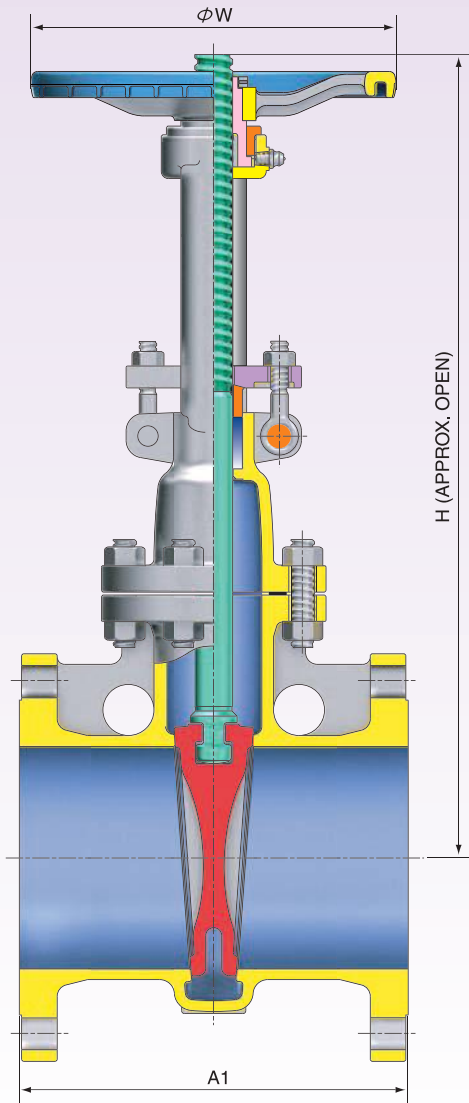
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL

NO	NAME OF PART	ASTM SPECIFICATION					
		STAINLESS STEEL				ALLOY STEEL	
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
5	STEM	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
8	PACKING GLAND	A276-304				A276-304	
9	GLAND FLANGE	A351-CF8				A351-CF8	
10	YOKE SLEEVE	A439-D2				A439-D2	
11	BONNET BOLT	A193-B8					
12	BONNET NUT	A194-8					
13	GLAND BOLT	A193-B8					
14	GLAND NUT	A194-8					
20	HINGE PIN	A276-304					

GATE VALVES

BOLTED BONNET

GT CLASS 150

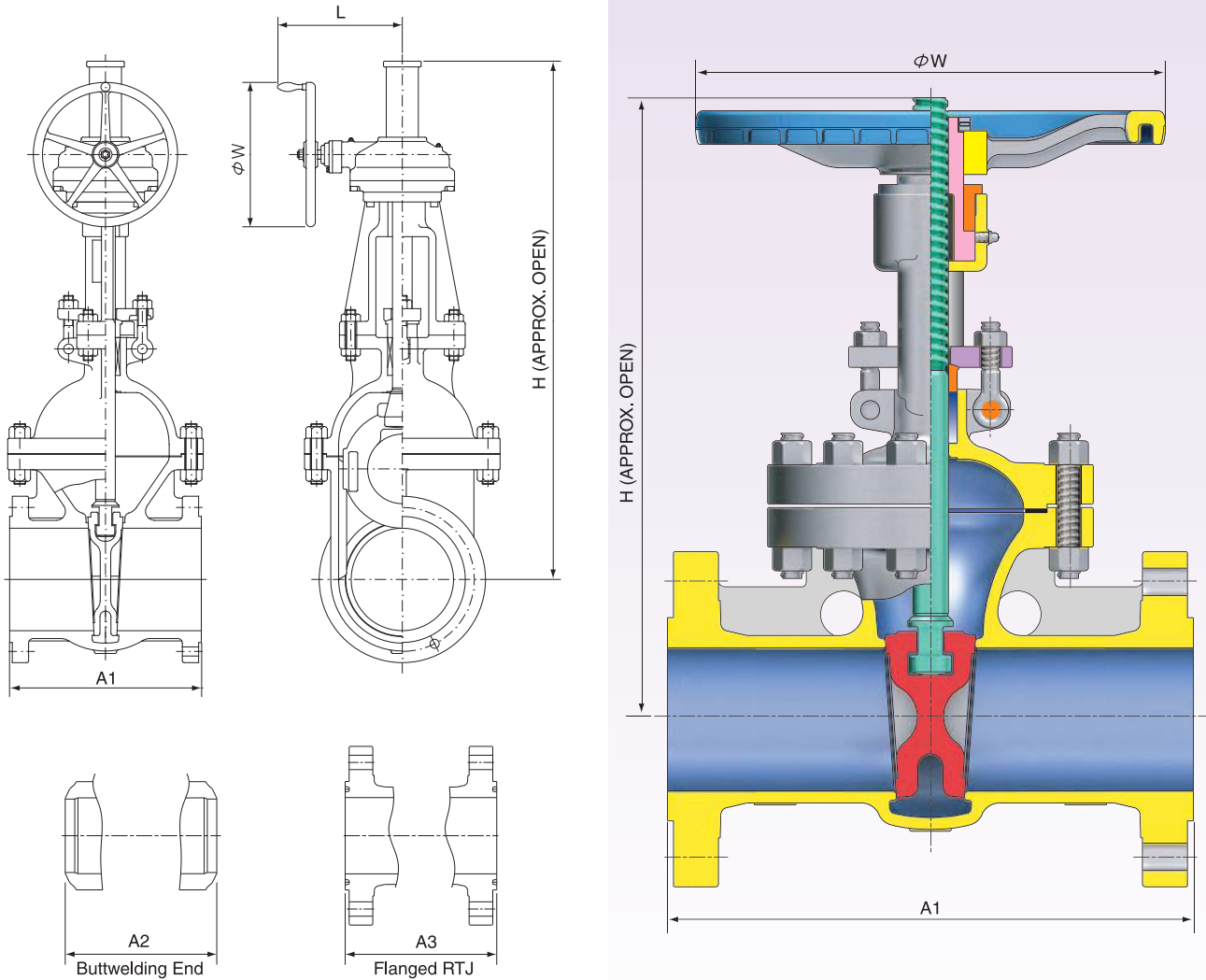


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1	in	7.0	7.5	8.0	9.0	10.5	11.5	13.0	14.0	15.0	16.0	17.0	18.0	20.0	24.0	24.0	28.0	
	mm	178	190	203	229	267	292	330	356	381	406	432	457	508	610	610	711	
A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	22.5	24.0	26.0	28.0	32.0	36.0	36.0	40.0	
	mm	216	241	283	305	403	419	457	502	572	610	660	711	813	914	914	1016	
H	in	13.5	15.2	16.3	21.3	28.5	36.1	43.7	54.1	58.3	66.9	78.9	87.2	107.5	122.2	133.0	156.9	
	mm	342	386	415	542	725	916	1110	1375	1480	1700	2005	2215	2730	3105	3378	3985	
W	in	7.1	7.1	7.9	9.8	11.8	14.0	17.7	17.7	19.7	22.0	19.7	24.8	24.8	28.0	28.0	31.5	
	mm	180	180	200	250	300	355	450	450	500	560	500	630	630	710	710	800	
L	in	-	-	-	-	-	-	-	-	-	-	13.5	15.3	15.3	16.0	16.0	18.1	
	mm	-	-	-	-	-	-	-	-	-	-	342	389	389	406	406	461	
WEIGHT	RF	lb	35.3	48.5	55.1	83.8	143.3	224.9	326.3	480.6	760.6	1091.3	1278.7	1675.5	3029.2	4168.9	4334.3	6267.7
		kg	16	22	25	38	65	102	148	218	345	495	580	760	1374	1891	1966	2843
	BW	lb	30.9	39.7	50.7	75.0	127.9	189.6	280.0	434.3	694.5	1025.1	1201.5	1587.3	2689.6	3483.3	3648.6	6161.9
		kg	14	18	23	34	58	86	127	197	315	465	545	720	1220	1580	1655	2795

GATE VALVES

BOLTED BONNET

GT CLASS 300

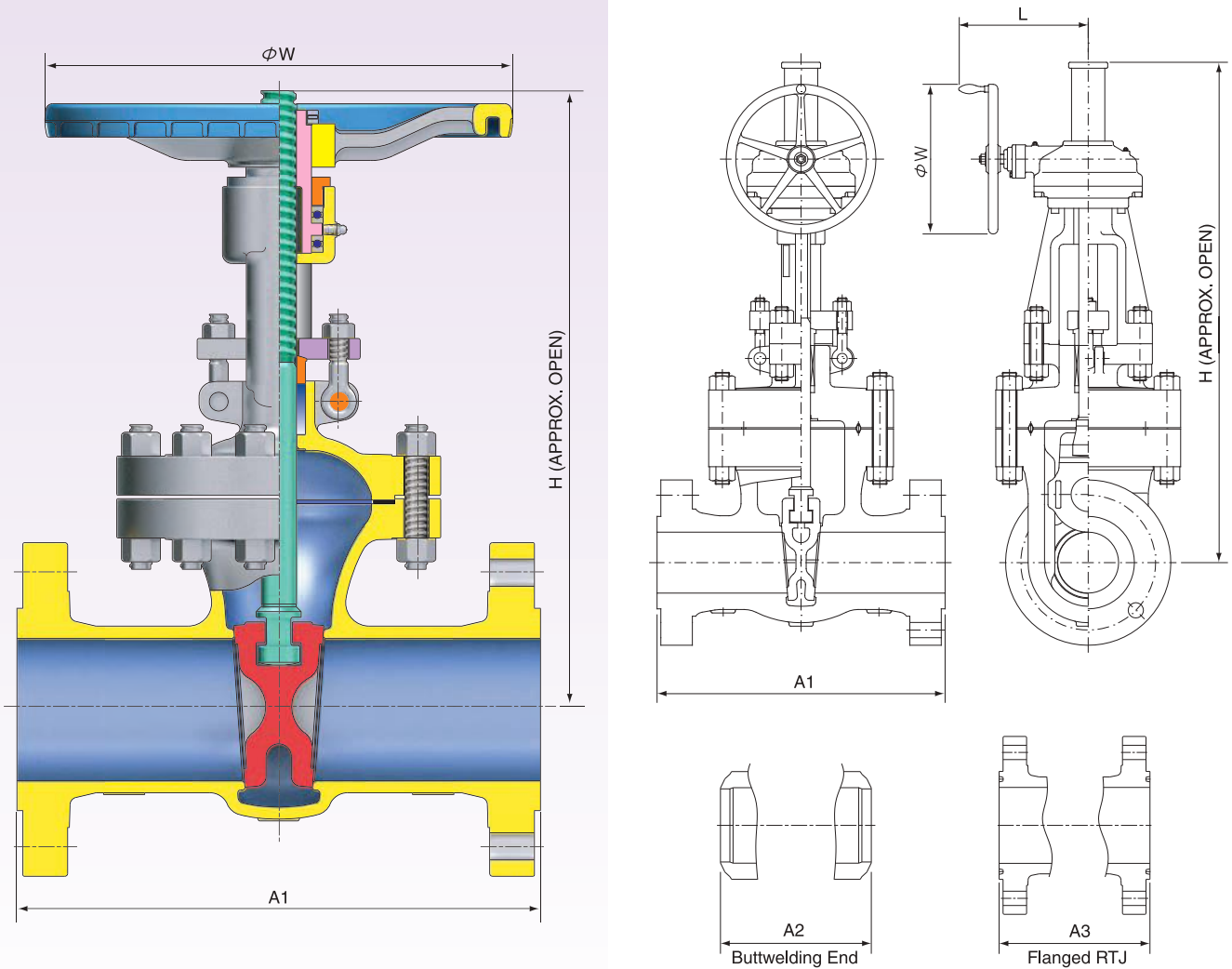


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1 & A2	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	30.0	33.0	36.0	39.0	45.0	53.0	55.0	68.0	
	mm	216	241	283	305	403	419	457	502	762	838	914	991	1143	1346	1397	1727	
A3	in	9.1	10.1	11.7	12.6	16.5	17.1	18.6	20.4	30.6	33.6	36.6	39.8	45.9	54.0	56.0	69.1	
	mm	232	257	298	321	419	435	473	518	778	854	930	1010	1165	1372	1422	1756	
H	in	14.6	16.9	18.3	21.4	29.7	38.6	47.0	54.1	64.2	72.4	84.1	91.5	110.8	129.3	145.1	168.6	
	mm	370	430	465	544	755	980	1193	1375	1630	1840	2135	2325	2815	3285	3685	4283	
W	in	7.9	7.9	8.8	9.8	14.0	15.7	17.7	19.7	19.7	24.8	24.8	28.0	28.0	31.5	35.4	39.4	
	mm	200	200	224	250	355	400	450	500	500	630	630	710	710	800	900	1000	
L	in	-	-	-	-	-	-	-	-	13.5	15.3	15.3	16.0	16.0	18.1	19.1	20.8	
	mm	-	-	-	-	-	-	-	-	342	389	389	406	406	461	486	529	
WEIGHT	RF	lb	52.9	72.8	88.2	130.1	242.5	377.0	564.4	934.8	1192.7	2039.3	2672.0	3216.5	5037.6	7550.8	8124.0	11827.8
		kg	24	33	40	59	110	171	256	424	541	925	1212	1459	2285	3425	3685	5365
	BW	lb	39.7	55.1	61.7	83.8	176.4	275.6	414.5	723.1	994.3	1704.2	2253.1	2733.7	4054.3	6583.0	6863.0	9931.8
		kg	18	25	28	38	80	125	188	328	451	773	1022	1240	1839	2986	3113	4505

GATE VALVES

BOLTED BONNET

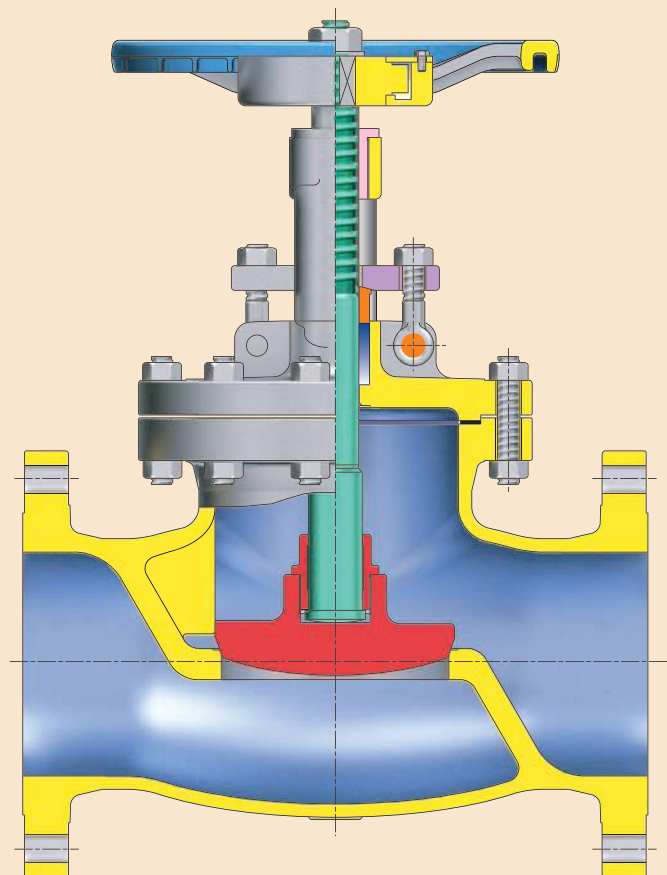
GT CLASS 600



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	
A1 & A2	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	
A3	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1406	
H	in	14.8	17.2	18.7	23.2	32.1	40.2	49.0	61.7	69.5	77.8	84.8	100.2	104.6	
	mm	375	436	475	590	816	1020	1245	1566	1765	1975	2155	2545	2658	
W	in	7.9	8.8	9.8	11.8	17.7	19.7	24.8	24.8	24.8	28.0	31.5	31.5	35.4	
	mm	200	224	250	300	450	500	630	630	630	710	800	800	900	
L	in	-	-	-	-	-	-	-	15.3	15.3	16.0	18.1	18.1	19.1	
	mm	-	-	-	-	-	-	-	389	389	406	461	461	486	
WEIGHT	RF	lb	70.5	99.2	134.5	260.1	498.2	844.4	1318.4	1907.0	2502.2	2921.1	4299.0	5915.0	7447.2
		kg	32	45	61	118	226	383	598	865	1135	1325	1950	2683	3378
	BW	lb	59.5	75.0	112.4	202.8	390.2	652.6	1036.2	1501.3	2125.3	2286.2	3648.6	5088.3	6265.5
		kg	27	34	51	92	177	296	470	681	964	1037	1655	2308	2842

STAINLESS STEEL GLOBE VALVES

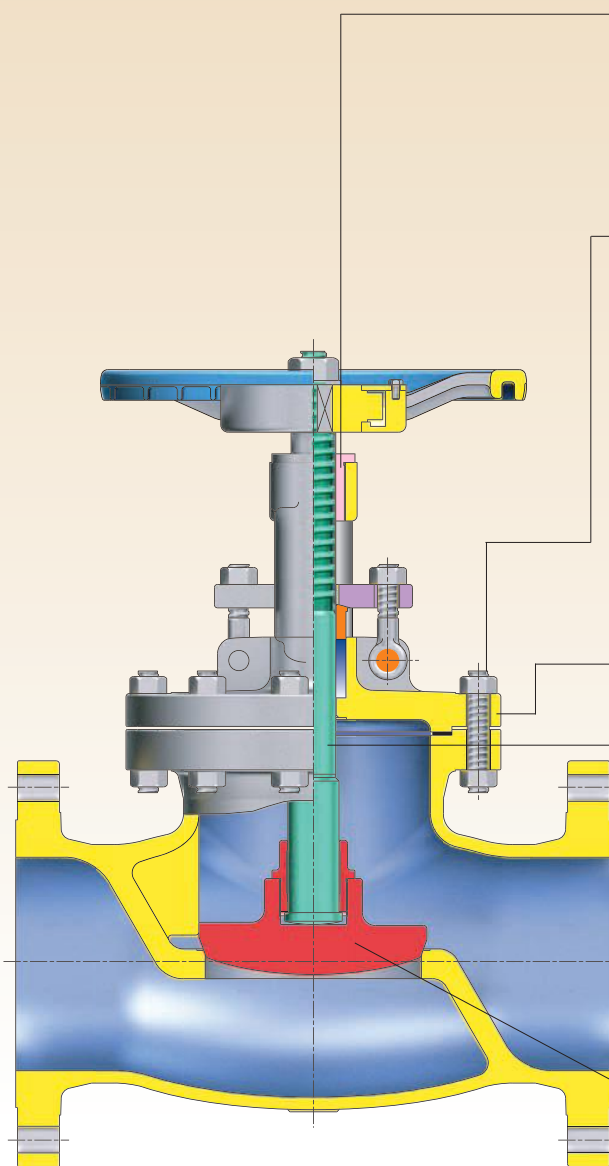
BOLTED BONNET



STAINLESS STEEL

BOLTED BONNET

GLOBE VALVES



YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over a 1150°C (2100°F) dissolution point in conformity with API Std. Specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2.

BONNET

The bonnet is integral or separate with the yoke and is the same material as the body. The body-bonnet flange drilling is spot-faced to exactly meet stud bolt nuts. The back seat bushing in the bonnet guarantees that the packing can be replaced even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API Std. specifications.

STEM

The heat-treated stems of one-piece construction insure adequate mechanical properties and surface hardness. Friction at the time of opening and shutting is reduced to a minimum friction to accurate machining and lapping. The round finished surface of the stem head helps to achieve point contact with the inside of the disc housing to eliminate friction.

DISC

The disc of our globe valves is a loose disc and can freely revolve around the stem. This prevents friction and galling with the seating surface when the valve is shut. The disc is furnished with a conical seating surface that has been ground and lapped to a mirror finish. It is of one-piece construction, and forged and heat-treated to deliver the required mechanical properties and hardness.

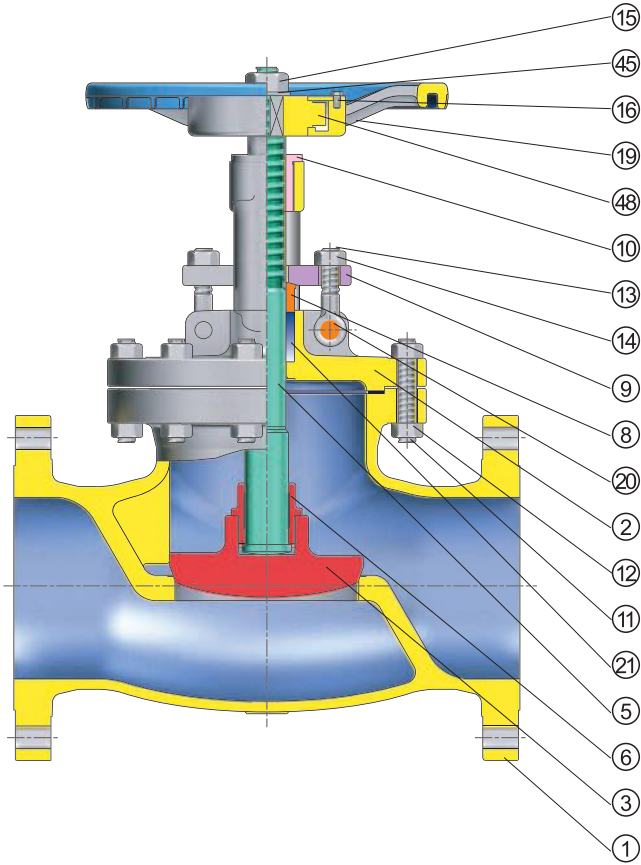
BODY

The cast stainless steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 603. Port and seat passage dimensions conform to ASME B16.34. The screw-in type seat ring is standard to allow interchangeability. The standard body-bonnet joint is male-female, and the flange is round for all valves. Accurate machining insures perfect coaxiality of the valve ends and seat ring in addition to exact perpendicularity of the body-bonnet flanges.

STAINLESS STEEL

BOLTED BONNET

GLOBE VALVES



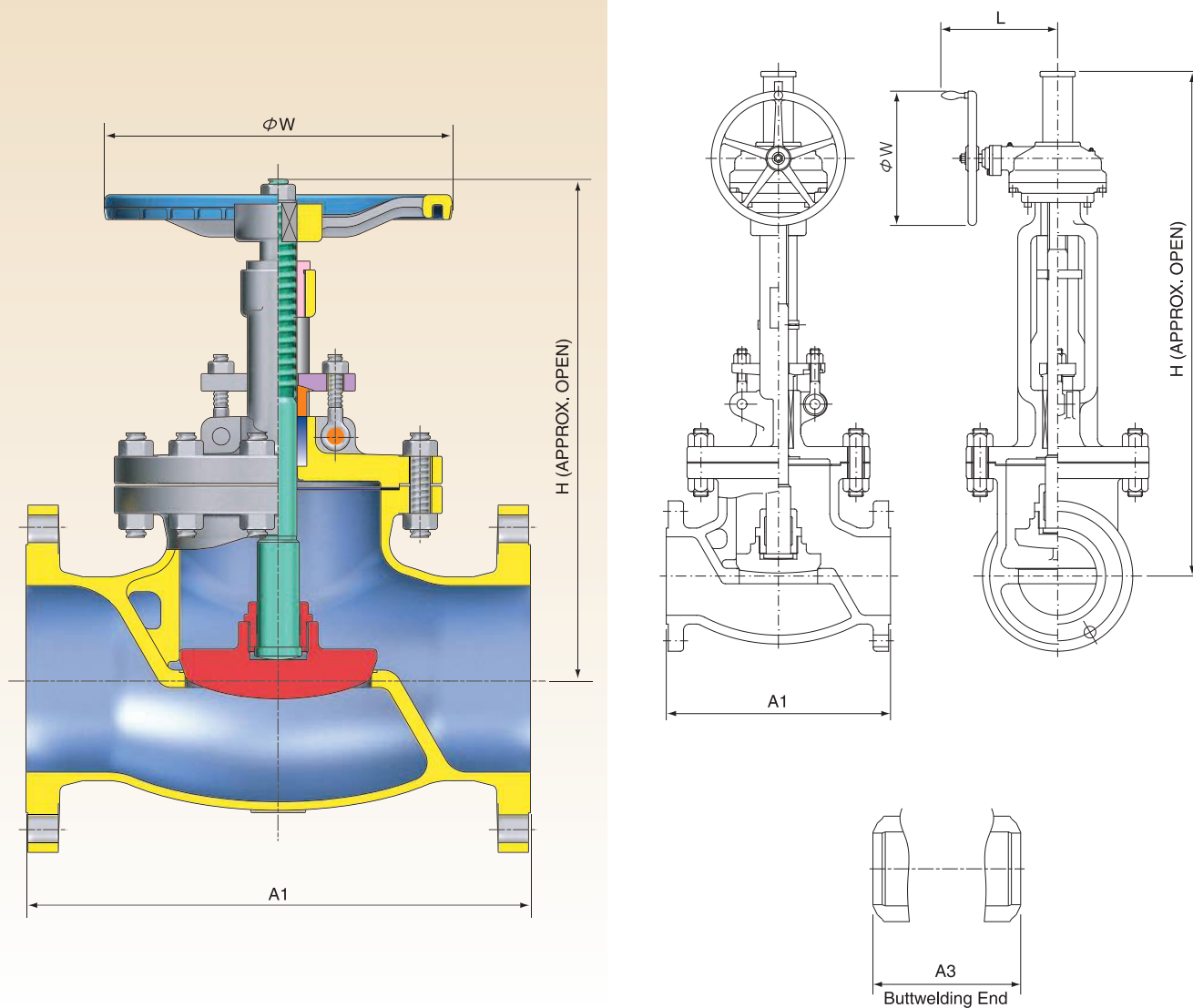
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
45	WASHER	STEEL

NO	NAME OF PART	ASTM SPECIFICATION					
		STAINLESS STEEL				ALLOY STEEL	
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
5	STEM	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
6	DISC GLAND	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
8	PACKING GLAND	A276-304					
9	GLAND FLANGE	A351-CF8					
10	YOKE SLEEVE	A439-D2					
11	BONNET BOLT	A193-B8		A193-B8		A193-B8	
12	BONNET NUT	A194-8		A194-B8		A194-8	
13	GLAND BOLT	A193-B8					
14	GLAND NUT	A194-8					
20	HINGE PIN	A276-304					
48	IMPACT	A216-WCB					

GLOBE VALVES

BOLTED BONNET

GL CLASS 150

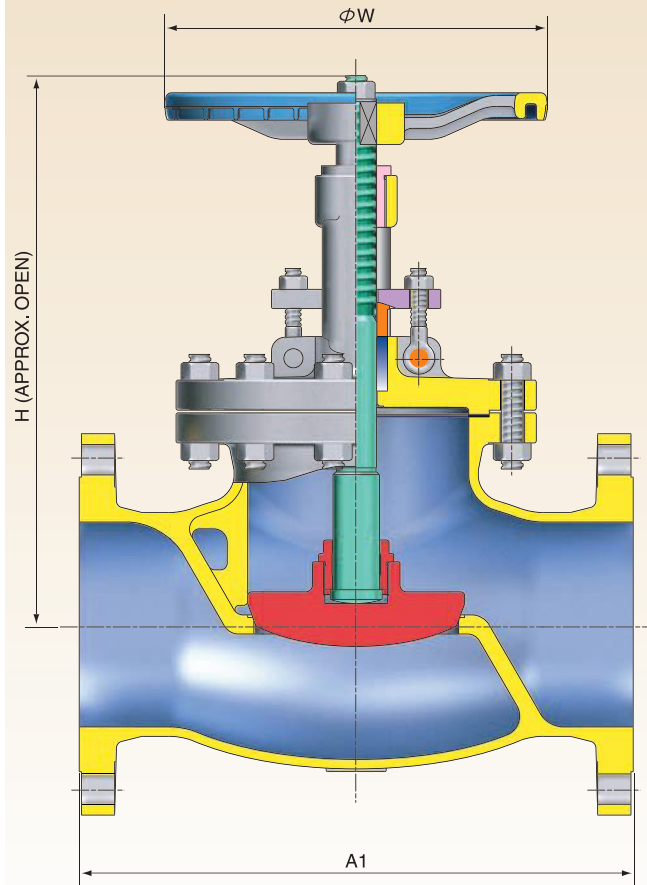
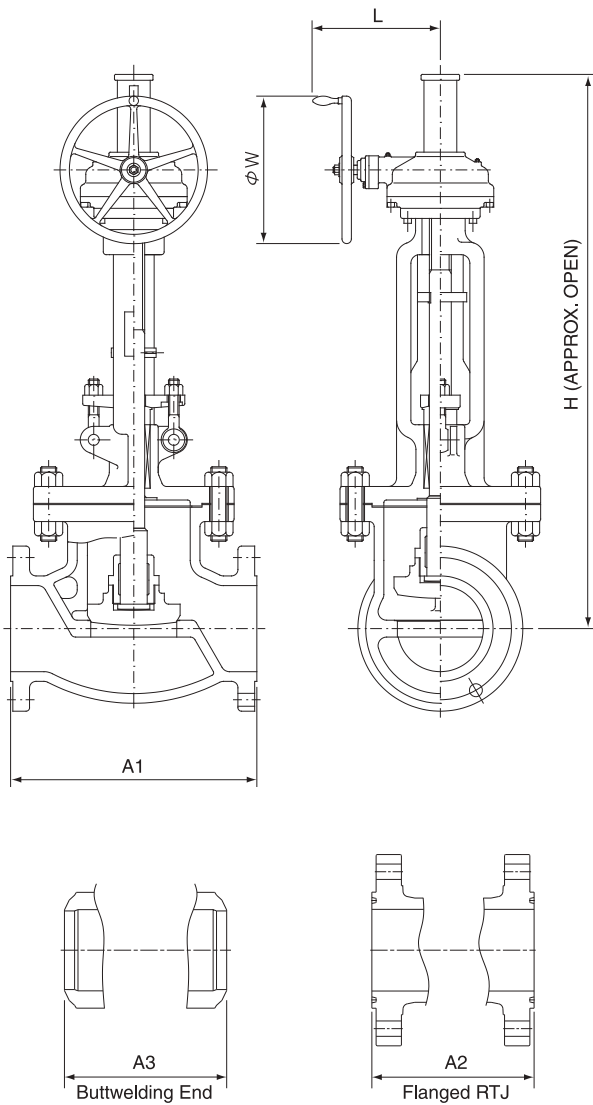


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1 & A3	in	8.0	8.5	9.5	11.5	16.0	19.5	24.5	27.5	31.0	36.0	38.5	
	mm	203	216	241	292	406	495	622	698	787	914	978	
H	in	10.3	11.5	12.5	15.0	19.5	21.9	24.6	28.1	31.4	39.2	49.2	
	mm	262	292	318	382	495	555	625	715	797	995	1250	
W	in	7.9	8.8	8.8	9.8	14.0	15.7	17.7	19.7	28.0	28.0	28.0	
	mm	200	224	224	250	355	400	450	500	710	710	710	
L	in	-	-	-	-	-	-	-	-	16.0	16.0	16.0	
	mm	-	-	-	-	-	-	-	-	406	407	407	
WEIGHT	RF	lb	33.1	44.1	57.3	97.0	174.2	286.6	416.7	815.7	1014.1	1366.9	1609.4
		kg	15	20	26	44	79	130	189	370	460	620	730
	BW	lb	24.3	33.1	44.1	72.8	141.1	235.9	346.1	712.1	875.2	1190.5	1419.8
		kg	11	15	20	33	64	107	157	323	397	540	644

GLOBE VALVES

BOLTED BONNET

GL CLASS 300

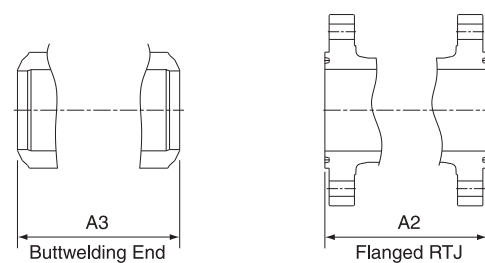
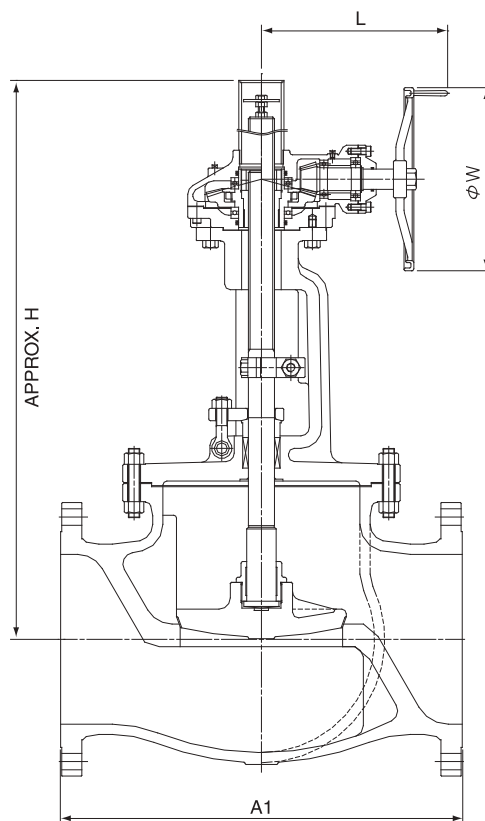
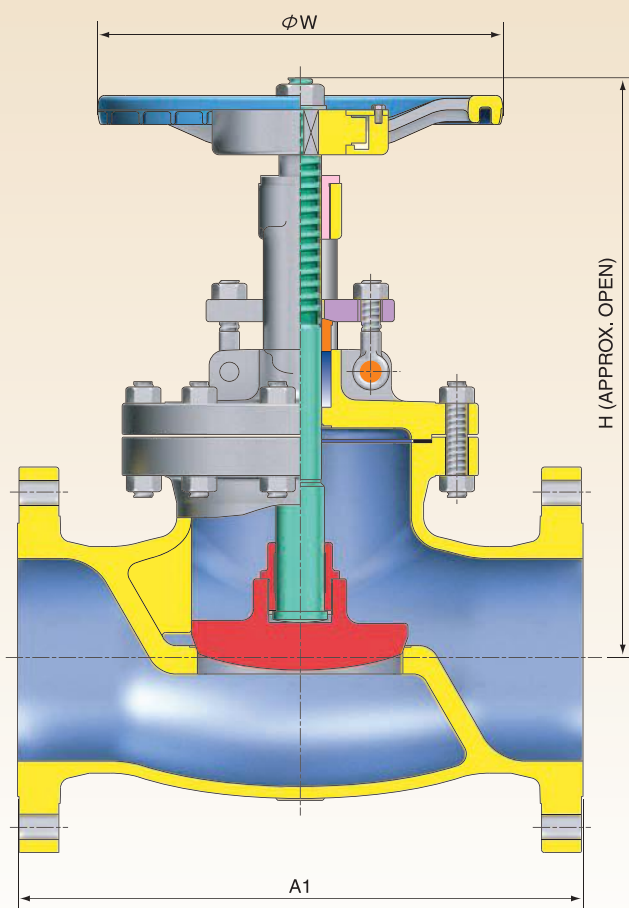


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	
	mm	50	65	80	100	150	200	250	300	350	400	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	22.0	24.5	28.0	33.0	36.0	
	mm	267	292	318	356	444	559	622	711	838	914	
A2	in	11.1	12.1	13.1	14.6	18.1	22.6	25.1	28.6	33.6	36.6	
	mm	283	308	333	371	460	575	638	727	854	929	
H	in	10.8	12.2	12.8	15.6	20.3	22.6	25.4	28.7	31.7	46.4	
	mm	275	310	325	395	515	575	645	730	806	1179	
W	in	7.9	8.8	9.8	14.0	17.7	22.0	28.0	28.0	35.4	31.5	
	mm	200	224	250	355	450	560	710	710	900	800	
L	in	-	-	-	-	-	-	16.0	16.0	20.8	21.0	
	mm	-	-	-	-	-	-	406	406	529	534	
WEIGHT	RF	lb	59.5	101.4	121.3	172.0	282.2	436.5	914.9	1212.5	1719.6	2535.3
		kg	27	46	55	78	128	198	415	550	780	1150
	BW	lb	46.3	81.6	94.8	130.1	216.1	339.5	771.6	1005.3	1433.0	2180.4
		kg	21	37	43	59	98	154	350	456	650	989

GLOBE VALVES

BOLTED BONNET

GL CLASS 600



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	
	mm	292	330	356	432	559	660	787	838	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	
	mm	295	333	359	435	562	664	791	841	
H	in	10.3	11.5	12.5	15.0	19.5	21.9	24.6	28.1	
	mm	262	292	318	382	495	555	625	715	
W	in	7.9	8.8	9.8	12.4	14.0	15.7	17.7	17.7	
	mm	200	224	250	315	355	400	450	450	
L	in	-	-	-	-	-	18.1	23.2	23.2	
	mm	-	-	-	-	-	461	590	590	
WEIGHT	RF	lb	94.8	141.1	160.9	297.6	606.3	992.1	1653.5	3196.7
		kg	43	64	73	135	275	450	750	1450
	BW	lb	77.2	114.6	127.9	231.5	471.8	787.1	1314.0	2791.1
		kg	35	52	58	105	214	357	596	1266

STAINLESS BC, SWING CHECK VALVES

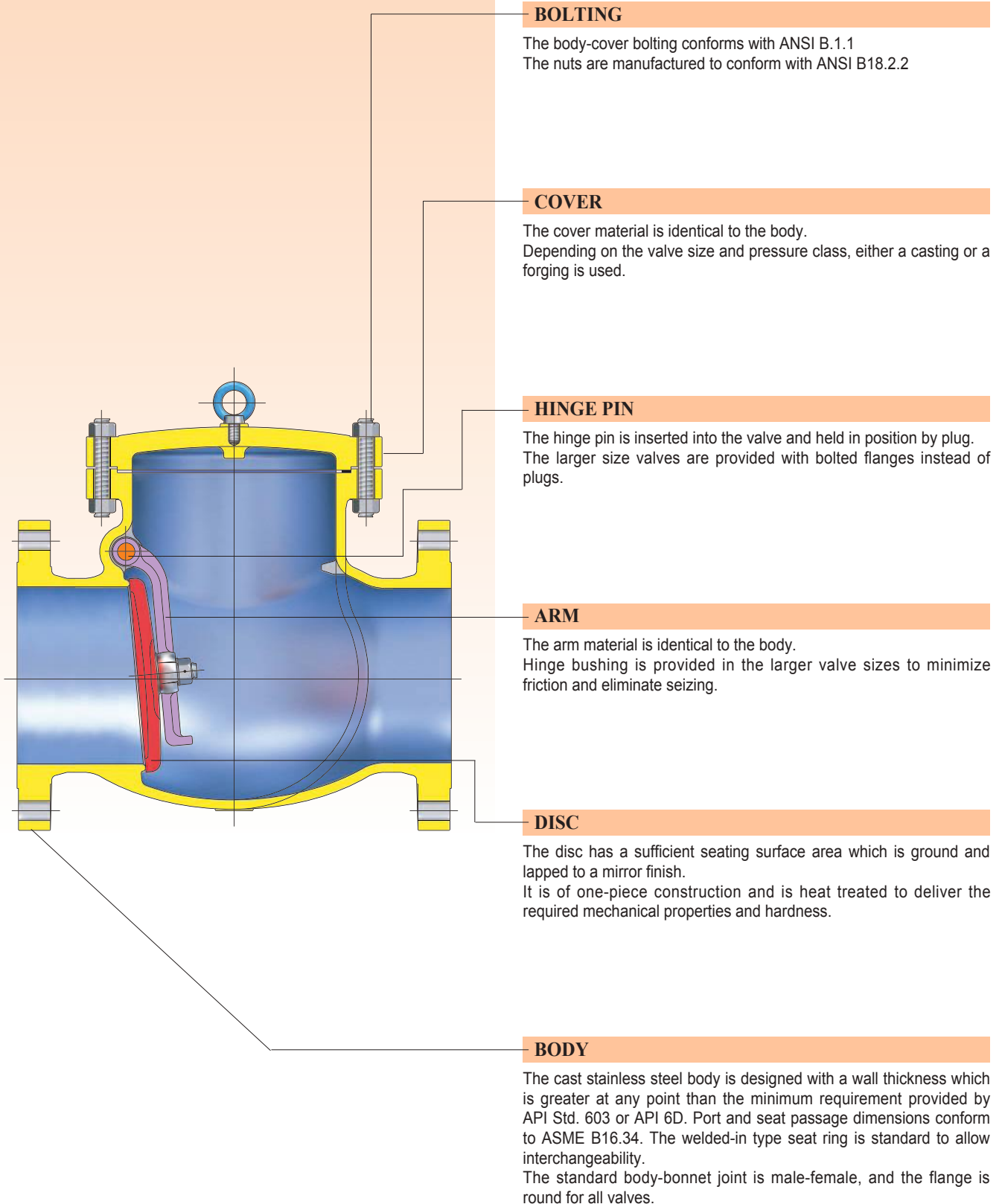
BOLTED COVER



STAINLESS STEEL

BOLTED COVER

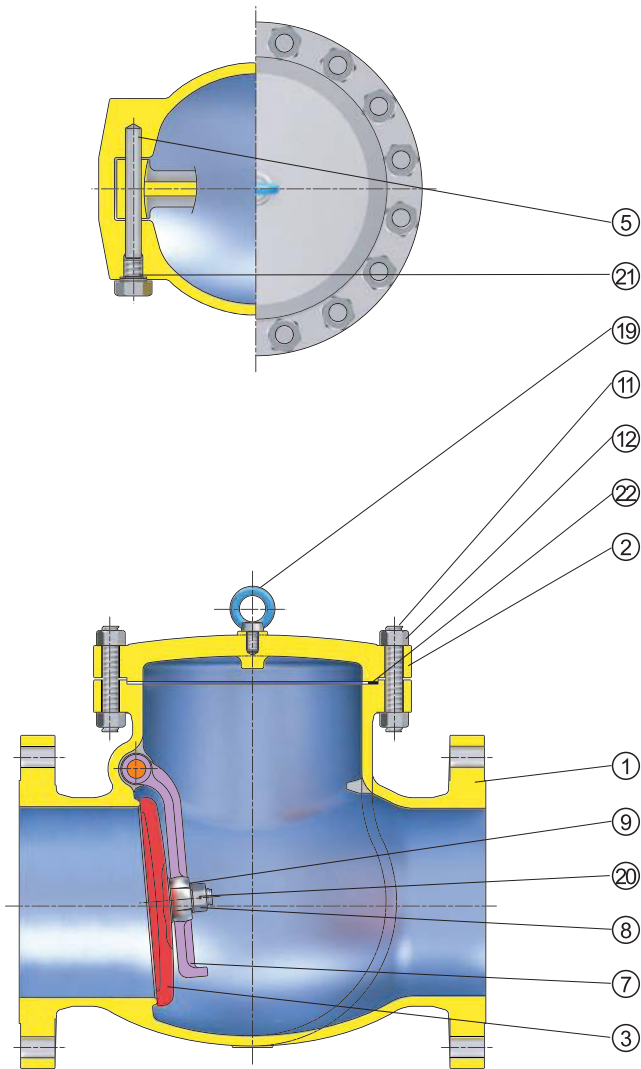
SWING CHECK VALVES



STAINLESS STEEL

BOLTED COVER

SWING CHECK VALVES



NO	NAME OF PART	ASTM SPECIFICATION
8	DISC NUT	AISI 304
9	DISC WASHER	AISI 304
19	EVE BOLT	A105
20	SPLIT PIN	AISI 304
21	PLUG GASKET	COMMERCIAL
22	GASKET	COMMERCIAL
24	PLUG	A105

Swing check valves can be supplied with the following accessories.

