

Sizes 2" - 12"

Cast Steel Swing Check Valve API 600 ANSI Class 150 & 300



Description

A heavy duty Swing Check valve to API and BS standards. The seat Ring and Wedge Disc are ground and lapped to a mirror finish that provides matching sealing surfaces. A free rotating Disc design to minimize localised wear on sealing surfaces. Standard internal HINGE design eliminates body penetration and allows ease of maintenance, since all parts are accessible from the top and the valve can be serviced insitu. High strength alloy steel STUD BOLTS and series HEX NUTS used.

Design	: API 600 / API 6D / BS 1873
Shell Thickness	: API 600 / API 6D / BS 1873
Flanged Ends	: ANSI B16.5
Face to Face	: ANSI B16.10
Testing	: API 598 / EN12266-1

- Swing Disc Design
- Regular Opening Type
- Bolted Cover Construction
- Internal Hinge Design Standard
- Through-Body Hinge Pin Design Available
- Renewable Threaded-in or Welded-in Seat Ring



Description

Designed to BS 1868 / API 600 / API 6D and pressure tested in accordance with API 598/ EN12266-1. This heavy duty flanged Swing Check valve offers durability throughout a wide range of industrial applications, boiler plant and rugged environments. Handwheel operated and offered in both ANSI 150 and ANSI 300, offering maximum service life.



Beschreibung

Entwickelt gemäß BS 1868 / API 600 / API 6D und druckgeprüft gemäß API 598 / EN12266-1. Dieses hochbelastbare, mit Flansch versehene Rückschlagklappenventil bietet Haltbarkeit in einer Vielzahl von industriellen Anwendungen, Kesselanlagen und robusten Umgebungen. Das Handrad wird sowohl in ANSI 150 als auch in ANSI 300 betrieben und angeboten und bietet eine maximale Lebensdauer.



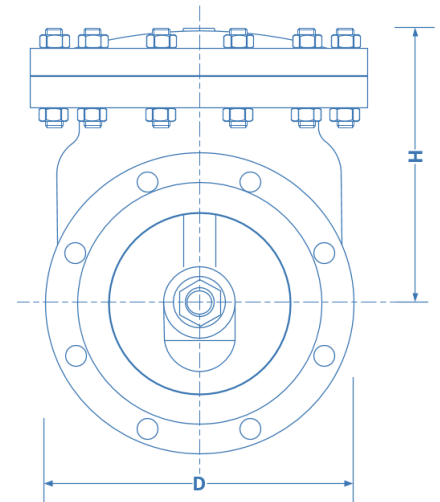
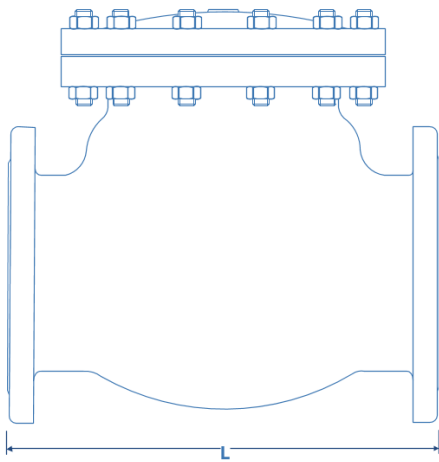
Descripción

Diseñada para BS 1868 / API 600 / API 6D y prueba de presión de acuerdo con API 598 / EN12266-1. Esta válvula Swing Check bridada de alta resistencia ofrece durabilidad en una amplia gama de aplicaciones industriales, plantas de calderas y entornos resistentes. El volante se maneja y se ofrece en ANSI 150 y ANSI 300, ofreciendo una vida útil máxima.



La description

Conçu selon les normes BS 1868 / API 600 / API 6D et testé en pression conformément à la norme API 598 / EN12266-1. Ce clapet anti-retour à brides pour usage intensif offre une durabilité dans un large éventail d'applications industrielles, de chaudières et d'environnements difficiles. Le volant est actionné et proposé dans les normes ANSI 150 et ANSI 300, offrant une durée de vie maximale.