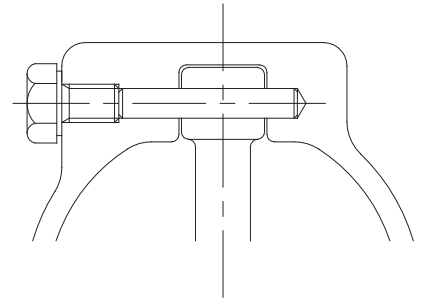
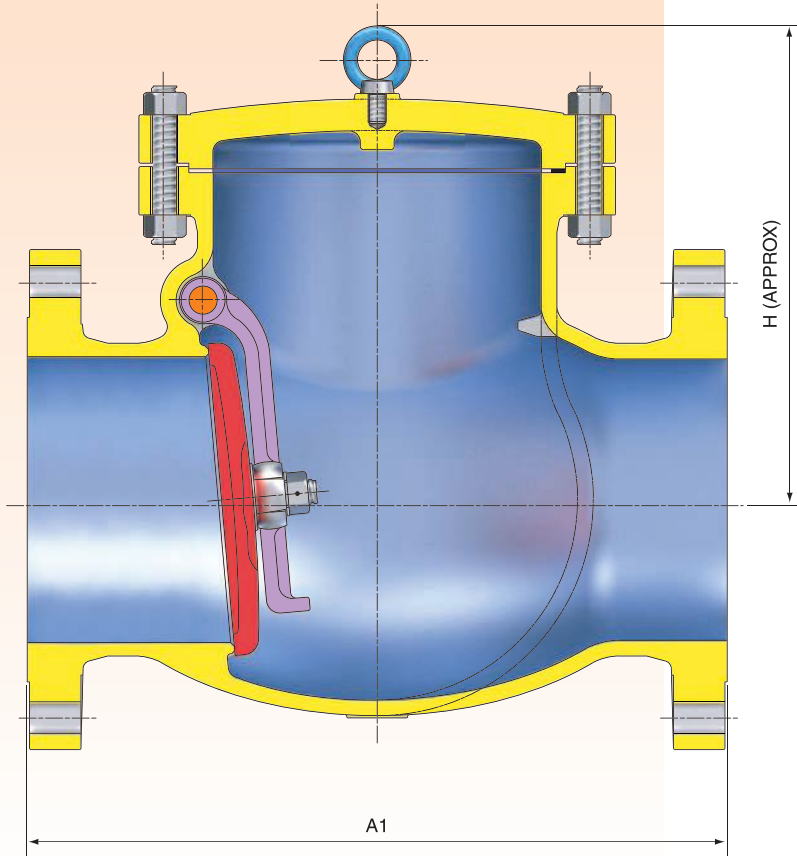
- outside weight and lever
- slam retarders
- assisting springs
- position switches/indicators
- pneumatic safety control

NO	NAME OF PART	ASTM SPECIFICATION					
		STAINLESS STEEL				ALLOY STEEL	
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	COVER	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
5	HINGE PIN	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	ARM	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
11	BONNET BOLT	A193-B8					
12	BONNET NUT	A194-8					

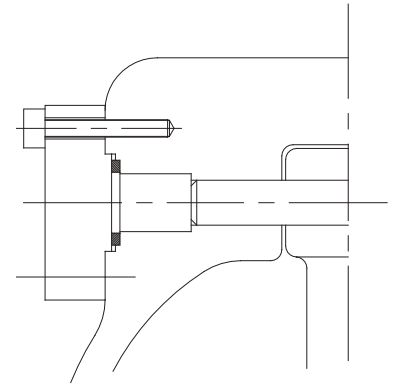
SWING CHECK VALVES

BOLTED COVER

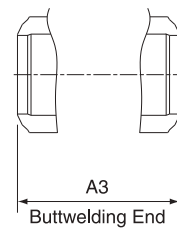
SW/CH CLASS 150



14" Thru 18"



20" & Larger



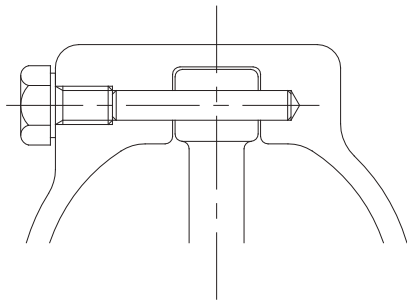
Buttwelding End

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	650	700	750	800	900	
A1 & A3	in	8.0	8.5	9.5	11.5	14.0	19.5	24.5	27.5	31.0	34.0	38.5	38.5	51.0	51.0	57.0	60.0	60.0	77.0	
	mm	203	216	241	292	356	495	622	698	787	864	978	978	1295	1295	1448	1524	1524	1956	
H	in	5.8	6.4	6.9	8.0	11.4	13.8	16.9	19.6	23.9	25.6	30.7	25.5	31.5	33.5	40.0	35.0	37.0	53.1	
	mm	147	163	176	204	290	350	428	499	606	650	781	647	800	852	1017	888	941	1349	
WEIGHT	RF	lb	35.3	48.5	66.1	97.0	172.0	260.1	520.3	758.4	930.3	1397.7	1798.9	2164.9	3924.2	3637.6	3825.0	4647.3	5291.0	7385.4
		kg	16	22	30	44	78	118	236	344	422	634	816	982	1780	1650	1735	2108	2400	3350
	BW	lb	28.7	33.1	46.3	57.3	136.7	200.6	449.7	645.9	661.4	1276.5	1547.6	1878.3	3584.7	3306.9	3223.1	4426.8	4960.3	6944.5
		kg	13	15	21	26	62	91	204	293	300	579	702	852	1626	1500	1462	2008	2250	3150

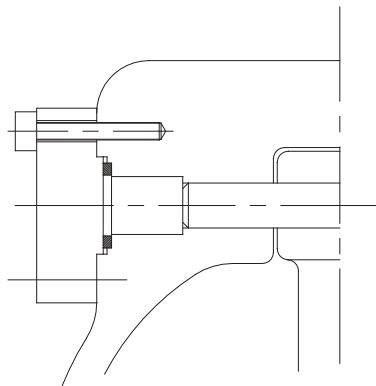
SWING CHECK VALVES

BOLTED COVER

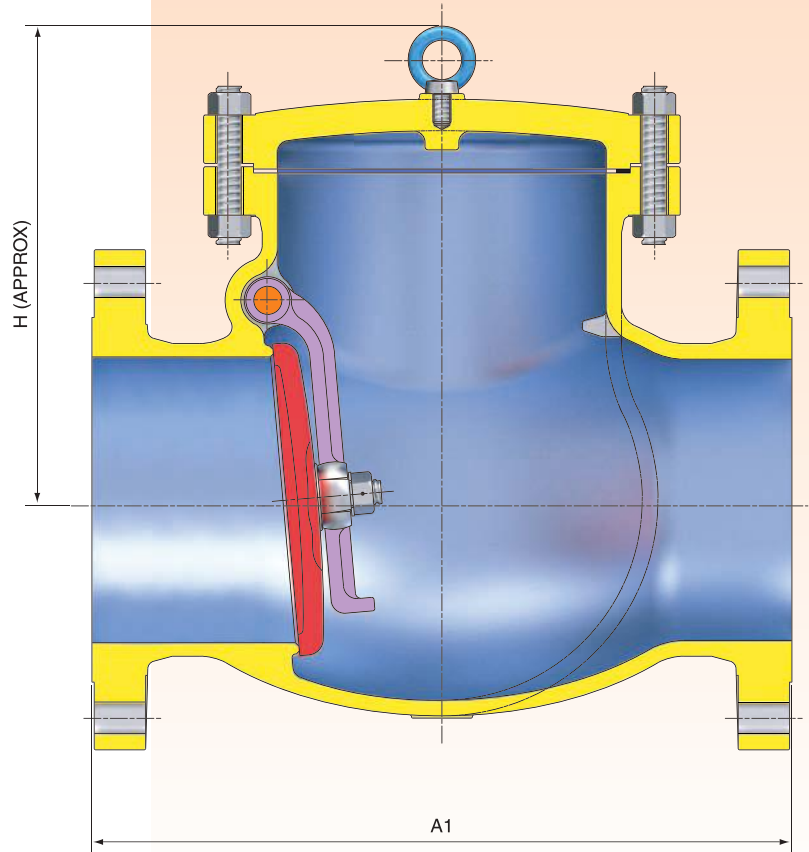
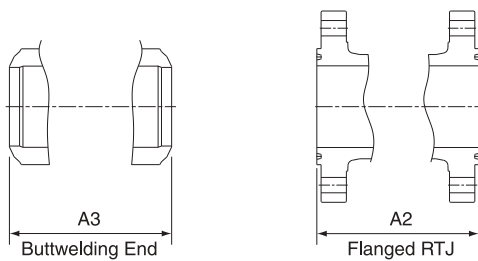
SW/CH CLASS 300



14" Thru 16"



18" & Larger

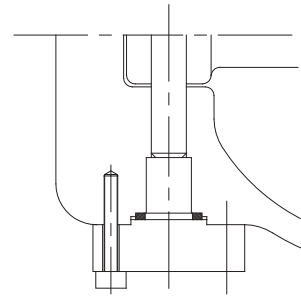
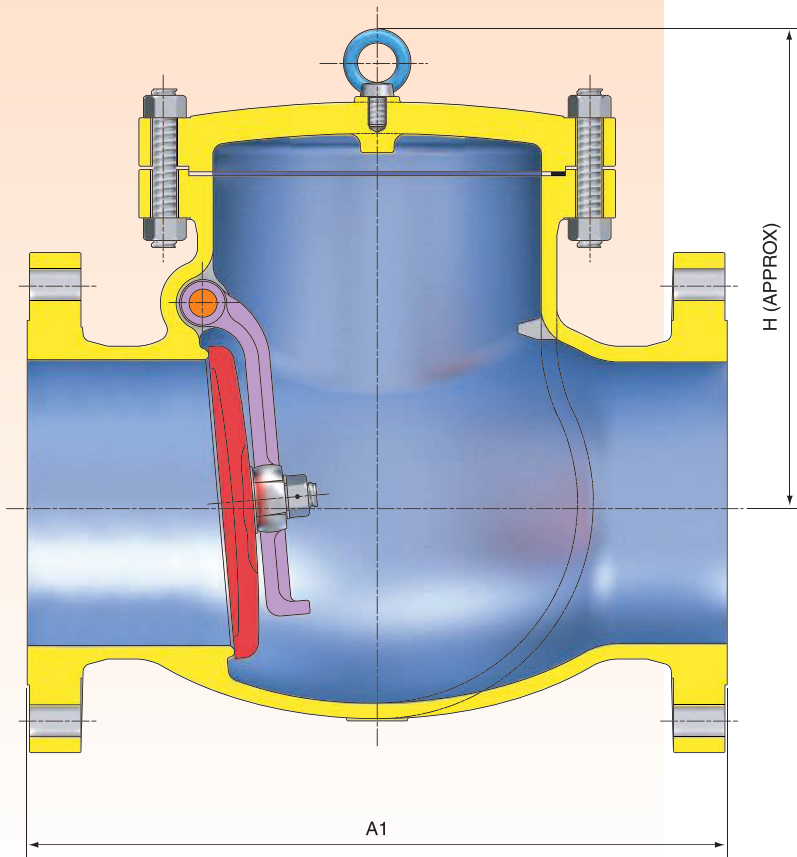


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	21.0	24.5	28.0	33.0	34.0	38.5	40.0	53.0	59.0	62.8	82.0	
	mm	267	292	318	356	444	533	622	711	838	864	978	1016	1346	1499	1594	2083	
A2	in	11.1	12.1	13.1	14.6	18.1	21.6	25.1	28.6	33.6	34.6	39.1	40.7	53.9	60.0	63.7	83.1	
	mm	283	308	333	371	460	549	638	727	854	880	994	1035	1368	1524	1619	2111	
H	in	6.4	7.1	7.8	8.7	13.1	15.0	18.8	21.1	22.8	27.4	31.4	30.5	40.4	45.2	50.0	46.1	
	mm	163	180	197	220	332	380	477	535	580	695	797	775	1025	1149	1270	1171	
WEIGHT	RF	lb	52.9	81.6	99.2	149.9	302.0	485.0	595.2	1091.3	1499.1	2094.4	2645.5	3306.9	4850.1	6172.9	7495.6	11022.9
		kg	24	37	45	68	137	220	270	495	680	950	1200	1500	2200	2800	3400	5000
	BW	lb	46.3	66.1	77.2	112.4	242.5	401.2	463.0	925.9	1157.4	1763.7	2202.4	2689.6	4060.9	5291.0	6503.5	9063.1
		kg	21	30	35	51	110	182	210	420	525	800	999	1220	1842	2400	2950	4111

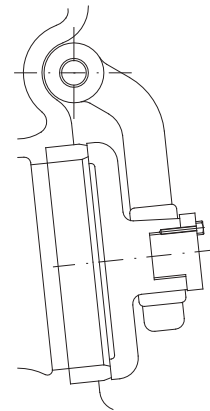
SWING CHECK VALVES

BOLTED COVER

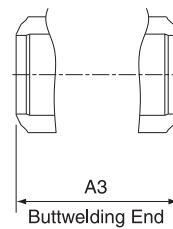
SW/CH CLASS 600



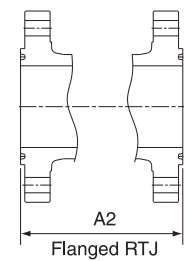
16" & Larger



18" & Larger



A3
Buttwelding End

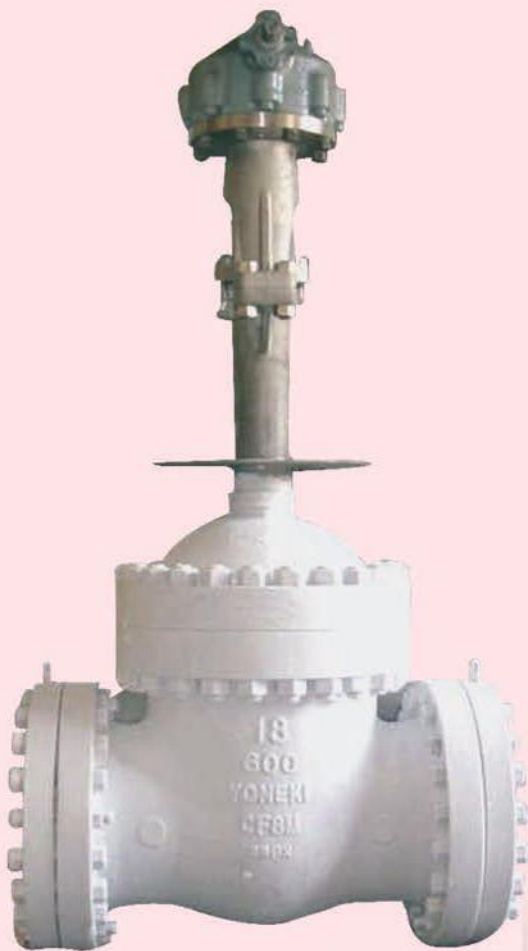


A2
Flanged RTJ

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	63.0	65.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	1600	1651	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	63.5	65.5	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1407	1613	1664	
H	in	8.3	8.6	10.5	12.2	15.5	21.2	24.6	24.4	26.8	32.0	37.8	40.5	47.3	54.6	51.7	
	mm	210	219	267	310	393	538	625	620	680	812	960	1029	1202	1388	1313	
WEIGHT	RF	lb	88.2	121.3	158.7	253.5	551.1	925.9	1349.2	1785.7	1984.1	2971.8	4448.9	5264.6	7195.8	9038.8	11022.9
		kg	40	55	72	115	250	420	612	810	900	1348	2018	2388	3264	4100	5000
	BW	lb	83.8	99.2	138.9	176.4	451.9	762.8	1078.0	1472.7	1940.0	2464.7	3798.5	4437.8	6011.9	7716.1	9261.5
		kg	38	45	63	80	205	346	489	668	880	1118	1723	2013	2727	3500	4201

CRYOGENIC VALVES

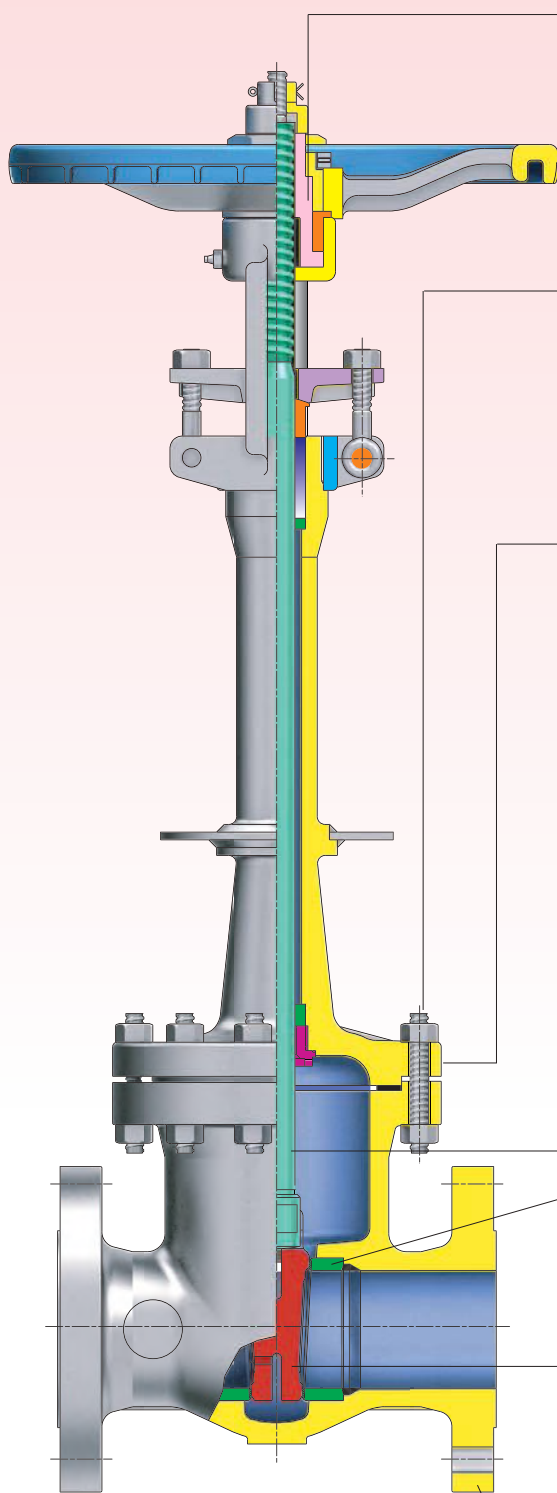
BOLTED BONNET



STAINLESS STEEL

BOLTED BONNET

CRYOGENIC GATE VALVES



YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150 °C (2100 °F) dissolution point in accordance with API Std. specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1 Strain-hardened austenitic stainless steel.

BONNET

Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion.

STEM

The heat treated stem delivers adequate mechanical properties as well as excellent surface hardness. Further, opening/shutting friction is minimized by accurate machining and lapping.

SEAT RING

Stellite 6 for all medium and high pressure application prevents seizing and galling.

FLEXIBLE WEDGE

The wedge seating surfaces have been accurately machined, grind and lapped to a mirror finish to prevent leakage and eliminate galling. Stellite 6 for all medium and high pressure application prevents seizing and galling.

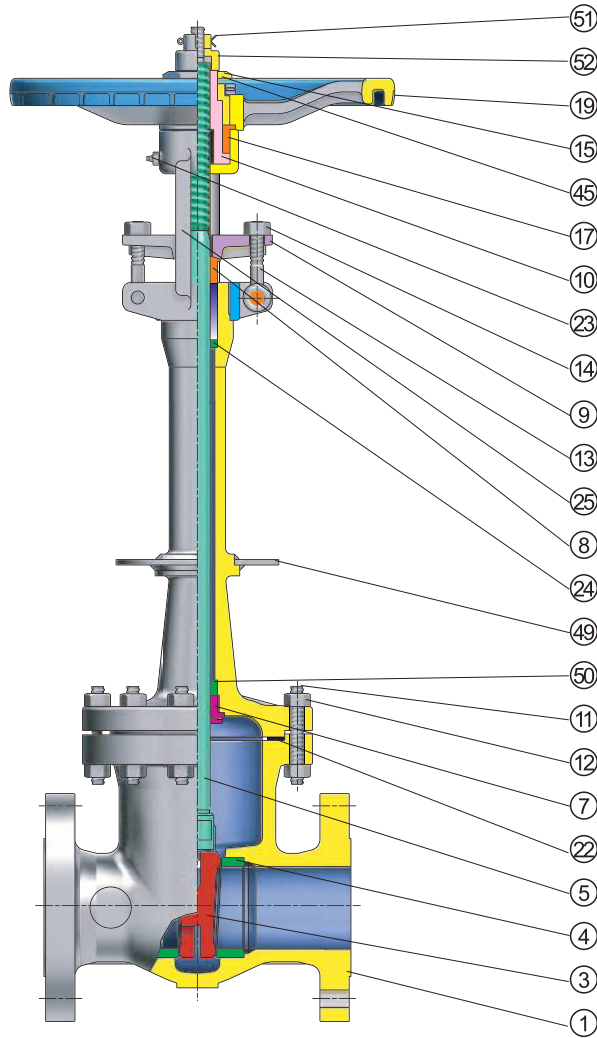
BODY

Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion.

STAINLESS STEEL

BOLTED BONNET

CRYOGENIC GATE VALVES



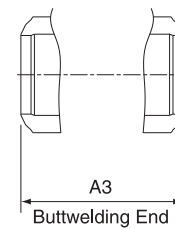
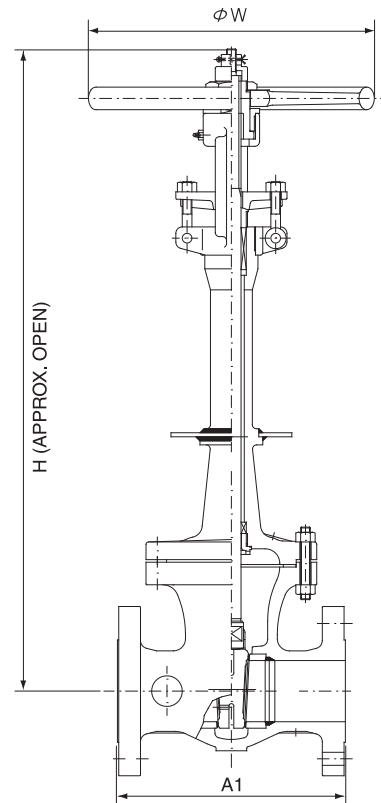
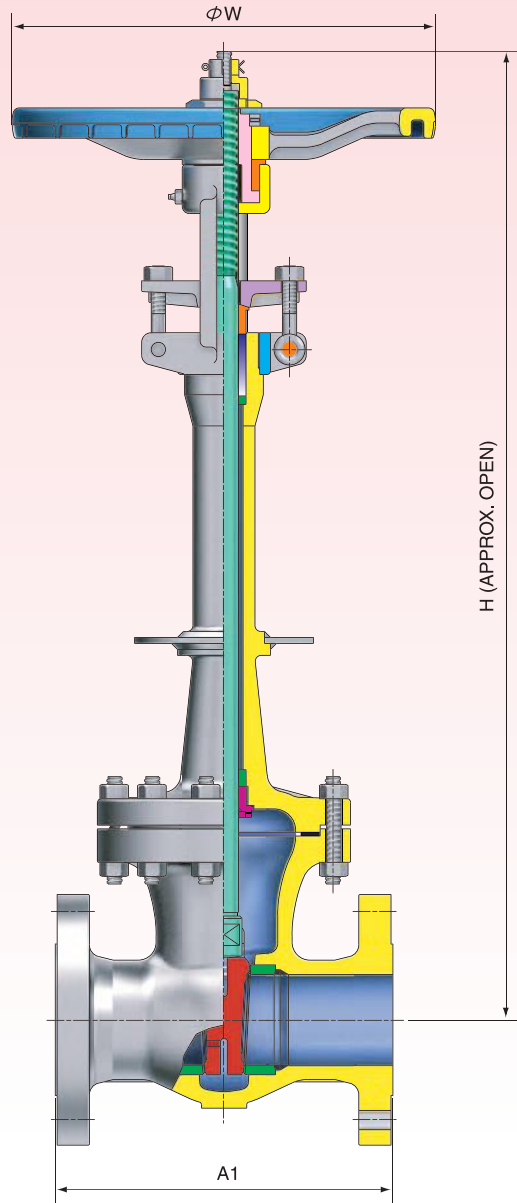
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	AISI 304
17	SLEEVE GLAND	AISI 304
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BEARING	COMMERCIAL
45	WASHER	AISI 304
49	INSULATION PLATE	AISI 304
50	STEM BEARING	COMMERCIAL
51	COTTER PIN	AISI 304
52	LIFT STOPPER	AISI 304

NO	NAME OF PART	ASTM SPECIFICATION			
		HIGH TEMPERATURE SERVICE			
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A240-304	A240-316	A240-304L	A240-316L
5	STEM	A276-304	A276-316	A276-304L	A276-316L
7	BONNET BUSH	A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND	A276-304			
9	GLAND FLANGE	A361-CF8			
10	YOKE SLEEVE	A439-D2			
11	BONNET BOLT	A320-B8	A320-B8	A320-B8	A320-B8
12	BONNET NUT	A194-8	A194-8	A194-8	A193-8
13	GLAND BOLT	A193-B8			
14	GLAND NUT	A194-8			
20	HINGE PIN	A276-304			
24	PACKING RING	A276-304	A276-316	A276-304L	A276-316L
25	YOKE	A351-CF8			
27	YOKE BOLT	A193-B7			
28	YOKE NUT	A194-2H			

CRYOGENIC GATE VALVES

BOLTED BONNET

GT CLASS 150

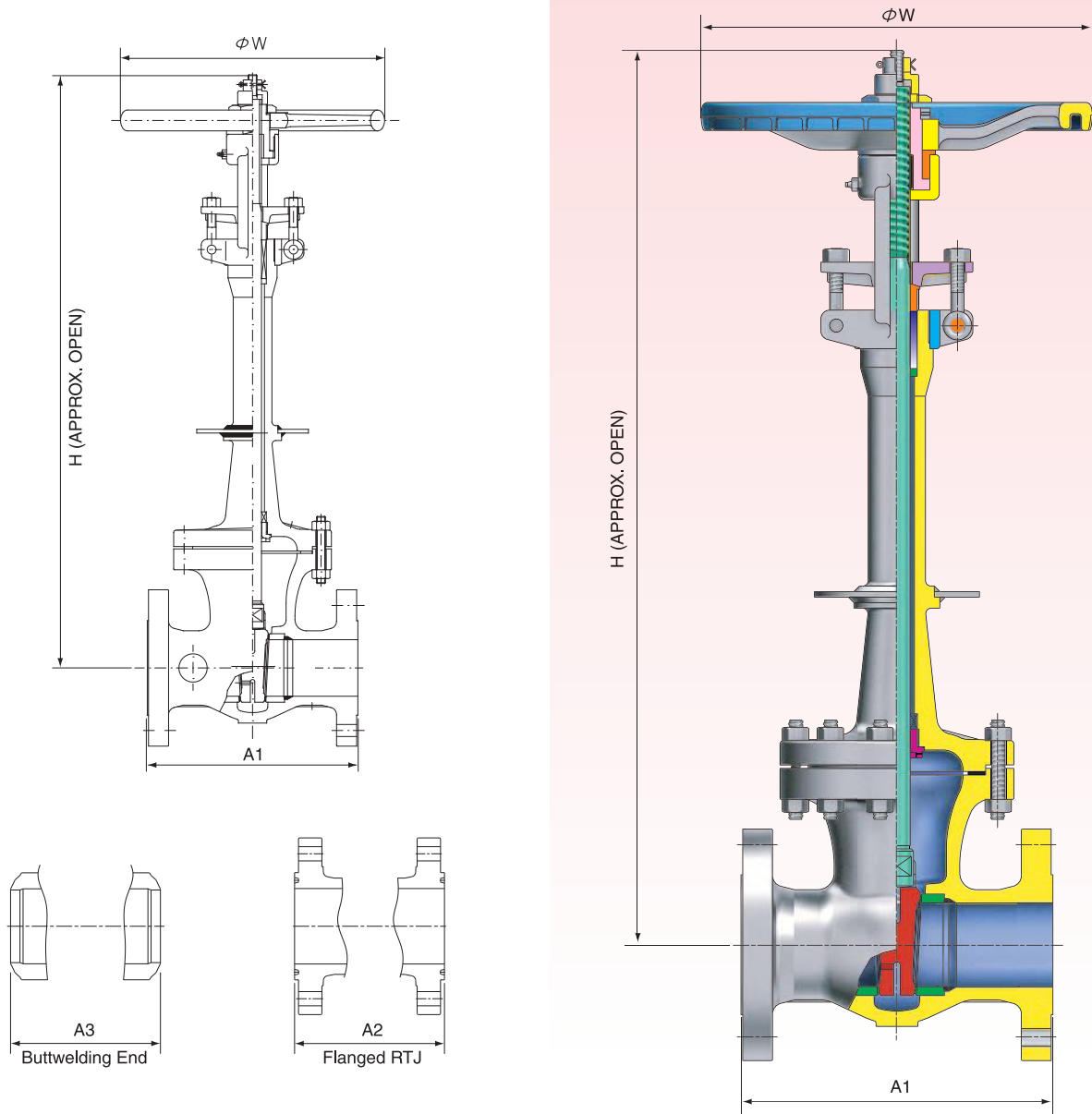


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1	in	7.0	7.5	8.0	9.0	10.5	11.5	13.0	14.0	15.0	16.0	17.0	
	mm	178	190	203	229	267	292	330	356	381	406	432	
A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	22.5	24.0	26.0	
	mm	216	241	283	305	403	419	457	502	572	610	660	
H	in	29.4	32.5	34.3	37.5	44.4	61.2	67.9	74.3	88.0	97.2	105.0	
	mm	748	826	870	953	1127	1554	1725	1887	2234	2469	2666	
W	in	9.8	9.8	11.0	11.8	15.7	17.7	23.6	27.2	28.0	28.0	31.5	
	mm	250	250	280	300	400	450	600	690	710	710	800	
WEIGHT	RF	lb	79.4	92.6	105.8	158.7	291.0	432.1	610.7	903.9	1106.7	1430.8	1977.5
		kg	36	42	48	72	132	196	277	410	502	649	897
	BW	lb	66.1	79.4	88.2	132.3	264.6	379.2	551.2	837.7	1036.2	1344.8	1889.3
		kg	30	36	40	60	120	172	250	380	470	610	857

CRYOGENIC GATE VALVES

BOLTED BONNET

GT CLASS 300

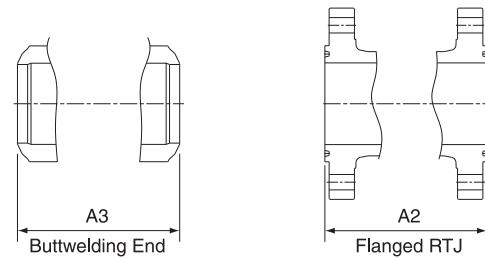
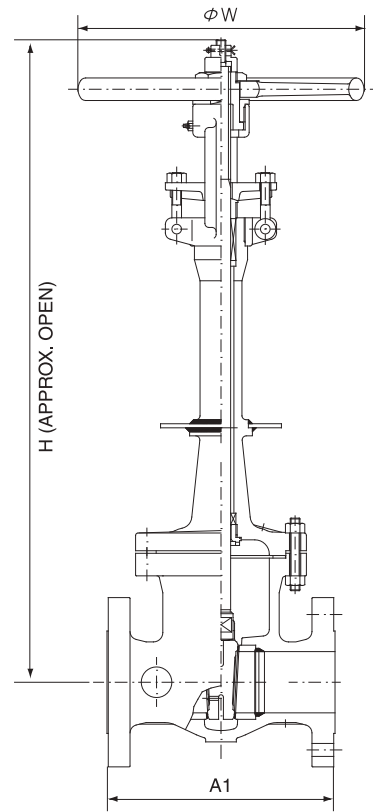
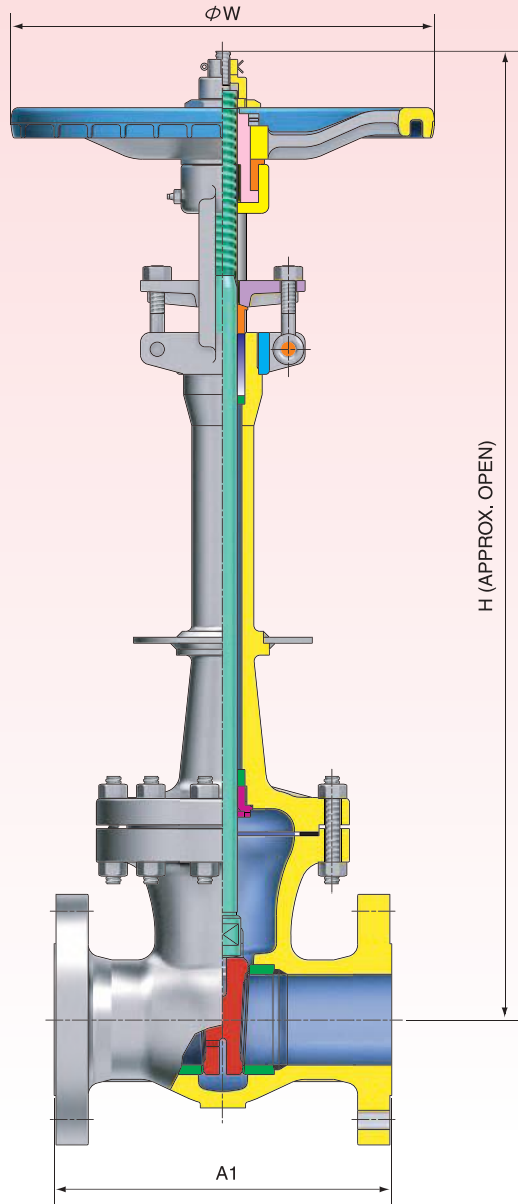


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1 & A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	30.0	33.0	36.0	
	mm	216	241	283	305	403	419	457	502	762	838	914	
A2	in	9.1	10.1	11.7	12.6	16.5	17.1	18.6	20.4	30.6	33.6	36.6	
	mm	232	257	298	321	419	435	473	518	778	854	930	
H	in	30.0	33.5	34.9	38.1	49.5	60.0	68.0	82.1	89.8	101.5	109.5	
	mm	763	850	886	969	1257	1524	1726	2085	2281	2579	2782	
W	in	11.8	9.8	14.0	15.7	19.7	27.2	27.2	28.0	35.4	35.4	35.4	
	mm	300	250	355	400	500	690	690	710	900	900	900	
WEIGHT	RF	lb	88.2	110.2	138.9	205.0	377.0	637.1	943.6	1283.1	1763.7	2578.0	3309.1
		kg	40	50	63	93	171	289	428	582	800	1251	1501
	BW	lb	77.2	94.8	114.6	180.8	352.7	595.2	884.0	1239.0	1717.4	2425.1	3108.5
		kg	35	43	52	82	160	270	401	562	779	1100	1410

CRYOGENIC GATE VALVES

BOLTED BONNET

GT CLASS 600



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	
	mm	50	65	80	100	150	200	250	300	350	400	450	
A1 & A3	in	11.5	13.0	14.0	17.0	21.9	26.0	31.0	33.0	35.0	39.0	43.0	
	mm	292	330	356	432	556	660	787	838	889	991	1092	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	
	mm	295	333	359	435	562	663	790	841	892	994	1095	
H	in	29.2	35.2	36.4	39.9	53.5	68.2	79.5					
	mm	742	895	924	1014	1359	1733	2020					
W	in	9.8	9.8	11.0	15.7	23.6	24.8	31.5					
	mm	250	250	280	400	600	630	800					
WEIGHT	RF	lb	116.8	154.3	180.8	319.7	674.6	1113.3	1851.9				
		kg	53	70	82	145	306	505	840				
	BW	lb	99.2	136.7	154.3	286.6	595.2	1069.2	1818.8				
		kg	45	62	70	130	270	485	825				

STAINLESS STEEL

BOLTED BONNET

CRYOGENIC GLOBE VALVES

YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over a 1150°C (2100°F) dissolution point in conformity with API Std. Specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B1.1 Strain-hardened austenitic stainless steel.

BONNET

Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion.

STEM

The heat treated stem delivers adequate mechanical properties as well as excellent surface hardness. Further, opening shutting friction is minimized by accurate machining and lapping.

DISC

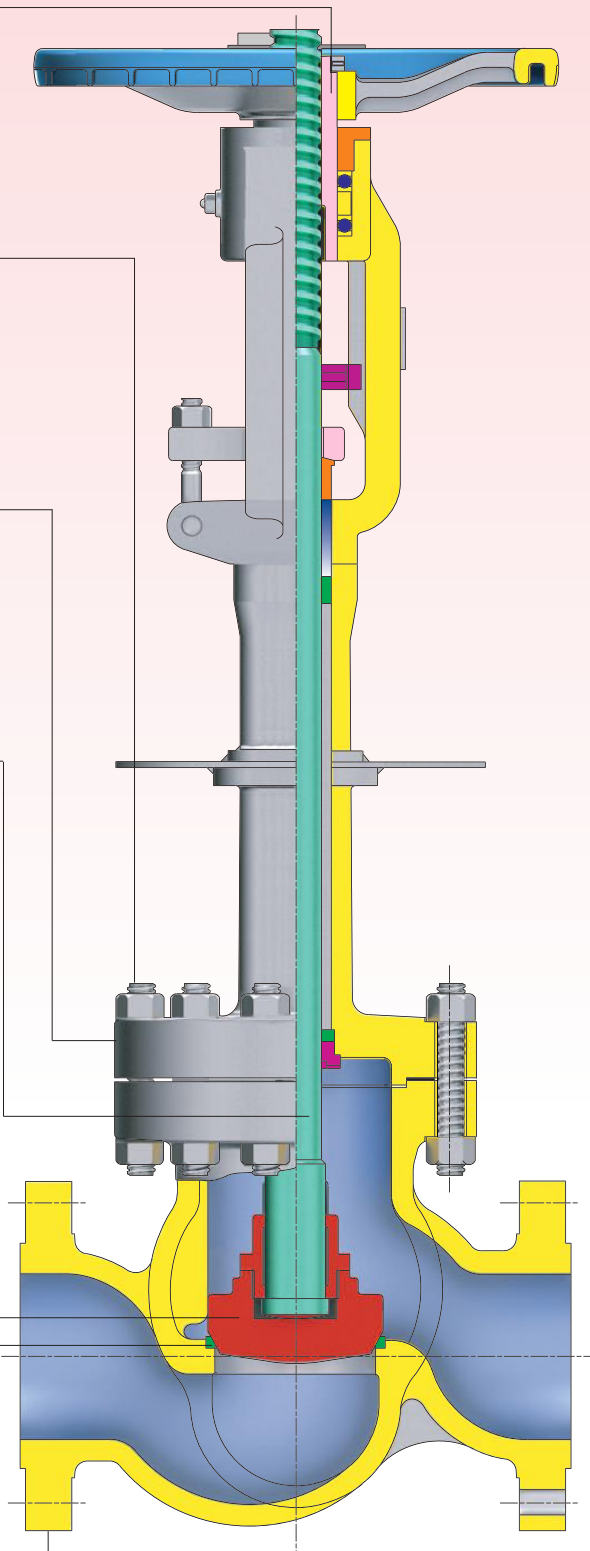
The disc of our globe valves is a loose disc and can freely revolve around the stem. This prevents friction and galling with the seating surface when the valve is shut. The disc is furnished with a conical seating surface that has been ground and lapped to mirror finish. Stellite 6 for all medium and high pressure application prevents seizing and galling.

SEAT RING

Stellite 6 for all medium and high pressure application prevents seizing and galling.

BODY

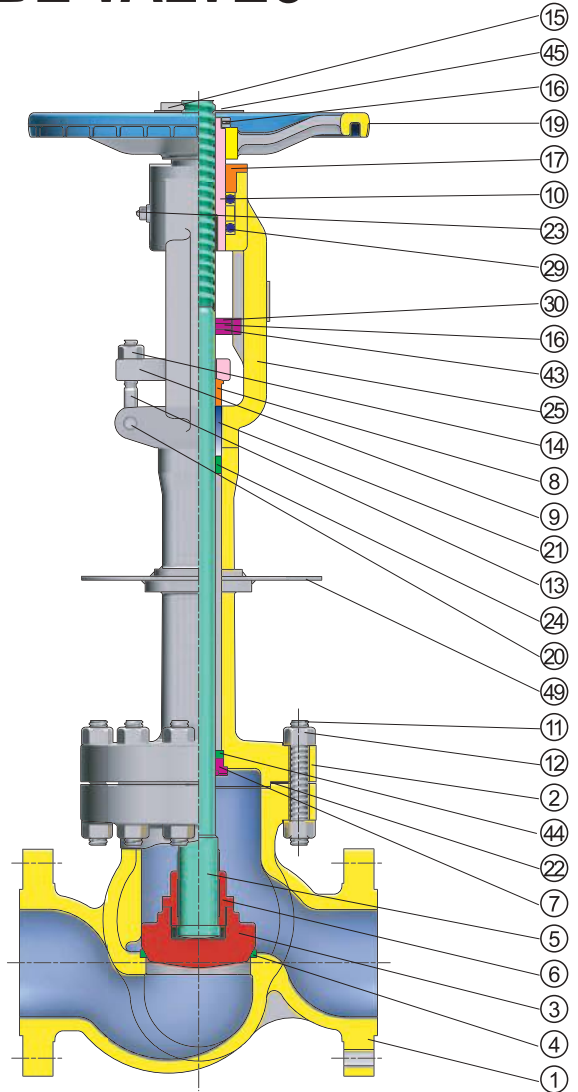
Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion



STAINLESS STEEL

BOLTED BONNET

CRYOGENIC GLOBE VALVES



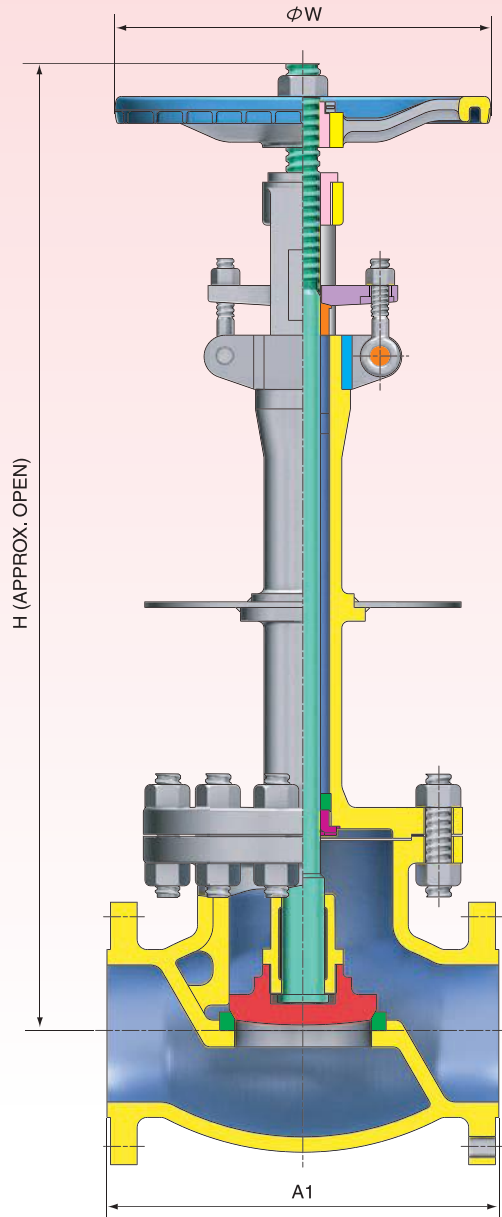
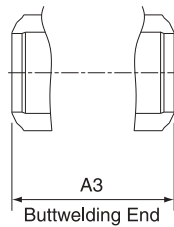
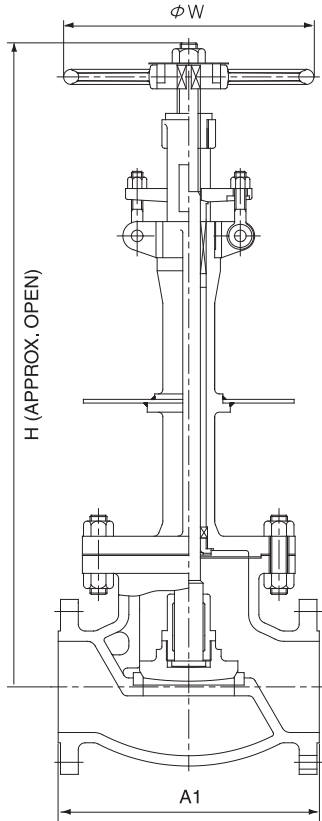
NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	AISI 304
16	SET SCREW	STEEL
17	SLEEVE GLAND	AISI 304
19	HANDWHEEL	A 395
21	PACKING	COMMERCAIL
22	GASKET	COMMERCAIL
23	GREASE NIPPLE	STEEL
29	BEARING	COMMERCAIL
30	STOPPER	A283-D
43	KEY	CARBON STEEL
44	STEM BEARING	COMMERCAIL
45	WASHER	AISI 304
49	INSULATION PLATE	AISI 304

NO	NAME OF PART	ASTM SPECIFICATION			
		HIGH TEMPERATURE SERVICE			
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	BONNET	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A240-304	A240-316	A240-304L	A240-316L
5	STEM	A276-304	A276-316	A276-304L	A276-316L
6	DISC GRAND	A276-304	A276-316	A276-304L	A276-316L
7	BONNET BUSH	A276-304	A276-316	A276-304L	A276-316L
8	PACKING GLAND	A276-304			
9	GLAND FLANGE	A351-CF8			
10	YOKE SLEEVE	A439-D2			
11	BONNET BOLT	A320-B8	A320-B8	A320-B8	A320-B8
12	BONNET NUT	A194-8	A194-8	A194-8	A193-8
13	GLAND BOLT	A193-B8			
14	GLAND NUT	A194-8			
20	HINGE PIN	A276-304			
24	PACKING RING	A276-304	A276-316	A276-304L	A276-316L
25	YOKE	A351-CF8	A351-CF8	A351-CF8	A351-CF8

CRYOGENIC GLOBE VALVES

BOLTED BONNET

GL CLASS 150

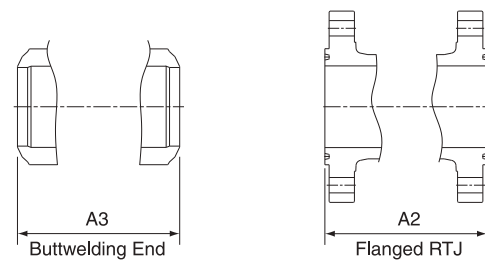
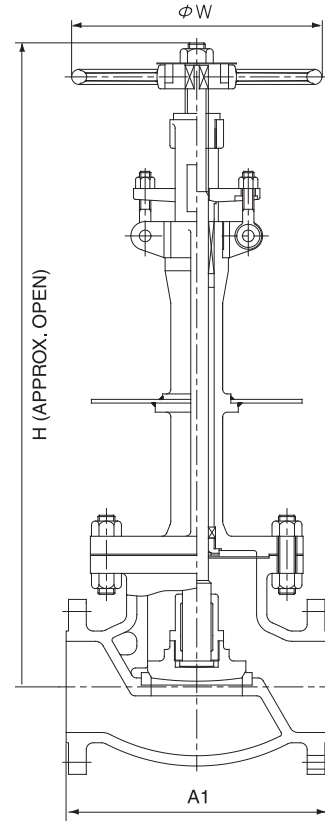
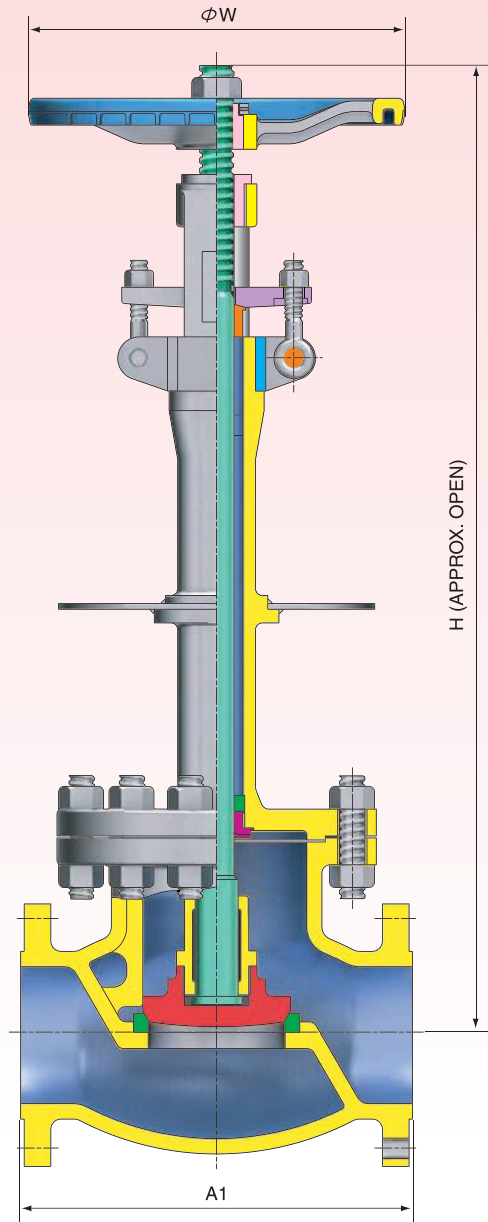


VALVE SIZE	in	2	2.5	3	4	6	8	
	mm		50	65	80	100	150	200
A1 & A3	in		8.0	8.5	9.5	11.5	16.0	19.5
	mm		203	216	241	292	406	495
H	in		31.0	30.6	32.8	34.0	38.3	43.7
	mm		788	776	833	864.5	974	1110
W	in		8.8	9.8	14.0	15.7	17.7	22.0
	mm		224	250	355	400	450	560
WEIGHT	RF	lb	75.0	99.2	119.0	185.2	315.3	429.9
		kg	34	45	54	84	143	195
	BW	lb	63.9	83.8	99.2	158.7	288.8	385.8
		kg	29	38	45	72	131	175

CRYOGENIC GLOBE VALVES

BOLTED BONNET

GL CLASS 300

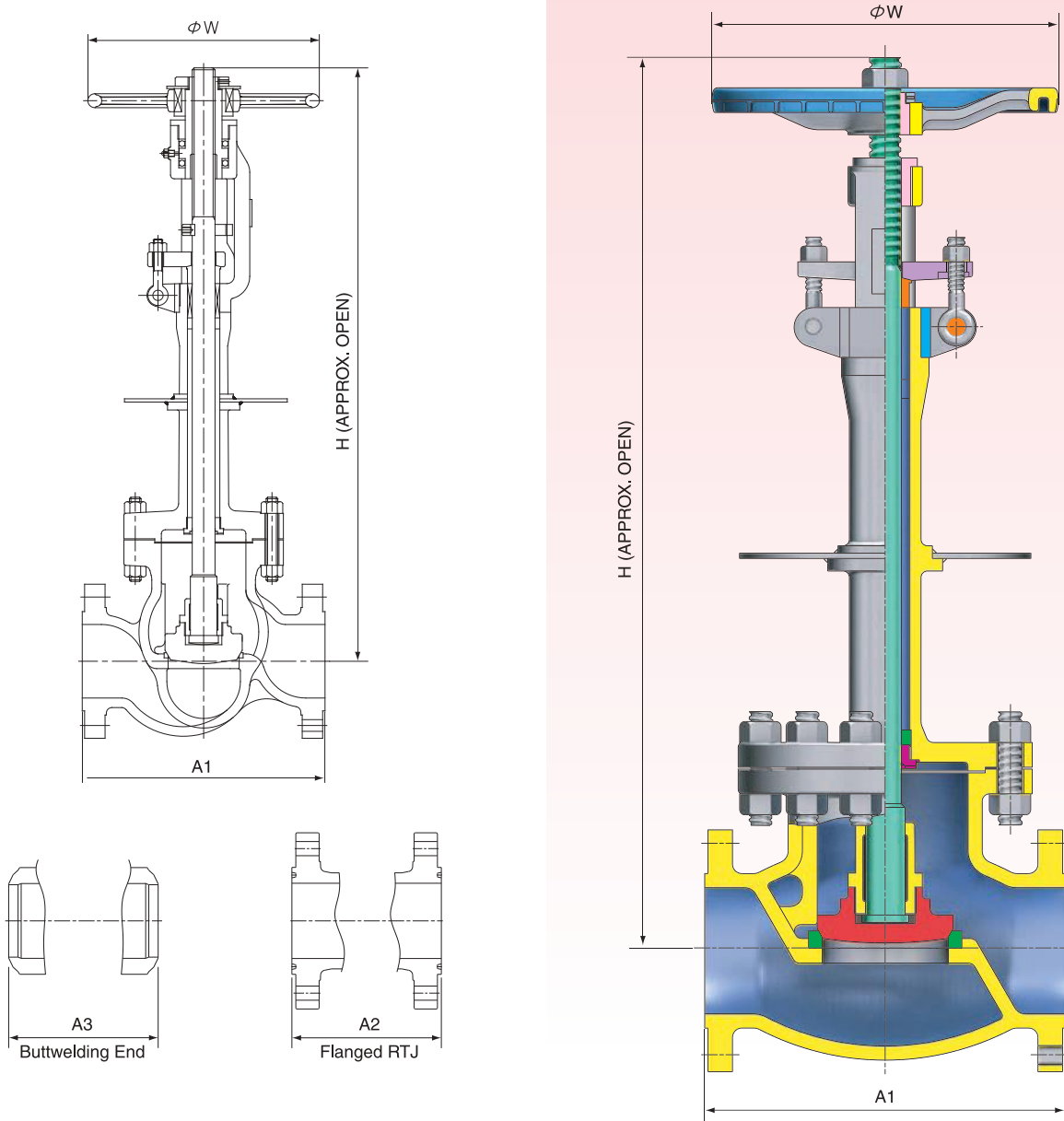


VALVE SIZE	in	2	2.5	3	4	6	8	
	mm	50	65	80	100	150	200	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	22.0	
	mm	267	292	318	356	444	559	
A2	in	11.1	12.1	13.1	14.6	18.1	22.6	
	mm	283	308	333	371	460	575	
H	in	27.2	28.3	29.8	36.7	43.0	47.2	
	mm	690	720	756	932	1092	1200	
W	in	9.8	11.0	14.0	23.6	22.0	28.0	
	mm	250	280	355	300	560	710	
WEIGHT	RF	lb	83.8	99.2	141.1	410.1	449.7	551.2
		kg	38	45	64	186	204	250
	BW	lb	66.1	81.6	121.3	374.8	407.9	496.0
		kg	30	37	55	170	185	225

CRYOGENIC GLOBE VALVES

BOLTED BONNET

GL CLASS 600

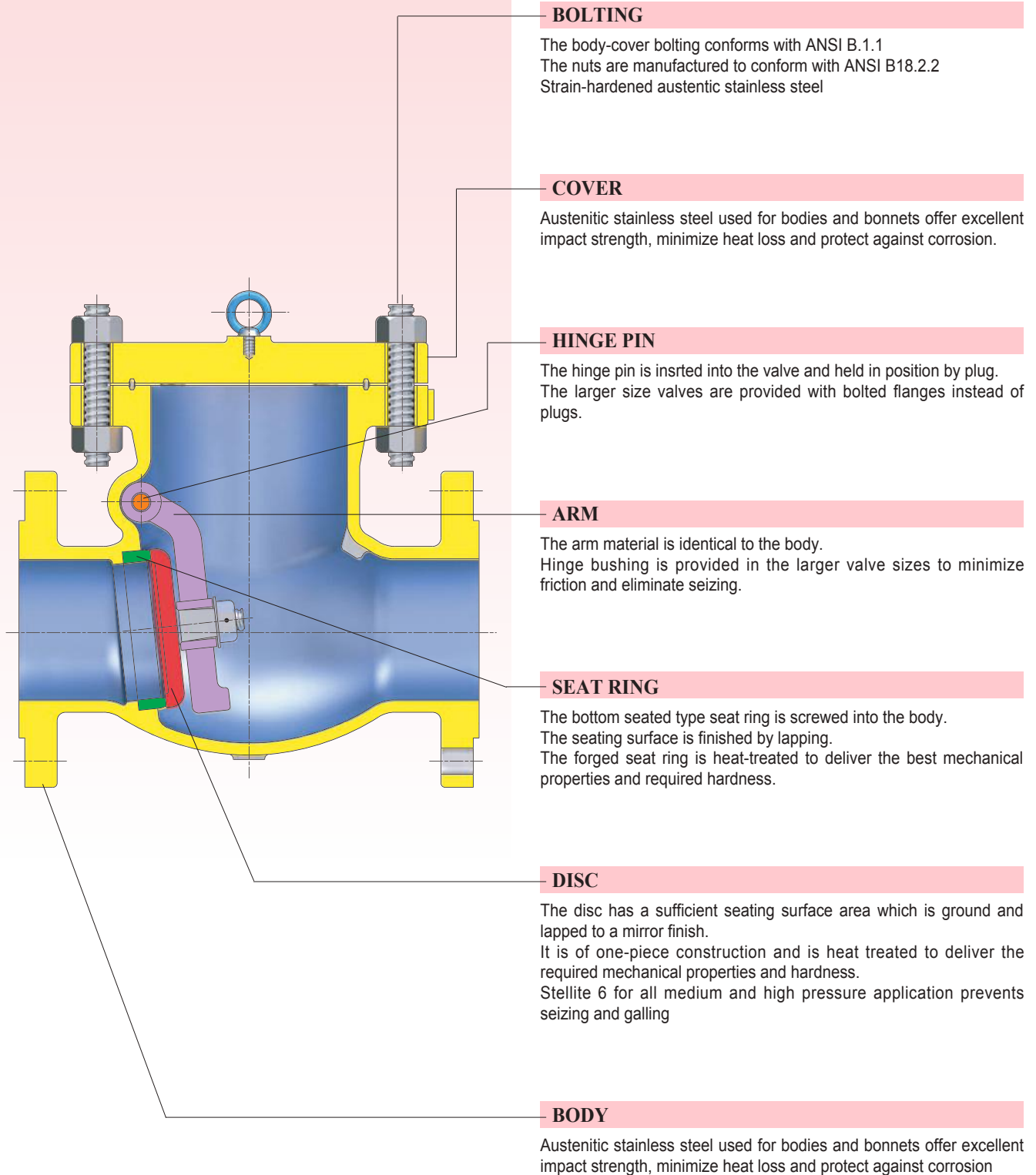


VALVE SIZE	in	2	2.5	3	4	6	8	
	mm	50	65	80	100	150	200	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	
	mm	292	330	356	432	559	660	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	
	mm	295	333	359	435	562	664	
H	in	27.8	31.6	31.7	34.2	41.7	44.3	
	mm	707	802	805	868	1059	1125	
W	in	11.0	14.0	17.7	22.0	28.0	31.5	
	mm	280	355	450	560	710	800	
WEIGHT	RF	lb	154.3	176.4	198.4	339.5	749.6	1433
		kg	70	80	90	154	340	650
	BW	lb	121.3	143.3	172.0	297.6	705.5	1254
		kg	55	65	78	135	320	570

STAINLESS STEEL

BOLTED COVER

CRYOGENIC SWING CHECK VALVES



BOLTING

The body-cover bolting conforms with ANSI B.1.1
The nuts are manufactured to conform with ANSI B18.2.2
Strain-hardened austenitic stainless steel

COVER

Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion.

HINGE PIN

The hinge pin is inserted into the valve and held in position by plug.
The larger size valves are provided with bolted flanges instead of plugs.

ARM

The arm material is identical to the body.
Hinge bushing is provided in the larger valve sizes to minimize friction and eliminate seizing.

SEAT RING

The bottom seated type seat ring is screwed into the body.
The seating surface is finished by lapping.
The forged seat ring is heat-treated to deliver the best mechanical properties and required hardness.

DISC

The disc has a sufficient seating surface area which is ground and lapped to a mirror finish.
It is of one-piece construction and is heat treated to deliver the required mechanical properties and hardness.
Stellite 6 for all medium and high pressure application prevents seizing and galling

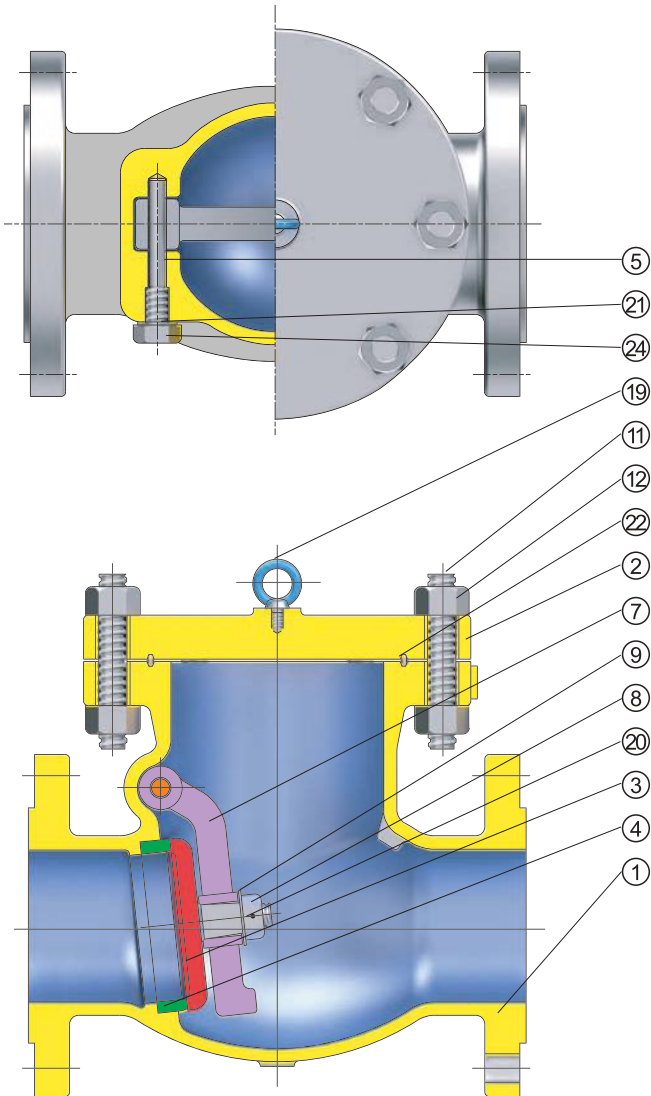
BODY

Austenitic stainless steel used for bodies and bonnets offer excellent impact strength, minimize heat loss and protect against corrosion

STAINLESS STEEL

BOLTED COVER

SW/CH CRYOGENIC VALVES



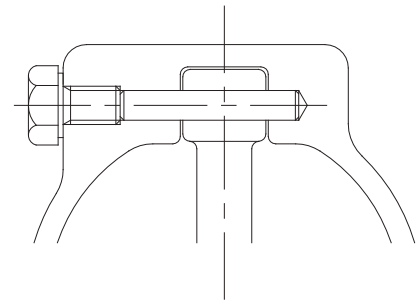
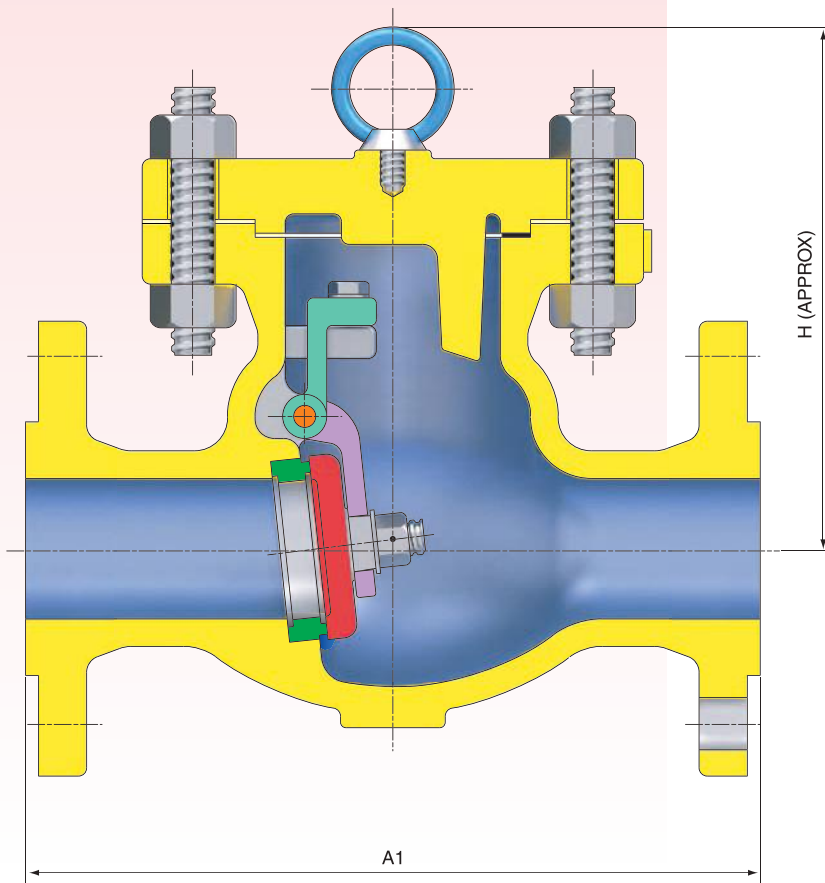
NO	NAME OF PART	ASTM SPECIFICATION
8	DISC NUT	A194-8
9	DISC WASHER	A240-304
15	EVE BOLT	A105
20	SPRIT PIN	AISI 304
21	PLUG GASKET	COMMERCIAL
22	GASKET	COMMERCIAL
24	PLUG	A105

NO	NAME OF PART	ASTM SPECIFICATION			
		STAINLESS STEEL			
1	BODY	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
2	COVER	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
3	DISC	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
4	BODY SEAT RING	A240-304	A240-316	A240-304L	A240-316L
5	HINGE PIN	A276-304	A276-316	A276-304L	A276-316L
7	ARM	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M
11	BONNET BOLT	A320-B8	A320-B8	A320-B8	A320-B8
12	BONNET NUT	A194-8	A194-8	A194-8	A193-8

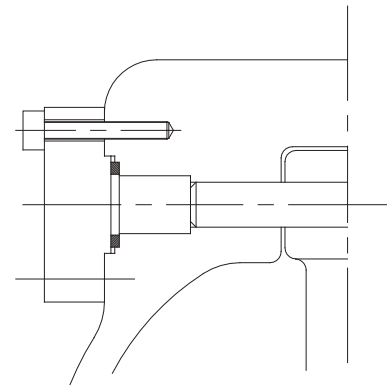
CRYOGENIC SW/CH VALVES

BOLTED COVER

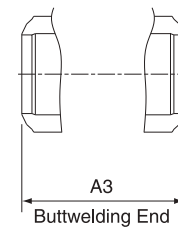
SW/CH CLASS 150



14" Thru 18"



20" & Larger



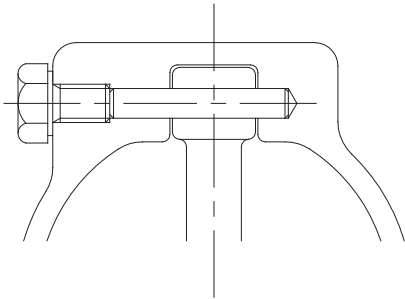
A3
Buttwelding End

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	650	700	750	800	900	
A1 & A3	in	8.0	8.5	9.5	11.5	14.0	19.5	24.5	27.5	31.0	34.0	38.5	38.5	51.0	51.0	57.0	60.0	60.0	77.0	
	mm	203	216	241	292	356	495	622	698	787	864	978	978	1295	1295	1448	1524	1524	1956	
H	in	5.8	6.4	6.9	8.0	11.4	13.8	16.9	19.6	23.9	25.6	30.7	25.5	31.5	33.5	40.0	35.0	37.0	53.1	
	mm	147	163	176	204	290	350	428	499	606	650	781	647	800	852	1017	888	941	1349	
WEIGHT	RF	lb	35.3	48.5	66.1	97.0	172.0	260.1	520.3	758.4	930.3	1397.7	1798.9	2164.9	3924.2	3637.6	3825.0	4647.3	5291.0	7385.4
		kg	16	22	30	44	78	118	236	344	422	634	816	982	1780	1650	1735	2108	2400	3350
	BW	lb	28.7	33.1	46.3	57.3	136.7	200.6	449.7	645.9	661.4	1276.5	1547.6	1878.3	3584.7	3306.9	3223.1	4426.8	4960.3	6944.5
		kg	13	15	21	26	62	91	204	293	300	579	702	852	1626	1500	1462	2008	2250	3150

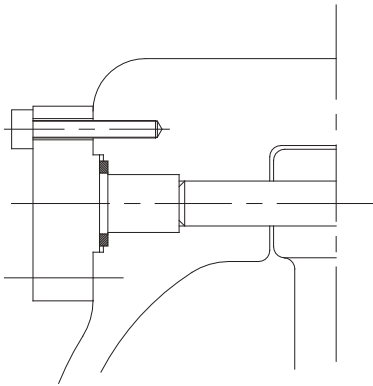
CRYOGENIC SW/CH VALVES

BOLTED COVER

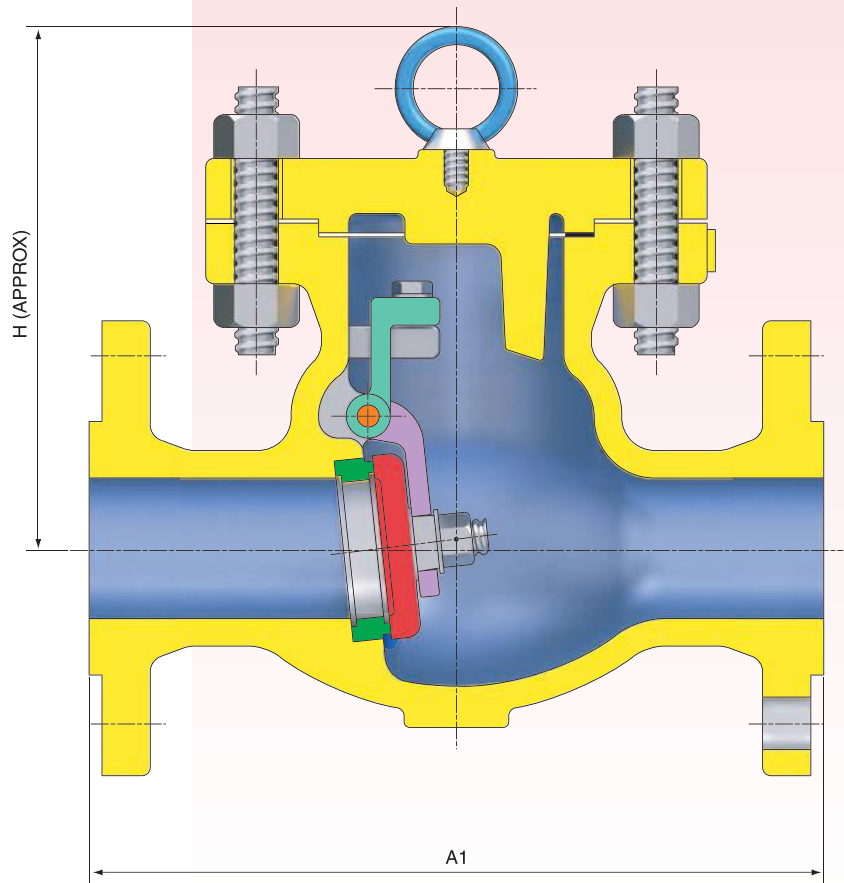
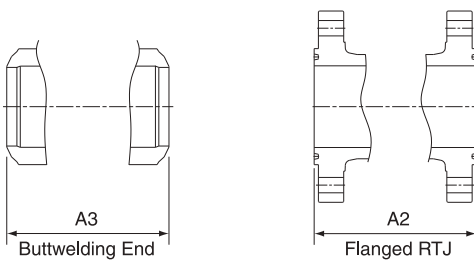
SW/CH CLASS 300



14" Thru 16"



18" & Larger

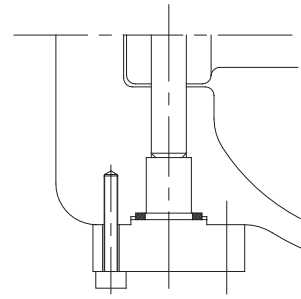
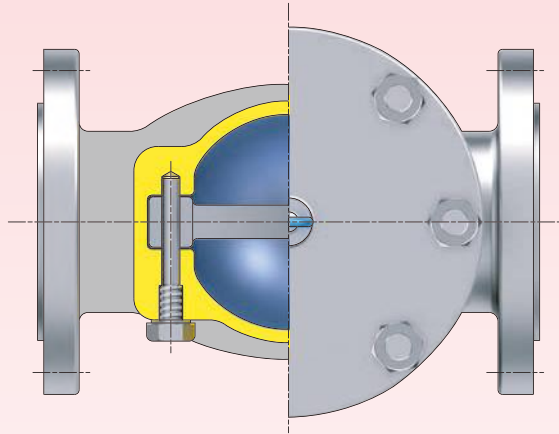


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	21.0	24.5	28.0	33.0	34.0	38.5	40.0	53.0	59.0	62.8	82.0	
	mm	267	292	318	356	444	533	622	711	838	864	978	1016	1346	1499	1594	2083	
A2	in	11.1	12.1	13.1	14.6	18.1	21.6	25.1	28.6	33.6	34.6	39.1	40.7	53.9	60.0	63.7	83.1	
	mm	283	308	333	371	460	549	638	727	854	880	994	1035	1368	1524	1619	2111	
H	in	6.4	7.1	7.8	8.7	13.1	15.0	18.8	21.1	22.8	27.4	31.4	30.5	40.4	45.2	50.0	46.1	
	mm	163	180	197	220	332	380	477	535	580	695	797	775	1025	1149	1270	1171	
WEIGHT	RF	lb	52.9	81.6	99.2	149.9	302.0	485.0	595.2	1091.3	1499.1	2094.4	2645.5	3306.9	4850.1	6172.9	7495.6	11022.9
		kg	24	37	45	68	137	220	270	495	680	950	1200	1500	2200	2800	3400	5000
	BW	lb	46.3	66.1	77.2	112.4	242.5	401.2	463.0	925.9	1157.4	1763.7	2202.4	2689.6	4060.9	5291.0	6503.5	9063.1
		kg	21	30	35	51	110	182	210	420	525	800	999	1220	1842	2400	2950	4111

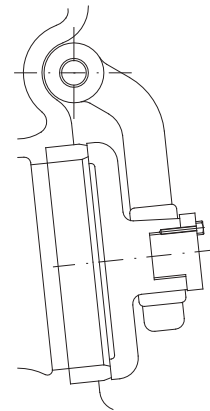
CRYOGENIC SW/CH VALVES

BOLTED COVER

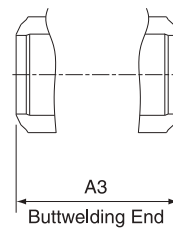
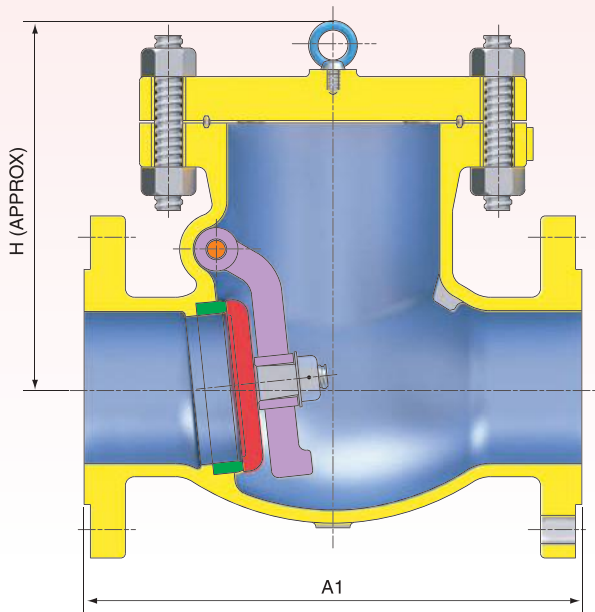
SW/CH CLASS 600



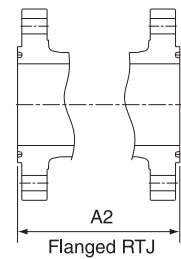
16" & Lager



18" & Lager



Buttwelding End

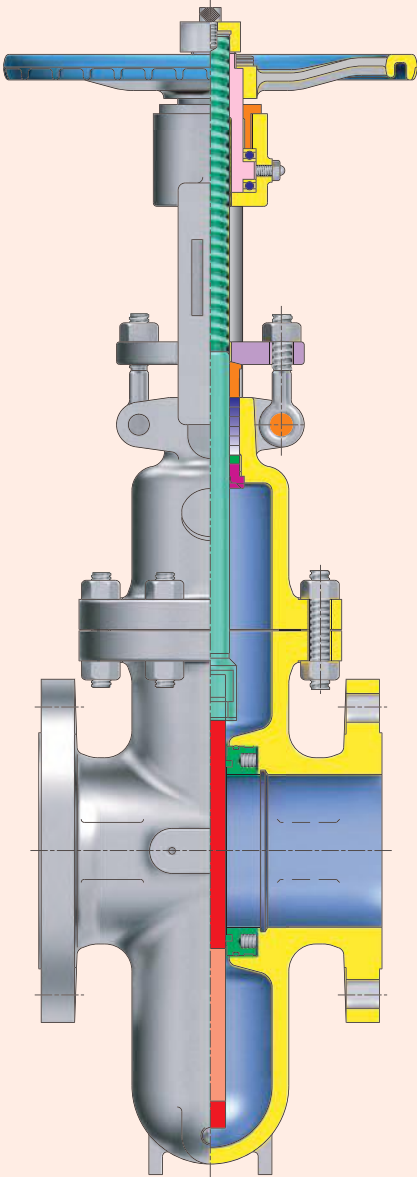


Flanged RTJ

VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	24	28	30	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	600	700	750	
A1 & A3	in	11.5	13.0	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	63.0	65.0	
	mm	292	330	356	432	559	660	787	838	889	991	1092	1194	1397	1600	1651	
A2	in	11.6	13.1	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	63.5	65.5	
	mm	295	333	359	435	562	664	791	841	892	994	1095	1200	1407	1613	1664	
H	in	8.3	8.6	10.5	12.2	15.5	21.2	24.6	24.4	26.8	32.0	37.8	40.5	47.3	54.6	51.7	
	mm	210	219	267	310	393	538	625	620	680	812	960	1029	1202	1388	1313	
WEIGHT	RF	lb	88.2	121.3	158.7	253.5	551.1	925.9	1349.2	1785.7	1984.1	2971.8	4448.9	5264.6	7195.8	9038.8	11022.9
		kg	40	55	72	115	250	420	612	810	900	1348	2018	2388	3264	4100	5000
	BW	lb	83.8	99.2	138.9	176.4	451.9	762.8	1078.0	1472.7	1940.0	2464.7	3798.5	4437.8	6011.9	7716.1	9261.5
		kg	38	45	63	80	205	346	489	668	880	1118	1723	2013	2727	3500	4201

THROUGH CONDUIT GATE VALVES

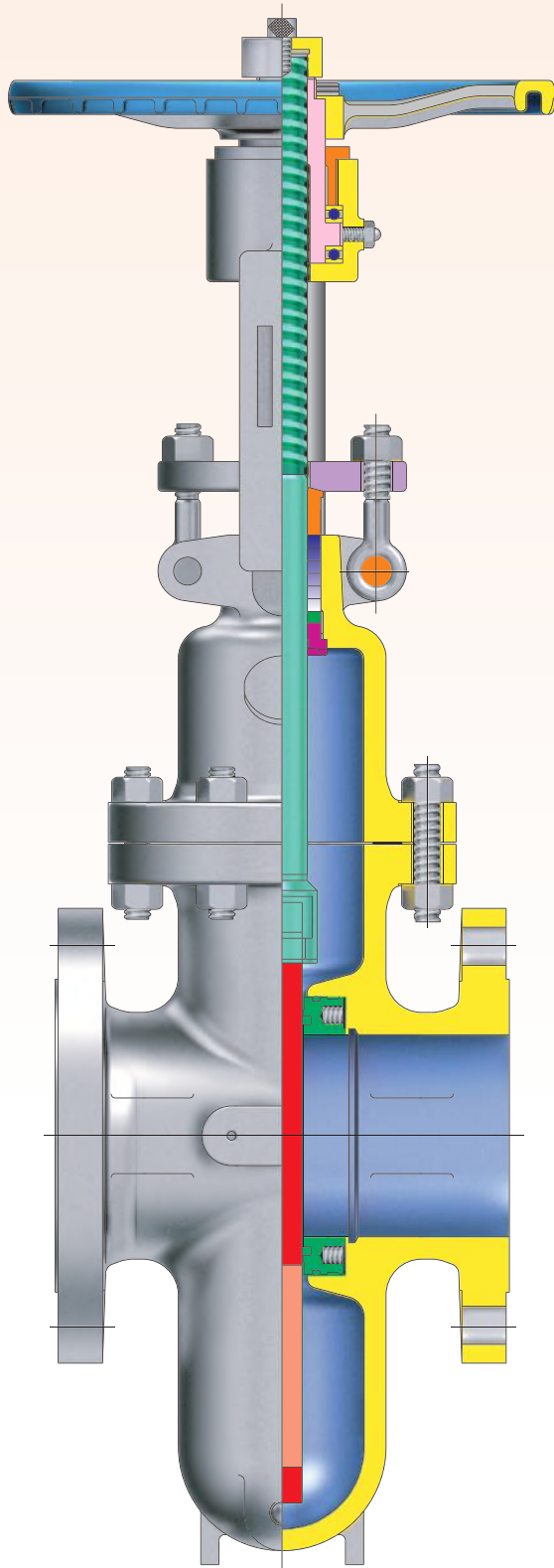
BOLTED BONNET



CAST STEEL

BOLTED BONNET

THROUGH CONDUIT GATE VALVES



CONFORMITY TO API STANDARDS

KJS Through-Conduit Gate Valves, uniquely designed by our advanced know-how and manufactured on a modern production line featuring rigid quality control, fully conforming to API 6D requirements.

They are classified into 150LB, 300LB, and 600LB Series.

BODY STRUCTURE

The entire valve body is made of cast steel, whereby a smooth internal construction is ensured. Moreover, stress concentration to four corners, which is a weak point of welded fabricated T-C valves of other manufactures, has been eliminated.

Because of this, KJS valves are free from body deformation due to external force which tends to take place on a pipeline valve, and thus free from any resultant malfunctions.

SEALING

The disc is single slab type configuration. It also adopts a floating seat construction which not only provides block-and-bleed but also maintains perfect sealing, even under valve body deformation due to extreme thermal warping along the entire pipeline.

The seat ring contains a specially designed "O" ring which ensures, through self-tightening, perfect sealing even under extremely low pressure or negative pressure in the pipeline.

TEFLON SEAT

To the contact surface of the seat, Teflon Elastomer rings are utilized in order to insure dependable and long term sealing over a wide range of temperature and pressure variations.

Because no direct metal-to-metal abrasion takes place when the valve opened and shut, neither abrasion nor seizure will result which ensures a longer valve service life.

Further, a grease injector is available at an option. This auxiliary device can be used as an emergency measure to apply sealing grease quickly and evenly to the seat for lubrication as well as to stop leakage.

BLOCK AND BLEED

The valve body's internal pressure may increase extraordinarily due to the thermally-effected cubic expansion of liquid. If this should occur, the special elastic seal mechanism automatically discharges the excess pressure to the primary side of the line. Therefore, there automatic bleeder into this valve.

STEM SEALING MECHANISM

Stem sealing is achieved by using V-shape synthetic rubber packing. This type of packing opens its own lips to the necessary extent according to varying pressure which comes from underneath. In the intermediate space between these packing groups a lantern ring is provided for easier grease charging which promotes smoother movement and highly reliable leakage prevention.

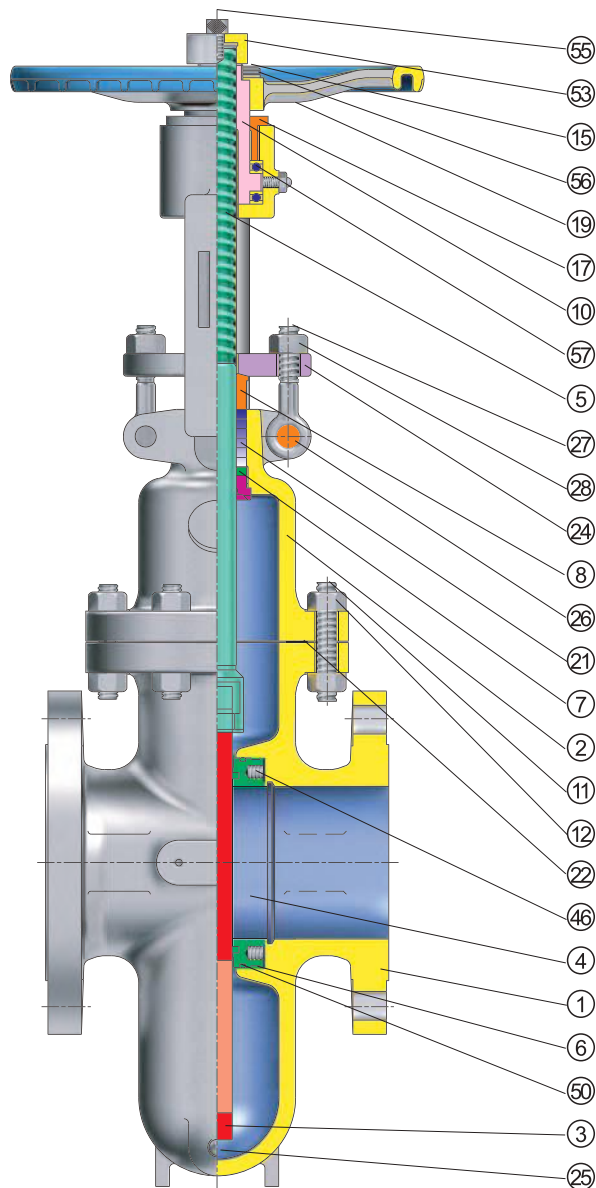
EASY PART REPLACEMENT

All valve parts including the seat ring can be easily replaced without dismantling the valve from the pipeline. In particular, the operational parts and stem packing can be inspected or replaced without difficulty under a full pressure load.

CAST STEEL

BOLTED BONNET

THROUGH CONDUIT GATE VALVES



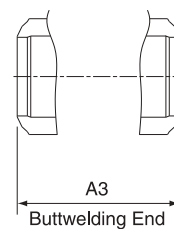
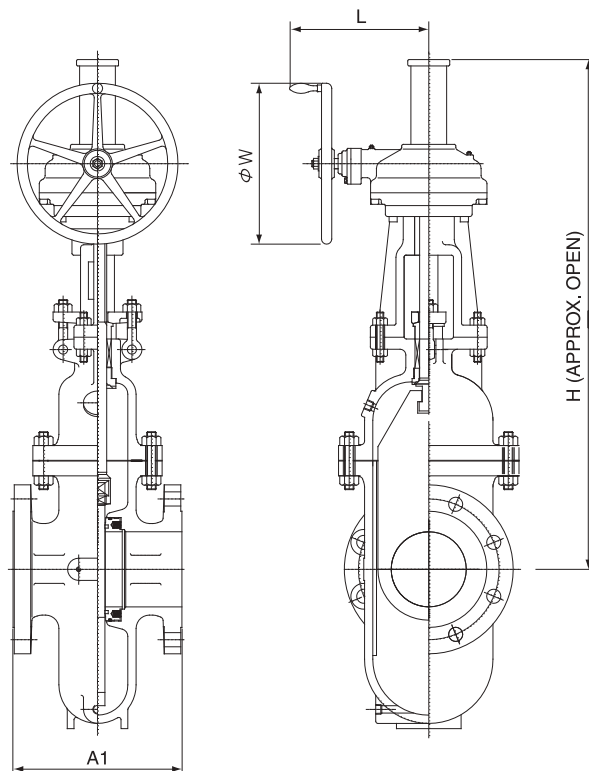
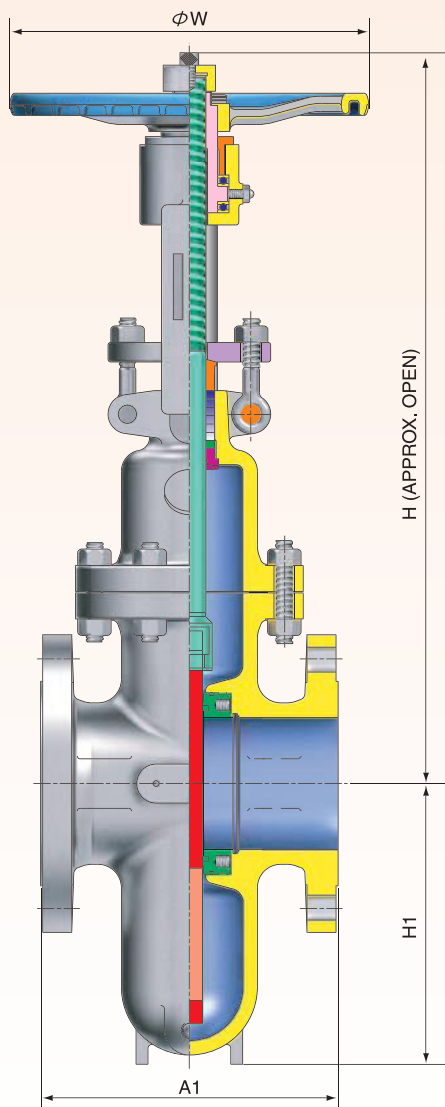
NO	NAME OF PART	QTY
1	BODY	1
2	BONNET	1
3	DISC PLATE	1
4	BODY SEAT RING	2
5	STEM	1
6	SQUARE RING	2
7	BONNET BUSH	1
8	PACKING GLAND	1
10	YOKE SLEEVE	1
11	BONNET BOLT	1SET
12	BONNET NUT	1SET
15	HANDLE NUT	1
17	SLEEVE GLAND	1
19	HANDWHEEL	1
21	PACKING	1SET
22	GASKET	1
24	GLAND FLANGE	1
25	PLUG	2
26	HINGE PIN	1
27	GLAND BOLT	1SET
28	GLAND NUT	1SET
46	DISC SPRING	2SET
50	O-RING	2
53	STEM COVER CAP	1
54	DRAIN FITTING	1
55	INDICATOR BOLT	1
56	SET SCREW	1
57	BEARING	2

NAME OF PART	ASTM SPECIFICATION	
	BASIC	GEOTHERMAL SERVICE
BODY & BONNET & YOKE	A216-WCB	A216-WCC
BODY SEAT RING	A240-410	A240-316
SQUARE RING	TEFLON	TEFLON
O-RING	VITON	EPDM
DISC PLATE	A285 with Hard Cr-Plated	A285 with Hard Cr-Plated
STEM	A479-410	A479-410
GASKET	VITON	EPDM
BONNET BOLT	A193-B7	A193-B7M
BONNET NUT	A194-2H	A194-2HM
BONNET BUSH	A479-410	A276-316
PACKING	Synthetic Rubber	Synthetic Rubber
PACKING RING	A479-410	A276-316

THROUGH CONDUIT GATE VALVES

BOLTED BONNET

TC CLASS 150

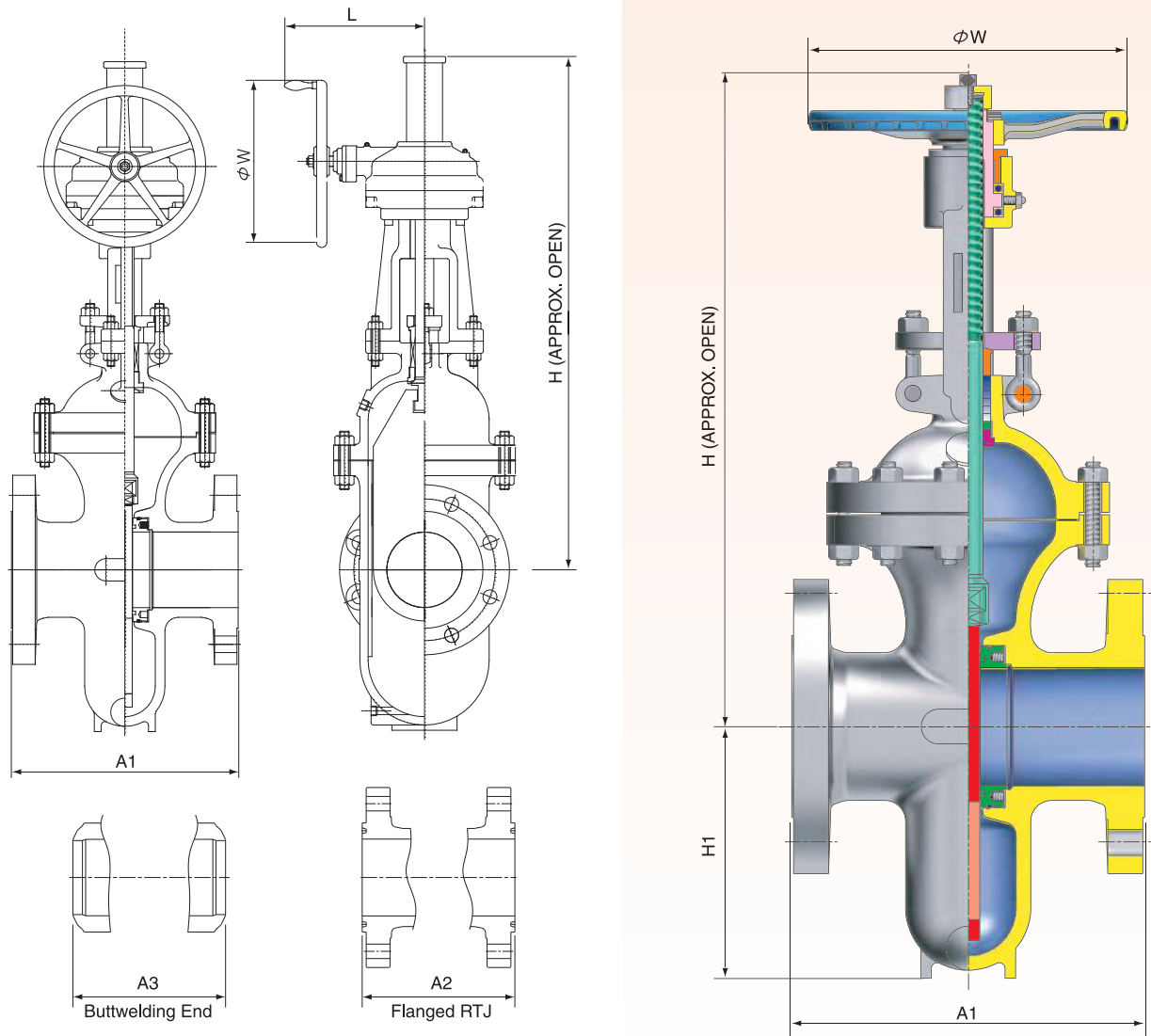


VALVE SIZE	in	4	6	8	10	12	14	16	18	20	24	
	mm	100	150	200	250	300	350	400	450	500	600	
A1	in	9.0	10.5	11.5	13.0	14.0	15.0	16.0	17.0	18.0	20.0	
	mm	229	267	292	330	356	381	406	432	457	508	
A3	in	12.0	15.88	16.5	18.0	19.75	22.5	24.0	26.0	28.0	32.0	
	mm	305	403	419	457	502	572	610	660	711	813	
H	in	29.9	44.1	57.1	64.2	76.4	84.6	89.4	99.2	109.8	131.9	
	mm	760	1120	1450	1630	1940	2150	2270	2520	2790	3350	
H1	in	8.5	11.9	15.2	18.6	22.1	24.1	27.8	31.0	34.4	41.1	
	mm	215	302	385	473	562	611	705	787	873	1043	
H2	in	-	-	-	-	-	50.4	53.9	59.4	65.4	78.3	
	mm	-	-	-	-	-	1280	1370	1510	1660	1990	
W	in	9.8	11.8	15.7	15.7	19.7	18.1	18.1	18.1	18.1	24.0	
	mm	250	300	400	400	500	460	460	460	460	610	
WEIGHT	RF	lb	242.6	396.9	573.3	837.9	1146.6	1433.3	2094.8	2668.1	3175.2	4961.3
		kg	110	180	260	380	520	650	950	1210	1440	2250
	BW	lb	231.5	377.1	533.6	787.2	1065.0	1382.5	1913.9	2266.7	2985.6	4350.5
		kg	105	171	242	357	483	627	868	1028	1354	1973

THROUGH CONDUIT GATE VALVES

BOLTED BONNET

TC CLASS 300

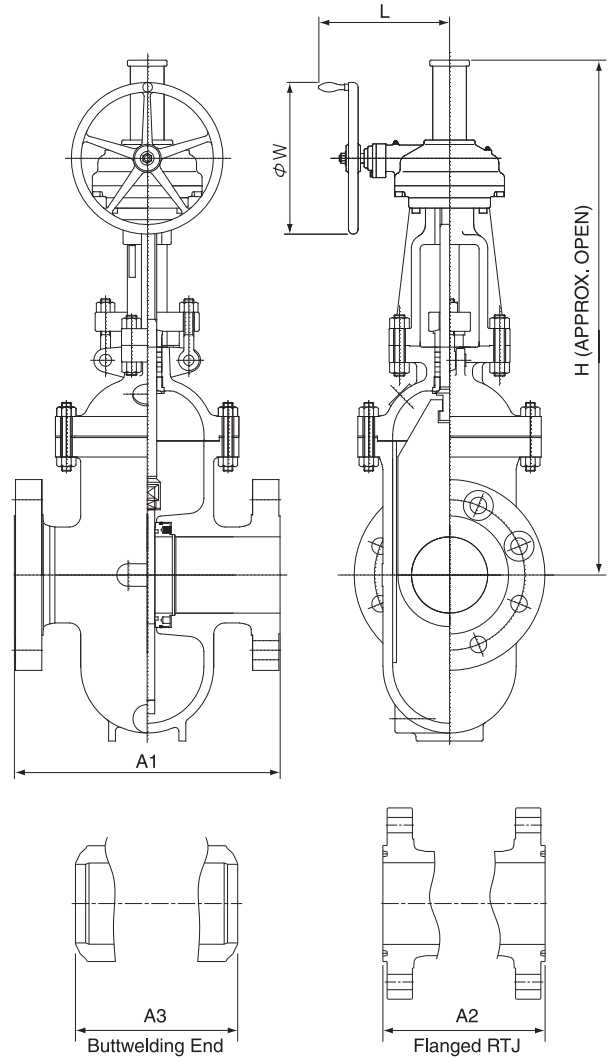
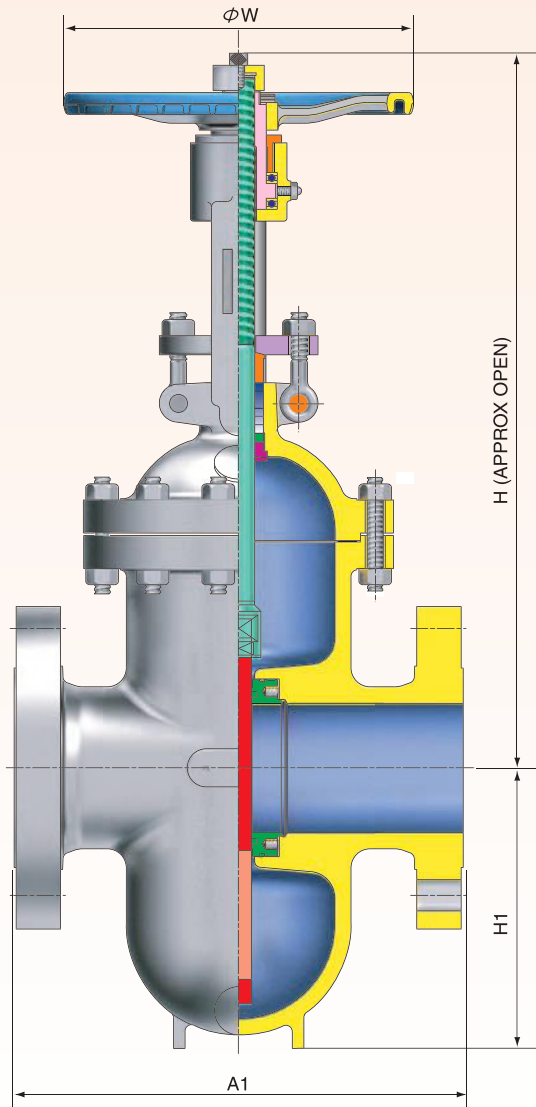


VALVE SIZE	in	4	6	8	10	12	14	16	18	20	24	
	mm	100	150	200	250	300	350	400	450	500	600	
A1 & A3	in	12.0	15.88	16.5	18.0	19.75	30.0	33.0	36.0	39.0	45.0	
	mm	305	403	419	457	502	762	838	914	991	1143	
A2	in	12.62	16.5	17.12	18.62	20.37	30.62	33.62	36.62	39.75	45.88	
	mm	321	419	435	473	518	778	854	930	1010	1165	
H	in	29.9	44.1	57.1	64.2	76.4	84.6	89.4	99.2	109.8	131.9	
	mm	760	1120	1450	1630	1940	2150	2270	2520	2790	3350	
H1	in	8.5	11.9	15.2	18.6	22.1	24.1	27.8	31.0	34.4	41.2	
	mm	215	302	385	473	562	611	705	788	874	1046	
H2	in	-	-	-	-	-	50.4	53.9	59.4	65.4	78.3	
	mm	-	-	-	-	-	1280	1370	1510	1660	1990	
W	in	9.8	11.8	15.7	15.7	19.7	18.1	18.1	18.1	18.1	24.0	
	mm	250	300	400	400	500	460	460	460	460	610	
WEIGHT	RF	lb	4.7	8.7	13.4	19.7	8.4	2255	3065.0	3858.8	4961.3	7254.5
		kg	120	220	340	500	730	1000	1390	1750	2250	3290
	BW	lb	233.7	445.1	690.2	1012.1	1468.5	2024.2	2833.4	3587.5	4621.7	6773.8
		kg	106	202	313	459	666	918	1285	1627	2096	3072

THROUGH CONDUIT GATE VALVES

BOLTED BONNET

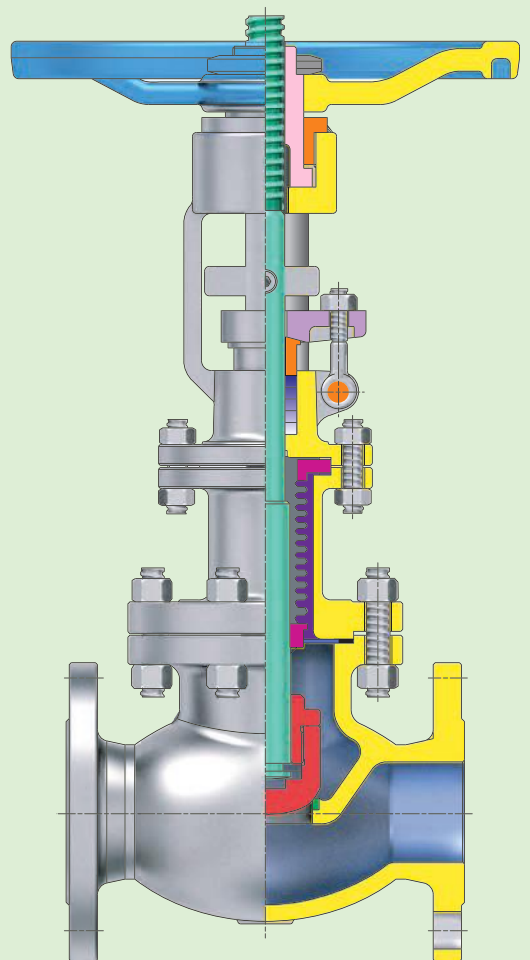
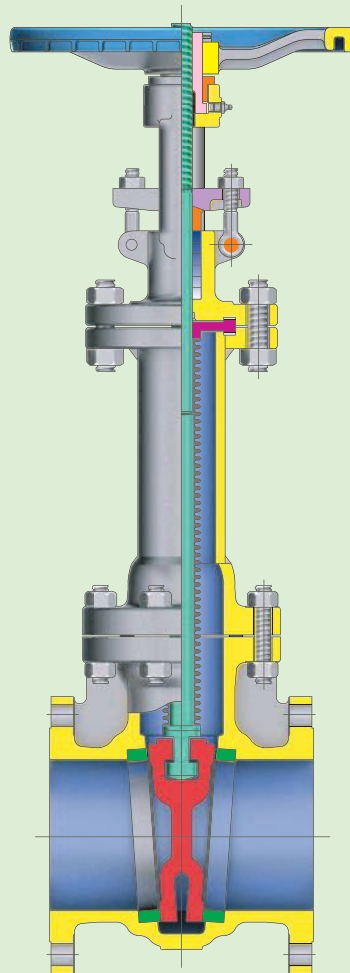
TC CLASS 600



VALVE SIZE	in	4	6	8	10	12	14	16	18	20	24	
	mm		100	150	200	250	300	350	400	450	500	600
A1 & A3	in		17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0
	mm		432	556	660	787	838	889	991	1092	1194	1397
A2	in		17.12	22.12	26.12	31.12	33.12	35.12	39.12	43.12	47.25	55.38
	mm		435	562	664	791	841	892	994	1095	1200	1406
H	in		29.9	44.1	57.1	64.2	76.4	87.4	92.1	102.0	113.8	133.5
	mm		760	1120	1450	1630	1940	2220	2340	2590	2890	3390
H1	in		8.5	11.9	15.3	18.8	22.4	24.4	28.2	31.5	35.0	41.9
	mm		215	302	388	478	570	619	716	801	890	1065
H2	in		-	-	-	-	-	52.0	55.5	61.0	68.3	79.5
	mm		-	-	-	-	-	1320	1410	1550	1735	2020
W	in		14.0	19.7	23.6	27.0	30.0	18.1	24.0	29.9	29.9	29.9
	mm		355	500	600	685	760	460	610	760	760	760
WEIGHT	RF	lb	286.7	529.2	904.1	1455.3	2205.0	3087.0	4299.8	5711.0	7254.5	10804.5
		kg	130	240	410	660	1000	1400	1950	2590	3290	4900
	BW	lb	247.0	458.6	804.8	1274.5	1985.5	2787.1	3819.1	5230.3	6725.3	10244.4
		kg	112	208	365	578	900	1264	1732	2372	3050	4646

BELLOWS SEAL GATE, GLOBE VALVES

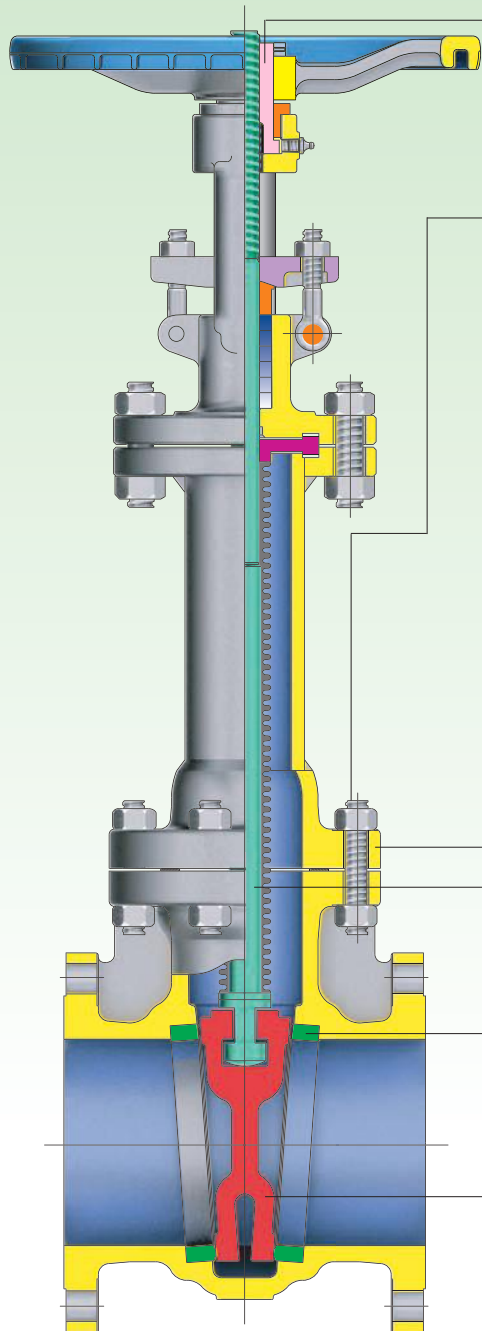
BOLTED BONNET



CAST STEEL

BOLTED BONNET

BELLOWS SEAL GATE VALVES



YOKE SLEEVE

The upper portion of the Yoke Sleeve is hexagonally tapered to fix the handwheel. The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over 1150 °C (2100 °F) dissolution point in accordance with API Std. specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2

BONNET

The bonnet and valve body have the same wall thickness. The body-bonnet flange drilling is spot-faced to exactly meet stud-bolt nuts. The bonnet back seat bushing guarantees packing replacement even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API specifications.

STEM

The machined forged stem comes with a T-shape head, which connects the slot of the wedge. The spherically shaped contacting surface of the head gives greater strength and durability. The stem dimensions are in accordance with API Std. 600 specifications. The heat treated stem delivers adequate mechanical properties as well as excellent surface hardness. Further, opening/shutting friction is minimized by accurate machining and lapping.

SEAT RING

Bottom seated type seat rings are welded or screwed into the body. The seating surface is finished by lapping. They are forgings that have been heat treated to delivered the best mechanical properties and required hardness. The difference in hardness between seats and wedge is in accordance with API specifications.

FLEXIBLE WEDGE

The standard disc of our valves is a one-piece flexible wedge. Slots are machined on both sides of the wedge to allow it to travel correctly in the integrally cast body guides. The wedge seating surfaces have been accurately machined, grind and lapped to a mirror finish to prevent leakage and eliminate galling.

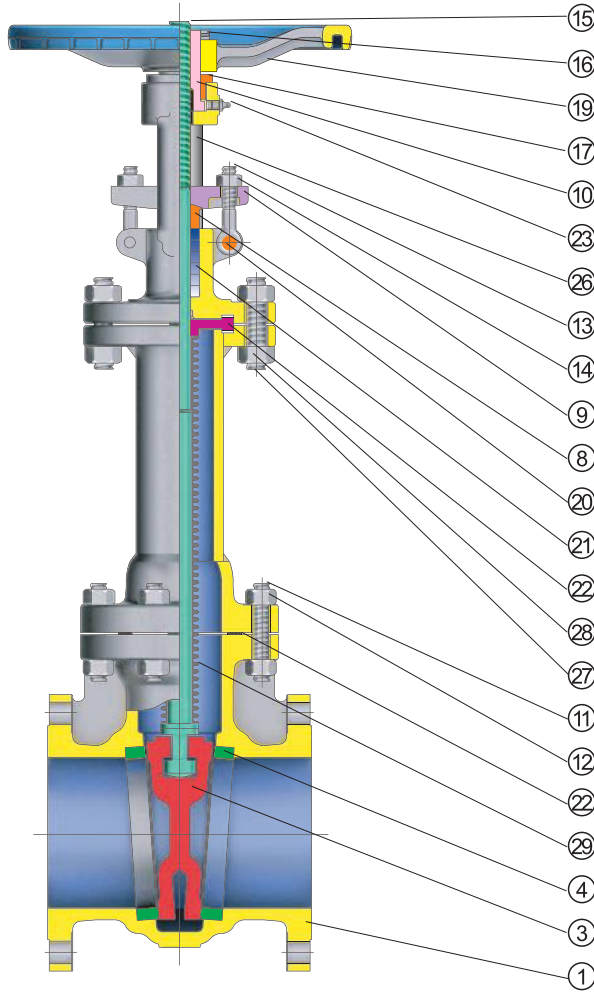
BODY

The cast steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 600 or API 603. Special care has been taken with the design of the Class 150 valve body so that the elliptically shaped center section is free from intensified stresses in the critical area. The body of above Class 300 are made circular in shape as much as possible to minimize distortion even under extreme operating conditions. Inlet and outlet port dimensions conform with ANSI B16.5 Pipe Fitting. The welded-in type seat ring is standard to insure interchangeability. Except for Class 150, the standard body-bonnet joint is male and female.

CAST STEEL

BOLTED BONNET

BELLOWS SEAL GATE VALVES



NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
23	GREASE NIPPLE	STEEL
29	BELLOWS	COMMERCIAL

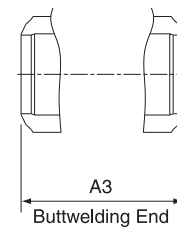
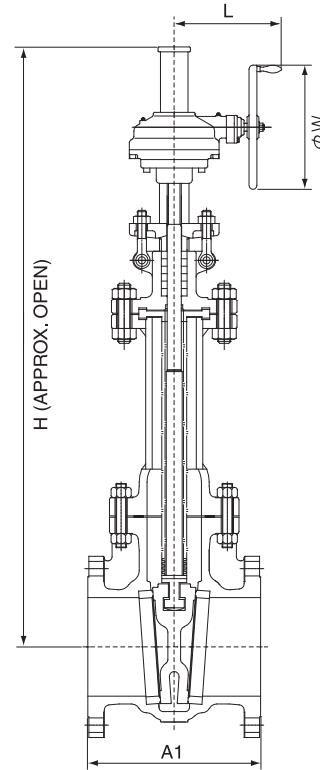
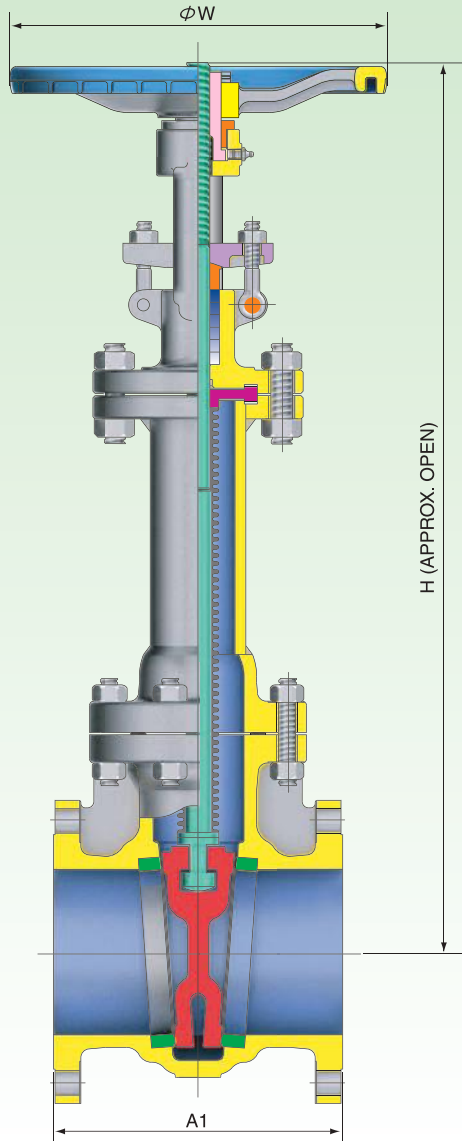
NO	NAME OF PART	ASTM SPECIFICATION												
		STANDARD	HIGH TEMPERATURE SERVICE				LOW TEMPERATURE SERVICE				STAINLESS STEEL			
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/ILC2/ILC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/ILC2/ILC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	*DISC	A217-CA15	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/ILC2/ILC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A350-LF2	A350-LF2	A182-F304	A182-F316	A182-F304L	A182-F316L	ALLOY 20	A182-F51
5	STEM		A479-410				A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	BONNET BUSH		A479-410				A276-304		A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A276-304
8	PACKING GLAND		A479-410						A276-304					
9	GLAND FLANGE		A105 or A283-D						A351-CF8					
10	YOKE SLEEVE		A439-D2						A439-D2					
11	BONNET BOLT	A193-B7	A193-B7	A193-B16	A193-B16	A193-B16	A320-L7	A320-L7	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8	A193-B8
12	BONNET NUT	A194-2H	A194-2H	A194-2H	A194-4	A194-4	A194-4L	A194-4L	A194-8	A194-8	A194-8	A194-8	A194-8	A194-8
13	GLAND BOLT		A307-B						A193-B8					
14	GLAND NUT		A194-2H						A194-8					
20	HINGE PIN		A108-1020						A276-304					
26	YOKE		A216-WCB						A351-CF8					
27	YOKE BOLT		A193-B7						A193-B8					
28	YOKE NUT		A194-2H						A194-8					

*Note : In case of 12" and larger size, we'll use trim material overlaid one on the same or equivalent material of the Body.

BELLOWS SEAL GATE VALVES

BOLTED BONNET

GT CLASS 150

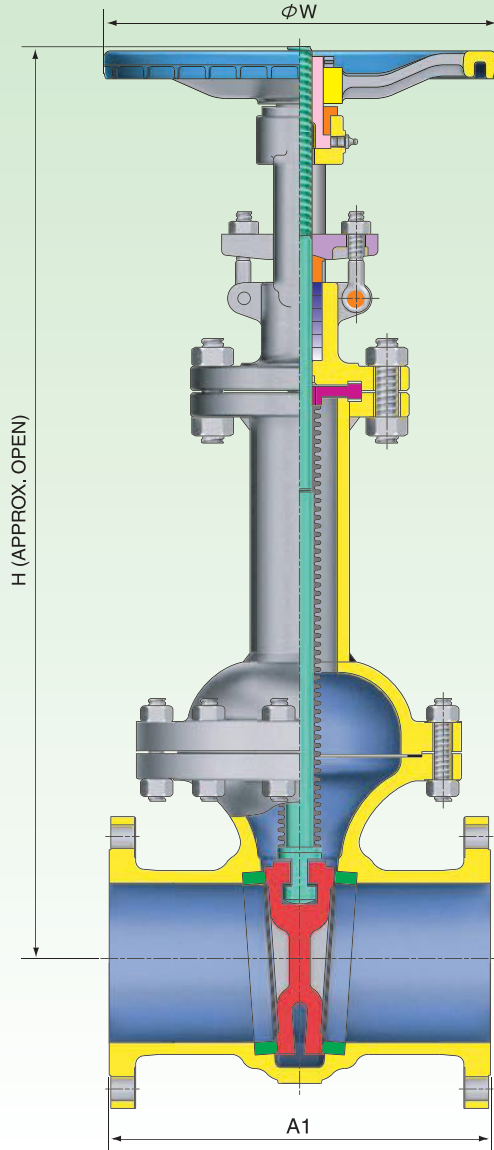
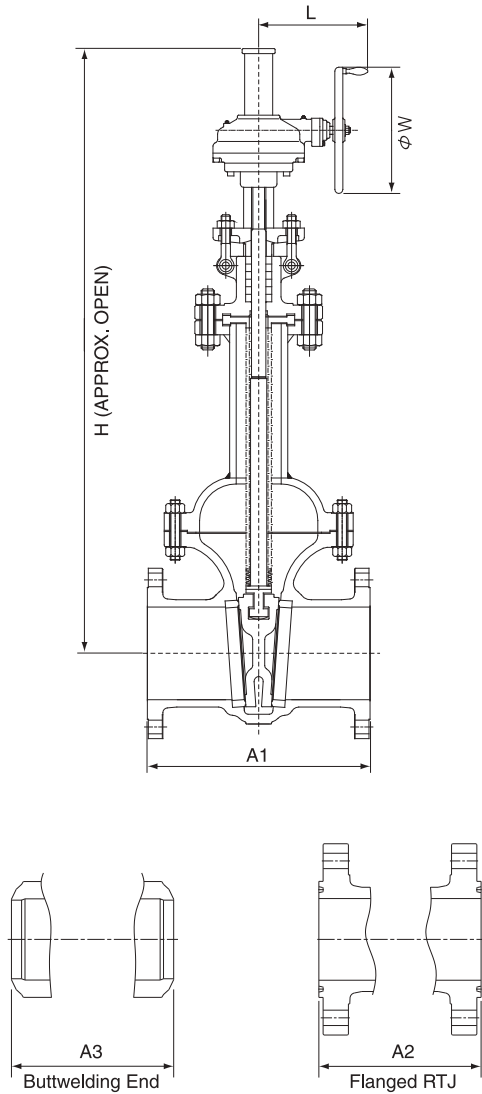


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	
A1	in	7.0	7.5	8.0	9.0	10.5	11.5	13.0	14.0	15.0	16.0	17.0	18.0	
	mm	178	190	203	229	267	292	330	356	381	406	432	457	
A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	22.5	24.0	26.0	28.0	
	mm	216	241	282	305	403	419	457	502	572	610	660	711	
H	in	23.4	28.4	30.7	35.4	45.5	53.1	66.0	75.6	86.6	102.4	120.1	134.6	
	mm	595	722	780	900	1155	1350	1676	1920	2200	2600	3050	3420	
W	in	7.9	7.9	7.9	9.8	11.8	14.0	15.7	17.7	15.7	19.7	19.7	24.8	
	mm	200	200	200	250	300	355	400	450	400	500	500	630	
L	in	-	-	-	-	-	-	-	-	13.0	13.5	13.5	15.3	
	mm	-	-	-	-	-	-	-	-	330	342	342	389	
WEIGHT	RF	lb	92.6	136.7	154.3	189.6	251.3	348.3	478.4	650.4	948.0	1333.8	1774.7	2094.4
		kg	42	62	70	86	114	158	217	295	430	605	805	950
	BW	lb	90.4	130.1	149.9	183.0	231.5	313.1	432.1	604.1	881.8	1267.7	1585.1	1849.7
		kg	41	59	68	83	105	142	196	274	400	575	719	839

BELLOWS SEAL GATE VALVES

BOLTED BONNET

GT CLASS 300

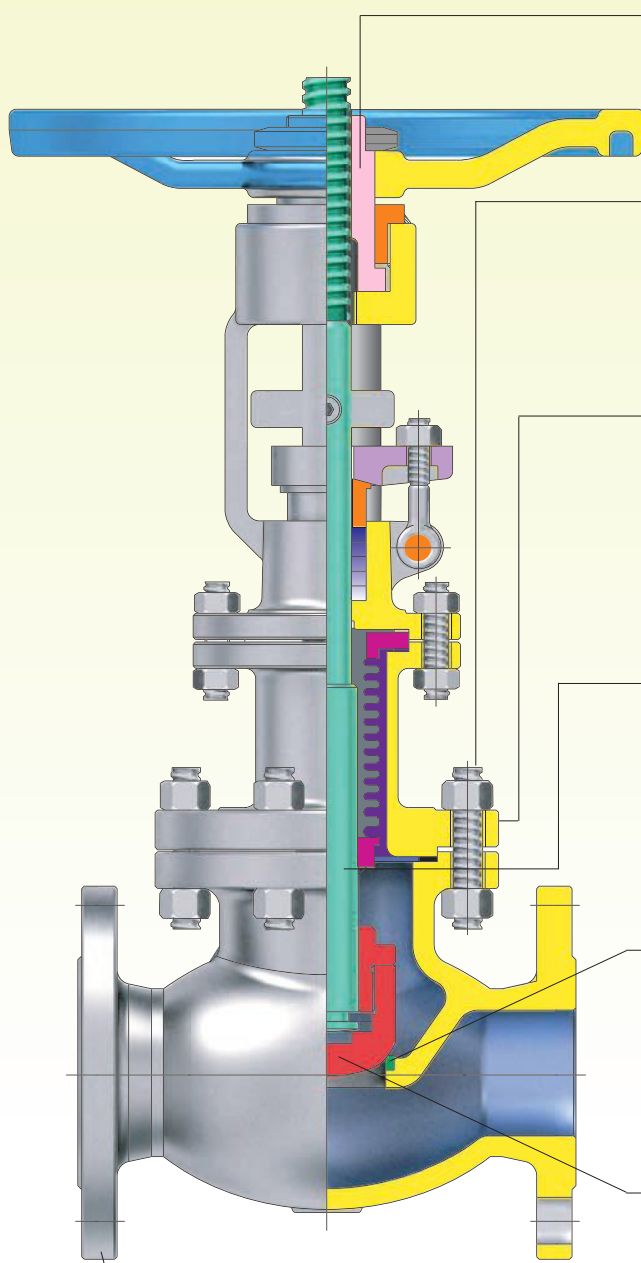


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	14	16	18	20	
	mm	50	65	80	100	150	200	250	300	350	400	450	500	
A1 & A3	in	8.5	9.5	11.1	12.0	15.9	16.5	18.0	19.8	30.0	33.0	36.0	39.0	
	mm	216	241	282	305	403	419	457	502	762	838	914	991	
A2	in	9.1	10.1	11.7	12.6	16.5	17.1	18.6	20.4	30.6	33.6	36.6	39.8	
	mm	232	257	298	321	419	435	473	518	778	854	930	1010	
H	in	24.5	29.8	31.4	36.2	46.5	56.4	66.1	79.2	95.5	108.1	122.2	136.6	
	mm	623	756	798	920	1182	1432	1679	2011	2425	2746	3103	3470	
W	in	7.9	7.9	8.9	9.8	14.0	15.7	17.7	19.7	19.7	19.7	24.8	24.8	
	mm	200	200	225	250	355	400	450	500	500	500	630	630	
L	in	-	-	-	-	-	-	-	-	13.5	13.5	15.3	15.3	
	mm	-	-	-	-	-	-	-	-	342	342	389	389	
WEIGHT	RF	lb	105.8	165.3	180.8	233.7	366.0	522.5	725.3	1137.6	1730.6	2548.5	3269.5	3761.1
		kg	48	75	82	106	166	237	329	516	785	1156	1483	1706
	BW	lb	101.4	152.1	156.5	191.8	304.2	440.9	601.9	934.8	1347.0	2063.5	2762.4	3227.6
		kg	46	69	71	87	138	200	273	424	611	936	1253	1464

CAST STEEL

BOLTED BONNET

BELLOWS SEAL GLOBE VALVES



YOKE SLEEVE

The standard material of the Yoke Sleeve is Nodular Ni-resist D2 with over a 1150°C (2100°F) dissolution point in conformity with API Std. Specifications.

BOLTING

The body-bonnet bolts are manufactured in accordance with API Std. 600 specifications. The nuts also strictly conform with ANSI B 1.1. The stud-bolt nuts, hexagonal, rigid and hot-forged, bear material notation as well as do the bolt nuts made according to ANSI B18.2.2.

BONNET

The bonnet is integral or separate with the yoke and is the same material as the body. The body-bonnet flange drilling is spot-faced to exactly meet stud bolt nuts. The back seat bushing in the bonnet guarantees that the packing can be replaced even when the valve is fully opened. The stem packing dimensions of the stuffing box are in accordance with API Std. specifications.

STEM

The heat-treated stems of one-piece construction insure adequate mechanical properties and surface hardness. Friction at the time of opening and shutting is reduced to a minimum friction to accurate machining and lapping. The round finished surface of the stem head helps to achieve point contact with the inside of the disc housing to eliminate friction.

SEAT RING

The shoulder seated type seat ring is welded or screwed into body. The seating surface is finished by lapping. The seat ring is forged and heat-treated to deliver the best mechanical properties and required hardness. The difference in hardness between the seats and disc conforms to API Std. specifications.

DISC

The disc of our globe valves is a loose disc and can freely revolve around the stem. This prevents friction and galling with the seating surface when the valve is shut. The disc is furnished with a conical seating surface that has been ground and lapped to a mirror finish. It is of one-piece construction, and forged and heat-treated to deliver the required mechanical properties and hardness.

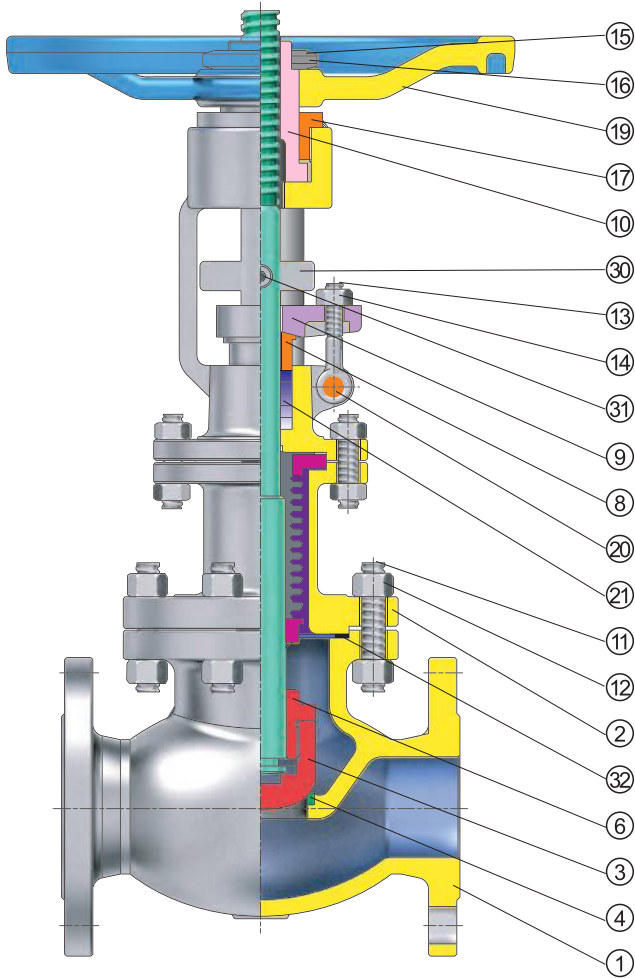
BODY

The cast steel body is designed to insure a wall thickness which is greater at any point than the minimum specified by API Std. 600 or API 603. Port and seat passage dimensions conform to ASME B16.34. The screw-in type seat ring is standard to allow interchangeability. The standard body-bonnet joint is male-female, and the flange is round for all valves. Accurate machining insures perfect coaxiality of the valve ends and seat ring in addition to exact perpendicularity of the body-bonnet flanges.

CAST STEEL

BOLTED BONNET

BELLOWS SEAL GLOBE VALVES



NO	NAME OF PART	ASTM SPECIFICATION
15	HANDLE NUT	STEEL
16	SET SCREW	STEEL
17	SLEEVE GLAND	STEEL
19	HANDWHEEL	A395
21	PACKING	COMMERCIAL
22	GASKET	COMMERCIAL
30	STOPPER	A283-D
31	STOPPER BOLT	STEEL

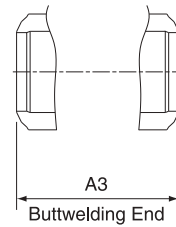
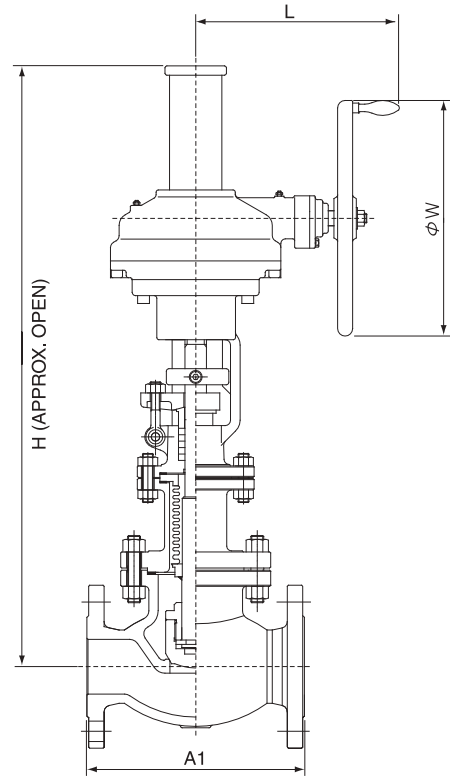
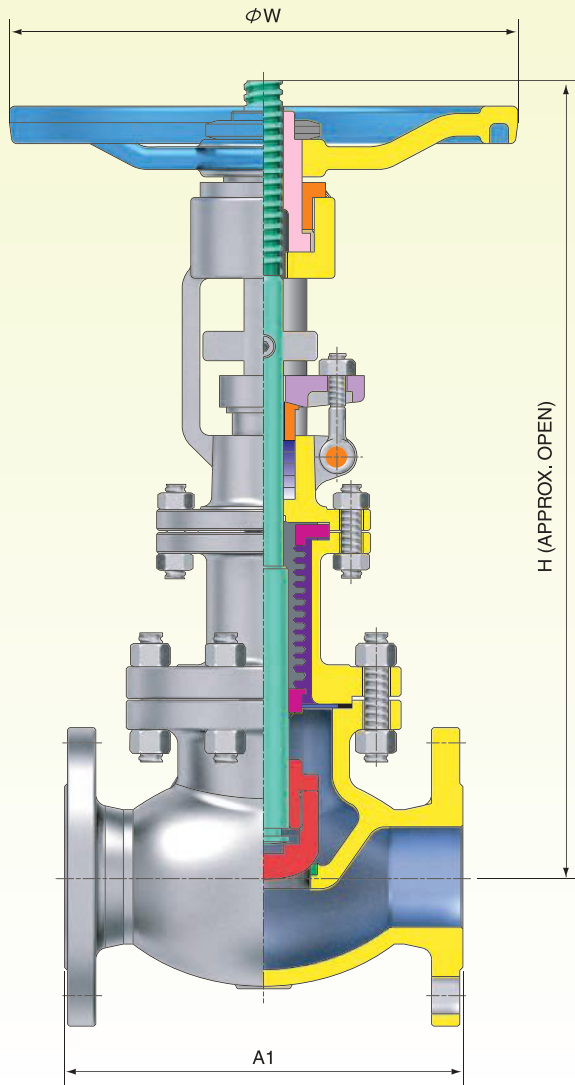
NO	NAME OF PART	ASTM SPECIFICATION												
		STANDARD	HIGH TEMPERATURE SERVICE				LOW TEMPERATURE SERVICE			STAINLESS STEEL			ALLOY STEEL	
1	BODY	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/1LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
2	BONNET	A216-WCB	A217-WC1	A217-WC6	A217-WC9	A217-C5	A352-LCB	A352-LC1/1LC2/LC3	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
3	*DISC	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A351-CF8	A351-CF8M	A351-CF3	A351-CF3M	A351-CN7M	A351-CK3MCUN
4	BODY SEAT RING	A105+STL	A182-F1	A182-F11	A182-F22	A182-F5a	A350-LF2	A350-LF2	A182-F304	A182-F316	A182-F304L	A182-F316L	ALLOY 20	A182-F51
5	STEM	A276-410				A276-304			A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
6	DISC GLAND	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A217-CA15	A351-CF8	A351-CF8	A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A182-F51
7	BONNET BUSH	A276-410				A276-304			A276-304	A276-316	A276-304L	A276-316L	ALLOY 20	A276-304
8	PACKING GLAND	A276-410						A276-304						
9	GLAND FLANGE	A105 or A283-D						A351-CF8						
10	YOKE SLEEVE	A439-D2						A439-D2						
11	BONNET BOLT	A193-B7		A193-B16			A320-L7			A193-B8				
12	BONNET NUT	A194-2H		A194-4			A194-4L			A194-8		A194-B8		A194-8
13	GLAND BOLT	A307-B						A193-B8						
14	GLAND NUT	A194-2H						A194-8						
20	HINGE PIN	A108-1020						A276-304						

*Note : In case of 12" and larger size, we'll use trim material overlaid one on the same or equivalent material of the Body.

BELLOWS SEAL GLOBE VALVES

BOLTED BONNET

GL CLASS 150

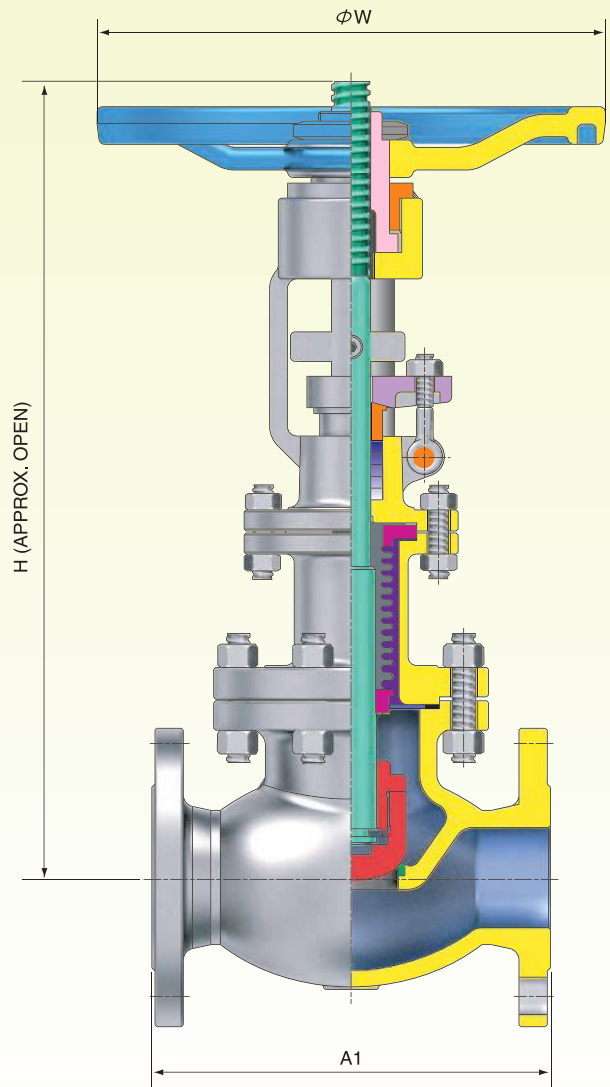
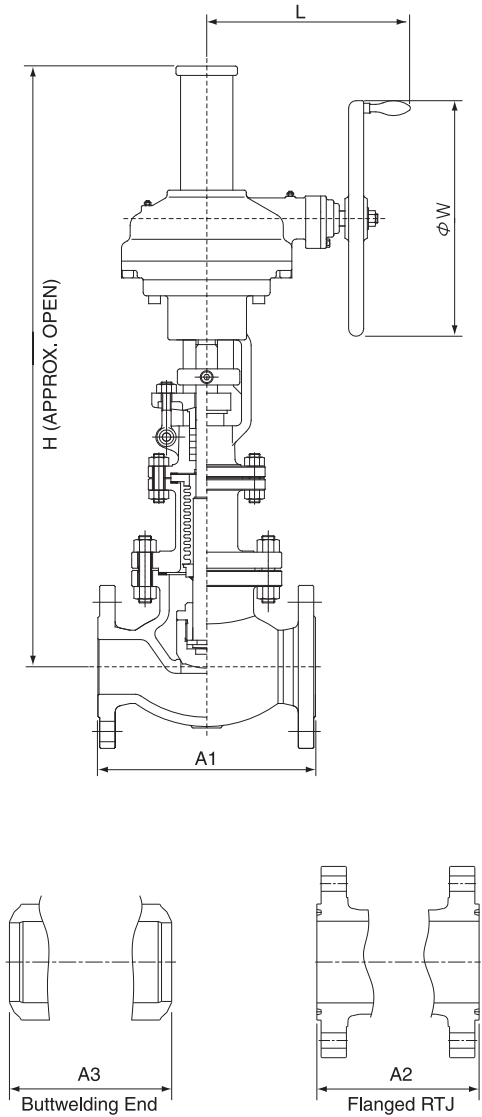


VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1 & A3	in	8.0	8.5	9.5	11.5	16.0	19.5	24.5	27.5	
	mm	203	216	241	292	406	495	622	699	
H	in	16.5	17.5	19.1	22.8	27.0	30.7	34.8	43.5	
	mm	420	445	485	580	685	780	885	1105	
W	in	7.9	8.8	8.8	9.8	14.0	15.7	19.7	24.8	
	mm	200	224	224	250	355	400	500	630	
L	in	-	-	-	-	-	13.0	13.5	15.3	
	mm	-	-	-	-	-	330	342	389	
WEIGHT	RF	lb	44.1	77.2	88.2	123.5	229.3	401.3	650.5	903
		kg	35	52	63	81	115	193	325	445
	BW	lb	33	66.2	70.6	90.4	183	311	496.1	780
		kg	31	47	57	52	100	170	293	399

BELLOWS SEAL GLOBE VALVES

BOLTED BONNET

GL CLASS 300



VALVE SIZE	in	2	2.5	3	4	6	8	10	12	
	mm	50	65	80	100	150	200	250	300	
A1 & A3	in	10.5	11.5	12.5	14.0	17.5	22.0	24.5	28.0	
	mm	267	292	318	356	444	559	622	711	
A2	in	11.1	12.1	13.1	14.6	18.1	22.6	25.1	28.6	
	mm	283	308	333	371	460	575	638	727	
H	in	16.7	19.1	20.7	24.8	33.3	36.3	45.3	48.6	
	mm	425	485	526	629	846	921	1150	1234	
W	in	7.9	8.8	9.8	14.0	17.7	24.8	28.0	28.0	
	mm	200	224	250	355	450	630	710	710	
L	in	-	-	-	-	-	15.3	16.0	16.0	
	mm	-	-	-	-	-	389	406	406	
WEIGHT	RF	lb	70.6	92.6	141	220.5	419	595.4	1389	2416.3
		kg	47	59	87	125	215	305	580	1096
	BW	lb	49	66.2	81.6	194	328.5	441	961	1246
		kg	41	50	75	110	185	261	515	1002

BALL VALVES

BOLTED CAP



BALL VALVES

BOLTED CAP

FLOATING BALL VALVES FEATURE

GENERAL

KJS floating ball valves are designed in accordance with API 608 or ISO17292(BS5351) for ANSI Class rating 150 to 2500, Nominal size from 1/2" to 12".

Valves have been designed for use with various combinations of materials such as; Carbon Steel, Low Carbon steel, special alloy, stainless steel, monel, inconel.

BODY JOINT CONSTRUCTION

The one piece unibody end entry design, graphite ring or-oring viton (on request) seals ensure absolute seal integrity.

The two piece bolted body designs include a tight toleranced overlapping metal fit between the body and the adapter to minimize any possibility of movement due to pipeline stress. A special high temperature spiral wound stainless steel/graphite filled gasket is utilized for absolute seal.

This gasket is encapsulated by body and adapted on all four sides. Body and adapters are dimensioned for metal contact to ensure correct gasket crush.

BLOW-OUT PROOF STEM

Stem is made separately from the ball, anti blow-up design with suitable PTFE and graphite rings and antistatic device.

The lower end of the stem is designed with an integral collar to be blowout-proof. It also functions as the backseat for assured stem sealing. (fig. A)

ANTI-STATIC DEVICE

All Flow Control floating flange ball valves include dual grounding systems from stem to ball and stem to body. Valve testing to ISO17292(BS5351) was performed for all sizes, and witnessed by a third party inspection company.

An antistatic feature is provided to ensure electrical continuity for assured stem sealing. (fig. B)

LIVE LOADED GLAND FLANGE

Live loading is designed to provide gland load retention, compensating for expected in-service consolidation of the packing. A Set of Belleville-Spring Washers are used on each gland stud to help exert a continuous compressive force on the gland follower flange and therefore reduce fugitive emissions from the stem packing. KJS standard Belleville-Spring Washers are protected by a weatherproof cap to keep them free from environmental contamination, resulting in a long stable life. (fig. C)

LOCKING DEVICE

Stem head design provides mounting of the lever handle always in parallel to the flow passage. Facility for mounting a locking device for prevention of accidental valve operation is provided. (fig. D)

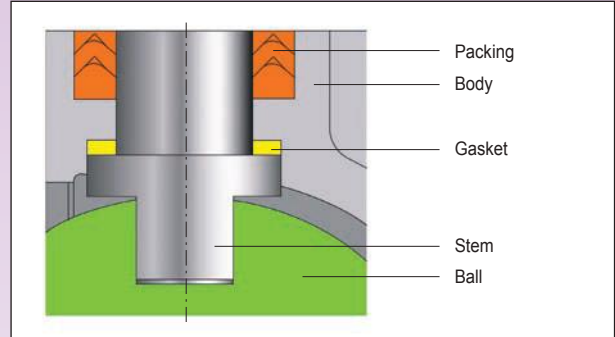


Fig. A

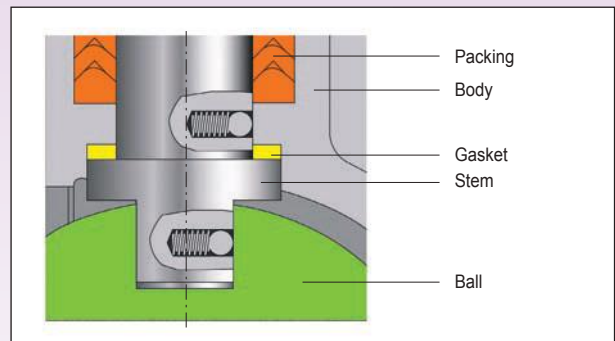


Fig. B

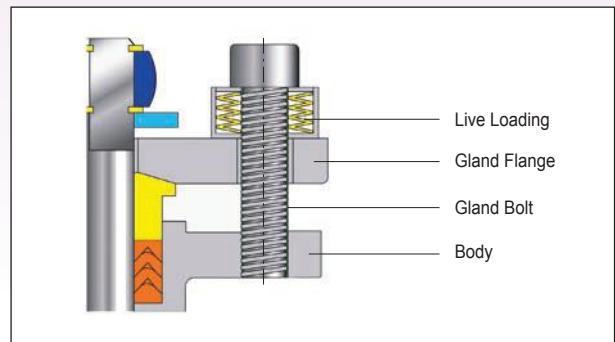


Fig. C

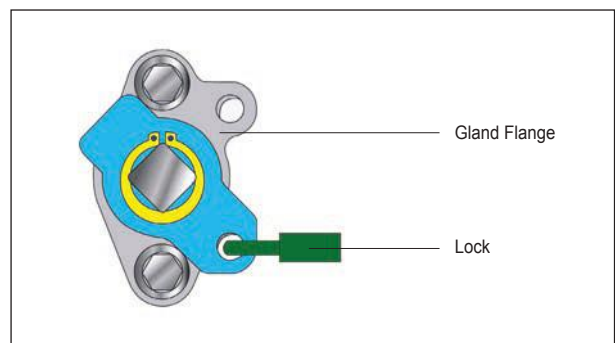


Fig. D

BALL VALVES

BOLTED CAP

FLOATING BALL VALVES FEATURE

CONTACT BETWEEN STEM AND VALVE SHELL

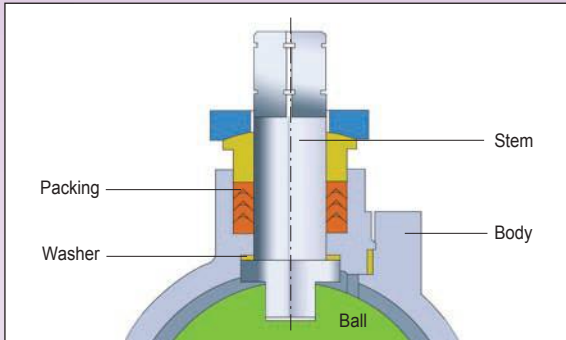


Fig. E (Before Fire)

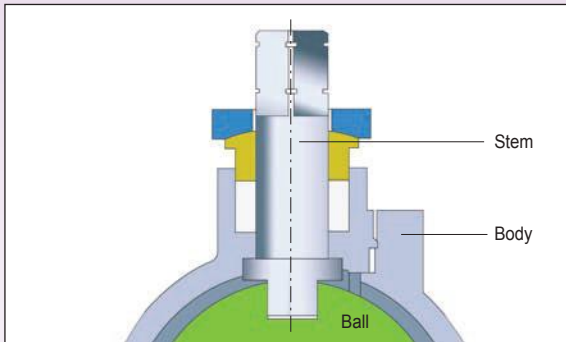


Fig. F (After Fire)
Metal-to-metal contact

CONTACT BETWEEN BALL AND VALVE SHELL

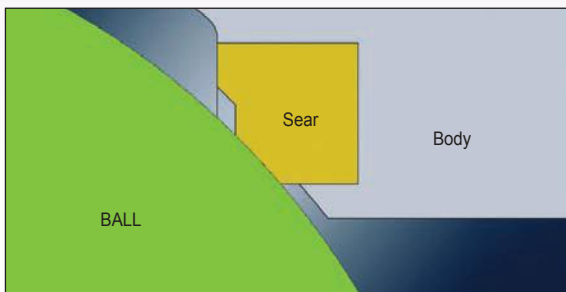


Fig. G (Before Fire)

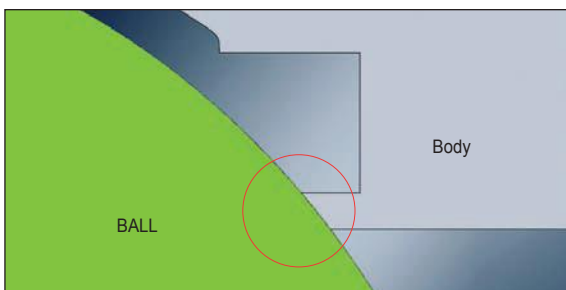


Fig. H (After Fire)
Metal-to-metal contact

FIRE SAFETY

All fire-safe valves conform to API 607 and API 6FA standards. When fire accident occurs at valve operating jobsite, and components such as seat ring, stem back seat, stem packing and mid-flange gasket which made of non-metallic material such as PTFE were broken or destroyed.

However, **KJS** particularly metal to metal added seal seated designed ball valves can effectively control external or internal leakage.

KJS soft seated fire safety designed as follows:

LONGEVITY OF LIFE

Special consideration was devoted to the attainment of enhanced life and operation of our valve throughout design, development, testing and manufacturing stages.

Valve designs combined with the selection of advanced materials are such that long periods of inactivity should not affect the operations of efficiency.

VALVE SHELL COUPLING FLANGES OF SPLIT BODY DESIGN

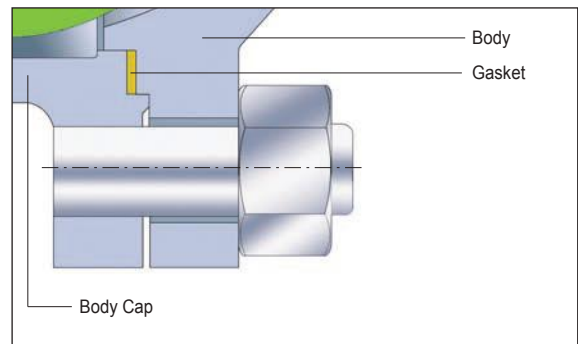


Fig. I (Before Fire)

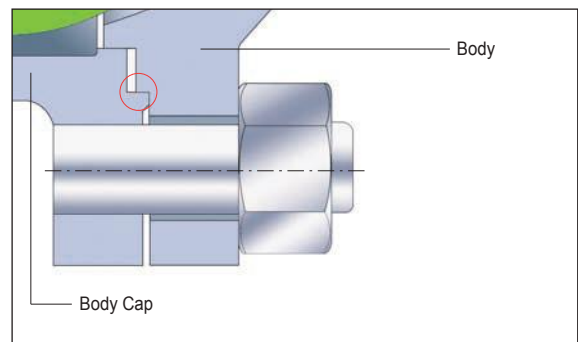
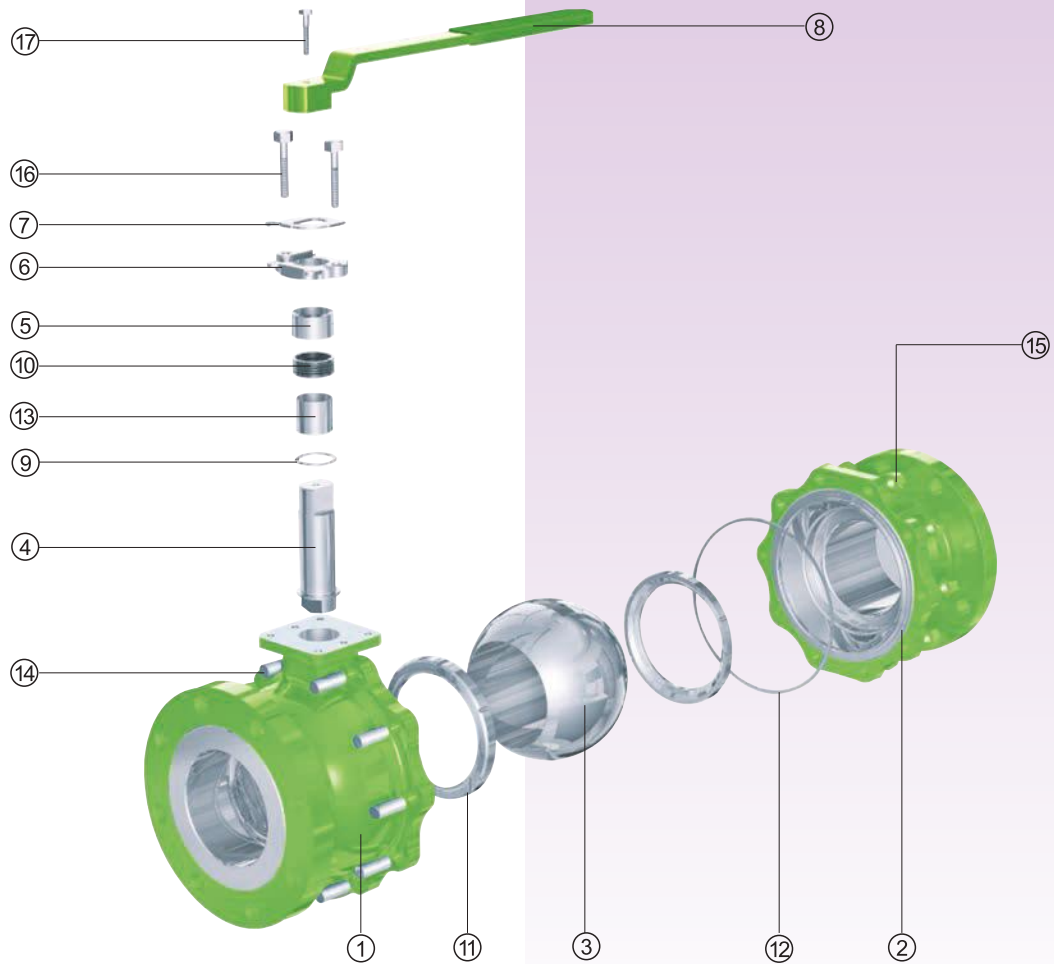


Fig. J (After Fire)
Metal-to-metal contact

BALL VALVES

BOLTED CAP

PART LIST AND MATERIAL SPECIFICATIONS(TYPICAL)

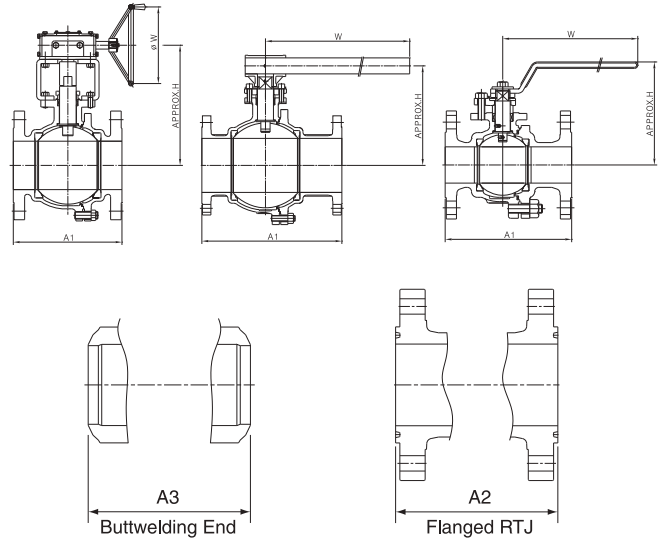


NO	PART NAME	Q'TY	CARBON STEEL	STAINLESS STEEL
1	BODY	1	A216-WCB	A351-CF8M
2	CAP	1	A216-WCB	A351-CF8M
3	BALL	1	A351-CF8M	A351-CF8M
4	STEM	1	A276-316	A276-316
5	GLAND	1	A276-304	A276-304
6	GLAND FLANGE	1	A351 CF8	A351-CF8
7	STOPPER	1	A240-304	A240-304
8	HANDLE	1	A283-D, A536	A283-D, A536
9	THRUST WASHER	1	PTFE	PTFE
10	GLAND PACKING	1Set	GRAPHITE +CARBON FIBER	GRAPHITE +CARBON FIBER PTFE
11	SEAT	2	RTFE	RTFE
12	GASKET	1	316HOOP+GRAPHITE	316HOOP+GRAPHITE
13	STEM BEARING	1	RTFE	RTFE
14	CAP BOLT	1Set	A193-B7	A193-B8
15	CAP BOLT NUT	1Set	A194-2H	A194-8
16	GLAND BOLT	2	A193-B7	A193-B8
17	HANDLE BOLT	1	A193-B8	A193-B8

BALL VALVES

BOLTED CAP

FLOATING BALL VALVE



CLASS 150

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	3	4	6	8	10	12	
	mm	15	20	25	40	50	80	100	150	200	250	300	
A1	in	4.3	4.6	5.0	6.5	7.0	8.0	9.0	15.5	18.0	21.0	24.0	
	mm	108	117	127	165	178	203	229	394	457	533	610	
H	in	3.3	3.5	4.0	5.0	5.6	6.7	8.1	12.2	16.0	18.7	21.3	
	mm	84	88	102	127	142	170	206	310	406	475	541	
W	in	5.1	5.1	6.1	9.1	9.1	13.8	17.7	23.6	15.7	19.7	22.0	
	mm	130	130	155	230	230	350	450	600	400	500	560	
WEIGHT	RF	lb	4.4	6.6	8.8	7.6	24.3	50.7	72.8	183.0	330.7	496.0	617.3
		kg	2	3	4	8	11	23	33	83	150	225	280

CLASS 300

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	3	4	6	8	10	
	mm	15	20	25	40	50	80	100	150	200	250	
A1	in	8.5	9.5	11.1	12.0	8.5	11.1	12.0	15.9	16.5	18.0	
	mm	216	241	282	305	216	282	305	403	419	457	
H	in	3.3	3.5	4.0	5.0	5.6	6.7	8.1	12.2	16.0	18.7	
	mm	84	88	102	127	142	170	206	310	406	475	
W	in	5.1	5.1	6.1	9.1	9.1	13.8	17.7	23.6	15.7	19.7	
	mm	130	130	155	230	230	350	450	600	400	500	
WEIGHT	RF	lb	6.6	8.8	13.2	24.3	30.9	70.5	108.0	233.7	401.2	557.8
		kg	3	4	6	11	14	32	49	106	182	253

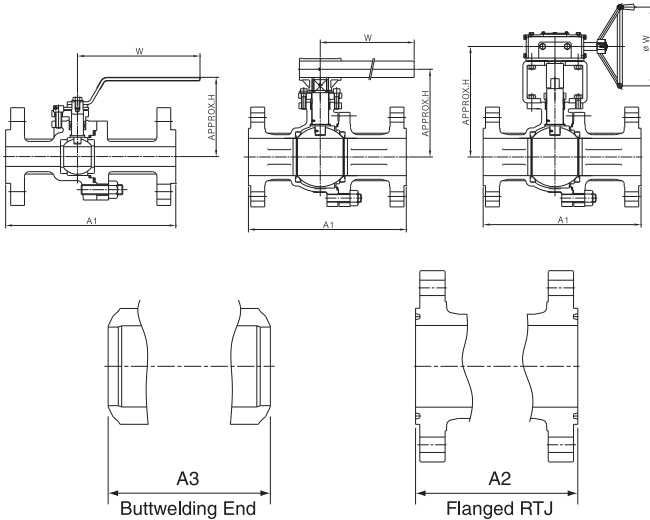
CLASS 600

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	3	4	6	
	mm	15	20	25	40	50	80	100	150	
A1 & A3	in	6.5	7.5	8.3	9.5	11.5	14.0	17.0	22.0	
	mm	165	190	210	241	292	356	432	559	
A2	in	6.4	7.5	8.3	9.5	11.6	14.1	17.1	22.1	
	mm	163	190	210	241	295	359	435	562	
H	in	3.5	3.7	4.7	5.0	5.3	6.7	8.1	10.8	
	mm	90	93	120	126	135	170	206	275	
W	in	5.1	5.1	6.1	9.1	13.8	17.7	23.6	17.7	
	mm	130	130	155	230	350	450	600	450	
WEIGHT	RF	lb	8.8	11.0	15.4	28.7	57.3	114.6	202.8	385.8
		kg	4	5	7	13	26	52	92	175

BALL VALVES

BOLTED CAP

FLOTING BALL VALVE



CLASS 900

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	
	mm	15	20	25	40	50	
A1 & A3	in	8.5	9.0	10.0	12.0	14.5	
	mm	216	229	254	305	368	
A2	in	8.5	9.0	10.0	12.0	14.6	
	mm	216	229	254	305	371	
H	in	3.9	4.0	4.6	5.7	6.1	
	mm	100	102	116	144	156	
W	in	6.1	9.1	9.1	13.8	13.8	
	mm	155	230	230	350	350	
WEIGHT	RF	lb	19.8	26.5	33.1	57.3	86.0
		kg	9	12	15	26	39

CLASS 1500

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	
	mm	15	20	25	40	50	
A1 & A3	in	8.5	9.0	10.0	12.0	14.5	
	mm	216	229	254	305	368	
A2	in	8.5	9.0	10.0	12.0	14.6	
	mm	216	229	254	305	371	
H	in	3.9	4.0	4.6	5.7	6.1	
	mm	100	102	116	144	156	
W	in	6.1	9.1	9.1	13.8	13.8	
	mm	155	230	230	350	350	
WEIGHT	RF	lb	19.8	26.5	33.1	57.3	86.0
		kg	9	12	15	26	39

CLASS 2500

VALVE SIZE	in	1/2	3/4	1	1 1/2	2	
	mm	15	20	25	40	50	
A1 & A3	in	10.4	10.7	12.1	15.1	17.8	
	mm	264	273	308	384	451	
A2	in	10.4	10.7	12.1	15.2	17.9	
	mm	264	273	308	387	454	
H	in	3.9	4.0	4.6	5.7	6.1	
	mm	100	102	116	144	156	
W	in	9.8	9.8	11.8	11.8	13.8	
	mm	250	250	300	300	350	
WEIGHT	RF	lb	33.1	44.1	63.9	77.2	110.2
		kg	15	20	29	35	50

BALL VALVES

BOLTED CAP

TRUNNION BALL VALVE

STANDARD

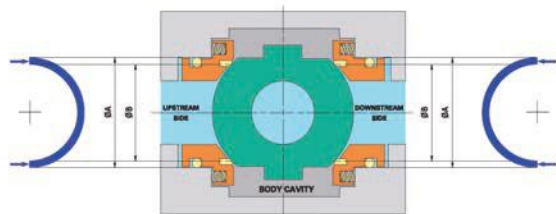
SINGLE PISTON EFFECT (SELF-RELIEVING SEATS)

Fluid pressure, both upstream and downstream, creates a resultant thrust that pushes the seat rings against the ball.

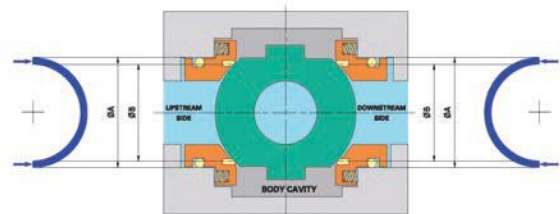
Fluid pressure acting in the body cavity creates a resultant thrust that pushes the seat rings away from the ball.

The single piston design permits the automatic release of any overpressure in the body cavity when the valve is in the fully open or fully closed position, therefore the seat rings are "self-relieving"

SINGLE PISTON EFFECT



PRESSURE ACTING UPSTREAM AND / OR DOWNSTREAM



PRESSURE ACTING IN THE BODY CAVITY

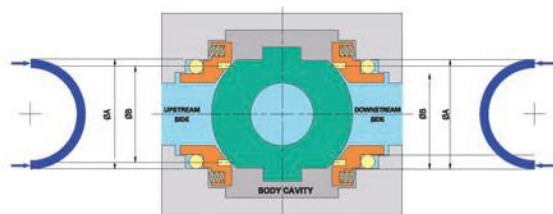
OPTIONAL

DOUBLE PISTON EFFECT

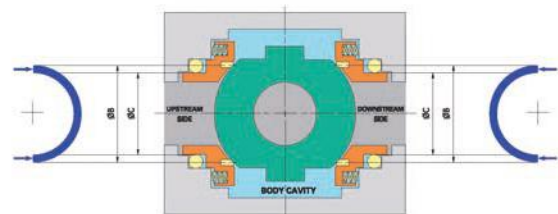
Fluid pressure, both upstream and down-stream, as well as in the body cavity creates a resultant thrust that pushes the seat rings towards the ball.

Valves with double piston effect seat rings require a relief valve in order to reduce the build-up of overpressure in the body cavity.

DOUBLE PISTON EFFECT



PRESSURE ACTING UPSTREAM AND / OR DOWNSTREAM



PRESSURE ACTING IN THE BODY CAVITY

BALL VALVES

BOLTED CAP

FEATURES

SEAT SEALING

Soft seats are standard. Seat inserts of synthetic material such as Nylon, PTFE, RTFE or Peek are contained within a one-piece metal seat ring.

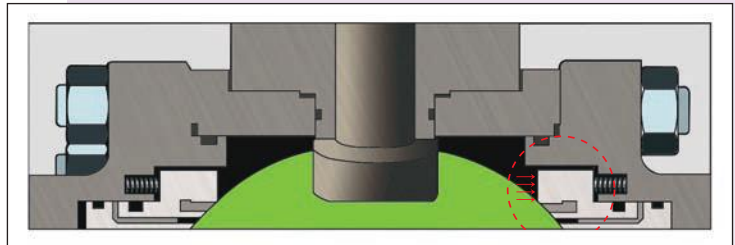
With no or very low line pressure, sealing between the seats and ball is achieved by seat springs. With higher line pressure, the line pressure, in conjunction with the spring load, forces the upstream seat ring against the ball, which results in tighter sealing.



SELF RELIEVING SEAT

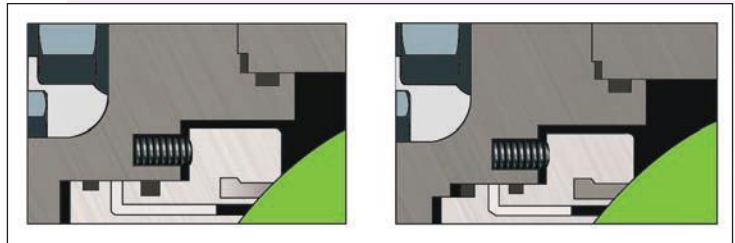
This standard feature is designed to prevent excessive pressure buildup within the valve by automatically relieving pressure when body cavity pressure exceeds the spring load on the seats.

Double Piston Seat is also available as an option.



SEAT RING SEALING

Two o-rings or one each of an o-ring and graphite ring are used for pressure classes 150 through 600. One lip seal with an o-ring or graphite ring is used for the pressure class 900 up to 2500.

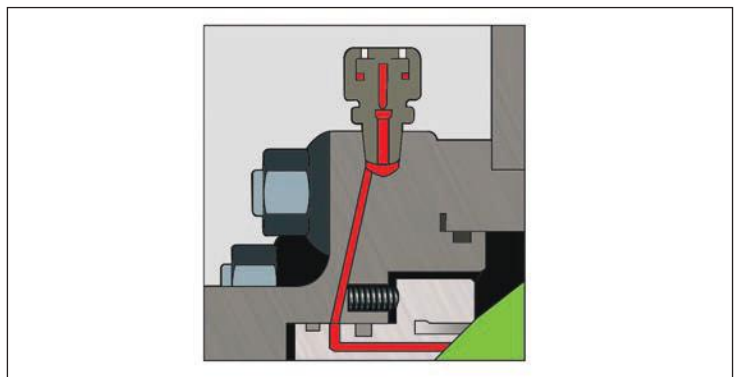


SEALANT INJECTION FITTING

This feature is standard except in sizes 2"-4" for pressure classes 150, 300 and 600.

In case of seat ring damage, sealant injection provides a fast, reliable way to restore tight sealing.

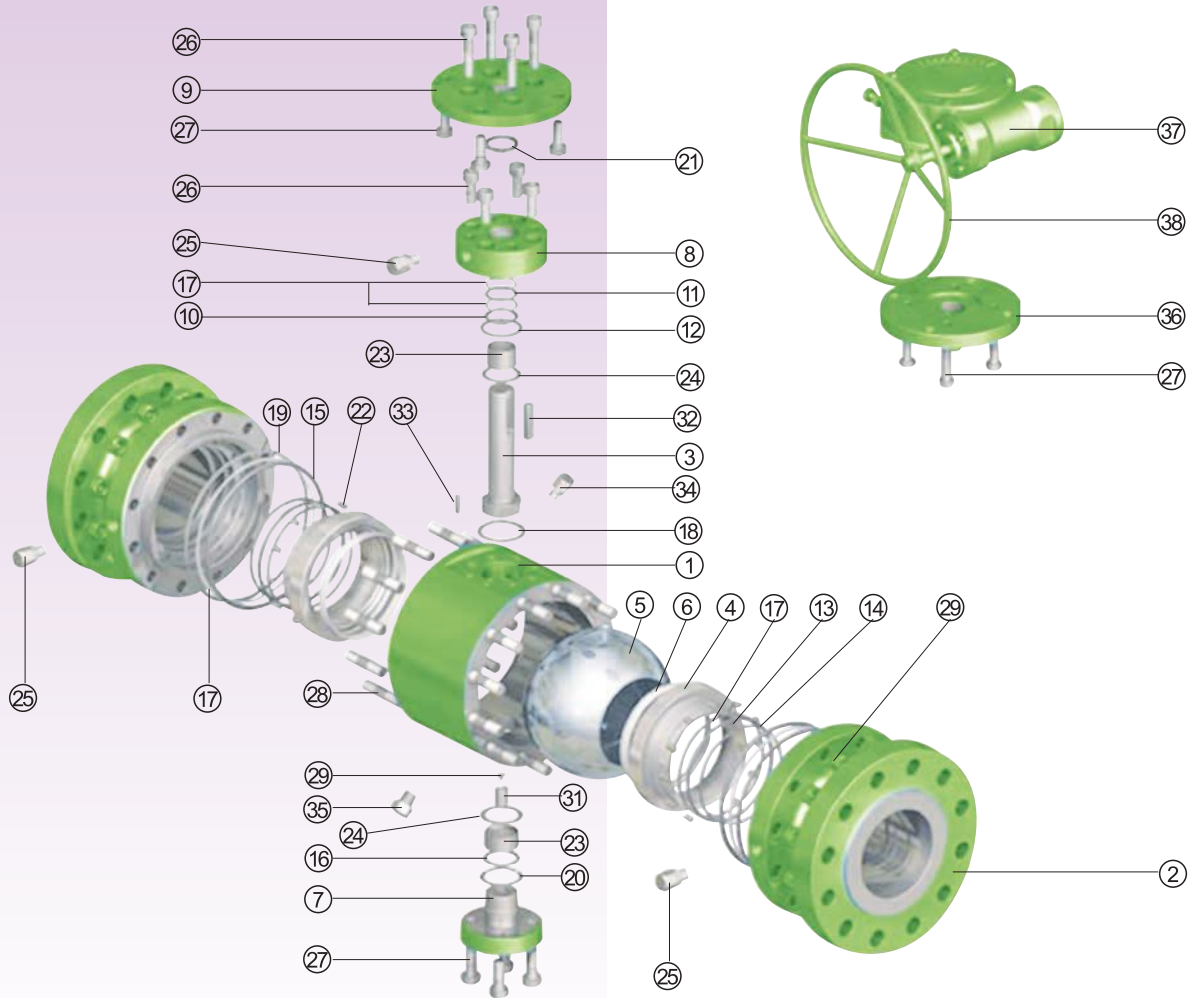
This injection system can also be used for routine flushing or the seat ring area while in service.



BALL VALVES

BOLTED CAP

PART LIST AND MATERIAL SPECIFICATIONS (TYPICAL)

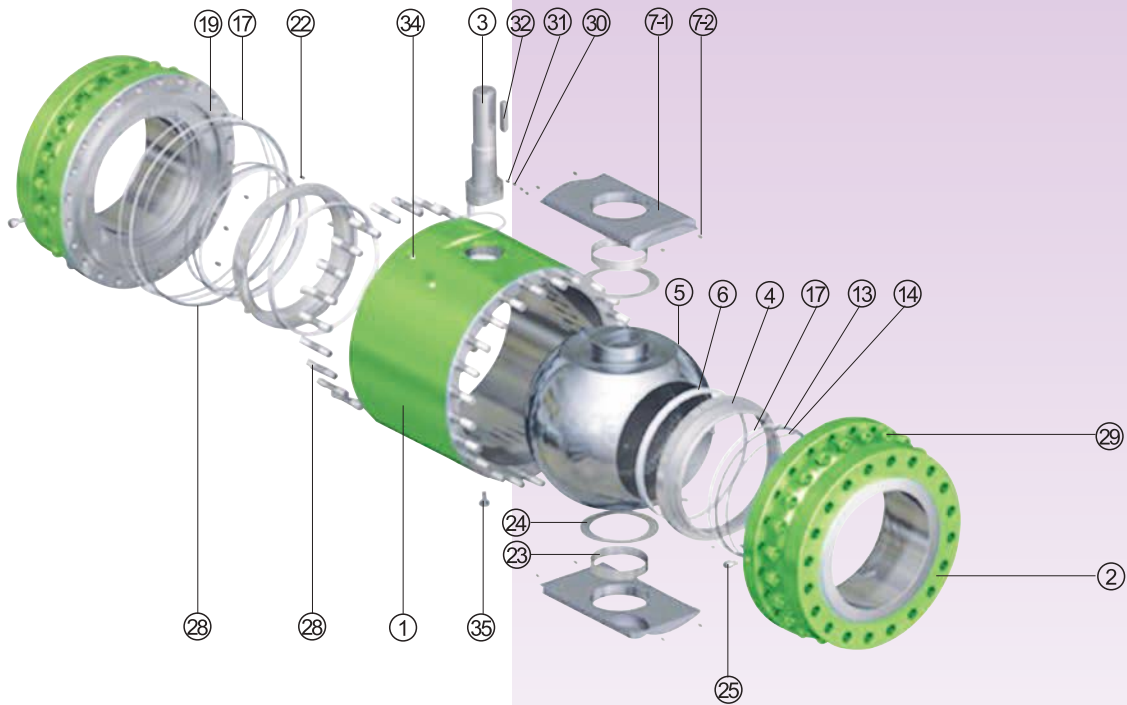


NO	PART NAME	CARBON STEEL NACE	LOW TEMP NACE	STAINLESS STEEL NACE
1	BODY	A105, A216 WCB	A350 LF2, A352 LCB	A182 F316, A351 CF8M
2	CAP	A105, A216 WCB	A350 LF2, A352 LCB	A182 F316, A351 CF8M
3	STEM	AISI 1045 ENP, AISI 4140 ENP	AISI 4140 ENP	316SS, 17-4 PHSS
4	SEAT RING	A105 ENP, A216 WCB ENP	A350 LF2 ENP, A352 LCB ENP	316SS
5	BALL	A105 ENP, A216 WCB ENP	A350 LF2 ENP, A352 LCB ENP	A182 F316, A351 CF8M
6	SEAT INSERT	Nylon, PTFE, PEEK	NYLON, PTFE, PEEK	Nylon, PTFE, PEEK
7	TRUNNION	AISI 1045, AISI 4140		316SS
7-1	TRUNNION BLOCK	AISI 1045, AISI 4140		316SS
7-2	TRUNNION BLOCK PIN	AISI 410		316SS
8	GLAND	AISI 1045		316SS
9	ADAPTER PLATE	AISI 1045		316SS
10	STEM O-RING / LIPSEAL	Viton / Polymite	Viton GLT / Polymite	Viton / Polymite
11	STEM O-RING	Viton	Viton GLT	Viton
12	GLAND O-RING	Viton	Viton GLT	Viton

BALL VALVES

BOLTED CAP

PART LIST AND MATERIAL SPECIFICATIONS (TYPICAL)

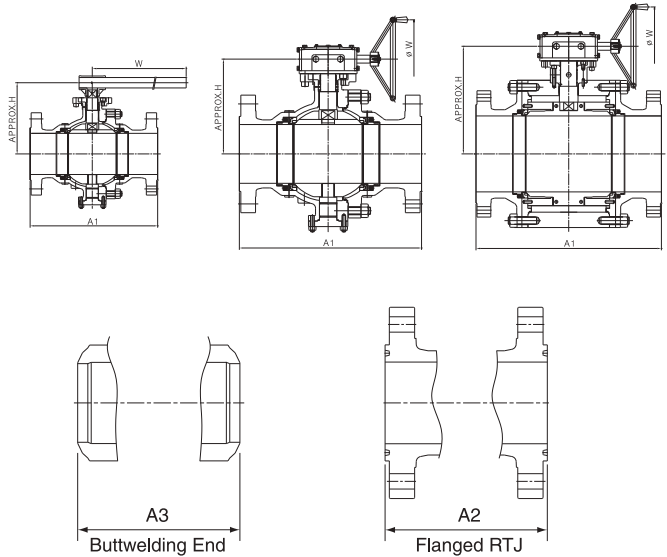


NO	PART NAME	CARBON STEEL NACE	LOW TEMP NACE	STAINLESS STEEL NACE
13	SEAT O-RING / LIPSEAL	Viton / Polymite	Viton GLT / Polymite	Viton / Polymite
14	SEAT SUBSEAL	Viton, Graphite	Viton GLT, Graphite	Viton, Graphite
15	CLOSURE O-RING	Viton	Viton GLT	Viton
16	TRUNNION O-RING	Viton	Viton GLT	Viton
17	BACKUP RING	PTFE, Nylon	PTFE, Nylon	PTFE, Nylon
18	GLAND SEAL	Spiral Wound Gasket 316SS + Graphite		
19	BODY SEAL	Spiral Wound Gasket 316SS + Graphite		
20	TRUNNION SEAL	Spiral Wound Gasket 316SS + Graphite		
21	STEM PACKING	Graphite		
22	SEAT SPRING	Inconel X-750, 17-7 PHSS		
23	BEARING	PTFE / Carbon Steel		PTFE / 316 SS
24	THRUST WASHER	PTFE / Carbon Steels		PTFE / 316 SS
25	SEALANT FITTING	Carbon Steel / SS Ball Check		316SS / SS Ball Check
26	SOCKET BOLT	A574		316SS
27	HEX / SOCKET BOLT	A574		316SS
28	STUD BOLT	A193 B7	A320L 7	A193 B8
29	HEX NUT	A194 2H	A194 7	A194 8
30	GROUNDING PIN	Stainless Steel		
31	GROUNDING SPRING	Stainless Steel		
32	KEY	Carbon Steel	Carbon Steel	Stainless Steel
33	DOWEL PIN	Carbon Steel	Carbon Steel	Stainless Steel
34	RELIEF PLUG	Carbon Steel	Carbon Steel	Stainless Steel
35	DRAIN PLUG	Carbon Steel	Carbon Steel	Stainless Steel
36	MOUNTING PLATE	Carbon Steel	Carbon Steel	Stainless Steel
37	GEAR OPERATOR	Ductile Iron Case / Carbon Steel Worm Gear		
38	HAND WHEEL	Carbon Steel, Ductile Iron		

BALL VALVES

BOLTED CAP

BC, TRUNNION BALL



CLASS 150

VALVE SIZE	in	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	150	200	250	300	350	400	450	500	600	700	750	900	
A1	in	15.5	18.0	21.0	24.0	27.0	30.0	34.0	36.0	42.0	49.0	51.0	60.0	
	mm	393.7	457.2	533.4	609.6	685.5	762	863.6	914.4	1066.8	1245	1295	1524	
H	in	29.5	36.7	46.3	52.2	60.0	71.2	87.2	99.3	112.2	129.3	139.0	156.7	
	mm	749	931	1176	1326	1525	1809	2214	2522	2850	3284	3530	3980	
W	in	23.6	15.7	15.7	17.7	19.7	22.0	19.7	24.8	24.8	28.0	28.0	31.5	
	mm	600	400	400	450	500	560	500	630	630	710	710	800	
WEIGHT	RF	lb	277.8	423.3	588.6	1003.1	1730.6	2275.2	3053.4	4695.8	6172.9	8035.8	10670.4	1642.4
		kg	126	192	267	455	785	1032	1385	2130	2800	3645	4840	7450

CLASS 300

VALVE SIZE	in	4	6	8	10	12	14	16	18	20	24	28	30	36	
	mm	100	150	200	250	300	350	400	450	500	600	700	750	900	
A1 & A3	in	12.0	15.9	16.5	18.0	19.8	30.0	33.0	36.0	39.0	45.0	53.0	55.0	68.0	
	mm	305	403	419	457	502	762	838	914	991	1143	1346	1397	1727	
H	in	9.3	12.0	13.6	16.1	17.9	19.0	20.1	21.7	24.0	27.4	30.8	33.7	37.8	
	mm	235	305	345	410	455	482	510	550	610	695	782	855	960	
W	in	23.6	19.7	22.0	24.8	24.8	28.0	31.5	31.5	31.5	31.5	31.5	31.5	31.5	
	mm	600	500	560	630	630	710	800	800	800	800	800	800	800	
WEIGHT	RF	lb	174.2	341.7	529.1	665.8	1135.4	21991.1	2623.5	3042.4	4343.1	6613.9	9336.6	12897.0	18386.5
		kg	79	155	240	302	515	9975	1190	1380	1970	3000	4235	5850	8340

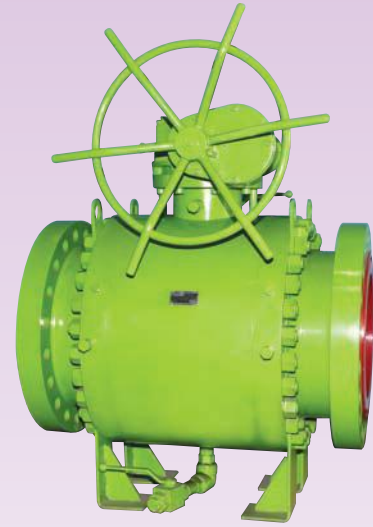
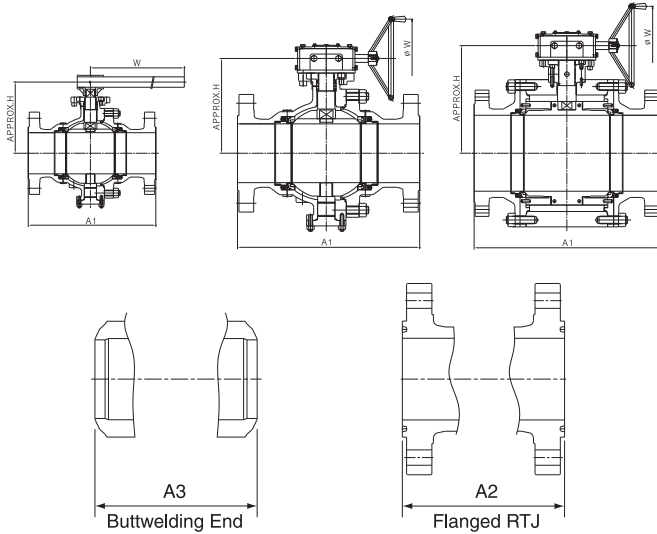
CLASS 600

VALVE SIZE	in	2	3	4	6	8	10	12	14	16	18	20	24	
	mm	50	80	100	150	200	250	300	350	400	450	500	600	
A1 & A3	in	11.5	14.0	17.0	22.0	26.0	31.0	33.0	35.0	39.0	43.0	47.0	55.0	
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397	
A2	in	11.6	14.1	17.1	22.1	26.1	31.1	33.1	35.1	39.1	43.1	47.2	55.4	
	mm	295	359	435	562	663	790	841	892	994	1095	1200	1407	
H	in	6.9	8.8	10.0	12.1	14.6	16.3	18.1	19.7	21.9	21.5	24.8	28.0	
	mm	175	223	255	308	372	415	460	500	556	545	630	710	
W	in	23.6	23.6	23.6	15.7	19.7	24.8	24.8	24.8	28.0	31.5	31.5	31.5	
	mm	600	600	600	400	500	630	630	630	710	800	800	800	
WEIGHT	RF	lb	94.8	154.3	295.4	628.3	987.7	1499.1	2398.6	2892.5	4146.9	5216.1	7050.4	10472.0
		kg	43	70	134	285	448	680	1088	1312	1881	2366	3198	4750

BALL VALVES

BOLTED CAP

BC, TRUNNION BALL



CLASS 900

VALVE SIZE		in	2	3	4	6	8	10	12	14	16
		mm	50	80	100	150	200	250	300	350	400
A1 & A3		in	14.5	15.0	18.0	24.0	29.0	33.0	38.0	40.5	44.5
		mm	368	381	457	610	737	838	965	1029	1130
A2		in	14.6	15.1	18.1	24.1	29.1	33.1	38.1	40.9	44.9
		mm	371	384	460	613	740	841	968	1038	1140
H		in	7.4	9.1	10.3	12.6	15.2	17.9	21.9	22.6	23.2
		mm	188	230	262	320	385	455	555	575	590
W		in	23.6	23.6	15.7	22.0	19.7	24.8	31.5	31.5	31.5
		mm	600	600	400	560	500	630	800	800	800
WEIGHT	RF	lb	165.3	209.4	451.9	738.5	1415.4	1653.5	2425.1	3417.2	4365.2
		kg	75	95	205	335	642	750	1100	1550	1980

CLASS 1500

VALVE SIZE		in	2	3	4	6	8	10	12
		mm	50	80	100	150	200	250	300
A1 & A3		in	14.5	18.5	21.5	27.8	32.8	39.0	44.5
		mm	368	470	546	705	832	991	1130
A2		in	14.6	18.6	21.6	28.0	33.1	39.4	45.1
		mm	371	473	549	711	842	1000	1146
H		in	7.4	9.1	10.3	12.6	15.2	17.8	23.0
		mm	188	230	262	320	385	452	583
W		in	23.6	23.6	19.7	22.0	24.8	28.0	31.5
		mm	600	600	500	560	630	710	800
WEIGHT	RF	lb	165.3	297.6	573.2	1135.4	1569.7	2711.7	3957.3
		kg	75	135	260	515	712	1230	1795

CLASS 2500

VALVE SIZE		in	2	3	4	6	8	10
		mm	50	80	100	150	200	250
A1 & A3		in	17.8	22.8	26.5	36.0	40.2	50.0
		mm	451	578	673	914	1022	1270
A2		in	17.9	23.0	26.9	36.5	40.9	50.9
		mm	454	584	683	927	1038	1292
H		in	9.5	11.2	13.2	16.9	19.9	29.5
		mm	241.3	284.5	335.2	429.3	505.5	749.3
W		in	15.7	19.7	22.0	24.8	28.0	31.5
		mm	400	500	560	630	710	800
WEIGHT	RF	lb	220.5	540.1	826.7	882.7	3858.1	6018.6
		kg	100	245	375	854	1750	2730



BY-PASSES & DRAINS
WEDGE DESIGN
CONSTRUCTION FEATURES
ADVANCED DESIGN OF AN EFFECTIVE STEM SEAL
SPECIAL SERVICE VALVES
ADVANCED PRESSURE SEAL DESIGN
OVERLAY IN GASKET CONTACT AREA
ACCESSORIES



▲ RT



▲ PT



▲ MT



▲ POST HEAT TREATMENT

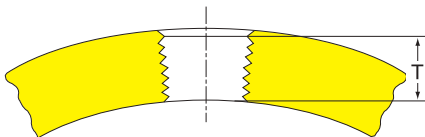
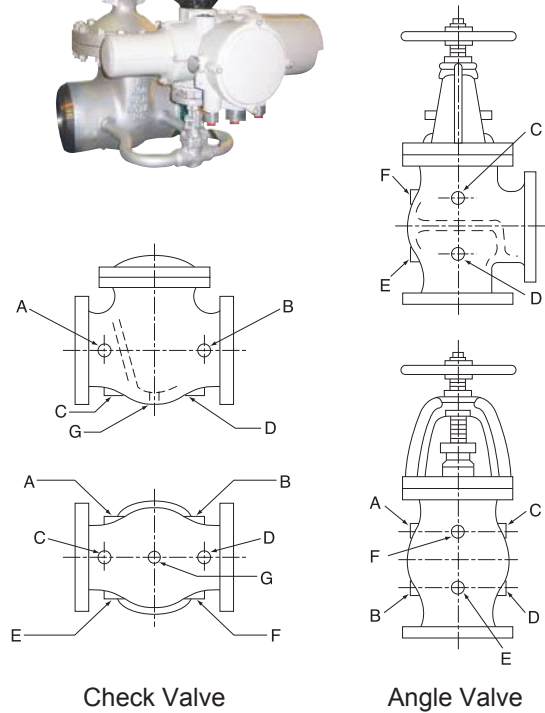
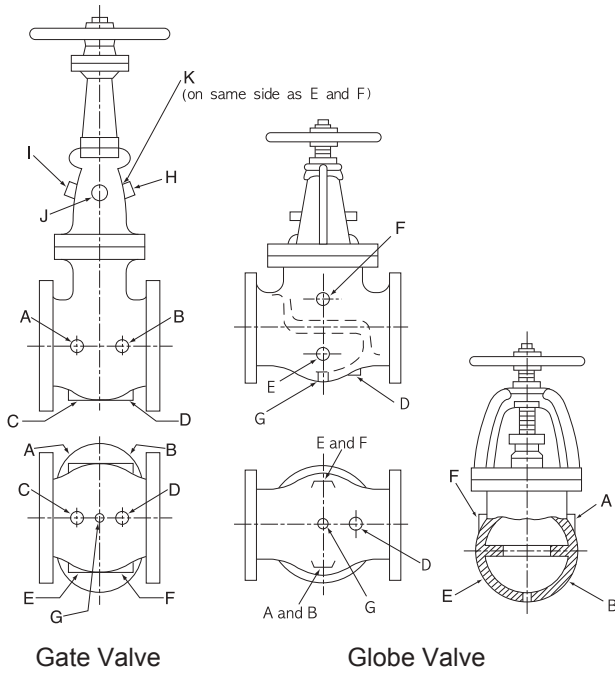
BY-PASSES & DRAINS

When specified, valves can be furnished with drain connections at any of the locations shown below. Standard drain connections are the same size as shown below and are drilled, tapped and plugged.

BUTT WELDING FOR

MAIN VALVE SIZE	1 1/2" ~ 4"	5" ~ 8"	10" ~ 36"
DRAIN SIZE	1/2"	3/4"	1"

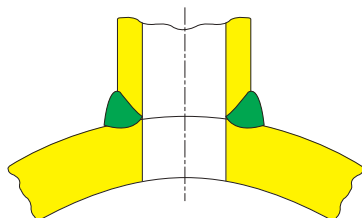
ASME B16.34



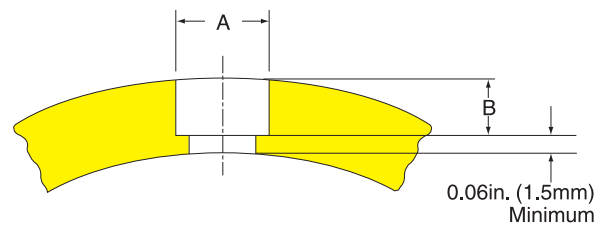
THREAD LENGTH FOR AUXILIARY CONNECTIONS

Conn. Size. NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
Length of	in	0.41	0.53	0.56	0.68	0.71	0.72	0.76
Thread. T	mm	11	14	14	18	18	19	20

In no case shall the effective length of thread, T, be less than that shown in table above. These lengths are equal to the effective thread length of American National Standard External Pipe Thread(ANSI B 2.1)

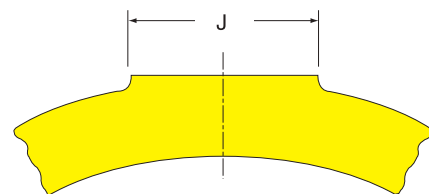


BUTT WELDING FOR AUXILIARY CONNECTIONS



SOCKET WELDING FOR AUXILIARY CONNECTIONS

Conn. Size. NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
Min. Dia. of Socket, A	in	0.690	0.855	1.065	1.330	1.675	1.915	2.406
	mm	17.5	22	27	34	43	49	61
Min. Depth of Socket, B	in	0.19	0.19	0.25	0.25	0.25	0.25	0.31
	mm	5	5	6.5	6.5	6.5	6.5	8

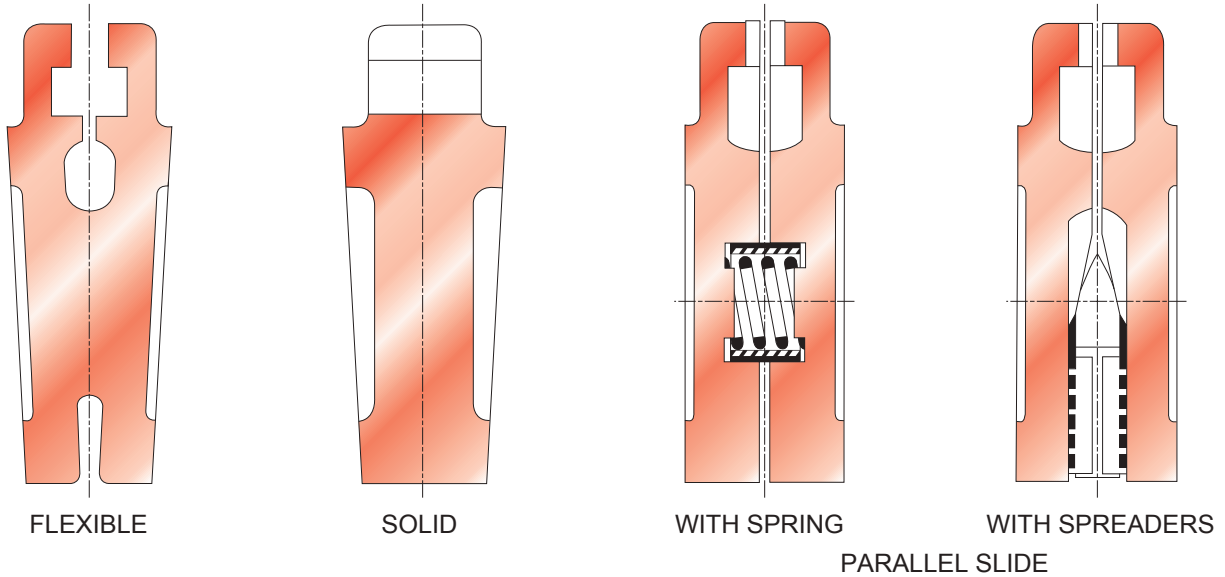


THREAD LENGTH FOR AUXILIARY CONNECTIONS

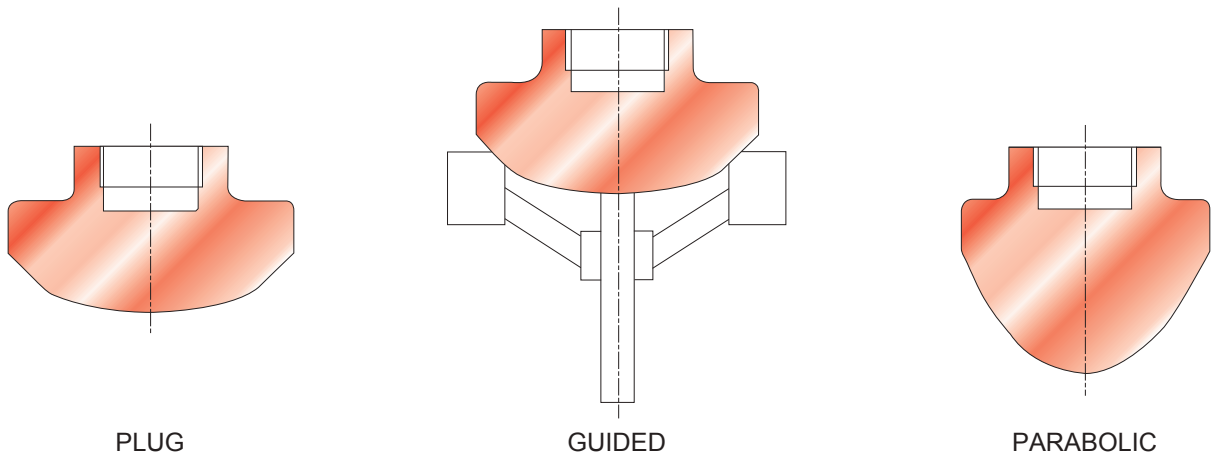
Conn. Size. NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
Dia of Boss, J	in	1.25	1.50	1.75	2.12	2.50	2.75	3.38
	mm	32	38	44	54	64	70	86

WEDGE DESIGN

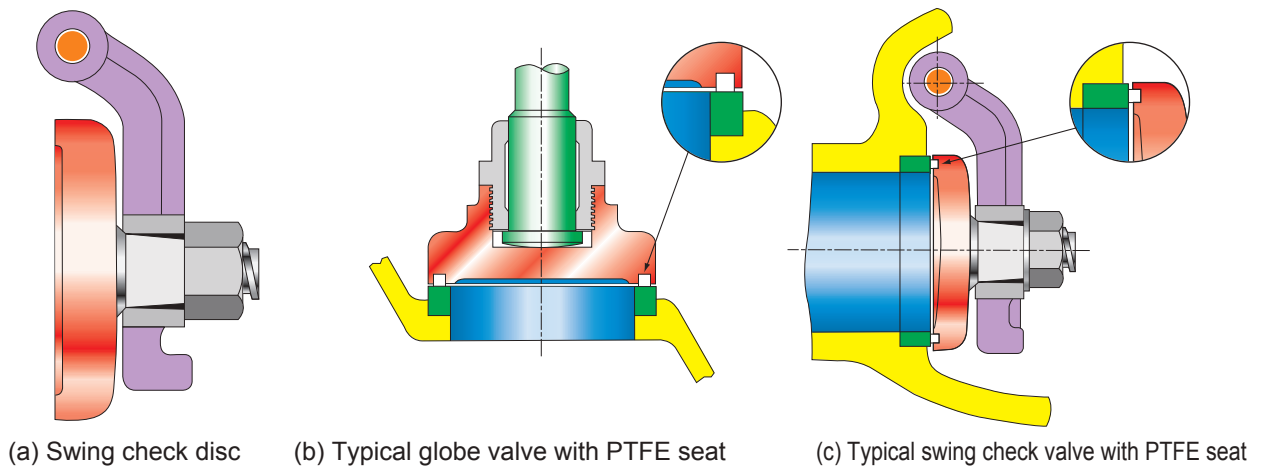
The Gate valve is normally supplied with a flexible wedge, on request with solid wedge, parallel slides with spring or with spreaders as shown below. All the wedges are fully guided.



The Globe Valve is normally supplied with plug type disc. On request we produce guided discs, parabolic discs and equilibrated discs. Equilibrated discs are normally supplied when differential pressure is very high and the service is on-off. In this case the flow direction is over the disc.



Unless otherwise specified, Swing Check valve is normally supplied with the disc shaped as following figure(a). If the customer require special type of disc like following figure(c). We can supply it as his requirement.

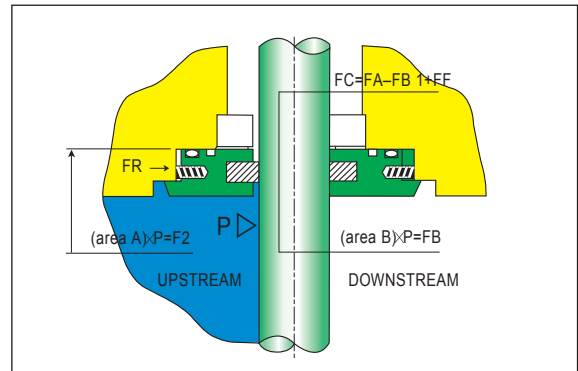


CONSTRUCTION FEATURES

KJS gate valves are engineered for superior performance in pipeline, manifold, product storage, general piping and slurry applications. They are able to handle media including crude oil, natural gas, crude products, water, carbon dioxide and slurries. KJS gate valves are manufactured within an uncompromising QA/QC program, (certification ISO 9001) a KJS tradition, and are available in sizes 4" through 24", and in pressure classes 150 through 600. They are manufactured with cast or forged/welded bodies. All valves are supplied with full documentation and traceability.

SEALING PRINCIPLE/DOUBLE BLOCK AND BLEED

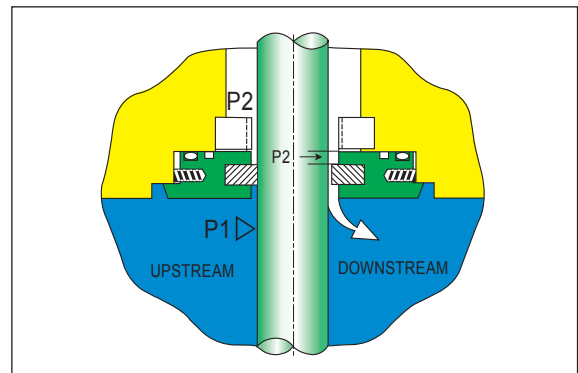
Two floating seat rings provide a positive sealing both upstream and downstream. At low or nil pressure, the floating seats are in contact with the gate using the force of springs. In closed position under high differential pressure the upstream seat is forced into tighter contact with the gate giving a positive shut-off. A vent plug is fitted on a valve body to ensure double block and bleed feature (fig.1).



SEALING PRINCIPLE (FIG.1)

SELF OVERPRESSURE RELIEF DEVICE

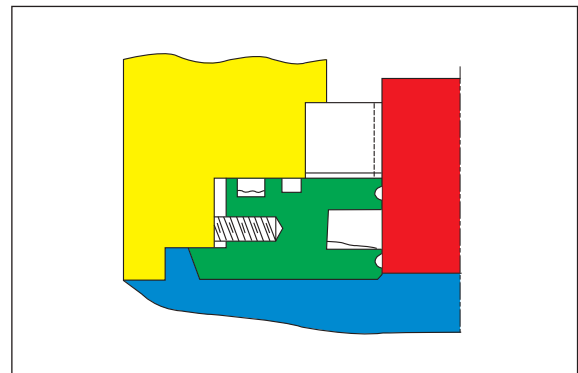
Any excessive build-up body cavity pressure is automatically vented into the high pressure side of the line. This is achieved by a reversal sealing process. (fig.2)



SELF RELIEVING SYSTEM (FIG.2)

FIRE SAFETY

KJS's slab gate valves are intrinsically fire safe by design. The double protection of body and bonnet seals gives the maximum security when specified KJS GATE VALVES are fitted with special graphite seals so as to effectively stop all leakage in the event of the fire. (fig.3)



FIRE SAFE SITUATION (FIG.3)

SOUR SERVICE

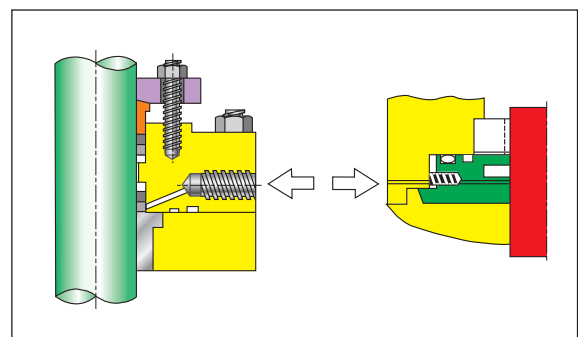
KJS gate valves can be manufactured according to the recommendations of NACE MR 01-75 (latest edition)

EASY MAINTENANCE LINE OPERATION

Optional cover device allows stem removal with pressure in line with out dismantling of the valve bonnet (Gate in open position, seats blocked and bleed).

SECONDARY SEAT AND STEM SEALING

KJS gate valves are designed to provide high integrity shut-off. Upon request, sealant injection facilities are available. In case of seat insert or stem seal damages, external or internal leakages can occur. An emergency sealant injection can save the integrity of the valve by incorporating a special grease seal around the stem or on the face of the seat. (fig.4)



SECONDARY SEALING (FIG.4)

ADVANCED DESIGN OF AN EFFECTIVE STEM SEAL

LIVE LOAD SYSTEM

NEW STEM SEAL ASSURES NEAR-ZERO LEAKAGE

The KJS stem-seal is a new technology, evolved from the test findings described above. It offers the user a tight stem seal with little or no maintenance over long periods of time.

UP TO 50% LOWER OPERATING TORQUE

is achieved with the non-rotating stem. The stem arm, preventing rotation, moves on roller bearings-indicates position and actuates limit switches.

LIVE LOADING OPTIONAL

2sets of Belleville springs maintain a minimum permanent packing stress of 8,000 psi on JC-187-1 or 5,000 psi on Graphoil Packing. Live-loading extends the stem tightness for long periods of time without maintenance. Bolt torques control total spring load.

HEAVY TWO-PIECE GLAND

A heavy gland flange is required to carry the high stresses due to live-load.

LEAK-OFF FOR DOUBLE PACKING

A lantern ring and leak-off pipe are provided for removal of leakage, if any, from lower packing set in packing chamber with 2 sets of packing.(OPTIONAL)

NON-REVOLVING STEM

has close roundness and straightness tolerances and is burnished for superior surface finish.

SHORT AND NARROW PACKING CHAMBER

sealing effectiveness improves as overall packing length shortens. Chamber wall is burnished for superior finish.

PRECOMPRESSED RINGS

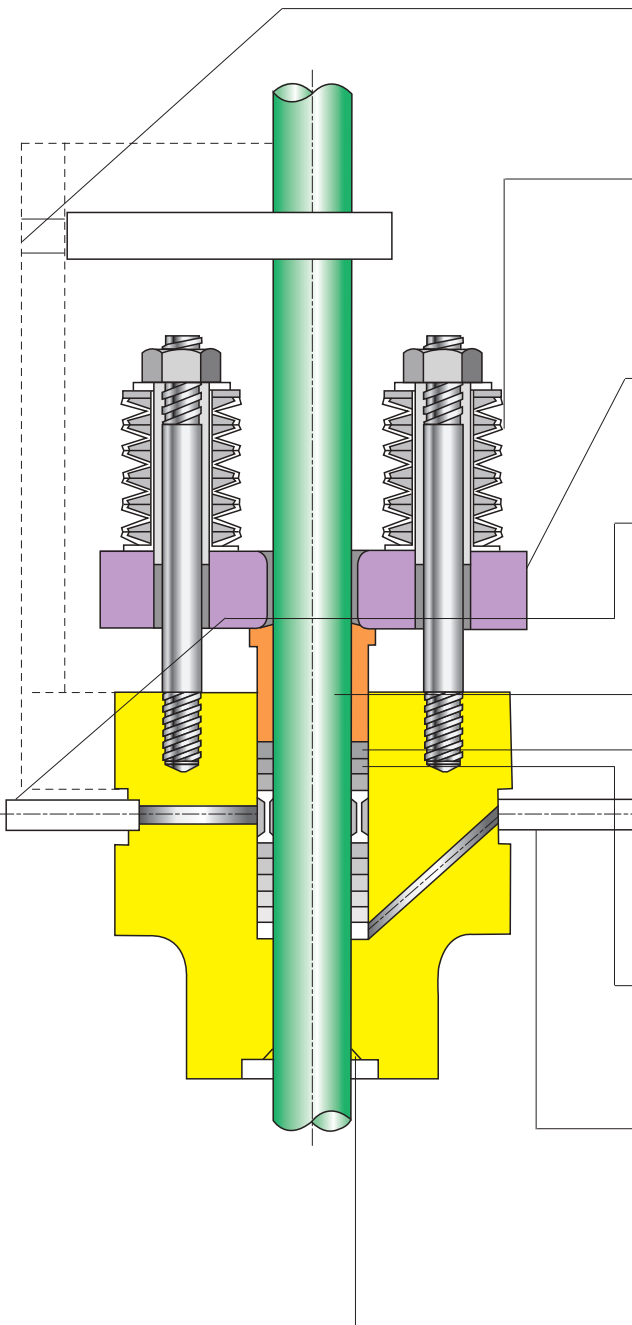
Each JC-187-1 ring is precompressed at 15,000 psi(Graphoil at 5,000 psi) to ensure extreme tightness at high packing strain.

PACKING BLOW-OUT(OPTIONAL)

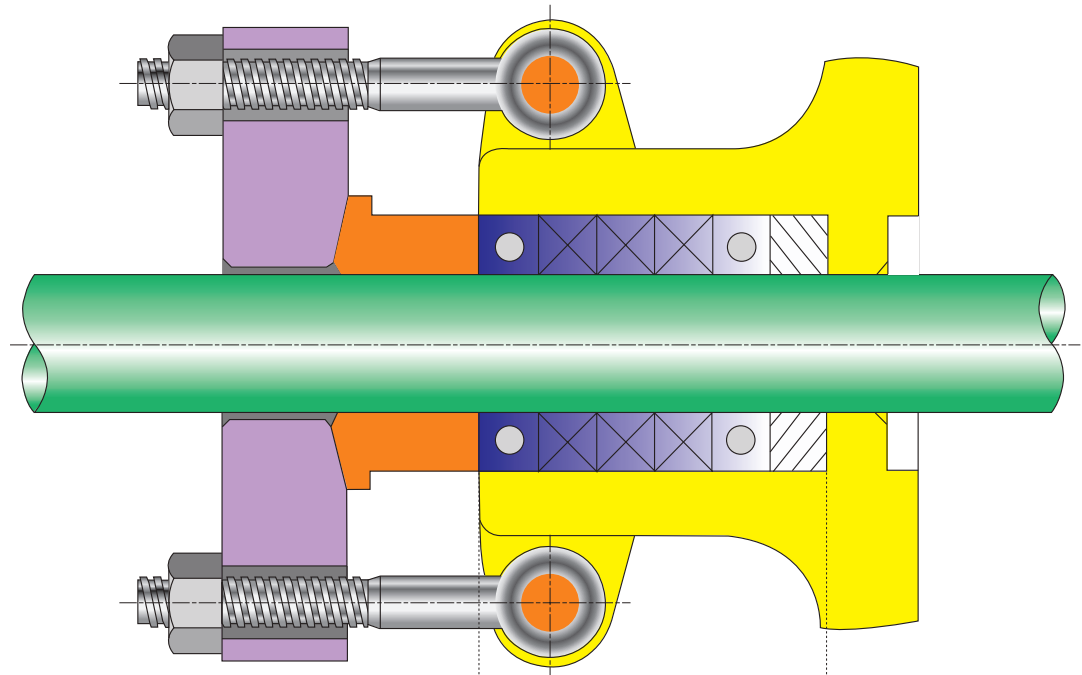
ensures fast removal of old packing rings in areas where time-consuming conventional packing removal methods are not acceptable, such as Nuclear Service, for instance. A Hydraulic source is normally used for this purpose.

EFFICIENT BACKSEAT

assures repacking under line pressure. Cone-in-cone design eliminates problem with over-torquing.



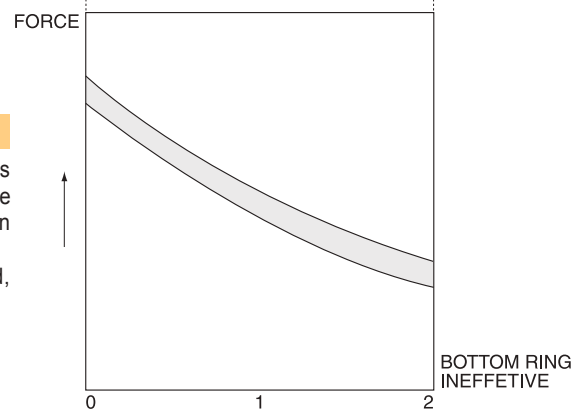
ADVANCED DESIGN OF AN EFFECTIVE STEM SEAL



FINDINGS:

1. LARGE LOADS:

Sealing is achieved when compression load is high and packing forms a mass of close fibers of low porosity and permeability resisting the flow. (See Diagram-Leakage vs. Strain). The effect is permanent when optimum compression is reached. This has been found to be 12,000 psi for John Crane 187-1 and, 5,000psi for Graphoil.



2. SHORT AND NARROW PACKING CHAMBERS

improve sealing

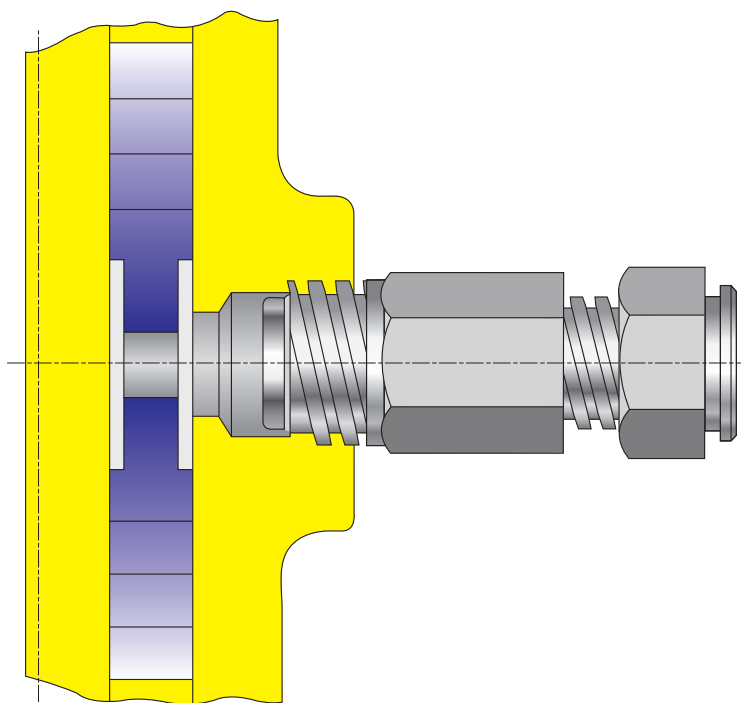
3. PRECISION STEM AND PACKING CHAMBERS

-straightness, roundness and fine finish of stem and packing chamber wall is essential.

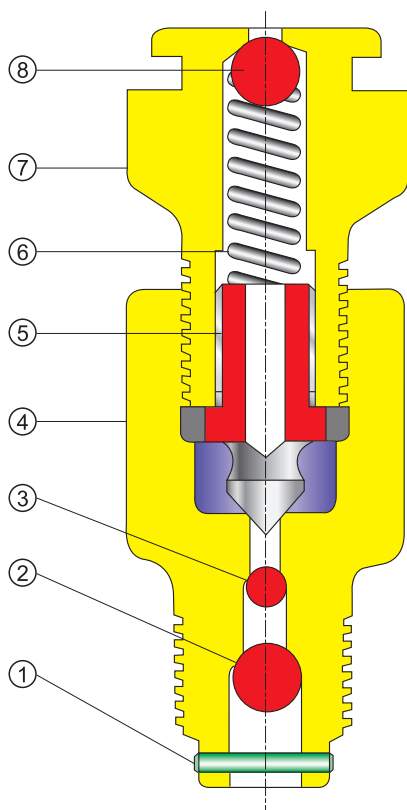
4. LIVE LOADING

may be necessary for automatic compensation of relaxation and aging of packing rings and minimum maintenance in service.

SPECIAL SERVICE VALVES



< Grease injector at lantern ring of gate or globe valve >



Double - Ball Grease Injector

Features :

1. Proprietary design with a double ball check, needle valve and one piece button head fitting
2. Provides positive shut-off by injector grease to seating surfaces if metal to seal fails due to damage to seats or foreign deposits on seat faces.
3. When used to lubricate and seal off around stem, the upper rings of packing are kept soft and pliable.
4. Simple operation-unscrew button head fitting one half turn, inject grease, retighten fitting.
5. Standard in 13Cr Stainless steel-Available on special order in most other materials

NO	PART NAME	MATERIAL
1	PIN	13Cr Stainless
2	BALL CHECK	AISI - 440C
3	BALL CHECK	AISI -440C
4	BODY	13Cr Stainless
5	NEEDLE	13Cr Stainless
6	SPRING	Music Wire
7	BUTTON HEAD	13Cr Stainless
8	BALL CHECK	AISI - 440C

ADVANCED PRESSURE SEAL DESIGN

The pressure seal bonnet joint remains tight under all conditions. The initial seal is established by the inner row of studs. The higher the internal pressure, the greater is the sealing force.

EASY DISMANTLING

by dropping bonnet assembly into body cavity and driving the 4-segmental thrust rings by means of push pin. A 1° body taper above the 18-8 inlay insures easy sliding of the gasket even after years of service.

INNER ROW OF STUDS

establishes the initial seal of the Pressure Seal joint.

OUTER ROW OF STUDS

secures the yoke to the body.

SEGMENTAL THRUST RING

absorbs all the thrust applied by internal pressure.

DRILLED KNOCK-OUT HOLES

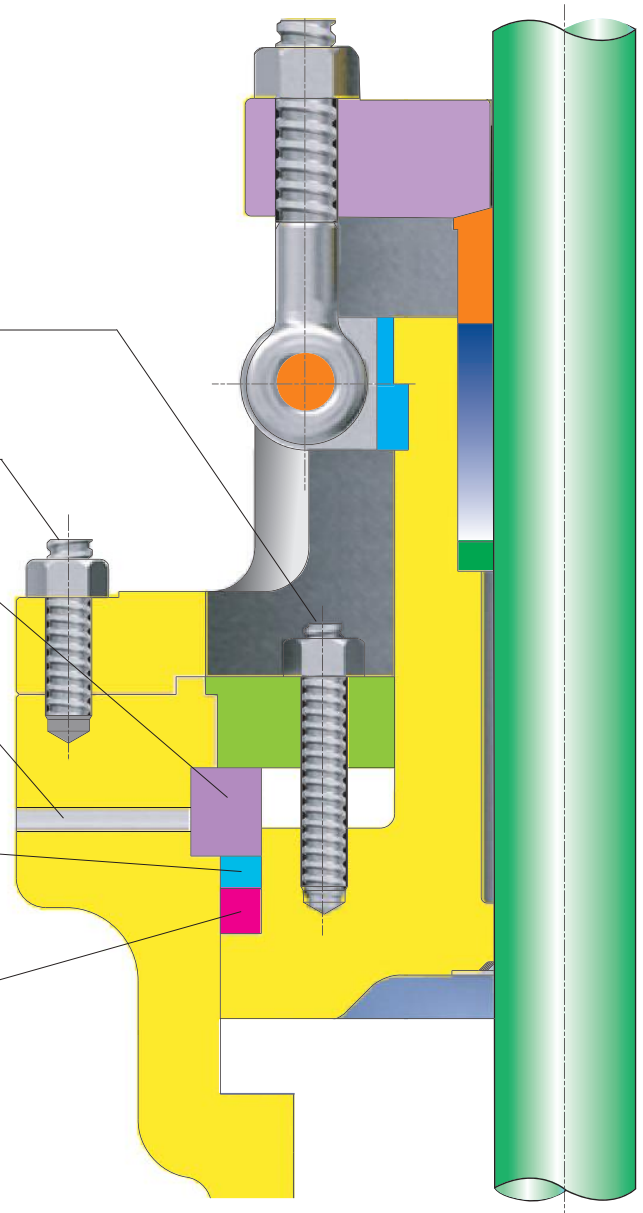
for driving out thrust rings, using pins.

SPACER RING

provides bearing surface and prevents deformation of the gasket.

GRAPHITE GASKET

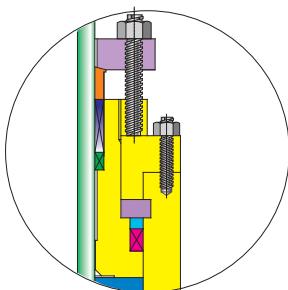
is available at a reduced price. This more economical valve does not have an 18-8 inlay on the body gasket surface



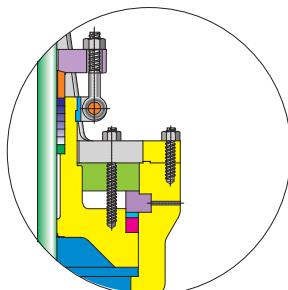
STANDARD BONNET CONSTRUCTION

PRESSURE SEAL TYPE

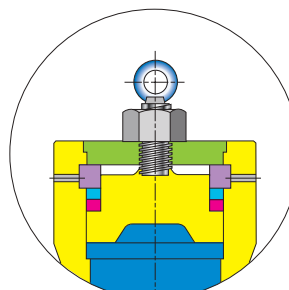
STANDARD BONNET CONSTRUCTION OF PRESSURE SEAL TYPE



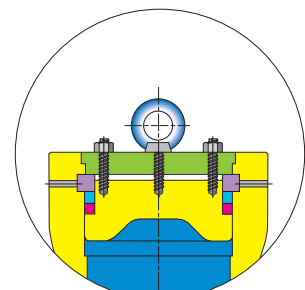
TYPE A
GATE & GLOBE VALVE



TYPE B
GATE & GLOBE VALVE



TYPE C
CHECK VALVE

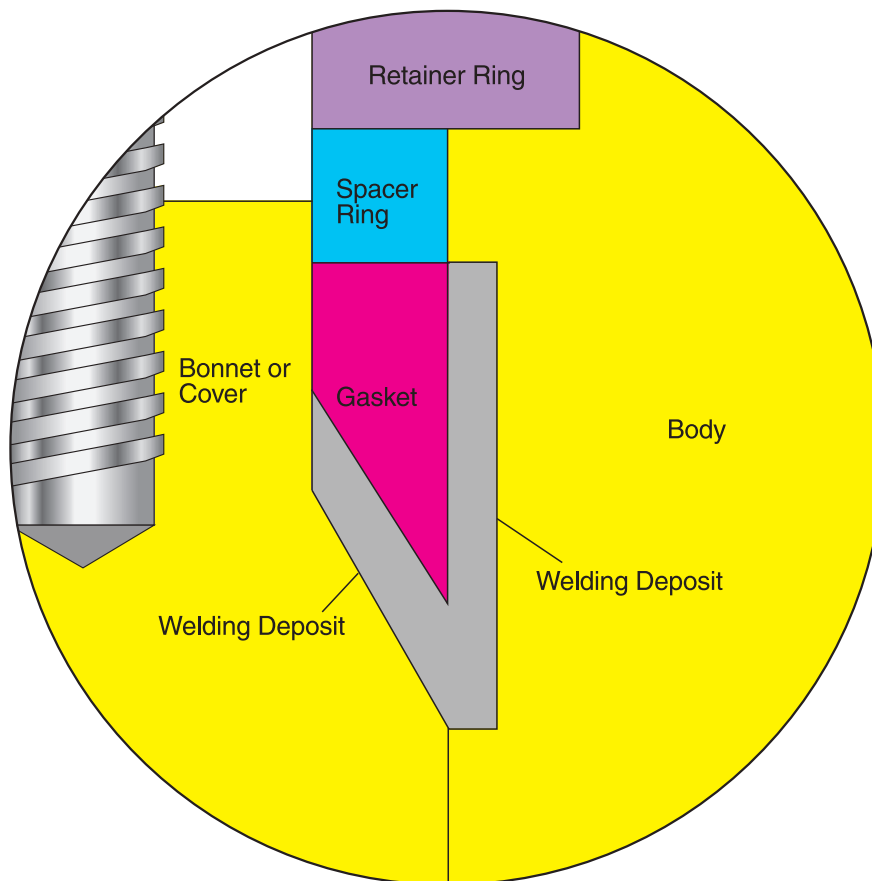


TYPE D
CHECK VALVE

OVERLAY IN GASKET CONTACT AREA

PRESSURE SEAL BONNET

(OPTION DESIGN)



BODY MATERIAL	WELDING DEPOSIT(SEE NOTE 1)			GASKET SPECIFICATION	
CASTING	BODY	BONNET (CASTING ONLY) (SEE NOTE 2)	MAX.HB	MATERIAL	MAX.TEMP
A216 WCB	304	304	180	SOFT IRON	540 °C
A217 WC1	304	304	180	SOFT IRON	540 °C
A217 WC6	304	304	180	F5	650 °C
A217 WC9	304	304	180	F5	650 °C
A217 C5	309	309	180	F5	650 °C
A351 CF8	304	304	180	304	800 °C
A351 CF3	304L	304L	180	304L	800 °C
A351 CF8M	316	316	180	316	800 °C
A351 CF3M	316L	316L	180	316L	800 °C
A351 CF8C	347	347	180	347	870 °C
A27 C12A	304	304	180	F5	650 °C

Note 1 : Other materials are available upon request.

Note 2 : Range of casting bonnet and cover is as follows

ACTUATORS

Operation by conventional handwheel or lever is not always suitable to perform the function of the Valve.

To gain mechanical advantage of to retard the closing and opening speed of operation a manual gear unit may be furnished.

KJS valves can be furnished with any of these many valve operations. It is extremely important that the correct method of operations is selected and that all relevant details of the required device are stated when ordering the valve/operator unit.

MOTOR ACTUATORS

KJS can install actuators on valves to meet customer's needs to automate and provide remote control of the piping system. Actuators may be driven by AIR Motor or Electric motor.

We install the actuators specified by the customer to meet operations needs. The following information needs to be specified when ordering actuators.

- A) Flow media
- B) Maximum differential pressure
- C) Temperature
- D) Speed of operation of the valve
- E) Power supply
- F) Type of motor-dust tight, weather proof, explosion proof etc.
- G) Control station
- H) Accessories
- I) Other requirements.

HYDRAULIC OR PNEUMATIC ACTUATORS

KJS valves can be fitted with pneumatic or hydraulic cylinder actuators. These units can provide adjustment of valve opening or closing times without changing actuator units.

These units can provide fail open, fail closed or fail As-is operation.

Please specify the following when ordering these units.

- A) Operation temperature
- B) Temperature at location of valve / actuator unit
- C) Flow media
- D) Maximum delta pressure
- F) Failure mode
- G) Controls
- H) Accessories
- I) Power source
- J) Other requirements

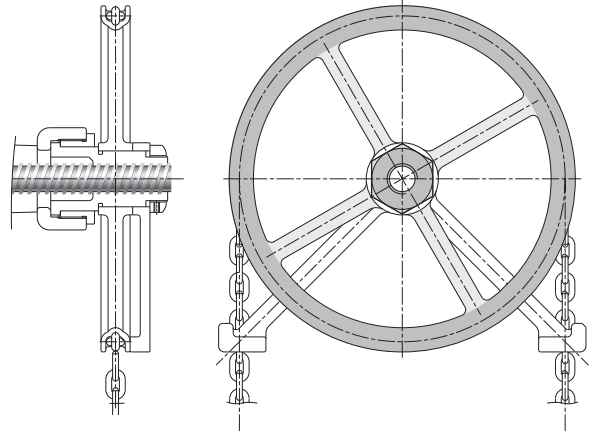


ACCESSORIES



CHAINWHEELS

Chainwheels can be furnished complete with chainwheel and chain guide. They are means of safe and convenient floor operation of valves in valves in overhead or inaccessible locations.



BY-PASSES AND LIMIT SWITCHES

A by-pass is utilized to balance line pressure and to prevent a rapid rise in temperature in steam lines.

When the main valve is starting to be opened, the seat surface is exposed to severe forces of the flow media. With the pressure equalized by means of the By-pass, these forces are reduced and you can expect longer service life from the valve seats.

By-pass assemblies are available on Gate, Globe(both "T" & "Y" pattern) angle valves and check valves.

Please consult your KJS sales engineer for additional data.

Valves can be furnished with all welded-on-by-passes when specified. By-passes are equipped with a single O.S & Y. globe valve with a pressure-temperature rating and corrosion resistance equal to or exceeding that of the main valve.

MAIN VALVE SIZE	1½" ~ 4"	5" ~ 8"	10" ~ 36"
BY - PASS SIZE	½"	¾"	1"

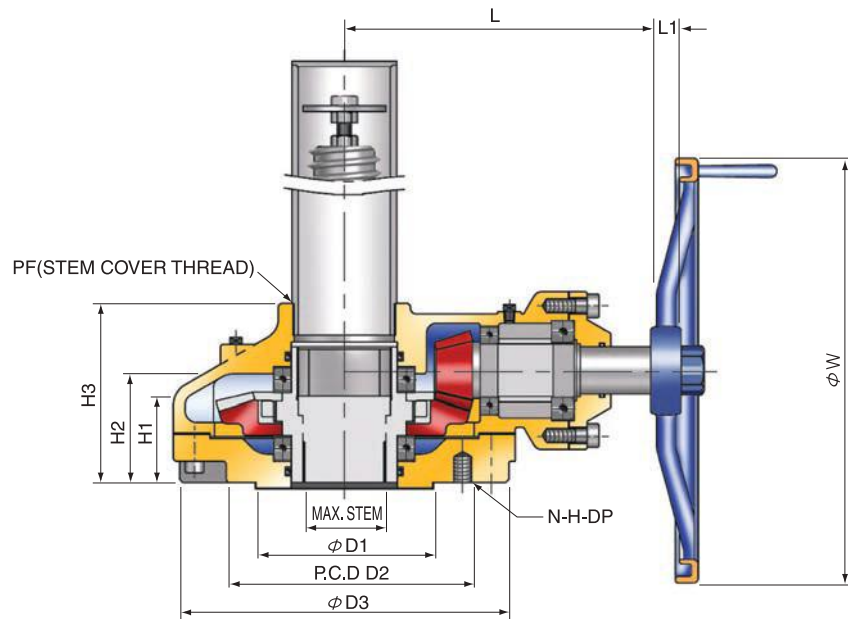
By-passes on valves 4" and larger are furnished to comply with MSS SP-45, Series A.

EXTENSION STEMS AND FLOOR STANDS

Where valves are installed under platforms, floors or in remote locations, KJS can provide stem extensions to provide convenient and safe operation of valves. Stem extensions can be adapted to valves to provide remote operation of valves. Stem extensions can be free standing or supported. Stem extensions can be used in conjunction with floor stands and manual gear units. Floor stands can be furnished with manual or motor operated actuators.

ACCESSORIES

Gear Operator



DIMENSION

Unit : mm

DIM MODEL	TYPE	PLANGE SIZE.	BASE PART				EXTERNAL PART				INPUT SHAFT PART		HAND WHEEL φW	STEM COVER				
			φD1	D2	P.C.D N-H-DP		φD3	H	H1	H2	H3	L			L1	φPD	KEY	
SB-VS10	A	F-10	70	102	4-M10-17 3/8"-16UNC	140	3	50	68	103	121	34	26	8×7	250	PF 2"		
SB-VS20		F-12	85	125	4-M12-20 1/2"-13UNC	150		60	76	110	131				300			
SB-V0		F-14	100	140	4-M16-25 5/8"-11UNC	175		70	76	120	160				400			
SB-V1		F-16	130	165	4-M20-30 3/4"-10UNC	210		82	96	141	172				500			
SB-V2		(F-16), F-20	140	205	8-M16-30 5/8"-11UNC	250		94	105	156	209				630		PF 3"	
SB-V3		F-25	200	254	8-M16-32 5/8"-11UNC	300		103	109	168	227				710		PF 4"	
SB-V35		B	F-30	230	298	8-M20-40 3/4"-10UNC		350	122	138	200				266		800	PF 5"
SB-V4								133	150	215	291				44		38	12×8
SB-V5	F-35		260	356	8-M30-45 1"-8UNC	415	164	175	251	334				PF 6"				
SB-V6	C	F-40	300	406	8-M36-55 1 1/4"-7UNC	475	182	201	284	375	58	50	16×10	1000	PF 8"			
SB-V7					12-M36-55 1 1/4"-7UNC	560	208	222	316	409				1000	PF 8"			
SB-V8		F-48	370	483			234	258	360	471	58	50	16×10	1000	PF 10"			

SELECTION CHART FOR MANUAL OPERATORS

MODEL	SIZE GEAR RATIO	MAX. Stam Acceptance		MAX. Thrust Capacity		MAX. Torque Capacity		WEIGHT Kg
		TW	KEY	kN	lbf	N · m	Ft · lbf	
SB-VS10	2.5 : 1	30	22 (8×7)	75.5	16970	220	162	8
SB-VS20	3 : 1	40	32 (10×8)	113	25400	370	273	11
SB-V0	3.25 : 1	46	38 (12×8)	127	28550	600	442	16
SB-V1	3.5 : 1	55	45 (14×9)	141	31700	980	723	23
SB-V2	4 : 1	62	52 (16×10)	190	42710	1500	1106	33
SB-V3	5 : 1	72	60 (18×11)	288	64750	2500	1844	48
SB-V35	5.5 : 1	85	72 (20×12)	350	78680	3500	2581	78
SB-V4	6 : 1	98	84 (22×14)	400	89920	5200	3835	103
SB-V5	6.5 : 1	115	100 (28×16)	510	114650	7800	5753	158
SB-V6	7 : 1	130	115 (32×18)	2310	519300	13000	9588	237
SB-V7	7.55 : 1	150	130 (36×20)	2500	562020	17600	12981	320
SB-V8	8 : 1	180	160 (40×22)	4100	921700	26000	19176	460

CONFORMANCE STANDARDS
MATERIAL COMPARISONS FOR ASTM AND JIS
MATERIAL PROPERTIES
BUTT-WELDING ENDS
FLANGE DIMENSION & TEMPLATES FOR DRILLING
RELATIONSHIP BETWEEN NOMINAL PIPE SIZE & INSIDE
DIAMETER
VALVE BODY MINIMUM WALL THICKNESS
TEMPERATURE CONVERSION
ANSI PRESSURE TEMPERATURE RATINGS
HYDROSTATIC TEST PRESSURE TO ANSI B16.34
CONVERSION TABLES
DATA FOR CALCULATION OF FLOW AND/OR PRESSURE DROP
HARDNESS CONVERSION
CORROSION TABLES



CONFORMANCE STANDARDS

KJS VALVES CONFORM TO THE FOLLOWING STANDARDS AS APPLICABLE TO CUSTOMER REQUIREMENTS.

API Spec 6D Latest Edition	: API Specification for Pipeline Valves
API Standard 598 Latest Edition	: Valve Inspection and Test
API Standard 600 Latest Edition	: Steel Gate Valves, Flanged and Butt-welding Ends
API Standard 603 Latest Edition	: Class 150, Cast Corrosion-Resistant Flanged-End Gate Valves
API Standard 605 Latest Edition	: Large-Diameter Carbon Steel Flanges
ASME B16.5 Latest Edition	: Steel Pipe Flanges and Flanged Fittings
ASME B16.10 Latest Edition	: Face-to-Face and End-to-End Dimensions of Ferrous Valves
ASME B16.25 Latest Edition	: Butt-welding Ends
ASME B16.34 Latest Edition	: Valves-Flanged, Threaded, And Welding End
MSS Standard Practice SP-6 Latest Edition	: Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
MSS Standard Practice SP-25 Latest Edition	: Standard Marking System for Valves, Fittings, Flanges and Unions
MSS Standard Practice SP-44 Latest Edition	: Steel Pipe Line Flanges
MSS Standard Practice SP-45 Latest Edition	: By-Pass and Drain Connection Standard
BS 1414 Latest Edition	: Steel wedge gate valves (flange and butt-welding ends)
BS 1868 Latest Edition	: Steel check valves (flange and butt-welding ends)
BS 1873 Latest Edition	: Steel globe and globe stop and check valves (flange and butt-welding ends)
BS 5352 Latest Edition	: Steel wedge gate, globe and check valves (50mm & smaller)
BS 6364 Latest Edition	: Valve for cryogenic service
JIS B2003 Latest Edition	: General Rules for Inspection of Valves
JIS B2201 Latest Edition	: Pressure Ratings for Ferrous Material Pipe Flanges
JIS B2203 Latest Edition	: Tolerances for Pipe Flanges
JIS B2210 Latest Edition	: Basic Dimensions of Ferrous Material Pipe Flanges
JIS B2071 Latest Edition	: 10 kgf/cm ² Cast Steel Flanged Glove Valves
JIS B2073 Latest Edition	: 10 kgf/cm ² Cast Steel Flanged Gate Valves (Outside Screw Type)
JIS B2074 Latest Edition	: 10 kgf/cm ² Cast Steel Flanged Swing Check Valves
JIS B2081 Latest Edition	: 20 kgf/cm ² Cast Steel Flanged Glove Valves
JIS B2083 Latest Edition	: 20 kgf/cm ² Cast Steel Flanged Gate Valves (Outside Screw Type)
JIS B2084 Latest Edition	: 20 kgf/cm ² Cast Steel Flanged Swing Check Valves
JPI-7S-15 Latest Edition	: Steel Pipe Flanges for The Petroleum Industry
JPI-7S-23 Latest Edition	: Ring Joint Gaskets and Grooves for Petroleum Industry
JPI-7S-24 Latest Edition	: Standard Marking System for valves
JPI-7S-39 Latest Edition	: Valve Inspection and Test
JPI-7S-46 Latest Edition	: Cast Steel Flanged Valves for the Petroleum Industry (Class 150,300)
JPI-7S-47 Latest Edition	: Cast Steel Valves for the Petroleum Industry, Flanged or Butt-welding Ends (Class 600 to 2500)
API	: American Petroleum Institute
ANSI	: American National Standards Institute
ASTM	: American Society for Testing and Materials
ASME	: American Society of Mechanical Engineers
ASS	: Manufacturers Standardization society of the Valve and Fitting Industry
BS	: British Standards Institution
JIS	: Japanese Industrial Standards
JPI	: Japan Petroleum Institute
NACE	: National Association of corrosion Engineers
AWS	: American welding Society

MATERIAL COMPARISONS FOR ASTM & JIS(CASTING & FORGING)

General Classification		"ASTM" Symbols		"JIS" Symbols		Service Temp
		Castings	Forgings	Castings	Forgings	
HIGH - TEMPERATURE	Cast Iron	A126 - Class B		G5501 - FC20		205℃
	Cast Iron	A126 - Class C		G5501 - FC25		250℃
	Carbon Steel	A216 - WCA		G5151 - SCPH1		420℃
	Carbon Steel	A216 - WCB	A105	G5151 - SCPH2	G3202 - SFVC 2A	425℃
	½ Mo Steel	A217 - WC1	A182 - F1	G5151 - SCPH11	G3203 - SFVA F1	455℃
	1¼ Cr - ½Mo	A217 - WC6	A182 - F11	G5151 - SCPH21	G3203 - SFVA F11A	593℃
	2¼ Cr - 1Mo	A217 - WC9	A182 - F22	G5151 - SCPH32	G3203 - SFCA F22A	593℃
	5Cr - ½Mo	A217 - C5	A182 - F5a	G5151 - SCPH61	G3203 - SFVA F5D	650℃
LOW - TEMPERATURE	9Cr - 1Mo	A217 - C12	A182 - F9		G3203 - SFVA F9	650℃
	Al Steel	A352 - LCB, LCC	A350 - LF2	G5121 - SCPL1	G3205 - SFL2	-46℃
	½ Mo Steel	A352 - LC1		G5121 - SCPL11		-59℃
	2½ Ni Steel	A352 - LC2		G5121 - SCPL21		-73℃
STAINLESS STEEL	3½ Ni Steel	A352 - LC3	A350 - LF3	G5121 - SCPL31	G3205 - SFL3	-101℃
	13Cr - ½Mo	A217 - CA15	A182 - F6a	G5121 - SCS1	G4303 - 410	550℃
	18Cr - 8Ni(CO.03)	A351 - CF3	A182 - F304L	G5121 - SCS19A	G3214 - SUS F304L	800℃
	18Cr - 8Ni(CO.08)	A351 - CF8	A182 - F304	G5121 - SCS13A	G3214 - SUS F304	800℃
	18Cr - 8Ni - 2Mo(CO.03)	A351 - CF3M	A182 - F316L	G5121 - SCS16A	G3214 - SUS F316L	800℃
	18Cr - 8Ni - 2Mo(CO.08)	A351 - CF8M	A182 - F316	G5121 - SCS14A	G3214 - SUS F316	800℃
	18Cr - 8Ni - Ti		A182 - F321		G3214 - SUS F321	800℃
	18Cr - 8Ni - Cb	A351 - CF8C	A182 - F347	G5121 - SCS21	G3214 - SUS F347	800℃
	22Cr - 12Ni	A351 - CH20		G5121 - SCS17		1200℃
	23Cr - 19Ni	A351 - CK20		G5121 - SCS18		1200℃
	19Cr - 27Ni - 2Mo - 3Cu	A351 - CN7M		G5121 - SCS23		1200℃

General Classification	"ASTM" Symbols	"JIS" Symbols	Service Temp
● HIGH - TEMPERATURE(BOLT)			
Mild Steel		G3101 - SS41	260℃
Carbon Steel	A307 - B	G4051 - S25C	204℃
5Cr - ½Mo	A193 - B5	G4107 - SNB5	600℃
1Cr - ??Mo	A193 - B7	G4107 - SNB7	550℃
Cr - Mo - Va	A193 - B16	G4107 - SNB16	600℃
18Cr - 8Ni	A193 - B8	G4303 - SUS304	800℃
18Cr - 10Ni - Cb	A193 - B8C	G4303 - SUS347	800℃
18Cr - 10Ni - Ti	A193 - B8T	G4303 - SUS321	800℃
18Cr - 12Ni - 2Mo	A193 - B8M	G4303 - SUS316	800℃
15Cr - 25Ni - Mo - Ti - V - B	A453 - 660		540℃

General Classification	"ASTM" Symbols	"JIS" Symbols	Service Temp
● HIGH - TEMPERATURE(BOLT)			
Cr - Mo	A320 - L7		-101℃
18Cr - 8Ni	A320 - B8	G4303 - SUS304	-196℃
18Cr - 10Ni - Cb	A320 - B8C	G4303 - SUS347	-196℃
18Cr - 10Ni - Ti	A320 - B8T	G4303 - SUS321	-196℃
18Cr - 12Ni - 2Mo	A320 - B8M	G4303 - SUS316	-196℃
● NUT			
Carbon Steel(C 0.15)		G4051 - S20C	420℃
Carbon Steel(C 0.40)	A194 - 2H	G4051 - S45C	550℃
Carbon Mo Steel	A194 - 4		600℃
18Cr - 8Ni	A194 - 8	G4303 - SUS304	800℃
18Cr - 10Ni - Cb	A194 - 8C	G4303 - SUS347	800℃
18Cr - 10Ni - Ti	A194 - 8T	G4303 - SUS321	800℃
18Cr - 12Ni - 2Mo	A194 - 8M	G4303 - SUS316	800℃

Body Materials	Temperature Degress F.	Bolts Material Specifications	Nuts
Carbon Steel(Grade WCB)	-20 to 800	ASTM A193 Gr B7	ASTM A194 Gr 2H
Carbon Steel(Grade LCB)	-50 to 650	ASTM A320 Gr L7	ASTM A194 Gr 4
Carbon Moly(Grade WC1)	-20 to 850	ASTM A193 Gr B7	ASTM A194 Gr 2H
1¼Cr - ½Mo(Grade WC6)	-20 to 1000	ASTM A193 Gr B7	ASTM A194 Gr 2H
2¼Cr - 1Mo(Grade WC9)	-20 to 1000	ASTM A193 Gr B7	ASTM A193 Gr B7
	1000 to 1050	ASTM A193 Gr B16	ASTM A194 Gr 4
5Cr - ½Mo(Grade C5)	-20 to 1000	ASTM A193 Gr B7	ASTM A194 Gr 2H
	1000 to 1100	ASTM A193 Gr B16	ASTM A194 Gr 4
9Cr - 1Mo(Grade C12)	-20 to 1000	ASTM A193 Gr B7	ASTM A194 Gr 8H
	1000 to 1100	ASTM A193 Gr B16	ASTM A194 Gr 2
Type 304(Grade CF8)	-425 to 100	ASTM A320 Gr B8	ASTM A194 Gr 8
	100 to 1500	ASTM A193 Gr B8	ASTM A194 Gr 8
Type 316(Grade CF8M)	-425 to 100	ASTM A320 Gr B8	ASTM A194 Gr 8
	100 to 1500	ASTM A193 Gr B8M	ASTM A194 Gr 8M
3½Ni(Grade LC3)	-150 to -50	ASTM A320 Gr B7	ASTM A194 Gr 8
	-50 to 650	With Charpy Test or 8M ASTM A193 Gr B7	ASTM A194 Gr 2H

MATERIAL PROPERTIES

CASTING MATERIALS

CHEMICAL PROPERTIES

	Carbon Steel	CA-15	High Temp.	High Temp.	304-S. S.	316-S. S.	HASTESSLOY-B	304L-S. S.	316L-S. S.	Low Temp.	HIGH	TEMP
ASTM Steel	A-216	A-217	A-217	A-217	A-351	A-351	A-494	A-351	A-351	A-352	A-217	A-217
Grade	WCB	CA-15	WC6	WC9	CF8	CF8M	N-12MV	CF3	CF3M	LCB	C-5	C-12
C% Max.	0.30	0.15	0.20	0.18	0.08	0.08	0.12	0.03	0.03	0.03	0.20	0.20
Mn%	1.00Max	1.00	0.50-0.80	0.40-0.70	1.50	1.50	1.00	1.50	1.50	1.00	0.40-0.70	0.35-0.65
p% Max.	0.04	0.040	0.04	0.04	0.04	0.04	0.040	0.04	0.04	0.05	0.040	0.040
S% Max.	0.045	0.040	0.045	0.045	0.04	0.04	0.030	0.04	0.04	0.06	0.045	0.045
Ni%	0.50	1.00	-	-	8.00	9.00	Bal	8.00-12.0	9.00-13.0	-	-	-
Cr%	0.40	11.5-14.0	1.00-1.50	2.00-2.75	18.0-21.0	18.0-21.0	1.00	17.0-21.0	17.0-21.0	-	4.0-6.50	8.00-10.00
Mo%	0.25	-	0.45-0.65	0.90-1.20	-	2.00-3.00	26.0-30.0	-	2.00-3.00	-	0.45-0.65	0.90-1.20
Cu	0.0	-	-	-	-	-	-	-	-	-	-	-
Si	0.30	1.50	0.60	0.60	2.00	2.00	1.00	2.00	1.50	0.60	0.75	1.00
Fe	-	-	-	-	-	-	4.0-6.0	-	-	-	-	-
V	-	-	-	-	-	-	0.20-0.60	-	-	-	-	-

PHYSICAL PROPERTIES

Tensile Strength Min. Ksi Mpa	70 485	90-115 621-793	70 485	70 485	70 485	70 485	76 525	70 485	70 485	65 450	90-115 621-793	90-115 621-793
Yield Point Min. Ksi Mpa	30 205	65 448	40 275	40 275	28 195	30 205	40 275	30 205	30 205	35 240	60 414	60 414
Elongation in 2 inch (50mm) % Min.	22	18	20	20	35	30	6	35	30	24	18	18
Reduction of Area % Min.	35	30	35	35	-	-	-	-	-	35	35	35

WROUGHT MATERIALS

CHEMICAL PROPERTIES

	11-13% Cr	Ductile	Carbon Steel	B - 8F	321 - S. S.	304 - S. S.	316 - S. S.	304L - S. S.	316L - S. S.	Hard Facing	Bolts	Nuts
ASTM Std.	A-182	A-439	ASTM	A-320	A-182	A-182	A-182	A-182	A-182	KLS	A-193	A-194
Grade	F6a	D2C	A-105	B-8F	F-321	F-304	F-316	F-304L	F-316L	HF-6R	B7	2H
C% Max.	0.15	0.29	0.22-0.35	0.15	0.08	0.08	0.08	0.035	0.035	1.05	0.38-0.48	0.04
Si% Max	1.00	1.00-3.00	0.35	1.00	1.00	1.00	1.00	1.00	1.00	1.11	0.15-0.35	-
Mn% Max	1.00	1.80-2.40	0.60-1.05	2.00	2.00	2.00	2.00	2.00	2.00	0.04	0.75-1.00	-
p% Max.	0.04	0.08	0.04	0.20	0.030	0.04	0.04	0.040	0.040	0.04	0.04	0.04
S% Max.	0.03	-	0.05	0.150-0.350	0.030	0.03	0.03	0.030	0.030	0.04	0.04	0.05
Ni%	0.50	21.0-24.0	-	8.00-10.00	9.00-12.00	8.0-11.0	10.0-14.0	8.00-13.0	10.00-15.00	-	-	-
Cr%	11.5-14.5	0.50	-	17.00-19.00	17.00Min	18.0-20.0	16.0-18.0	18.0-20.0	16.00-18.00	28.3	0.80-1.10	-
Mo%	-	-	-	-	-	-	2.00-3.00	-	2.00-3.00	-	0.15-0.25	-
Ti%	-	-	-	-	C% × 5-0.06	-	-	-	-	-	-	-
Fe%	Bal.	-	-	-	-	-	-	-	-	0.30	Bal.	Bal.
W%	-	-	-	-	-	-	-	-	-	4.20	-	-
Co%	-	-	-	-	-	-	-	-	-	Bal.	-	-

PHYSICAL PROPERTIES

Tensile Strength Min. Ksi Mpa	85 586	58 400	70 483	75 517	75 517	75 517	75 517	70 483	70 493	-	125 862	175 -
Yield Point Min. Ksi Mpa	55 379	28 193	36 248	30 207	30 207	30 207	30 207	25 172	25 172	-	105 724	- -
Elongation in 2 inch (50mm) % Min	18	20	22	35	45	30	30	30	30	-	16	-
Reduction of Area % Min.	35	45	30	50	50	50	50	50	30	-	50	-

BUTT-WELDING ENDS

Dimensions of Butt - Welding Ends

ASME B16.25 - 2004

Nominal Pipe Size	Schedule Number or Wall	Outside Diameter(Cast Steel Valves) A		Nominal Inside Diameter B		Machined Inside Diameter C		Nominal Wall Thickness T	
		inch	mm	inch	mm	inch	mm	inch	mm
2½	40	2.96	75	2.469	63	2.479	62.95	0.203	5.15
	80			2.323	59	2.351	59.70	0.276	7.00
	160			2.125	54	2.178	55.30	0.375	9.55
	XXS			1.771	45	1.868	47.45	0.552	14.00
3	40	3.59	91	3.068	78	3.081	78.25	0.216	5.50
	80			2.900	74	2.934	74.50	0.300	7.60
	160			2.624	67	2.692	68.40	0.438	11.15
	XXS			2.300	58	2.409	61.20	0.600	15.25
3½	40	4.12	105	3.548	90	3.564	90.55	0.226	5.75
	80			3.364	85	3.402	86.40	0.318	8.10
4	40	4.62	117	4.026	102	4.044	102.70	0.237	6.00
	80			3.826	97	3.869	98.25	0.337	8.55
	120			3.624	92	3.692	93.80	0.438	11.15
	160			3.438	87	3.530	89.65	0.531	13.50
	XXS			3.152	80	3.279	83.30	0.674	17.0
5	40	5.69	144	5.047	128	5.070	128.80	0.258	6.55
	80			4.813	122	4.866	123.60	0.375	9.55
	120			4.563	116	4.647	118.05	0.500	12.70
	160			4.313	110	4.428	112.45	0.625	15.90
	XXS			4.063	103	4.209	106.90	0.750	19.05
6	40	6.78	172	6.065	154	6.094	154.80	0.280	7.10
	80			5.761	146	5.828	148.05	0.432	10.95
	120			5.501	140	5.600	142.25	0.562	14.25
	160			5.187	132	5.326	135.30	0.719	18.25
	XXS			4.897	124	5.072	128.85	0.864	21.95
8	40	8.78	223	7.981	203	8.020	203.70	0.322	8.20
	60			7.813	198	7.873	199.95	0.406	10.30
	80			7.625	194	7.709	195.80	0.500	12.70
	100			7.437	189	7.544	191.60	0.594	15.10
	120			7.187	183	7.326	186.10	0.719	18.25
	140			7.001	178	7.163	181.95	0.812	20.60
	160			6.875	175	7.053	179.15	0.875	22.25
	XXS			6.813	173	6.998	177.75	0.906	23.00
10	40	10.94	278	10.020	255	10.070	255.80	0.365	9.25
	60			9.750	248	9.834	249.80	0.500	12.70
	80			9.562	243	9.670	245.60	0.594	15.10
	100			9.312	237	9.451	240.05	0.719	18.25
	120			9.062	230	9.232	234.50	0.844	21.45
	140			8.750	222	8.959	227.55	1.000	25.40
	160			8.500	216	8.740	222.00	1.125	28.60
12	STD	12.97	329	12.000	305	12.053	306.15	0.375	9.55
	40			11.938	303	11.999	304.75	0.406	10.30
	XS			11.750	298	11.834	300.60	0.500	12.70
	60			11.626	295	11.725	297.80	0.562	14.25
	80			11.374	289	11.505	292.25	0.688	17.50
	100			11.062	281	11.232	285.30	0.844	21.45
	120			10.750	273	10.959	278.35	1.000	25.40
	140			10.500	267	10.740	272.80	1.125	28.60
	160			10.126	257	10.413	264.50	1.312	33.30
14	STD	14.25	362	13.250	337	13.303	337.90	0.375	9.55
	40			13.124	333	13.192	335.10	0.438	11.15
	XS			13.000	330	13.084	332.35	0.500	12.70
	60			12.812	325	12.920	328.15	0.594	15.10
	80			12.500	318	12.646	321.20	0.750	19.05
	100			12.124	308	12.318	312.90	0.938	23.85
	120			11.812	300	12.044	305.90	1.094	27.80
	140			11.500	292	11.771	299.00	1.250	31.75
	160			11.188	284	11.498	292.05	1.406	35.70
16	STD	16.25	413	15.250	387	15.303	388.70	0.375	9.55
	40			15.000	381	15.084	383.15	0.500	12.70
	60			14.688	373	14.811	376.20	0.656	16.65
	80			14.312	364	14.482	367.85	0.844	21.45
	100			13.938	354	14.155	359.55	1.031	26.20
	120			13.562	344	13.826	351.20	1.219	30.95
	140			13.124	333	13.442	341.45	1.438	36.55
	160			12.812	325	13.170	334.50	1.594	40.50

BUTT-WELDING ENDS

Dimensions of Butt - Welding Ends

ASME B16.25 - 2004

Nominal Pipe Size	Schedule Number or Wall	Outside Diameter (Cast Steel Valves) A		Nominal Inside Diameter B		Machined Inside Diameter C		Nominal Wall Thickness T	
		inch	mm	inch	mm	inch	mm	inch	mm
18	STD	18.28	464	17.250	438	17.303	439.50	0.375	9.55
	XS			17.000	432	17.084	433.95	0.500	12.70
	40			16.876	429	16.975	431.15	0.562	14.25
	60			16.500	419	16.646	422.80	0.750	19.05
	80			16.124	410	16.318	414.50	0.938	23.85
	100			15.688	398	15.936	404.75	1.156	29.35
	120			15.250	387	15.553	395.05	1.375	34.95
	140			14.876	378	15.225	386.70	1.562	39.65
	160			14.438	367	14.842	377.00	1.781	45.25
20	STD	20.31	516	19.250	489	19.303	490.30	0.375	9.55
	XS			19.000	483	19.084	484.75	0.500	12.70
	40			18.812	478	18.920	480.55	0.594	15.10
	60			18.376	467	18.538	470.85	0.812	20.60
	80			17.938	456	18.155	461.15	1.031	26.20
	100			17.438	443	17.717	450.00	1.281	32.55
	120			17.000	432	17.334	440.30	1.500	38.10
	140			16.500	419	16.896	429.15	1.750	44.45
	160			16.062	408	16.513	419.45	1.969	50.00
22	STD	22.34	567	21.250	540	21.303	541.10	0.375	9.55
	XS			21.000	533	21.084	535.55	0.500	12.70
	60			20.250	514	20.428	518.85	0.875	22.25
	80			19.750	502	19.990	507.75	1.125	28.60
	100			19.250	489	19.553	496.65	1.375	34.95
	120			18.750	476	19.115	485.50	1.625	41.30
	140			18.250	464	18.678	474.40	1.875	47.65
	160			17.750	451	18.240	463.30	2.125	54.00
	24			STD	24.38	619	23.250	591	23.303
XS		23.000	584	23.084			586.35	0.500	12.70
30		22.876	581	22.975			583.55	0.562	14.25
40		22.624	575	22.755			578.00	0.688	17.50
60		22.062	560	22.263			565.50	0.969	24.60
80		21.562	548	21.826			554.40	1.219	30.95
100		20.938	532	21.280			540.50	1.531	38.90
120		20.376	518	20.788			528.00	1.812	46.00
140		19.876	505	20.350			516.90	2.062	52.35
160	19.312	491	19.857	504.35	2.344	59.55			
26	10	26.38	670	25.376	645	25.413	645.50	0.312	7.90
	20			25.000	635	25.084	637.15	0.500	12.70
28	10	28.38	721	27.376	695	27.413	696.30	0.312	7.90
	20			27.000	686	27.084	687.95	0.500	12.70
	30			26.750	679	26.865	682.35	0.625	15.90
30	10	30.38	772	29.376	746	29.413	747.10	0.312	7.90
	20			29.000	737	29.084	738.75	0.500	12.70
	30			28.750	730	28.865	733.15	0.625	15.90
32	10	32.50	825	31.376	797	31.413	797.90	0.312	7.90
	20			31.000	787	31.084	789.55	0.500	12.70
	30			30.750	781	30.865	783.95	0.625	15.90
	40			30.624	778	30.755	781.20	0.688	17.50
34	10	34.50	876	33.376	848	33.413	848.70	0.312	7.90
	20			33.000	838	33.084	840.35	0.500	12.70
	30			32.750	832	32.865	833.75	0.625	15.90
	40			32.624	829	32.755	832.00	0.688	17.50
36	10	36.50	927	35.376	899	35.413	899.50	0.312	7.90
	20			35.000	889	35.084	891.15	0.500	12.70
	30			34.750	883	34.865	885.55	0.625	15.90
	40			34.500	876	34.646	880.00	0.750	19.05

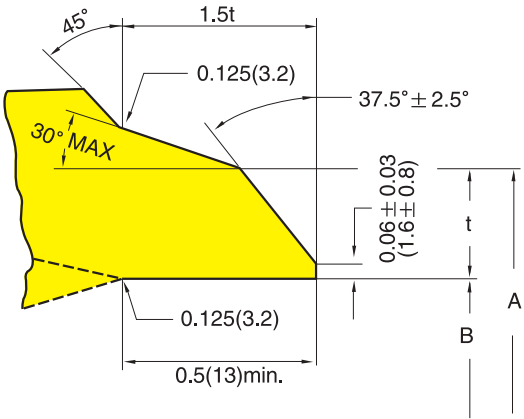
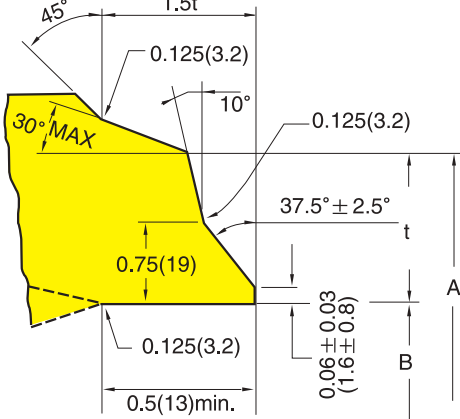
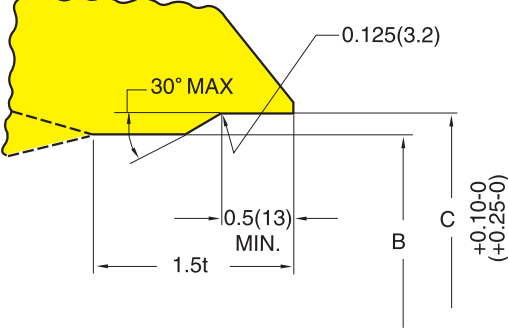
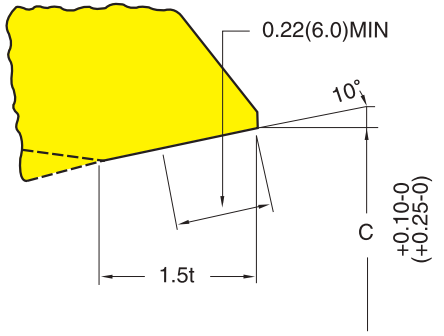
NOTES

STC - standard wall thickness
 XS - extra - strong wall thickness
 XXS - double extra - strong wall thickness

BUTT-WELDING ENDS

STANDARD PREPARATION OF VALVE BUTT WELDING ENDS

ASME B16.25 - 2004

TYPE_A	TYPE_B
 <p>For Wall Thickness(t) 0.188(4.8) to 0.875(22.2) Inclusive</p>	 <p>For Wall Thickness(t) Greater Than 0.875(22.2)</p>
TYPE_C	TYPE_D
 <p>Inside Contour for Use with Rectangular Backing Ring</p>	 <p>Inside Contour for Use with Taper Backing Ring</p>

FORMULA

Dimension C for the bore of pipe, valve, welding neck flanges and pipe fittings when using continuous rectangular or taper backing rings is determined by the following formula:

$$C = A - 0.031(0.787) - 1.75t - 0.010(0.254)$$

where

A = Nominal outside diameter of pipe
 0.031(0.787) = Minus tolerance on OD of pipe (As covered by ASTM Specification having the more restrictive requirements such as A106, A335, etc.)

1.75 = Minimum wall of 87 1/2 percent of nominal wall (permitted by ASTM specification having the more restrictive requirements such as A106, A335, etc.) multiplied by two to convert into terms of diameter.

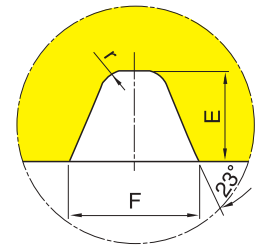
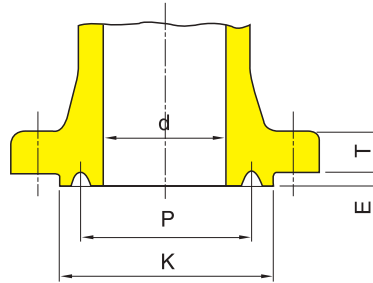
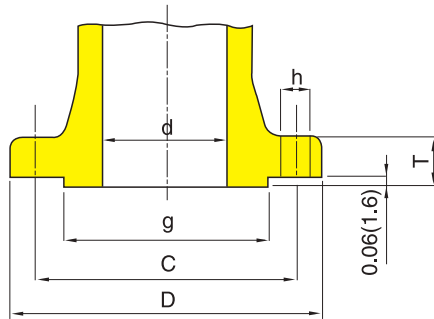
t = Nominal wall thickness of pipe in inches

0.010(0.254) = Plus machining tolerance on Bore C.

Linear dimensions are in inches with metric valves shown in millimeters in parenthesis.

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 150 Steel Flange Valves and Fittings

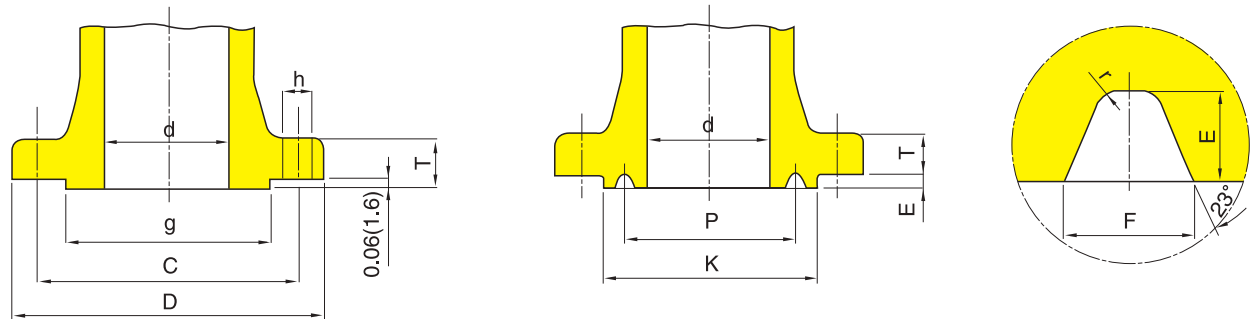


ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange		Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h	K			P	E		F	r	
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15	0.50 13	3.50 89	1.38 34.9	- -	0.44 11.5	2.38 60.3	0.62 16	4	1/2	- -	- -	-	- -	- -	- -
3/4 20	0.75 19	3.88 98	1.69 42.9	- -	0.50 13.0	2.75 69.9	0.62 16	4	1/2	- -	- -	-	- -	- -	- -
1 25	1.00 25	4.25 108	2.00 50.8	0.44' 11.3'	0.56 14.5	3.12 79.4	0.62 16	4	1/2	2.50 63.5	1.875 47.63	R15	0.25 6.35	0.344 8.74	0.03 0.8
1 1/4 32	1.25 32	4.62 117	2.50 63.5	0.50' 13.0'	0.62 16.0	3.50 88.9	0.62 16	4	1/2	2.88 73.0	2.250 57.15	R17	0.25 6.35	0.344 8.74	0.03 0.8
1 1/2 40	1.50 38	5.00 127	2.88 73.0	0.56' 14.5'	0.69 17.5	3.88 98.4	0.62 16	4	1/2	3.25 82.5	2.562 65.09	R19	0.25 6.35	0.344 8.74	0.03 0.8
2 50	2.00 51	6.00 152	3.62 92.1	0.62' 16.0'	0.75 19.5	4.75 120.6	0.75 20	4	5/8	4.00 102	3.250 82.55	R22	0.25 6.35	0.344 8.74	0.03 0.8
2 1/2 65	2.50 64	7.00 178	4.12 104.8	0.69' 17.5'	0.88 22.5	5.50 139.7	0.75 20	4	5/8	4.75 121	4.00 101.60	R25	0.25 6.35	0.344 8.74	0.03 0.8
3 80	3.00 76	7.50 191	5.00 127.0	0.75' 19.5'	0.94 24.0	6.00 152.4	0.75 20	4	5/8	5.25 133	4.50 144.30	R29	0.25 6.35	0.344 8.74	0.03 0.8
3 1/2 90	3.50 89	8.50 216	5.50 139.7	0.8' 20.5'	0.94 24.0	7.00 177.8	0.75 20	8	5/8	6.06 154	5.188 131.76	R33	0.25 6.35	0.344 8.74	0.03 0.8
4 100	4.00 102	9.00 229	6.19 157.2	0.94 24.0	7.50 190.5	0.75 20	0.75 20	8	5/8	6.75 171	5.875 149.23	R36	0.25 6.35	0.344 8.74	0.03 0.8
5 125	5.00 127	10.00 254	7.31 185.7	0.94 24.0	8.50 215.9	0.88 23	0.88 23	8	3/4	7.62 194	6.750 171.45	R40	0.75 6.35	0.344 8.74	0.03 0.8
6 150	6.00 152	11.00 279	8.50 215.9	1.00 25.5	9.50 241.3	0.88 23	0.88 23	8	3/4	8.62 219	7.625 193.68	R43	0.25 6.35	0.344 8.74	0.03 0.8
8 200	8.00 203	13.50 343	10.62 269.9	1.12 29.0	11.75 298.4	0.88 23	0.88 23	8	3/4	10.75 273	9.750 247.65	R48	0.25 6.35	0.344 8.74	0.03 0.8
10 250	10.00 254	16.00 406	12.75 323.8	1.19 30.5	14.25 361.9	1.00 26	1.00 26	12	7/8	13.00 330	12.000 304.80	R52	0.25 6.35	0.344 8.74	0.03 0.8
12 300	12.00 305	19.00 483	15.00 381.0	1.25 32.0	17.00 431.8	1.00 26	1.00 26	12	7/8	16.00 406	15.000 381.00	R56	0.25 6.35	0.344 8.74	0.03 0.8
14 350	13.25 337	21.00 535	16.25 412.8	1.38 35.0	18.75 476.2	1.12 29	1.12 29	12	1	16.75 425	15.625 396.88	R59	0.25 6.35	0.344 8.74	0.03 0.8
16 400	15.25 387	23.50 595	18.50 469.9	1.44 37.0	21.25 539.7	1.12 29	1.12 29	16	1	19.00 483	17.875 454.03	R64	0.25 6.35	0.344 8.74	0.03 0.8
18 450	17.25 438	25.00 635	21.00 533.4	1.56 40.0	22.75 577.8	1.25 32	1.25 32	16	1 1/8	21.50 546	20.375 517.53	R68	0.25 6.35	0.344 8.74	0.03 0.8
20 500	19.25 489	27.50 700	23.00 584.2	1.69 43.0	25.00 635.0	1.25 32	1.25 32	20	1 1/8	23.50 597	22.000 558.80	R72	0.25 6.35	0.344 8.74	0.03 0.8
24 600	23.25 591	32.00 815	27.25 692.2	1.88 48.0	29.50 749.3	1.38 35	1.38 35	20	1 1/4	28.00 711	26.500 673.10	R76	0.25 6.35	0.344 8.74	0.03 0.8

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 300 Steel Flange Valves and Fittings

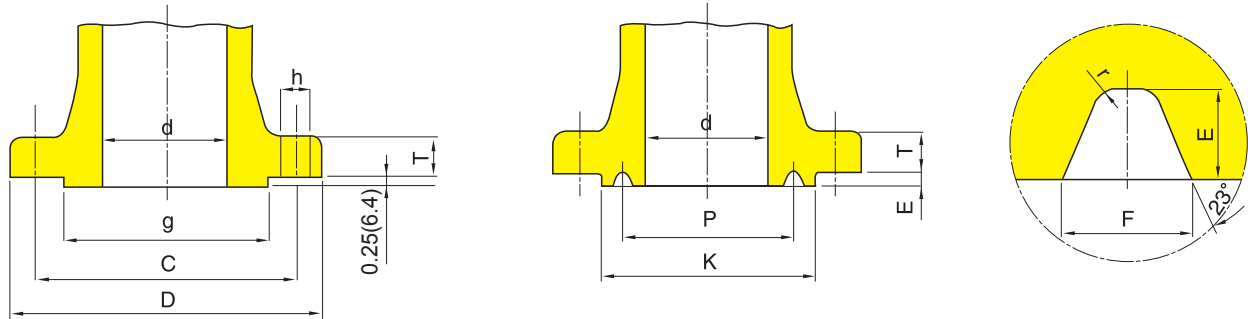


ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange	Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h			K	P		E	F	r
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15	0.50 13	3.75 95	1.38 34.9	0.56 14.5	2.62 66.7	0.62 16	4	1/2	2.00 51.0	1.344 34.13	R11	0.219 5.56	0.281 7.14	0.03 0.8
3/4 20	0.75 19	4.62 117	1.69 42.9	0.62 16.0	3.25 82.5	0.75 20	4	5/8	2.50 63.5	1.688 42.86	R13	0.250 6.35	0.344 8.74	0.03 0.8
1 25	1.00 25	4.88 124	2.00 50.8	0.69 17.5	3.50 88.9	0.75 20	4	5/8	2.75 70.0	2.000 50.80	R16	0.750 6.35	0.344 8.74	0.03 0.8
1 1/4 32	1.25 32	5.25 133	2.50 63.5	0.75 19.5	3.88 98.4	0.75 20	4	5/8	3.12 79.5	2.375 60.33	R18	0.250 6.35	0.344 8.74	0.03 0.8
1 1/2 40	1.50 38	6.12 156	2.88 73.0	0.81 21.0	4.50 114.3	0.88 23	4	3/4	3.56 90.5	2.688 68.26	R20	0.250 6.35	0.344 8.74	0.03 0.8
2 50	2.00 51	6.50 165	3.62 92.1	0.88 22.5	5.00 127.0	0.75 20	8	5/8	4.25 108	3.250 82.55	R23	0.312 7.92	0.469 11.91	0.03 0.8
2 1/2 65	2.50 64	7.50 191	4.12 104.8	1.00 25.5	5.88 149.2	0.88 23	8	3/4	5.00 127	4.000 101.60	R26	0.312 7.92	0.469 11.91	0.03 0.8
3 80	3.00 76	8.25 210	4.00 127.0	1.12 29.0	6.62 168.3	0.88 23	8	3/4	5.75 146	4.875 123.83	R31	0.312 7.92	0.469 11.91	0.03 0.8
3 1/2 90	3.50 89	9.00 229	5.50 139.7	1.19 30.5	7.25 184.1	0.88 23	8	3/4	6.25 159	5.188 131.76	R34	0.312 7.92	0.469 11.91	0.03 0.8
4 100	4.00 102	10.00 254	6.19 157.2	1.25 32.0	7.88 200.0	0.88 23	8	3/4	6.88 175	5.875 149.23	R37	0.312 7.92	0.469 11.91	0.03 0.8
5 125	5.00 127	11.00 279	7.31 185.7	1.38 35.0	9.25 234.9	0.88 23	8	3/4	8.25 210	7.125 180.98	R41	0.312 7.92	0.469 11.91	0.03 0.8
6 150	6.00 152	12.50 318	8.50 215.9	1.44 37.0	10.62 269.9	0.88 23	12	3/4	9.50 241	8.312 211.14	R45	0.312 7.92	0.469 11.91	0.03 0.8
8 200	8.00 203	15.00 381	10.62 269.9	1.62 41.5	13.00 330.2	1.00 26	12	7/8	11.88 302	10.265 269.88	R49	0.312 7.92	0.469 11.91	0.03 0.8
10 250	10.00 254	17.50 445	12.75 323.8	1.88 48.0	15.25 387.3	1.12 29	16	1	14.00 356	12.750 323.85	R53	0.312 7.92	0.469 11.91	0.03 0.8
12 300	12.00 305	20.50 520	15.00 381.0	2.00 51.0	17.75 450.8	1.25 32	16	1 1/8	16.25 413	15.000 381.00	R57	0.312 7.92	0.469 11.91	0.03 0.8
14 350	13.25 337	23.00 585	16.25 412.8	2.12 54.0	20.25 514.3	1.25 32	20	1 1/8	18.00 457	16.500 419.10	R61	0.312 7.92	0.469 11.91	0.03 0.8
16 400	15.25 387	25.50 650	18.50 469.9	2.25 57.5	22.50 571.5	1.38 35	20	1 1/4	20.00 508	18.500 469.90	R65	0.312 7.92	0.469 11.91	0.03 0.8
18 450	17.00 432	28.00 710	21.00 533.4	2.38 60.5	24.75 628.6	1.38 35	24	1 1/4	22.62 575	21.000 533.40	R69	0.312 7.92	0.469 11.91	0.03 0.8
20 500	19.00 483	30.50 775	23.00 584.2	2.50 63.5	27.00 685.8	1.38 35	24	1 1/4	25.00 635	23.000 584.20	R73	0.375 9.52	0.531 13.49	0.06 1.5
24 600	23.00 584	36.00 915	27.25 692.2	2.75 70.0	32.00 812.8	1.62 42	24	1 1/2	30.38 749	27.250 692.15	R77	0.438 11.13	0.656 16.66	0.06 1.5

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 600 Steel Flange Valves and Fittings

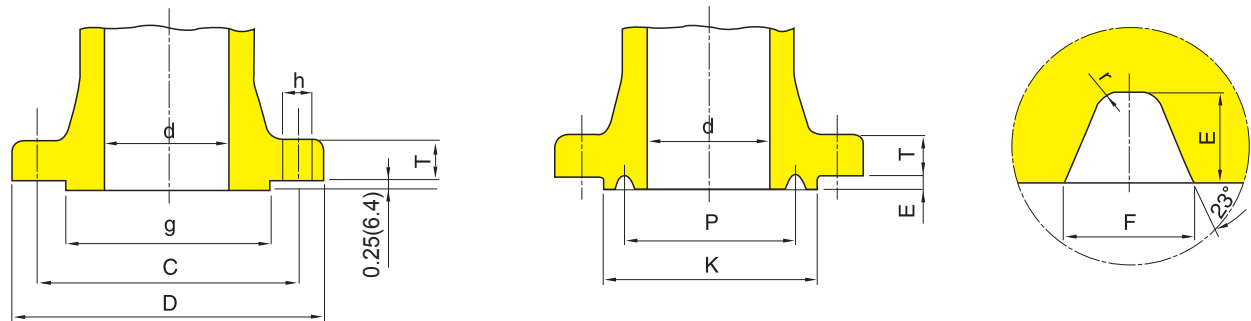


ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange	Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h			K	P		E	F	r
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15	0.50 13	3.75 95	1.38 34.9	0.56 14.5	2.62 66.7	0.62 16	4	1/2	2.00 51.0	1.344 34.13	R11	0.219 5.56	0.281 7.14	0.03 0.8
3/4 20	0.75 19	4.62 117	1.69 42.9	0.62 16.0	3.25 82.5	0.75 20	4	5/8	2.50 63.5	1.688 42.86	R13	0.250 6.35	0.344 8.74	0.03 0.8
1 25	1.00 25	4.88 124	2.00 50.8	0.69 17.5	3.50 88.9	0.75 20	4	3/4	2.75 70.0	2.000 50.80	R16	0.250 6.35	0.344 8.74	0.03 0.8
1 1/4 32	1.25 32	5.25 133	2.50 63.5	0.81 21.0	3.88 98.4	0.75 20	4	5/8	3.12 79.5	2.375 60.33	R18	0.250 6.35	0.344 8.74	0.03 0.8
1 1/2 40	1.50 38	6.12 156	2.88 73.0	0.88 22.5	4.50 114.3	0.88 23	4	3/4	3.56 90.5	2.688 68.26	R20	0.250 6.35	0.344 8.74	0.03 0.8
2 50	2.00 51	6.50 165	3.62 92.1	1.00 25.5	5.00 127.0	0.75 20	8	5/8	4.25 108	3.250 82.55	R23	0.312 7.92	0.469 11.91	0.03 0.8
2 1/2 65	2.50 64	7.50 191	4.12 104.8	1.12 29.0	5.88 149.2	0.88 23	8	3/4	5.00 127	4.000 101.60	R26	0.312 7.92	0.469 11.91	0.03 0.8
3 80	3.00 76	8.25 210	5.00 127.0	1.25 32.0	6.62 168.3	0.88 23	8	3/4	5.75 146	4.875 123.83	R31	0.312 7.92	0.469 11.91	0.03 0.8
3 1/2 90	3.50 89	9.00 229	5.50 139.7	1.38 35.0	7.25 184.1	1.00 26	8	7/8	6.25 159	5.188 131.76	R34	0.312 7.92	0.469 11.91	0.03 0.8
4 100	4.00 102	10.75 273	6.19 157.2	1.50 38.5	8.50 215.9	1.00 26	8	7/8	6.88 175	5.875 149.23	R37	0.312 7.92	0.469 11.91	0.03 0.8
5 125	5.00 127	13.00 330	7.31 185.7	1.75 44.5	10.50 266.7	1.12 29	8	1	8.25 210	7.125 180.98	R41	0.312 7.92	0.469 11.91	0.03 0.8
6 150	6.00 152	14.00 356	8.50 215.9	1.88 48.0	11.50 292.1	1.12 29	12	1	9.50 241	8.312 211.14	R45	0.312 7.92	0.469 11.91	0.03 0.8
8 200	7.88 200	16.50 419	10.62 269.9	2.19 56.0	13.75 349.2	1.25 32	12	1 1/8	11.88 302	10.265 269.88	R49	0.312 7.92	0.469 11.91	0.03 0.8
10 250	9.75 248	20.00 510	12.75 328.8	2.50 63.5	17.00 431.8	1.38 35	16	1 1/4	14.00 356	12.750 323.85	R53	0.312 7.92	0.469 11.91	0.03 0.8
12 300	11.75 298	22.00 560	15.00 381.0	2.62 67.0	19.25 488.9	1.38 35	20	1 1/4	16.25 413	15.000 381.00	R57	0.312 7.92	0.469 11.91	0.03 0.8
14 350	12.88 327	23.75 605	16.25 412.8	2.75 70.0	20.75 527.0	1.5 39	20	1 3/8	18.00 457	16.500 419.10	R61	0.312 7.92	0.469 11.91	0.03 0.8
16 400	14.75 375	27.00 685	18.50 469.9	3.00 76.5	23.75 603.2	1.62 42	20	1/2	20.00 508	18.500 469.90	R65	0.312 7.92	0.469 11.91	0.03 0.8
18 450	16.50 419	29.25 745	21.00 533.4	3.25 83.0	25.75 654.0	1.75 45	20	1 5/8	22.62 575	21.000 533.40	R69	0.312 7.92	0.469 11.91	0.03 0.8
20 500	18.25 464	32.00 815	23.00 584.2	3.50 89.0	28.50 723.9	1.75 45	24	1 5/8	25.00 635	23.000 584.20	R73	0.375 9.52	0.531 13.49	0.06 1.5
24 600	22.00 559	37.00 940	27.25 692.2	4.00 102.0	33.00 838.2	2.00 51	24	1 7/8	30.38 749	27.250 692.15	R77	0.438 11.13	0.656 16.66	0.06 1.5

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 900 Steel Flange Valves and Fittings



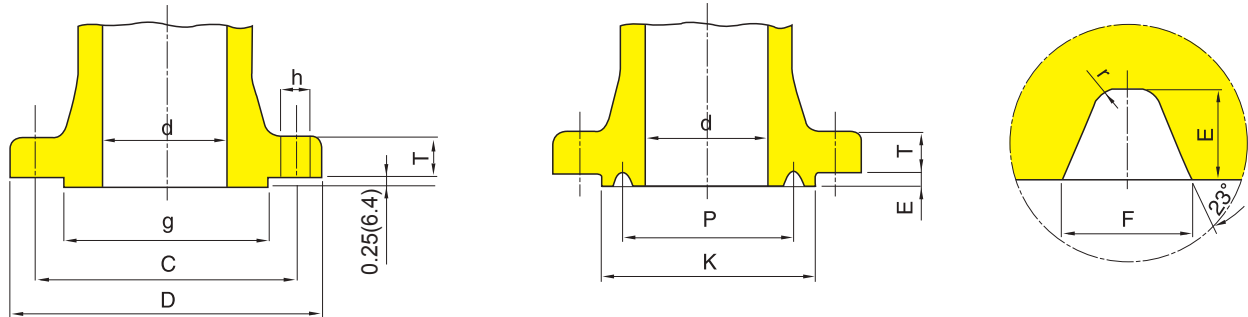
ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange	Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h			K	P		E	F	r
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15														
3/4 20														
1 25														
1 1/4 32														
1 1/2 40														
2 50														
2 1/2 65														
3 80	2.88 73	9.50 241	5.00 127.0	1.50 38.5	7.50 190.5	1.00 26	8	3/8	6.12 156	4.875 123.83	R31	0.312 7.92	0.469 11.91	0.03 0.8
4 100	3.88 98	11.50 292	6.19 157.2	1.75 44.5	9.25 234.9	1.25 32	8	1/2	7.12 181	5.875 149.23	R37	0.312 7.92	0.469 11.91	0.03 0.8
5 125	4.75 121	13.75 349	7.31 185.7	2.00 51.0	11.00 279.4	1.38 35	8	1 1/4	8.50 216	7.125 180.98	R41	0.312 7.92	0.469 11.91	0.03 0.8
6 150	5.75 146	15.00 381	8.50 215.9	2.19 56.0	12.50 317.5	1.25 32	12	1 1/2	9.50 241	8.312 211.14	R45	0.312 7.92	0.469 11.91	0.03 0.8
8 200	7.50 191	18.50 470	10.62 269.9	2.50 63.5	15.50 393.7	1.50 39	12	1 3/8	12.12 308	10.625 269.88	R49	0.312 7.92	0.469 11.91	0.03 0.8
10 250	9.38 238	21.50 545	12.75 323.8	2.75 70.0	18.50 469.9	1.50 39	16	1 3/4	14.25 362	12.750 323.85	R53	0.312 7.92	0.469 11.91	0.03 0.8
12 300	11.12 283	24.00 610	15.00 381.0	3.12 79.5	21.00 533.4	1.50 39	20	1 7/8	16.50 419	15.000 381.00	R57	0.312 7.92	0.469 11.91	0.03 0.8
14 350	12.25 311	25.25 640	16.25 412.8	3.38 86.0	22.00 558.8	1.62 42	20	2	18.38 467	16.500 419.10	R62	0.438 11.13	0.656 16.66	0.06 1.5
16 400	14.00 356	27.75 705	18.50 469.9	3.50 89.0	24.25 615.9	1.75 45	20	2 1/8	20.62 524	18.500 469.90	R66	0.438 11.13	0.656 16.66	0.06 1.5
18 450	15.75 400	31.00 785	21.00 533.4	4.00 102.0	27.00 685.8	2.00 51	20	2 1/4	23.38 594	21.000 533.40	R70	0.500 12.70	0.781 19.84	0.06 1.5
20 500	17.50 445	33.75 855	23.00 584.2	4.25 108.0	29.50 749.3	2.12 54	20	2	25.50 648	23.000 584.20	R74	0.500 12.70	0.781 19.84	0.06 1.5
24 600	21.00 533	41.00 104.0	27.25 692.2	5.50 140.0	35.50 901.7	2.62 67	20	2 1/2	30.38 772	27.250 692.15	R78	0.625 15.88	1.062 26.97	0.09 2.4

Use Class 1500 dimensions in these sizes.

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 1500 Steel Flange Valves and Fittings

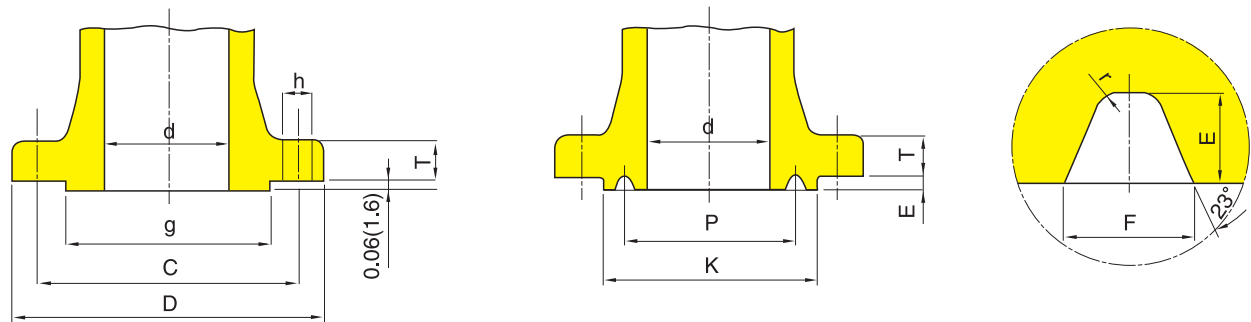


ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange	Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h			K	P		E	F	r
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15	0.50 13	4.75 121	1.38 34.9	0.88 22.5	3.25 82.5	0.88 23	4	3/4	2.38 60.5	1.562 39.69	R12	0.250 6.35	0.344 8.74	0.03 0.8
3/4 20	0.69 17	4.12 130	1.69 42.9	1.00 25.5	3.50 88.9	0.88 23	4	3/4	2.62 66.5	1.750 44.45	R14	0.250 6.35	0.344 8.74	0.03 0.8
1 25	0.88 22	5.88 149	2.00 50.8	1.12 29.0	4.00 101.6	1.00 26	4	7/8	2.81 71.5	2.000 50.80	R16	0.250 6.35	0.344 8.74	0.03 0.8
1 1/4 32	1.12 29	6.25 159	2.50 63.5	1.12 29.0	4.38 111.1	1.00 26	4	7/8	3.19 81.0	2.375 60.33	R18	0.250 6.35	0.344 8.74	0.03 0.8
1 1/2 40	1.38 35	7.00 178	2.88 73.0	1.25 32.0	4.88 123.8	1.12 29	4	1	3.62 92.0	2.688 68.26	R20	0.250 6.35	0.344 8.74	0.03 0.8
2 50	1.88 48	8.50 216	3.62 92.1	1.50 38.5	6.50 165.1	1.00 26	8	7/8	4.88 124	3.750 95.25	R24	0.312 7.92	0.469 11.91	0.03 0.8
2 1/2 65	2.25 57	9.62 244	4.12 104.8	1.62 41.5	7.50 190.5	1.12 29	8	1	5.38 137	4.250 107.95	R27	0.312 7.92	0.469 11.91	0.03 0.8
3 80	2.75 70	10.50 267	5.00 127.0	1.88 48.0	8.00 203.2	1.25 32	8	1 1/8	6.62 168	5.375 136.53	R35	0.312 7.92	0.469 11.91	0.03 0.8
4 100	3.62 92	12.25 311	6.19 157.2	2.12 54.0	9.50 241.3	1.38 35	8	1 1/4	7.62 194	6.375 161.93	R39	0.312 7.92	0.469 11.91	0.03 0.8
5 125	4.38 111	14.75 375	7.31 185.7	2.88 73.5	11.5 292.1	1.62 42	8	1 1/2	9.00 229	7.625 193.68	R44	0.312 7.92	0.469 11.91	0.03 0.8
6 150	5.38 137	15.50 394	8.50 215.9	3.25 83.0	12.50 317.5	1.50 39	12	1 3/8	9.75 248	8.312 211.14	R46	0.375 9.52	0.531 13.49	0.06 1.5
8 200	7.00 178	19.00 483	10.62 269.9	3.62 92.0	15.50 393.7	1.75 45	12	1 5/8	12.50 318	10.625 269.88	R50	0.438 11.13	0.656 16.66	0.06 1.5
10 250	8.75 222	23.00 585	12.75 328.8	4.25 108.0	19.00 482.6	2.00 51	12	1 7/8	14.62 371	12.750 323.85	R54	0.438 11.13	0.656 16.66	0.06 1.5
12 300	10.38 264	26.50 675	15.00 381.0	4.88 124.0	22.50 571.5	2.12 54	16	2	17.25 438	15.00 381.00	R58	0.562 14.27	0.906 23.01	0.06 1.5
14 350	11.38 289	29.50 750	16.25 412.8	5.25 133.5	25.00 635.0	2.38 61	16	2 1/4	19.25 489	16.500 419.10	R63	0.625 15.88	1.062 26.97	0.09 2.4
16 400	13.00 330	32.50 825	18.50 469.9	5.75 146.5	27.75 704.8	2.62 67	16	2 1/2	21.50 546	18.500 469.90	R67	0.688 17.48	1.188 30.18	0.09 2.4
18 450	14.62 371	36.00 915	21.00 533.4	6.38 162.0	30.50 774.7	2.88 74	16	2 3/4	24.12 613	21.000 533.40	R71	0.688 17.48	1.188 30.18	0.09 2.4
20 500	16.38 416	38.75 985	23.00 584.2	7.00 178.0	32.75 831.8	3.12 80	16	3	26.50 673	23.000 584.20	R75	0.688 17.48	1.312 33.32	0.09 2.4
24 600	19.62 498	46.00 117.0	27.25 692.2	8.00 203.5	39.00 990.6	3.62 93	16	3 1/2	31.25 794	27.250 692.15	R79	0.812 20.62	1.438 36.53	0.09 2.4

FLANGE DIMENSION & TEMPLATES FOR DRILLING

Dimensions of Class 2500 Steel Flange Valves and Fittings



ASME B16.5 - 2004

Nominal Size	Inside Diam	OD of Flange	Raised Face Diam.	Thickness of Flange	Diam. of Bolt Circle	Diam. of Bolt Holes	No. of Bolt	Diam of Bolt	Facing Diam.	Pitch Diam.	Ring No.	Depth Groove	Width of Groove	Groove Fillet Radius
	d	D	g	T	C	h			K	P		E	F	r
inch mm	inch mm	inch mm	inch mm	inch mm	inch mm	inch mm			inch mm	inch mm		inch mm	inch mm	inch mm
1/2 15	0.44 11	5.25 133	1.39 34.9	1.19 30.5	3.50 88.9	0.88 23	4	3/4	2.56 65.0	1.688 42.86	R13	0.250 6.35	0.344 8.74	0.03 0.8
3/4 20	0.56 14	5.50 140	1.69 42.9	1.25 32.0	3.75 95.2	0.88 23	4	3/4	2.88 73.0	2.000 50.80	R16	0.250 6.35	0.344 8.74	0.03 0.8
1 25	0.75 19	6.25 159	2.00 50.8	1.38 35.0	4.25 107.9	1.00 26	4	7/8	3.25 82.5	2.375 60.33	R18	0.250 6.35	0.344 8.74	0.03 0.8
1 1/4 32	1.00 25	7.25 184	2.50 63.5	1.50 38.5	5.12 130.2	1.12 29	4	1	4.00 102	2.844 72.23	R21	0.312 7.92	0.469 11.91	0.03 0.8
1 1/2 40	1.12 29	8.00 203	2.88 73.0	1.75 44.5	5.75 146.0	1.25 32	4	1 1/8	4.50 114	3.250 82.55	R23	0.312 7.92	0.469 11.91	0.03 0.8
2 50	1.50 38	9.25 235	3.62 92.1	2.00 51.0	6.75 171.4	1.12 29	8	1	5.25 133	4.000 101.60	R26	0.312 7.92	0.469 11.91	0.03 0.8
2 1/2 65	1.88 48	10.50 267	4.12 104.8	2.25 57.5	7.75 196.8	1.25 32	8	1 1/8	5.88 149	4.375 111.13	R28	0.375 9.52	0.531 13.49	0.06 1.5
3 80	2.25 57	12.00 305	5.00 127.0	2.62 67.0	9.00 228.6	1.38 35	8	1 1/4	6.62 168	5.000 127.00	R32	0.375 9.52	0.531 13.49	0.06 1.5
4 100	2.88 73	14.00 356	6.19 157.2	3.00 76.5	10.75 273.0	1.62 42	8	1 1/2	8.00 203	6.188 157.16	R38	0.438 11.13	0.656 16.66	0.06 1.5
5 125	3.62 92	16.50 419	7.31 185.7	3.62 92.5	12.75 323.8	1.88 48	8	1 3/4	9.50 241	7.500 190.50	R42	0.500 12.70	0.781 19.84	0.06 1.5
6 150	4.38 111	19.00 483	8.50 215.9	4.25 108.0	14.5 368.3	2.12 54	8	2	11.00 279	9.000 228.600	R47	0.500 12.700	0.781 19.84	0.06 1.5
8 200	5.75 146	21.75 550	10.62 269.9	5.00 127.0	17.25 438.1	2.12 54	12	2	13.38 340	11.000 279.40	R51	0.562 14.27	0.906 23.01	0.06 1.5
10 250	7.25 184	26.50 675	12.75 323.8	6.50 165.5	21.25 539.7	2.62 67	12	2 1/2	16.75 425	13.500 342.90	R55	0.688 17.48	1.188 30.18	0.09 2.4
12 300	8.62 219	30.00 760	15.00 381.0	7.25 184.5	24.38 619.1	2.88 74	12	2 3/4	19.50 495	16.000 406.40	R60	0.688 17.48	1.312 33.32	0.09 2.4

RELATIONSHIP BETWEEN NOMINAL PIPE SIZE AND INSIDE DIAMETER

This Annex is a nonmandatory part of ASME/ANSI B16.34-2004 and is provided for information purposes only.

The relationship between wall thickness and inside diameter shown in Table 3 is the basis for pressure rating of valves. By interpolation, a definitive design basis can be determined for any pressure-diameter-material combination. Following the evolution of standard dimensions for flanges in a series of rating classes, corresponding standard relationships were established between nominal pipe sizes and the inside diameter of fittings matching the rating class of the flanges.

These provided a useful design basis for the corresponding flanged end valves, subsequently extended in application to welding end valves, which in many cases are identical except for the pipe ends. Table A1 is based on the dimensions given in B16.5 dimensional tables as "Inside Diameter of Fitting." The values above nominal pipe size 24 for the lower pressure classes and above nominal pipe size 12 for Class 2500 are obtained by linear extrapolation.

TABLE A1 INSIDE DIAMETER d.

Nominal Pipe Size	Class													
	150		300		400		600		900		1500		2500	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
½	0.50	12.70	0.50	12.70	0.50	12.70	0.50	12.70	0.50	12.70	0.50	12.70	0.44	11.17
¾	0.75	19.05	0.75	19.05	0.75	19.05	0.75	19.05	0.69	17.52	0.69	17.52	0.56	14.22
1	1.00	25.40	1.00	25.40	1.00	25.40	1.00	25.40	0.87	22.09	0.87	22.09	0.75	19.05
1¼	1.25	31.75	1.25	31.75	1.25	31.75	1.25	31.75	1.12	28.44	1.12	28.44	1.00	25.40
1½	1.50	38.10	1.50	38.10	1.50	38.10	1.50	38.10	1.37	34.79	1.37	34.79	1.12	28.44
2	2.00	50.80	2.00	50.80	2.00	50.80	2.00	50.80	1.87	47.49	1.87	47.49	1.50	38.10
2½	2.50	63.50	2.50	63.50	2.50	63.50	2.50	63.50	2.25	57.15	2.25	57.15	1.87	47.49
3	3.00	76.20	3.00	76.20	3.00	76.20	3.00	76.20	2.87	72.89	2.75	69.85	2.25	57.15
4	4.00	101.60	4.00	101.60	4.00	101.60	4.00	101.60	3.87	98.29	3.62	91.94	2.87	72.89
5	5.00	127.00	5.00	127.00	5.00	127.00	5.00	127.00	4.75	120.65	4.37	110.99	3.62	91.94
6	6.00	152.40	6.00	152.40	6.00	152.40	6.00	152.40	5.75	146.05	5.37	136.39	4.37	110.99
8	8.00	203.20	8.00	203.20	8.00	203.20	7.87	199.89	7.50	190.50	7.00	177.80	5.75	146.05
10	10.00	254.00	10.00	254.00	10.00	254.00	9.75	247.65	9.37	237.99	8.75	222.25	7.25	184.15
12	12.00	304.80	12.00	304.80	12.00	304.80	11.75	298.45	11.12	282.44	10.37	263.39	8.62	218.94
14	13.25	336.55	13.25	336.55	13.12	333.24	12.87	326.89	12.25	311.15	11.37	288.79	9.50	241.30
16	15.25	387.35	15.25	387.35	15.00	381.00	14.75	374.65	14.00	355.60	13.00	330.20	10.87	276.09
18	17.25	438.15	17.00	431.80	17.00	431.80	16.50	419.10	15.75	400.05	14.62	371.34	12.25	311.15
20	19.25	488.95	19.00	482.60	18.87	479.29	18.25	463.55	17.50	444.50	16.37	415.79	13.50	342.90
22	21.25	539.75	21.00	533.40	20.75	527.05	20.12	511.81	19.25	488.95	18.00	457.20	14.87	377.69
24	23.25	590.55	23.00	584.20	22.62	574.54	22.00	558.80	21.00	533.40	19.62	498.34	16.25	412.75
26	25.25	641.35	25.00	635.00	24.50	622.30	23.75	603.25	22.75	577.85	21.25	539.75	17.62	447.54
28	27.25	692.15	27.00	685.80	26.37	669.79	25.50	647.70	24.50	622.30	23.00	584.20	19.00	482.60
30	29.25	742.95	29.00	736.60	28.25	717.55	27.37	695.19	26.25	666.75	24.62	625.34	20.37	517.39

ANSI PRESSURE TEMPERATURE RATINGS

CLASS 150/PN 20

(°C/Bar)

Material Group No.	1.1	1.2	1.3	1.4	1.5	1.7	1.9	1.10	1.11	1.13
Forgings	A105(1) (3) (5) A350-LF2(10)	A350-LF3(10)		A350-LF1(10)	A182-F1(2) (11)	A182-F2(12)	A182-F12(4) (14) A182-F11(4) (14)	A182-F22(14)	A182-F21(14)	A182-F5a
Castings	A216-WCB(1)	A216-WCC(1) A352-LC2(10) A352-LC3(10)	A352-LCB(10) A217-WC1(2) (11) A352-LC1(10)				A217-WC4(4) (12) A217-WC5(4) (13)	A217-WC6(4) (15)	A217-WC9(4) (15)	A217-C5(4)
Temperature, °C										
-29 to 38	19.6	19.8	18.4	16.3	18.4	19.8	19.8	19.8	20.0	20.0
50	19.2	19.5	18.2	16.0	18.4	19.5	19.5	19.5	19.5	19.5
100	17.7	17.7	17.4	14.9	17.7	17.7	17.7	17.7	17.7	17.7
150	15.8	15.8	15.8	14.4	15.8	15.8	15.8	15.8	15.8	15.8
200	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
250	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
300	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2
350	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
375	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
400	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
425	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
450	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
475	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
500	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
538	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
550						1.4(a)	1.4(a)	1.4(a)	1.4(a)	1.4(a)
575						1.4(a)	1.4(a)	1.4(a)	1.4(a)	1.4(a)
600						1.4(a)	1.4(a)	1.4(a)	1.4(a)	1.4(a)
625							1.4(a)	1.4(a)	1.4(a)	1.4(a)
650							1.1(a)	1.1(a)	1.2(a)	0.9(a)

GENERAL NOTE : a) Flanged end valve ratings terminate at 538 °C

(°C/Bar)

Material Group No.	1.14	1.15	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Forgings	A182-F9	A182-F91 A335-P91	A182-F304(6) A182-F304H	A182-F316(6) A182-F316H	A182-F304L(16) A182-F316L	A182-F321(6) (12) A182-F321H	A182-F347(6) (12) A182-F347H A182-F348(6) (12) A182-F348H		A182-F310(6) (7)
Castings	A217-C12(4)	A217-C12A A387-91-CL2	A351-CF3(16) A351-CF8(6)	A351-CF3A(10) A351-CF8A(10) A351-CF3M(17) A351-CF8M(6)			A351-CF8(6)	A351-CH8(6) A351-CH20(6)	A351-CK20(6)
Temperature, °C									
-29 to 38	20.0	20.0	19.0	19.0	15.9	19.0	19.0	19.0	19.0
50	19.5	19.5	18.3	18.4	15.3	18.6	18.7	18.5	18.5
100	17.7	17.7	15.7	16.2	13.3	17.0	17.4	16.5	16.6
150	15.8	15.8	14.2	14.8	12.0	15.7	15.8	15.3	15.3
200	13.8	13.8	13.2	13.7	11.2	13.8	13.8	13.8	13.8
250	12.1	12.1	12.1	12.1	10.5	12.1	12.1	12.1	12.1
300	10.2	10.2	10.2	10.2	10.0	10.2	10.2	10.2	10.2
350	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4
375	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
400	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
425	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
450	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
475	3.7	3.7	3.7	3.7		3.7	3.7	3.7	3.7
500	2.8	2.8	2.8	2.8		2.8	2.8	2.8	2.8
538	1.4	1.4	1.4	1.4		1.4	1.4	1.4	1.4
550	1.4(a)	1.4(a)	1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
575	1.4(a)	1.4(a)	1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
600	1.4(a)	1.4(a)	1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
625	1.4(a)	1.4(a)	1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
650	1.4(a)	1.4(a)	1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
675			1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
700			1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
725			1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.4(a)	1.4(a)
750			1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.3(a)	1.3(a)
775			1.4(a)	1.4(a)		1.4(a)	1.4(a)	1.0(a)	1.0(a)
800			1.2(a)	1.2(a)		1.2(a)	1.2(a)	0.8(a)	0.8(a)

- Notes (1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to graphite.
 (2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon molybdenum steel may be converted to graphite.
 (3) Only killed steel shall be used above 850°F(455°C)
 (4) Use normalized and tempered material only.
 (5) Permissible, but not recommended for prolonged usage above about 800°F(425°C)
 (6) At temperatures over 1000°F(540°C) use only when the carbon is 0.04% or higher.
 (7) For service temperatures of 1050°F(565°C) and above, assurance must be provided that grain size is not finer than ASTM No.6
 (8) Use annealed material only
 (9) Use solution annealed material only

- (10) Not to be used over 650°F(345°C)
 (11) Permissible, but not recommended for prolonged upon above about 850°F(455°C)
 (12) Not to be used over 1000°F(540°C)
 (13) Not to be used over 1050°F(565°C)
 (14) Permissible, but not recommended for prolonged upon above about 1100°F(595°C)
 (15) Not to be used over 1100°F(595°C)
 (16) Not to be used over 800°F(425°C)
 (17) Not to be used over 850°F(455°C)
 (18) For welding end valves Flanged end ratings terminate at 1000°F(540°C)

ANSI PRESSURE TEMPERATURE RATINGS

CLASS 300/PN 50

(°C/Bar)

Material Group No.	1.1	1.2	1.3	1.4	1.5	1.7	1.9	1.10	1.11	1.13
Forgings	A105(1) (3) (5) A350-LF2(10)	A350-LF3(10)		A350-LF1(10)	A182-F1(2) (11)	A182-F2(12)	A182-F12(4) (14) A182-F11(4) (14)	A182-F22(14)	A182-F21(14)	A182-F5a
Castings	A216-WCB(1)	A216-WCC(1) A352-LC2(10) A352-LC3(10)	A352-LCB(10) A217-WC1(2) (11) A352-LC1(10)			A217-WC4(4) (12) A217-WC5(4) (13)	A217-WC6(4) (15)	A217-WC9(4) (15)		A217-C5(4)
Temperature, °C										
-29 to 38	51.1	51.7	48.0	42.6	48.0	51.7	51.7	51.7	51.7	51.7
50	50.1	51.7	47.5	41.8	48.0	51.7	51.7	51.7	51.7	51.7
100	46.6	51.5	45.3	38.8	47.9	51.5	51.5	51.5	51.5	51.5
150	45.1	50.2	43.9	37.6	47.3	50.3	49.7	50.3	50.3	50.3
200	43.8	48.6	42.5	36.4	45.8	48.6	48.0	48.6	48.6	48.6
250	41.9	46.3	40.8	34.9	44.5	46.3	46.3	46.3	46.3	46.3
300	39.8	42.9	38.7	33.2	42.9	42.9	42.9	42.9	42.9	42.9
350	37.6	40.0	36.4	31.2	40.3	40.3	40.3	40.3	40.3	40.3
375	36.4	37.8	35.0	30.4	38.9	38.9	38.9	38.9	38.9	38.9
400	34.7	34.7	32.6	29.3	36.5	36.5	36.5	36.5	36.5	36.5
425	28.8	28.8	27.3	25.8	35.2	35.2	35.2	35.2	35.2	35.2
450	23.0	23.0	21.6	21.4	33.7	33.7	33.7	33.7	33.7	33.7
475	17.4	17.1	15.7	14.1	31.7	31.7	31.7	31.7	31.7	27.9
500	11.8	11.6	11.1	10.3	24.1	26.7	25.7	28.2	23.6	21.4
538	5.9	5.9	5.9	5.9	11.3	13.9	14.9	18.4	11.3	13.7
550										
575						12.6	12.7	15.6	11.3	12.0
600						7.2	8.8	10.5	10.1	8.9
625							6.1	6.9	7.1	6.2
650							4.3	4.5	5.3	4.0
650							2.8	2.8	3.1	2.4

(°C/Bar)

Material Group No.	1.14	1.15	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Forgings	A182-F9	A182-F91 A335-P91	A182-F304(6) A182-F304H	A182-F316(6) A182-F316H	A182-F304L(16) A182-F316L	A182-F321(6) (12) A182-F321H	A182-F347(6) (12) A182-F347H A182-F348(6) (12) A182-F348H		A182-F310(6) (7)
Castings	A217-C12(4)	A217-C12A A387-91-CL2	A351-CF3(16) A351-CF8(6)	A351-CF3A(10) A351-CF8A(10) A351-CF3M(17) A351-CF8M(6)			A351-CF8(6)	A351-CH8(6) A351-CH20(6)	A351-CK20(6)
Temperature, °C									
-29 to 38	51.7	51.7	49.6	49.6	41.4	49.6	49.6	49.6	49.6
50	51.7	51.7	47.8	48.1	40.0	48.6	48.8	48.3	48.4
100	51.5	51.5	40.9	42.2	34.8	44.2	45.3	43.1	43.4
150	50.3	50.3	37.0	38.5	31.4	41.0	42.5	40.0	40.0
200	48.6	48.6	34.5	35.7	29.2	38.3	39.9	37.8	37.6
250	46.3	46.3	32.5	33.4	27.5	36.0	37.8	36.1	35.8
300	42.9	42.9	30.9	31.6	26.1	34.1	36.1	34.8	34.5
350	40.3	40.3	29.6	30.3	25.1	32.6	34.8	33.8	33.3
375	38.9	38.9	29.0	29.9	24.8	32.0	34.2	33.4	32.9
400	36.5	36.5	28.4	29.4	24.3	31.6	33.9	33.1	32.4
425	35.2	35.2	28.0	29.1	23.9	31.1	33.6	32.6	32.1
450	33.7	33.7	27.4	28.8	23.4	30.8	33.5	32.2	31.7
475	31.7	31.7	26.9	28.7		30.5	31.7	31.7	31.2
500	28.2	28.2	26.5	28.2		28.2	28.2	28.2	28.2
538	17.5	25.2	24.4	25.2		25.2	25.2	25.2	25.2
550	15.0	25.0	23.6	25.0		25.0	25.0	25.0	25.0
575	10.5	24.0	20.8	24.0		24.0	22.2	22.2	22.2
600	7.2	19.5	16.9	19.9		20.3	21.6	16.8	16.8
625	5.0	14.6	13.8	15.8		15.8	18.3	12.5	12.5
650	3.5	9.9	11.3	12.7		12.6	14.1	9.4	9.4
675			9.3	10.3		9.9	12.4	7.2	7.2
700			8.0	8.4		7.9	10.1	5.5	5.5
725			6.8	7.0		6.3	7.9	4.3	4.3
750			5.8	5.9		5.0	5.9	3.4	3.4
775			4.6	4.6		4.0	4.6	2.7	2.7
800			3.5	3.5		3.1	3.5	2.1	2.1

- Notes (1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to graphite.
 (2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon molybdenum steel may be converted to graphite.
 (3) Only killed steel shall be used above 850°F(455°C)
 (4) Use normalized and tempered material only.
 (5) Permissible, but not recommended for prolonged usage above about 800°F(425°C)
 (6) At temperatures over 1000°F(540°C) use only when the carbon is 0.04% or higher.
 (7) For service temperatures of 1050°F(565°C) and above, assurance must be provided that grain size is not finer than ASTM No.6

- (8) Use annealed material only
 (9) Use solution annealed material only
 (10) Not to be used over 650°F(345°C)
 (11) Permissible, but not recommended for prolonged upon above about 850°F(455°C)
 (12) Not to be used over 1000°F(540°C)
 (13) Not to be used over 1050°F(565°C)
 (14) Permissible, but not recommended for prolonged upon above about 1100°F(595°C)
 (15) Not to be used over 1100°F(595°C)
 (16) Not to be used over 800°F(425°C)
 (17) Not to be used over 850°F(455°C)

ANSI PRESSURE TEMPERATURE RATINGS

CLASS 600/PN 100

(°C/Bar)

Material Group No.	1.1	1.2	1.3	1.4	1.5	1.7	1.9	1.10	1.11	1.13
Forgings	A105(1) (3) (5) A350-LF2(10)	A350-LF3(10)		A350-LF1(10)	A182-F1(2) (11)	A182-F2(12)	A182-F12(4) (14) A182-F11(4) (14)	A182-F22(14)	A182-F21(14)	A182-F5a
Castings	A216-WCB(1)	A216-WCC(1) A352-LC2(10) A352-LC3(10)	A352-LCB(10) A217-WC1(2) (11) A352-LC1(10)				A217-WC4(4) (12) A217-WC5(4) (13)	A217-WC6(4) (15)	A217-WC9(4) (15)	A217-C5(4)
Temperature, °C										
-29 to 38	102.1	103.4	96.0	85.1	96.0	103.4	103.4	103.4	103.4	103.4
50	100.2	103.4	94.9	83.5	96.0	103.4	103.4	103.4	103.4	103.4
100	93.2	103.0	90.7	77.7	95.9	103.0	103.0	103.0	103.0	103.0
150	90.2	100.3	87.9	75.1	94.7	100.3	99.5	100.3	100.3	100.3
200	87.6	97.2	85.1	72.8	91.6	97.2	95.9	97.2	97.2	97.2
250	83.9	92.7	81.6	69.8	89.0	92.7	92.7	92.7	92.7	92.7
300	79.6	85.7	77.4	66.4	85.7	85.7	85.7	85.7	85.7	85.7
350	75.1	80.0	72.8	62.5	80.4	80.4	80.4	80.4	80.4	80.4
375	72.7	75.7	69.9	60.7	77.6	77.6	77.6	77.6	77.6	77.6
400	69.4	69.4	65.2	58.7	73.3	73.3	73.3	73.3	73.3	73.3
425	57.5	57.5	54.6	51.5	70.0	70.0	70.0	70.0	70.0	70.0
450	46.0	46.0	43.2	42.7	67.7	67.7	67.7	67.7	67.7	67.7
475	34.9	34.2	31.3	28.2	63.4	63.4	63.4	63.4	63.4	55.7
500	23.5	23.2	22.1	20.6	48.1	53.4	51.5	56.5	47.1	42.8
538	11.8	11.8	11.8	11.8	22.7	27.9	29.8	36.9	22.7	27.4
550						25.2	25.4	31.3	22.7	24.1
575						14.4	17.6	21.1	20.1	17.8
600							12.2	13.8	14.2	12.5
625							8.5	8.9	10.6	8.0
650							5.7	5.7	6.1	4.7

(°C/Bar)

Material Group No.	1.14	1.15	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Forgings	A182-F9	A182-F91 A335-P91	A182-F304(6) A182-F304H	A182-F316(6) A182-F316H	A182-F304L(16) A182-F316L	A182-F321(6) (12) A182-F321H	A182-F347(6) (12) A182-F347H A182-F348(6) (12) A182-F348H		A182-F310(6) (7)
Castings	A217-C12(4)	A217-C12A A387-91-CL2	A351-CF3(16) A351-CF8(6)	A351-CF3A(10) A351-CF8A(10) A351-CF3M(17) A351-CF8M(6)			A351-CF8(6)	A351-CH8(6) A351-CH20(6)	A351-CK20(6)
Temperature, °C									
-29 to 38	103.4	103.4	99.3	99.3	82.7	99.3	99.3	99.3	99.3
50	103.4	103.4	95.6	96.2	80.0	97.1	97.5	96.6	96.7
100	103.0	103.0	81.7	84.4	69.6	88.5	90.6	86.2	86.8
150	100.3	100.3	74.0	77.0	62.8	82.0	84.9	80.0	80.0
200	97.2	97.2	69.0	71.3	58.3	76.6	79.9	75.5	75.2
250	92.7	92.7	65.0	66.8	54.9	72.0	75.6	72.1	71.5
300	85.7	85.7	61.8	63.2	52.1	68.3	72.2	69.6	68.9
350	80.4	80.4	59.3	60.7	50.1	65.2	69.5	67.6	66.6
375	77.6	77.6	58.1	59.8	49.5	64.1	68.4	66.8	65.7
400	73.3	73.3	56.9	58.9	48.6	63.2	67.8	66.1	64.8
425	70.0	70.0	56.0	58.3	47.7	62.3	67.2	65.3	64.2
450	67.7	67.7	54.8	57.7	46.8	61.7	66.9	64.4	63.4
475	63.4	63.4	53.9	57.3		61.1	63.4	63.4	62.5
500	56.5	56.5	53.0	56.5		56.5	56.4	56.5	56.5
538	35.0	50.0	48.9	50.0		50.0	50.0	50.0	50.0
550	30.0	49.8	47.1	???		49.8	49.8	49.8	49.8
575	20.9	47.9	41.7	47.9		47.9	47.9	44.4	44.4
600	14.4	39.0	33.8	39.8		40.5	42.9	33.5	33.5
625	9.9	29.2	27.6	31.6		31.6	36.6	25.0	25.0
650	7.1	19.9	22.5	25.3		25.3	28.1	18.7	18.7
675			18.7	20.6		19.8	25.2	14.5	14.5
700			16.1	16.8		15.8	20.0	11.0	11.0
725			13.5	14.0		12.7	15.4	8.7	8.7
750			11.6	11.7		10.0	11.7	6.8	6.8
775			9.0	9.0		8.0	9.0	5.4	5.3
800			7.0	7.0		6.3	7.0	4.2	4.1

- Notes (1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to graphite.
 (2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon molybdenum steel may be converted to graphite.
 (3) Only killed steel shall be used above 850°F(455°C)
 (4) Use normalized and tempered material only.
 (5) Permissible, but not recommended for prolonged usage above about 800°F(425°C)
 (6) At temperatures over 1000°F(540°C) use only when the carbon is 0.04% or higher.
 (7) For service temperatures of 1050°F(565°C) and above, assurance must be provided that grain size is not finer than ASTM No.6

- (8) Use annealed material only
 (9) Use solution annealed material only
 (10) Not to be used over 650°F(345°C)
 (11) Permissible, but not recommended for prolonged upon above about 850°F(455°C)
 (12) Not to be used over 1000°F(540°C)
 (13) Not to be used over 1050°F(565°C)
 (14) Permissible, but not recommended for prolonged upon above about 1100°F(595°C)
 (15) Not to be used over 1100°F(595°C)
 (16) Not to be used over 800°F(425°C)
 (17) Not to be used over 850°F(455°C)

ANSI PRESSURE TEMPERATURE RATINGS

CLASS 900/PN 150

(°C/Bar)

Material Group No.	1.1	1.2	1.3	1.4	1.5	1.7	1.9	1.10	1.11	1.13
Forgings	A105(1) (3) (5) A350-LF2(10)	A350-LF3(10)		A350-LF1(10)	A182-F1(2) (11)	A182-F2(12)	A182-F12(4) (14) A182-F11(4) (14)	A182-F22(14)	A182-F21(14)	A182-F5a
	A216-WCB(1)	A216-WCC(1) A352-LC2(10) A352-LC3(10)	A352-LCB(10) A217-WC1(2) (11) A352-LC1(10)				A217-WC4(4) (12) A217-WC5(4) (13)	A217-WC6(4) (15)	A217-WC9(4) (15)	A217-C5(4)
Temperature, °C										
-29 to 38	153.2	155.1	144.1	127.7	144.1	155.1	155.1	155.1	155.1	155.1
50	150.4	155.1	142.4	125.3	144.1	155.1	155.1	155.1	155.1	155.1
100	139.8	154.6	136.0	116.5	143.8	154.6	154.4	154.6	154.6	154.6
150	135.2	150.5	131.8	112.7	142.0	150.6	149.2	150.6	150.6	150.6
200	131.4	145.8	127.6	109.2	137.4	145.8	143.9	145.8	145.8	145.8
250	125.8	139.0	122.3	104.7	133.5	139.0	139.0	139.0	139.0	139.0
300	119.5	128.6	116.1	99.5	128.6	128.6	128.6	128.6	128.6	128.6
350	112.7	120.1	109.2	93.7	120.7	120.7	120.7	120.7	120.7	120.7
375	109.1	113.5	104.9	91.1	116.5	116.5	116.5	116.5	116.5	116.5
400	104.2	104.2	97.9	88.0	109.8	109.8	109.8	109.8	109.8	109.8
425	86.3	86.3	81.9	77.3	105.1	105.1	105.1	105.1	105.1	105.1
450	69.0	69.0	64.8	64.1	101.4	101.4	101.4	101.4	101.4	101.4
475	52.3	51.3	47.0	42.3	95.1	95.1	95.1	95.1	95.1	83.6
500	35.3	34.7	33.2	30.9	72.2	80.1	77.2	84.7	70.7	64.1
538	17.7	17.7	17.7	17.7	34.0	41.8	44.7	55.3	34.0	41.1
550						37.8	38.1	46.9	34.0	36.1
575						21.5	26.4	31.6	30.2	26.7
600							18.3	20.7	21.3	18.7
625							12.8	13.4	15.9	12.0
650							8.5	8.5	9.2	7.1

(°C/Bar)

Material Group No.	1.14	1.15	2.1	2.2	2.3	2.4	2.5	2.6	2.7
Forgings	A182-F9	A182-F91 A335-P91	A182-F304(6) A182-F304H	A182-F316(6) A182-F316H	A182-F304L(16) A182-F316L	A182-F321(6) (12) A182-F321H	A182-F347(6) (12) A182-F347H A182-F348(6) (12) A182-F348H		A182-F310(6) (7)
	A217-C12(4)	A217-C12A A387-91-CL2	A351-CF3(16) A351-CF8(6)	A351-CF3A(10) A351-CF8A(10) A351-CF3M(17) A351-CF8M(6)			A351-CF8(6)	A351-CH8(6) A351-CH20(6)	A351-CK20(6)
Temperature, °C									
-29 to 38	155.1	155.1	99.3	148.9	124.1	148.9	148.9	148.9	148.9
50	155.1	155.1	95.6	144.3	120.1	145.7	146.3	144.9	145.1
100	154.6	154.6	81.7	126.6	104.4	132.7	135.9	129.3	130.2
150	150.6	150.6	74.0	115.3	94.2	122.9	127.4	120.0	120.0
200	145.8	145.8	69.0	107.0	87.5	114.9	119.8	113.3	112.8
250	139.0	139.0	65.0	100.1	82.4	108.1	113.4	108.2	107.3
300	128.6	128.6	61.8	94.9	78.2	102.4	108.3	104.4	103.4
350	120.7	120.7	59.3	91.0	75.2	97.8	104.3	101.4	99.9
375	116.5	116.5	58.1	89.6	74.3	96.1	102.6	100.1	98.6
400	109.8	109.8	56.9	88.3	72.9	94.8	101.7	99.2	97.3
425	105.1	105.1	56.0	87.4	71.6	93.4	100.8	97.9	96.4
450	101.4	101.4	54.8	86.5	70.2	92.5	100.4	96.5	95.1
475	95.1	95.1	53.9	86.0		91.6	95.1	95.1	93.7
500	84.7	84.7	53.0	84.7		84.7	84.7	84.7	84.7
538	52.5	75.2	48.9	75.2		75.2	75.2	75.2	75.2
550	45.0	74.8	47.1	74.8		74.8	74.8	74.8	74.8
575	31.4	71.8	41.7	???		71.8	71.8	66.5	66.5
600	21.5	58.5	33.8	59.7		60.8	64.2	50.3	50.3
625	14.9	43.8	27.6	47.4		47.4	54.9	37.5	37.5
650	10.6	29.8	22.5	38.0		37.9	42.5	28.1	28.1
675			18.7	31.0		29.6	37.6	21.7	21.7
700			16.1	25.1		23.7	29.8	16.5	16.5
725			13.5	21.0		19.0	23.2	13.0	13.0
750			11.6	17.6		15.0	17.6	10.2	10.2
775			9.0	13.7		11.9	13.7	8.1	8.0
800			7.0	10.5		9.4	10.5	6.3	6.2

- Notes (1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to graphite.
 (2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon molybdenum steel may be converted to graphite.
 (3) Only killed steel shall be used above 850°F(455°C)
 (4) Use normalized and tempered material only.
 (5) Permissible, but not recommended for prolonged usage above about 800°F(425°C)
 (6) At temperatures over 1000°F(540°C) use only when the carbon is 0.04% or higher.
 (7) For service temperatures of 1050°F(565°C) and above, assurance must be provided that grain size is not finer than ASTM No.6

- (8) Use annealed material only
 (9) Use solution annealed material only
 (10) Not to be used over 650°F(345°C)
 (11) Permissible, but not recommended for prolonged upon above about 850°F(455°C)
 (12) Not to be used over 1000°F(540°C)
 (13) Not to be used over 1050°F(565°C)
 (14) Permissible, but not recommended for prolonged upon above about 1100°F(595°C)
 (15) Not to be used over 1100°F(595°C)
 (16) Not to be used over 800°F(425°C)
 (17) Not to be used over 850°F(455°C)

HYDROSTATIC TEST PRESSURE TO ASME B16.34

Material			Test Pressures by Classes																											
Group No	Forging	Casting	150				300				600				900				1500				2500				4500			
			Shell		Seat / Backseat		Shell		Seat / Backseat		Shell		Seat / Backseat		Shell		Seat / Backseat		Shell		Seat / Backseat		Shell		Seat / Backseat		Shell		Seat / Backseat	
			kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi
1.1	A105 A350-LF2	A216-WCB	32.0	450	23.0	325	79.5	1125	58.5	825	156.5	2225	116.5	1650	236.0	3350	172.5	2450	392.0	5515	288.5	4100	652.5	9275	478.5	6800	1172.5	16675	860.0	12225
1.2	A350-LF3	A216-WCC A352-LC2 A352-LC3	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.3		A352-LCB	30	400	21	295	74	1050	54	775	148	2100	108	1535	222	3150	162	2299	368	5225	270	3828	615	8725	449	6386	1099.0	15625	806.5	11470
1.4	A350-LF1		26.5	375	19.5	275	67.0	950	49.5	700	133.0	1875	97.0	1375	195.5	2275	144.5	2050	327.0	4650	239.5	3400	543.5	7125	399.5	5675	977.5	13900	717.5	10200
1.5	A182-LF1	A217-WC1 A352-LC1	28.5	400	21.5	300	74.0	1050	54.5	775	148.0	2100	109.0	1550	221.5	3150	162.0	2300	367.5	5225	269.0	3825	612.0	8700	448.5	6375	1099.0	15625	806.5	11470
1.7	A182-F2	A217-WC4 A217-WC5	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.9	A182-F12 A182-F11	A217-WC6	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.10	A182-F22	A217-WC9	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.11	A182-F21		32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.13	A182-F5a	A217-C5	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
1.14	A182-F9	A217-C12	32.0	450	23.0	325	79.5	1125	58.5	825	158.5	2250	116.5	1650	237.5	3375	174.5	2475	395.5	5625	290.5	4125	659.5	9375	483.5	6875	1186.5	16875	870.5	12375
2.1	A182-F304 A182-F304H	A351-CF3 A351-CF8	30.0	425	23.0	325	77.5	1100	56.5	800	153.0	2175	112.5	1600	229.0	3250	169.0	2400	380.0	5400	279.5	3975	633.0	9000	464.5	6600	1139.5	16200	837.0	11900
2.2	A182-F316 A182-F316H	A351-CF3A A351-CF8A A351-CF3M A351-CF8M	30.0	425	23.0	325	77.5	1100	56.5	800	153.0	2175	112.5	1600	229.0	3250	169.0	2400	380.0	5400	279.5	3975	633.0	9000	464.5	6600	1139.5	16200	837.0	11900
2.3	A182-F304L A182-F316L		25.0	350	19.5	275	63.5	900	49.5	675	127.0	1800	93.5	1325	190.0	2700	141.0	2000	316.5	4500	232.5	3300	527.5	7500	387.0	5500	349.5	13500	696.5	9900
2.4	A182-F321 A182-F321H		30.0	425	23.0	325	77.5	1100	56.5	800	153.0	2175	112.5	1600	229.0	3250	169.0	2400	380.0	5400	279.5	3975	633.0	9000	464.5	6600	1139.5	16200	837.0	11900
2.5	A182-F347 A182-F347H A182-F348 A182-F348	A351-CF8C	30.0	425	23.0	325	77.5	1100	56.5	800	153.0	2175	112.5	1600	229.0	3250	169.0	2400	380.0	5400	279.5	3975	633.0	9000	464.5	6600	1139.5	16200	837.0	11900
2.6	A351-CH20	A351-CH20	28.5	400	21.5	300	72.5	1025	53.0	750	143.0	2025	106.0	1500	213.5	3025	157.0	2225	356.0	5050	261.0	3700	592.0	8400	435.0	6175	1065.5	15125	782.0	11100
2.7	A182-F310	A351-CK20	28.5	400	21.5	300	72.5	1025	53.0	750	143.0	2025	106.0	1500	213.5	3025	157.0	2225	356.0	5050	261.0	3700	592.0	8400	435.0	6175	1065.5	15125	782.0	11100
3.1	B462	A351-CM7M	25.0	350	19.5	275	63.5	900	47.5	675	127.0	1800	93.5	1325	190.0	2700	141.0	2000	316.5	4500	232.5	3300	527.5	7500	387.0	5500	949.5	13500	696.5	9900

Notes. All pressures are given as gauge pressure.

DATA FOR CALCULATION OF FLOW AND / OR PRESSURE DROP

$$K_v = C_v \times 0.85$$

$$\frac{m^3 / n}{\sqrt{kg / cm^2}}$$

A valve coefficient C_v is used to calculate pressure drop through a particular valve for a given flow rate. The coefficient of flow C_v expresses the rate of flow in gallons per minute at 60°F water with a pressure drop of 1 psig. across the valve.

The C_v coefficients for the various types and sizes, shown in table, have been determined from calculations and actual flow tests.

FOR LIQUIDS

$$Q_L = C_v \sqrt{\frac{\Delta P}{G_L}} \quad \Delta P = G_L \left(\frac{Q_L}{C_v} \right)^2$$

WHERE : Q_L = Flow in U.S.Gallons per minute.
 ΔP = ($P_1 - P_2$) Pressure Drop in psi
 G_L = Specific Gravity of Liquid (Water = 1 at 60°F)

FOR GASES

$$Q_g = 1360 C_v \sqrt{\frac{\Delta P}{G_g T}} \cdot \sqrt{\frac{P_1 + P_2}{2}}$$

$$\Delta P = P_1 - \sqrt{P_1^2 - 2G_g T \left(\frac{Q_g}{1360 C_v} \right)^2}$$

WHERE : Q_g = Volumetric Flow of Gas(SCFH)
 G_g = Specific Gravity of Gas at Standard Conditions (Air at atm. and 60°F = 1)
 T = Absolute Temperature of Gas (°F + 460)

FOR STEAM

$$W = \frac{2.1}{1 + 0.0007 T_s} C_v \sqrt{\Delta P (P_1 + P_2)}$$

$$\Delta P = P_1 - \sqrt{P_1^2 - K_2}$$

$$\text{WHERE : } K = \left(\frac{1 + 0.0007 T_s}{2.1 C_v} \cdot W \right)^2$$

AND W = Pounds per hour of Steam
 ΔP = ($P_1 - P_2$) Pressure Drop in psi
 T_s = Degree of Superheat(°F)

NOTE = For Saturated Steam $T_s = 0$

NOTE : For Gas and Steam Max. $\Delta P = \frac{1}{2} P_1$, and Min $P_2 = \frac{1}{2} P_1$ and P_1, P_2 are absolute pressures(PSIA) P_1 = Inlet Pressure P_2 = Outlet Pressure

Cv Value(BB TYPE)

TYPE	GATE					GLOBE					CHECK						
	CLASS	150#	300#	600#	900#	1500#	150#	300#	600#	900#	1500#	150#	300#	600#	900#	1500#	2500#
2"		306	306	306	262	262	47	47	47	41	41	122	122	122	107	107	68
2 1/2"		492	492	492	396	396	75	75	75	57	57	197	197	197	158	158	106
3"		709	709	709	650	598	108	108	108	99	91	283	283	283	260	239	158
4"		1297	1297	1297	1206	1063	198	198	198	186	162	519	519	519	482	425	267
6"		3107	3107	3107	2851	2474	476	476	476	437	379	1242	1242	1242	1140	989	659
8"		5718	5718	5718	4999	4387	877	877	848	770	671	2287	2287	2215	2000	1755	1180
10"		8934	8934	8496	7844	6824	1370	1370	1295	1203	1046	3573	3573	3398	3137	2729	1875
12"		13351	13351	12804	11460	9970	2047	2047	1957	1753	1524	5340	5340	5122	4571	3976	2757
14"		16282	16282	15357	13917	12002	2503	2503	2357	2132	1841	6513	6513	6143	5560	4801	3338
16"		21567	21567	20176	18172	15650	3301	3301	3099	2793	2400	8627	8627	8070	7285	6260	4378
18"		28721	27889	26260	23932	20588	4401	4281				11488	11155	10509	9573	8235	5787
20"		35767	34837	32203	29487	25885						14307	13934	12859	11794	10354	
22"		43584	42557	39057	35767	31239						17434	17022	15623	14306	12495	
24"		52174	51049	46740	42493	37095						20869	20419	18682	16997	14838	
26"		64271	62995	56806	52193	45556						25708	25198	19513			
28"		74855	73520	65601	60442	53282						29942	29408	26240			
30"		86246	84766	75462	69504	61027						34498	33943	30185			
32"		102780	N/A									41112					
34"		N/A	113424														
36"		129964	125824									51985	50329				
42"		186201	179695									74480		66080			

HARDNESS CONVERSION

1. The bottom HARDNESS CONVERSION TABLE(hereinafter referred as THE TABLE) is made according to SAE 417b and quoted as information only.

2. The table gives the approximate relationship of hardness of BRINELL and ROCKWELL. It is impossible to give the exact relationship, because of the inevitable influence of size, mass, composition and method of heat treatment.

Where more precise conversion is required, it should be developed specially to chemical composition, heat treatment and part for each steel.

3. The table is based on extensive tests on carbon and alloy steels, mostly in the heat treated condition, but have been found to be reliable on practically all constructional alloy steel and tool steels in the as-forged, annealed, normalized and quenched and tempered conditions, provided they are homogenous.

Such special cases as high manganese steel, 18% chromium 8% nickel steel and other austenitic steels, and nickel base alloys, as well as constructional alloy steels and tool steels in the cold worked condition, may not conform to the relationships given with the degree of accuracy as the steels for which the table are intended

Brinell Indentation Diameter, mm	Brinell Hardness Number		Rockwell Hardness Number		Tensile Strength (Approximate)	
	Standard Ball	Tungsten-Carbide Ball	B Scale	C Scale	× 1000 psi	kgf/mm ² (N/mm ²)
	10mm Ball 3000kg	1/16" Ball 1000kg Load	Brale 150kg Load			
-	-	-	-	68.0	-	-
-	-	-	-	67.5	-	-
-	-	-	-	67.0	-	-
-	-	(767)	-	66.4	-	-
-	-	(757)	-	65.9	-	-
2.25	-	(745)	-	65.3	-	-
-	-	(733)	-	64.7	-	-
-	-	(722)	-	64.0	-	-
2.30	-	(712)	-	-	-	-
-	-	(710)	-	63.3	-	-
-	-	(698)	-	62.5	-	-
-	-	(684)	-	61.8	-	-
2.35	-	(682)	-	61.7	-	-
-	-	(670)	-	61.0	-	-
-	-	(656)	-	60.1	-	-
2.40	-	(653)	-	60.0	-	-
-	-	(647)	-	59.7	-	-
-	-	(638)	-	59.2	-	-
-	-	630	-	58.8	-	-
2.45	-	627	-	58.7	-	-
2.50	-	-	-	59.1	-	-
2.50	-	601	-	57.3	-	-
2.55	-	-	-	57.3	-	-
2.55	-	578	-	56.0	-	-
2.60	-	-	-	55.6	-	-
2.60	-	555	-	54.7	298	210(2095)
2.65	-	-	-	54.0	292	205(2010)
2.65	-	534	-	53.5	288	202(1981)
2.70	-	-	-	52.5	278	195(1912)
2.70	-	514	-	52.1	274	193(1893)
2.75	495	-	-	51.6	269	189(1854)
2.75	-	-	-	51.1	264	186(1824)
2.75	-	495	-	51.0	264	186(1824)
2.80	477	-	-	50.3	258	181(1775)
2.80	-	-	-	49.6	252	177(1736)
2.80	-	477	-	49.6	252	177(1736)
2.85	461	-	-	48.8	244	172(1687)
2.85	-	-	-	48.5	242	170(1667)
2.85	-	461	-	48.5	242	170(1667)
2.90	444	-	-	47.2	230	162(1589)
2.90	-	-	-	47.1	230	162(1589)
2.90	-	444	-	47.1	230	162(1589)

Brinell Indentation Diameter, mm	Brinell Hardness Number		Rockwell Hardness Number		Tensile Strength (Approximate)	
	Standard Ball	Tungsten-Carbide Ball	B Scale	C Scale	× 1000 psi	kgf/mm ² (N/mm ²)
	10mm Ball 3000kg	1/16" Ball 1000kg Load	Brale 150kg Load			
2.95	429	429	-	45.7	219	154(1510)
3.00	415	415	-	44.5	212	149(1461)
3.05	401	401	-	43.1	202	142(1392)
3.10	388	388	-	41.8	193	136(1334)
3.15	375	375	-	40.4	184	129(1265)
3.20	363	363	-	39.1	177	124(1216)
3.25	352	352	(110.0)	37.9	171	120(1177)
3.30	341	341	(109.0)	36.6	164	115(1128)
3.35	331	331	(108.5)	35.5	159	112(1098)
3.40	321	321	(108.0)	34.3	154	108(1059)
3.45	311	311	(107.5)	33.1	149	105(1030)
3.50	302	302	(107.0)	32.1	146	103(1010)
3.55	293	293	(106.0)	30.9	141	99(971)
3.60	285	285	(105.5)	29.9	138	97(951)
3.65	277	277	(104.5)	28.8	134	94(922)
3.70	269	269	(104.0)	27.6	130	91(892)
3.75	262	262	(103.0)	26.6	127	89(873)
3.80	255	255	(102.0)	25.4	123	86(843)
3.85	248	248	(101.0)	24.2	120	84(824)
3.90	241	241	100.0	22.8	116	82(804)
3.95	235	235	99.0	21.7	114	80(785)
4.00	229	229	98.2	20.5	111	78(765)
4.05	223	223	97.3	(18.8)	-	-
4.10	217	217	96.4	(17.5)	105	74(726)
4.15	212	212	95.5	(16.0)	102	72(706)
4.20	207	207	94.6	(15.2)	100	70(686)
4.25	201	201	93.8	(13.8)	98	69(677)
4.30	197	197	92.8	(12.7)	95	67(657)
4.35	192	192	91.9	(11.5)	93	65(637)
4.40	187	187	90.7	(10.0)	90	63(618)
4.45	183	183	90.0	(9.0)	89	63(618)
4.50	179	179	89.0	(8.0)	87	61(598)
4.55	174	174	87.8	(6.4)	85	60(588)
4.60	170	170	86.8	(5.4)	83	58(569)
4.65	167	167	86.0	(4.4)	81	57(559)
4.70	163	163	85.0	(3.3)	79	56(549)
4.80	156	156	82.9	(0.9)	76	53(520)
4.90	149	149	80.8	-	73	51(500)
5.00	143	143	78.7	-	71	50(490)
5.10	137	137	76.4	-	67	47(461)
5.20	131	131	74.0	-	65	46(451)
5.30	126	126	72.0	-	63	44(431)
5.40	121	121	69.8	-	60	42(412)
5.50	116	116	67.6	-	58	40(402)
5.60	111	111	65.7	-	56	39(382)

CORROSION TABLES

CARBON STEEL AND BRONZE ARE SHOWN FOR COMPARISON PURPOSES

CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL	CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL
acetaldehyde	O	O	E	E	E	E		borac acid	O	G	G	G		E	G
acetic acid aerated	O	O	E	E	E	E		bromine(dry)	O	O	O	O	E	E	E
acetic acid(air free)	O	O	E	E	E	E		bromine(wet)	O	O	O	O	O	E	E
acetic anhydride	O	F	G	G	E	E		butadiene	F	O	G	O			
acetone	E	E	E	E	E	E	E	butane	G	E	G	G	G	E	G
acetylene	E	G	E	E	E	E	F	buttermilk	O	O	E	E		E	
air	E	E	E	E	E			butyric acid	O	O	G	G	E	E	G
alcohols	G	G	E	E	E	E	E	calcium bisulfite	O	G	F	G	E		
aluminium acetate	O	O	F	F	F	F	G	calcium carbonate	O	F	E	E	E	E	G
aluminium chloride 10%	O	O	O	O	E	O	E	calcium chloride	F	G	F	G	G	F	G
aluminium chloride 10%	O	O	O	O	F	O	E	calcium hydroxide	F	O	E	E	E	E	E
aluminium fluoride	O	O	G	G	E	G	E	calcium hypochlorite	O	O	F	F	F	E	
aluminium hydroxide	O	O	E	E	E	G		calcium sulfate	O	E	E	E	E	G	G
aluminium oxalate	O	O			E	G	E	carbolic acid	O	G	G	G	E	E	G
aluminium potassium sulphate	O	O	E	E	E	G	G	carbon bisulfide	G	F	G	G	E		G
aluminium sulfate(alums)	O	F	F	G	E	E	F	carbon tetrachloride(dry)	F	F	G	E	E	E	G
amines	G	O	E	E	E			carbonated water	O	G	E	E	E	E	G
ammonia(aqueous)	E	E	E	E	E	G	E	carbonic acid	O	O	G	G	E	E	E
ammonia(anhydrous liquid)	G	O	G	G	G	G	E	castor oil	G	E	E	E	E		E
ammonium bicarbonate	F	O	G	G	G			china wood oil(tung)	F	F	E	E	E		E
ammonium carbonate	G	O	G	G	G	G		chlorinated solvents	F	F	E	E			G
ammonium chloride	O	O	F	F	E	G	G	chlorine gas(dry)	G	F	G	G	E	E	G
ammonium hydroxide(28%)	O	O	G	G	E	E		chloroacetic acid	O	O	O	O	O	E	G
ammonium hydroxide(conc)	O	O	G	G	E	E		chlorobenzene(dry)	F	F	E	E	F		F
ammonium monophosphate	O	O	G	G	E	E		chloroform(dry)	O	G	E	E	E	E	E
ammonium nitrate	O	O	G	G	E	E		chromic acid	O	O	E	E	E	E	
ammonium phosphate	O	O	G	G	E	E		citrus juices	O	O	E	E	E	E	G
ammonium sulfate	F	G	G	G	E	G	G	coca-cola syrup(pure)	O	O	E	E			
amyl acetate	F	G	G	G	E	G	G	coconut oil	O	O	G	G	G		G
aniline	F	F	G	G	G	G	G	copper chloride	O	F	O	O	E	E	G
aniline dyes	F	O	E	E	E			cooking oil	O	G	E	E	E		
antimony trichloride	O	O	O	O	O	E	G	copper nitrate	O	O	E	E	E	E	O
apple juice	O	O	G	O	O			copper sulfate	O	O	G	G	E	G	E
arsenic acid	O	O	G	G	G			corn oil	F		G	G	G	G	E
asphalt emulsion	G	G	E	E	E			cottonseed oil	F		G	G	G	G	E
asphalt liquid	G	G	E	E	E	E		creosote oil	G	G	G	G	G	E	E
barium carbonate	G	G	E	E	E			creylic acid	F	F	G	G	G	G	G
barium chloride	F	G	G	G	F	E	G	cupric chloride	O	O	O	O	O	O	E
barium hydroxide	F	O	G	G	E	E		diesel fuels	E	E	E	E			E
barium sulfate	F	F	E	E	E		G	dowtherm	G		E	E			
barium sulfide	F	F	G	G	G		F	drying oil			G	G	G	G	
beer	O	E	E	E	G	E	E	epsom salt	F	G	G	G	G		
beet sugar liquors	G	E	E	E	G		E	ethers	G	G	E	E	E	G	E
benzene(benzol)	G	G	E	E	E	G	G	ethyl acetate	G	F	G	G	G	E	G
benzoid acid	O	O	E	E	E	E	G	ethyl alcohol	G	G	G	G	G	G	G
borax liquors	F	O	E	E	E	E	G	ethyl chloride(dry)	G	G	E	E	E	G	G

CODE

E - Excellent F - Fair G - Good O - Not recommended Blank - No data

CORROSION TABLES

CARBON STEEL AND BRONZE ARE SHOWN FOR COMPARISON PURPOSES

CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL	CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL
ethylene glycol	G	G	G	G	E	G		lactic acid	O	G	E	E	E	G	E
ethylene oxide	G	E	G	G	G	G		large oil		E	E	G	G	G	
fatty acids	O		G	E	E	G	E	lead acetate	O		E	E	E	G	E
ferric chloride	O	O	O	O	O	O	E	linseed oil	E	G	E	E	E	E	E
ferric nitrate	O		G	G	E	O	E	lubricating oil	E						
ferric sulfate	O	O	G	G	E		E	magnesium chloride	G	G	F	E	E	G	E
ferrous chloride	O	G	O	O	O	O	G	magnesium hydroxide	G	G	E	E	E	G	E
ferrous sulfate	O	G	E	E	E	G	G	magnesium sulfate	G	G	E	E	E	E	E
fish oils				G				maleic acid		G	G	G	F		F
fluorine							E	malic acid			E	E	E	G	E
formaldehyde	O	F	O	F	F	F	E	mayonnaise			E	E		G	
formic acid	O	G	F	G	G	G	E	mercury	E	O	E	E	E	G	E
fruit juices		G	E	E	E	E	E	methyl alcohol	G	G	G	G	G	E	
fuel oil		G	E	E	E	G	E	methyl chloride	G	E	G	E	E	G	G
furfural	G	F	G	E	E	G	E	methyl ethyl ketone	E	E	E	E	E	E	E
gallic acid	O	F	E	E	E	E	E	milk	O	E	E	E		G	E
gas-manufactured	G	G						mine waters(acid)		F	G	G	E	O	E
gas-natural	G	G	E	E	E			mineral oil			E				
gasoline(lead)	E	E	E	E	E	E		molasses, edible	F		E	E	E	G	E
gasoline(unlead)	E	E	E	E	E	E		molasses, crude	E	E	E	E	E	E	E
gelatin			E	E	E			mustard	O	O	F	E		G	
glucose		E	E	E				mercuric chloride					F		E
glue	E	G	G	G	G	G		naphtha	G	G	E	E	E	E	E
glycerin	F	G	E	E	E	E	E	naphthalene	E	G	G	G	G	G	E
heptane	O	O	O	O	E	G	E	nickel chloride	O		G	G	G	G	
hydrochloric acid(air free)	O	O	O	O	O	F	G	nickel nitrate			G	G	G	G	
hydrogen chloride								nickel sulfate	O		G	G	G	G	
hydrochloric acid	O	O	O	O	O	O	E	nitric acid(10%)	O	O	E	E	E	O	G
hydrofluoric acid	O	O	O	O	O	G	G	nitric acid(30%)	O	O	E	E	E	O	G
hydrogen fluoride	O	O	O	F	F	E		nitric acid(100%)	O	O	E	E	E	O	G
hydrogen			F	E	E		F	nitrobenzene	G		G	G	E	G	
hydroxide	O	O	E	E	E	G		nitrous acid(10%)	O	O	G	G	G	O	
hydrogen peroxide	O		G	G	E	G	E	nitrous oxide	G		G	G	G	O	
hydrogen sulfite(dry)	G	F	E	E	E		G	oleic acid	F	G	G	E	E	G	G
hydrogen sulfide(wet)	F		E	E	E		E	oleum	G		G	G	G	G	G
hypo(sodium thisosulfate)	O	F	E	E	E	G		olive oil			E	E			
hypochlorites - sodium		O	F	E	E	G	E	oxalate	O	O			E	G	E
ink			G	E	E	G	G	oxalic acid	O	G	E	E	E	G	G
iodine(wet)		O	O	O	O	F	E	palmitic acid		G	G	G	G	G	
iodoform	G		O	E		F	E	palm oil			G	G			
isopropyl alcohol			G	G	G	G		paraffin	G	E	E	E	E	E	E
JP-4			E	E	E	E		paraformaldehyde	G	G	G	G	G	G	
JP-5 fuel			E	E	E	E		penicilin	O	O	O	G	O	E	
kerosene	G	E	E	F	E	G	E	pentane	G	F	E	E	G	G	G
ketchup	O	O	F	E	E	G	F	petrolatum			G	G	G		
lacquers(and solvents)	F	E		E		E		phenol	O	E	E	E	E	E	E

CODE

E - Excellent F - Fair G - Good O - Not recommended Blank - No data

CORROSION TABLES

CARBON STEEL AND BRONZE ARE SHOWN FOR COMPARISON PURPOSES

CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL	CORROSIVE MEDIA	CARBON STEEL	BRONZE	AIISI 304	AIISI 316, 347, 321	ALLOY 20	HASTELLOY	MONEL-INCONEL
phosphoric acid(10%)	O		G	G	E	G	E	sodium phosphate	F	F	G	G	G		G
phosphoric acid(25%)	O		G	G	E	G	E	sodium silicate	G	G	G	G	G	G	
phthalic acid			G	G	G			sodium sulfate	G	G	G	E	E	E	E
picric acid	O		E	E	E	G	E	sodium sulfide	G	O	G	G	G		E
pine oil	G		E	E				sodium thiosulfate			E	E	E		
pineapple juice				E				soybean oil	F		E	E	E	E	
potassium bisulfite	O		G	G	G	O		stannic chloride	O	O	O	E	E	F	G
potassium bromide	O		E	E		G		stannous chloride	O	O	O	E	E	F	G
potassium carbonate	G	G	G	G	G	G		starch				G			
potassium chlorate	G		G	G	G			steam(212°F)	E	E	E	E	E	E	
potassium chloride	F	G	F	F	F	G	G	stearic acid		F	E	E	E	G	E
potassium cyanide	G	O	G	G	G	G	G	sugar liquids	O	O	E	E	E	E	E
potassium dichromate	F	O	G	G	G		E	sulfate - black liquor		F	G	G	G	G	E
potassium diphosphate				E				sulfate - green liquor			G	G	G	G	E
potassium ferricyanide	F	O	G	G	G	G	G	sulfate - white liquor			G	G	G	F	E
potassium ferrocyanide	F	G	G	G	G	G	G	sulfur dioxide(dry)	G	F	G	G	G	G	E
potassium hydroxide	F	G	G	G	G	E	E	sulfur trioxide(dry)	G	G	G	G	G	G	E
potassium iodide	F		G	G	G	G		sulfuric acid(20%)	O	G	O	O	E	E	E
potassium nitrate	E		G	G	G	G	G	sulfuric acid(50%)	O	G	O	O	E	E	E
potassium permanganate	G		G	G	G		E	sulfuric acid(100%)	F	E	O	G	E	O	E
potassium sulfate	G	G	G	G	G	G	G	sulfurous acid	O	F	F	O	E	O	G
propane	G	E	G	G	G	G		tall oil				G			
pyrogalllic acid	G		E	E	E	G	E	tannic acid	F	G	E	E	E	G	G
rosin emulsion	F	G	G	G	G	E		tartaric acid	O	E	E	E	E	G	E
salad oil	F	G	G	G	G	G		tetraethyl lead				G	G		
salicylic acid	O	G	G	G	G	G	G	toluene	E	E	E	E	E	E	
sea water	O	F	E	E	E	E	G	tomato juice			F	E	E	G	E
silver nitrate	O	O	G	G	G	O	G	trichloroethylene	G	G	G	G	G	E	E
sodium acetate	F		G	G	G	F	G	tung oil				G			
sodium aluminate			G	G	G	G	G	turpentine	G	G	G	G	G		
sodium bicarbonate	F	G	G	G	E	G	G	titanium "E"							
sodium bisulfate(10%)	O	G	E	E	E	G	G	urea			G	G			
sodium bisulfite	O	G	E	E	E	G	G	varnish	O	O	E	E		G	E
sodium borate			G	G	G	G	G	vegetable oil, edible			E	E	E	G	E
sodium bromide(10%)	G		F	G	G	G	G	vegetable oil, non - edible			E	E	E	G	E
sodium carbonate	G							vinegar	O	E	E	E			
sodium chlorate		G	G	G	G		G	vitamins	O	O	O	G	O	E	
sodium chloride	F	G	G	G	G	G	G	water - distilled(aerated)	O	E	E	E	E	E	
sodium chromate	G	F				G		water - fresh		F	E	E	E	E	E
sodium cyanide	G	O	G	G	G	G		water - sea	O	F	E	E	E	E	
sodium fluoride	O		F	G		E	F	whiskey	O		E	E		E	
sodium hydroxide	F	G	G	G	G	E	E	wine	O		E	E			
sodium hypochlorite	O	O	O	G	E	O	E	xylylene(dry)	G		E	E			
sodium nitrate	G	G	G	G	G	G	G	zinc chloride	O	O	O	O	G	G	G
sodium perborate	G		G	G	G	G	G	zinc hydrosulfite	F		F	F	F	G	G
sodium peroxide	F	O	G	G	G	G	G	zinc sulfate	O	G	G	G	G	G	G

CODE

E - Excellent F - Fair G - Good O - Not recommended Blank - No data














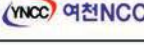
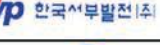





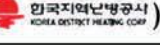
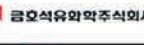



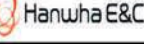
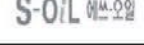

MAJOR CLIENTS (OVERSEAS)

USA/CANADA	EUROPE	INDIA	ASIA	JAPAN
  	   	 	      	          
				

MAJOR CLIENTS (Middle East)

SAUDI ARABIA	KUWAIT	QATAR	UAE	OMAN
       <p>شركة مرافق الكهرباء والمياه بالجبل وينبع Power and Water Utility Company for Jubail and Yanbu</p>	      	    	<p>هيئة كهرباء ومياه دبي Dubai Electricity & Water Authority</p>   <p>هيئة مياه وكهرباء أبوظبي Abu Dhabi Water & Electricity Authority</p>	
			<p>EGYPT/ALGERIE</p> 	<p>IRAN</p>  

MAJOR CLIENTS (DOMESTIC)

EPC	PETROCHEM.	POWER
HYUNDAI E&C 	HYUNDAI OIL BANK 	KOREA SOUTH POWER 
GS E&C. 	GS CALTEX 	KOREA SOUTH EAST POWER 
DAELIM INDUSTRY 	SAMSUNG PETRO C 	KOREA EAST WEST POWER 
SAMSUNG E&C 	SK ENERGY 	KOREA MIDLAND POWER 
SK E&C 	YEOCHON PETROCHEM 	KOREA WEST POWER 
DAEWOO ENG. 	HANHWA PETROCHEM 	GE KOREA 
HYUNDAI ENGINEERING 	HONAM PETROCHEM 	KDHC (Korea District Heating Co.) 
	KUMHO PETROCHEM 	
DOOSAN HEAVY IND. 	LG CHEMICAL 	
HYUNDAI HEAVY IND. 	HANHWA E&C 	
	S-OIL 	
	DAESAN MMA 	

SUPPLY RECORDS –

Saudi Kayan Petrochemical Complex PP & PH PJ Jubail, Saudi Arabia

The formation of the **Saudi Kayan Petrochemical Company** (a public stock company) was the outcome of a partnership agreement between Saudi Basic Industries Corp. (SABIC) & AlKayan Petrochemical Company (Kayan). The company's capital amounts to 15 billion Saudi Riyals.



شركة كيان السعودية للبتر وكيمائيات
Saudi Kayan Petrochemical Company

SABIC Affiliate

شركة تابعة لسابك



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
SABIC	Saudi Kayan Petrochemical Company	Samsung E&C	Saudi Kayan Petrochemical Complex PP & PH PJ	KJS	8	2008

SUPPLY RECORDS – Rabigh PJ in Saudi Arabia

In August 2005 Saudi Arabia's **Saudi Aramco** and Japan's **Sumitomo Chemical** agreed to form a 50:50 joint venture to develop a **petrochemical complex in Rabigh** - the centre of one of the world's largest. The venture is called **PetroRabigh**.

The complex is due for completion in the second half of 2008. The complex has required an estimated investment of **\$9.9bn**.



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
Saudi Aramco Sumitomo Chemical	Petro Rabigh 	JGC Mitsubishi	Rabigh PJ PC-1	KVC	994	2006

السعودية العربية
Saudi Aramco

SUPPLY RECORDS – South Pars PJ in Iran




The South Pars Gas Field Development in Iran Offshore

in Iran contains about 50% of Iran's gas resources and is regarded as the largest offshore gas field in the world.

Iran holds 15.3 percent of the world's gas repositories which is the second largest holder of gas after Russia of 26.7 percent.

The South Pars Gas Field has been divided into 28 phases for exploitation with development cost for each phase of around 1 billion USD.



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
NIOC(National Iranian Oil Company) 	PETRO PARS 	HYUNDAI ENG& CONST.	SOUTH PARS PHASE 4,5	KJS	3,720	2003
		DAELIM, JGC, TEC.IDRO	SOUTH PARS PHASE 6,7,8	KVC	4,239	2004

SUPPLY RECORDS POWER PLANT-MIDDLE EAST

NO.	CLIENT (USER)	EPC CONTRACTOR	PROJECT NAME	CAPA	QTY	YEAR	LOCATION
E1	AMMAN EAST POWER SUPPLY	DOOSAN HEAVY IND.	AMMAN EAST POWER PJ	370MW	360	2008	JORDAN
E2	JUBAIL WATER AND POWER COMPANY	DOOSAN HEAVY IND.	MARAFIQ HRSG	2700MW	228	2008	SAUDI ARABIA
E3	DEWA=Dubai Electricity and Water Authority	DOOSAN HEAVY IND.	JEBEL ALI-M PJ	2000MW	621	2008	UAE
E4	MEW(Ministry of Electricity & Water)	MITSUBISHI CO. HYUNDAI E&C	SHUAIBA NORTH CO GEN PJ	500MW	560	2008	KUWAIT
E5	GECOL-GENERAL ELECTRIC COMPANY OF LYBIA	HYUNDAI E&C.	ZAWIA CCPP	960MW	1,320	2006	LYBIA
E6	PRAYAS ENERGY GROUP	HYUNDAI E&C.	TANIR BAVI CCGT POWER PROJECT	235MW	52	2000	INDIA
E7	KAHRAMAA(Qatar General Electricity & Water Corporation)	SUEZ ENERGY+MITSUBI - HYUNDAI E&C.	RAS LAFFAN C IWPP PJ	2730MW	153	2009	QATAR
E8	Egyptian Electricity Holding Co	BECHTEL	AYOUN MOUSSA POWER PLANT	640MW	80	1998	EGYPT
E9	Sidi Krir Unit I&II	MITSUBISHI PGESCO-KVC	Sidi Krir Unit I&II Power Plant	650MW		2008	EGYPT
E10	Yerevan Thermal Power Plant CJSC	MITSUBISHI-PGESCO-KVC SEDAE ENERTEC-	Yerevan CCPP	205MW	192	2009	ARMENIA



SUPPLY RECORDS – PP-III Utility & Offshore PJ in Saudi Arabia

Al Jubail Polypropylene Plant, Saudi Arabia

The project is located in Yanpet, near Al Jubail in Saudi Arabia, which has been the focus of significant petrochemical investment in the last five years. The Saudi European Petrochemical Company (also known as Ibn Zahr) is 70% owned by **Sabtic (Saudi Arabian Basic Industries Company)**. Arab Petroleum Investment Corporation (APICORP) also owns 10% of the company.



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
SABIC	Saudi European Petrochemical Company (= Ibn Zahr)	Daelim Ind.	PP-III Utility & Offshore PJ	KJS	1,113	2007

SUPPLY RECORDS

QP LAB PJ in QATAR



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
QP	LAFFAN REFINERY COMPANY	GS E&C	QP LAB PJ	KJS	4,948	2004

SUPPLY RECORDS in Abu Dhabi, UAE
Umm Al Nar power and water desalination plant PJ
 ADWEA (Abu Dhabi Water and Electricity Authority)
 IP (International Power) Tokyo Electric Power Company (TEPCO) and Mitsui
 The total project cost, comprising the cost of both acquisition and the planned expansion, is estimated at \$2.1 billion

هيئة مياه وكهرباء أبوظبي
 Abu Dhabi Water & Electricity Authority

وزارة الطاقة
 هيئة مياه وكهرباء أبوظبي
 وزارة الكهرباء

OWNER	CONTRACTOR	EPC	VENDOR	PROJECT	BRAND	Q'TY	YEAR
ADWEA +IP	-	Mitsui with Toshiba	KVC	Umm Al Nar power and water desalination plant PJ	KVC	355	2005

SUPPLY RECORDS NERP PJ in KUWAIT



The local KUWAIT NATIONAL PETROLEUM CO. (KNPC) is currently gearing-up to build a **new ethane recovery plant(NERP) PJ** at Mina Al Ahmadi Refinery Plant.

The cost to complete the project, by September 2007, has been estimated at **\$397,000,000.**



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
KNPC	HYUNDAI E&C	HYUNDAI E&C	NEW ETHANE RECOVERY PJ	KJS	2,187	2006

SUPPLY RECORDS –

Sharq Third Expansion Project Jubail, Saudi Arabia



Saudi Arabia's **Sabic** announced an investment of **\$6.4 billion** for the expansion of its petrochemical capacity in 2004. The plans included increased capacity at its affiliate **Eastern Petrochemical Company (Sharq)**. The company is a 50:50 joint venture between Sabic and a Japanese consortium, led by Japan's government and the Mitsubishi group of companies. Sharq's plans included an investment of **\$2.28 billion in ethylene** and downstream capacity located in Jubail, Saudi Arabia, known as the **Sharq third expansion project**. Completion is slated for 2008

OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
SABIC	Eastern Petrochemical Company (Sharq).-Linde	Hyundai E&C	Sharq third expansion project	KJS Provalve	541	2006

SUPPLY RECORDS

300KTM Bandar Imam LDPE PJ in IRAN



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
NPC(National Petrochemical Company)	Amir Kabir Petrochemical	Daelim Ind.	300KTM Bandar Imam LDPE PJ	KJS	625	2006

SUPPLY RECORDS

QCS, QG, RGX, AKG-II PJ in QATAR



Qatar's North Field is the largest offshore non-associated natural gas field in the world. RasGas was established in 1993 to produce liquefied natural gas (LNG) developed by RasGas (RG), QatarGas (QG) and North Field Alpha (NFA).



OWNER	CONTRACTOR	EPC	PROJECT	BRAND	Q'TY	YEAR
Exxonmobil QP	RAS GAS	CTJV (Chiyoda & Technip)	AKG-II PJ-Al Khaleej Gas PJ Phase-2	YONEKI	3,637	2007
	RAS GAS		RGX-6 PJ-Ras Gas Onshore Expansion PJ Phase-2	YONEKI	7,970	2007
	QATAR GAS		QCS PJ-Qatar Gas Development PJ	YONEKI	1,569	2006
	QATAR GAS		QG-II PJ-Qatar Gas Development PJ	YONEKI	1,212	2006

WARRANTY

SAMWOO KJS TEC CO.,LTD(SAMWOO HEREAFTER) WARRANTS ITS PRODUCTS (INCLUDED PARTS) TO THE ORIGINAL PURCHASER FOR A PERIOD OF ONE YEAR FROM AND AFTER THE DATE OF DELIVERY TO THE ORIGINAL CUSTOMER, AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP UNDER PROPER AND NORMAL USE AND SERVICE AND NOT CAUSED OF INSTALLATIONS, IMPROPER MAINTENANCE AND REPAIRS, MODIFICATIONS OR ALTERNATIONS. PURCHASER SHALL GIVE NOTICE TO SAMWOO UPON FINDING OF ANY DEFECT OR ASSUMING DEFECT AND SAMWOO HAS PRIVILEGE TO CHECK THE FACTS OF THE DEFECT.

THIS WARRANTY SHALL BE LIMITED TO THE FOLLOWINGS.

- 1) REPAIR OF THE MATERIALS OR,
- 2) REPLACEMENT OF THE PARTS AND MATERIALS OR,
- 3) REFUND THE PURCHASE PRICE OR COLLECT THE DEFECTED PRODUCTS FROM THE ORIGINAL PURCHASER.

SAMWOO IS NOT RESPONSIBLE TO CLAIMS FOR CONSEQUENTIAL DAMAGE, LOSS OR EXPENSE OF ANY KIND ARISING OUT OF THE DEFECT.

THE SCOPE AND LIMITATION OF WARRANTY CAN BE CHANGED THROUGH THE AGREEMENT BETWEEN SAMWOO AND PURCHASER.



SAMWOO KJS TEC CO., LTD.

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