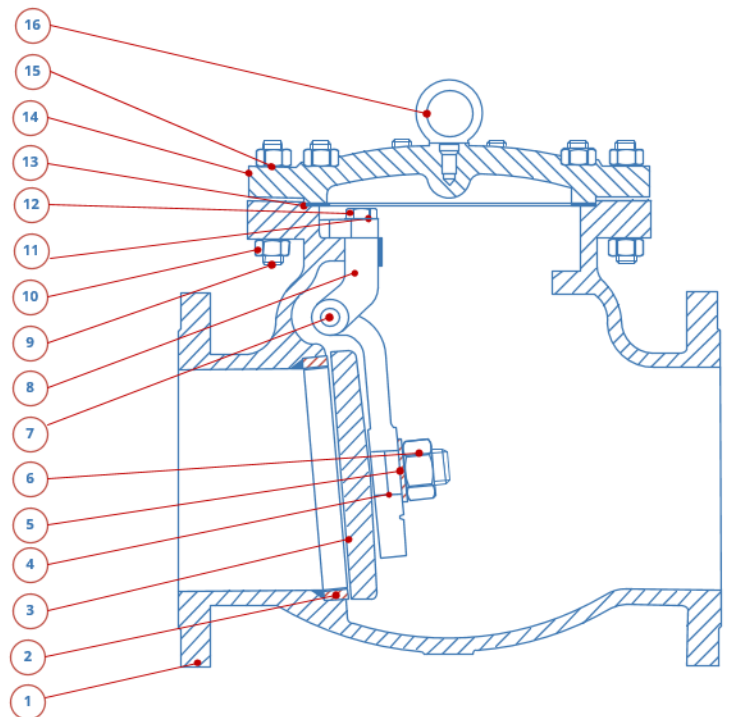


Dimensions

Size	ANSI Class 150					ANSI Class 300				
	L	H	D	lb	kg	L	H	D	lb	kg
2"	203	156	152	42	18	267	198	165	46	21
3"	241	180	191	62	28	318	222	210	94	43
4"	292	213	229	105	48	356	266	254	146	66
6"	356	307	279	172	78	445	326	318	276	125
8"	495	357	343	293	133	533	400	381	430	195
10"	622	390	406	587	266	622	455	445	666	302
12"	699	410	483	765	347	711	543	521	858	389

DESCRIPTION OF PARTS

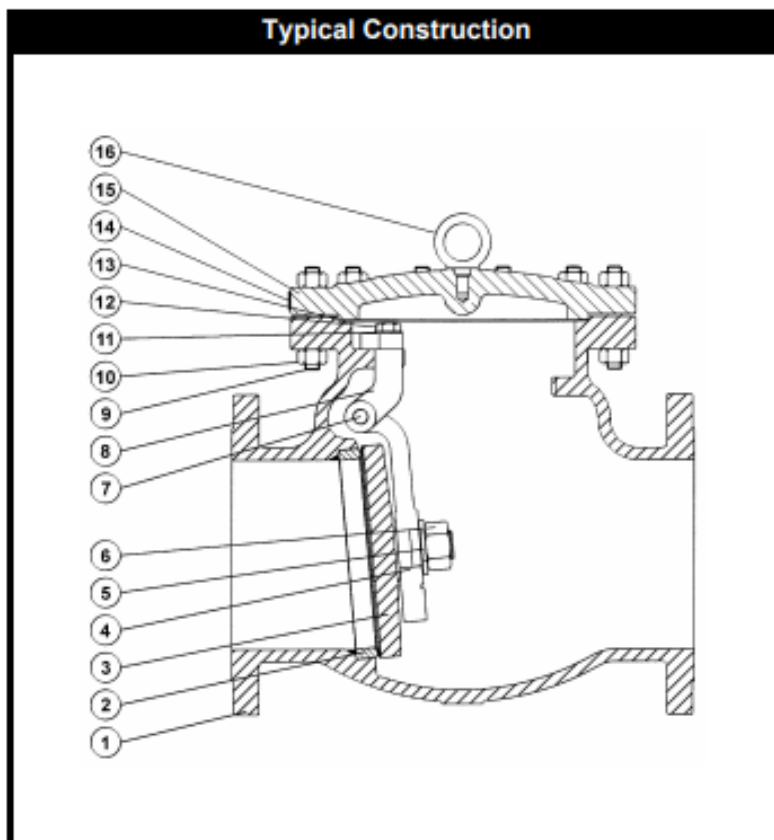
1	Body
2	Seat Ring
3	Disc
4	Hinge
5	Disc Washer
6	Disc Nut
7	Hinge Pin
8	Bracket
9	Stud Bolt
10	Hex Nut
11	Washer
13	Capscrew
14	Nameplate
15	Cover
16	Lifting Lug



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SWING CHECK VALVE DESIGN FEATURES

- ◆ Swing Disc Design
- ◆ Regular Opening Type
- ◆ Bolted Cover Construction
- ◆ Internal Hinge Design Standard
- ◆ Through-Body Hinge Pin Design Available
- ◆ Renewable Threaded-In or Welded-In Seat Ring
- ◆ Design : API 6D / API 600 / BS 1868
- ◆ Shell Thickness : API 6D / API 600 / BS 1868
- ◆ Flanged Ends : ANSI B16.5 (Sizes ≤ 24")
MSS SP-44 (Sizes > 24")
API 605 (Sizes > 24")
- ◆ Face-to-Face : ANSI B16.10
- ◆ Testing : API 598 / EN12266-1

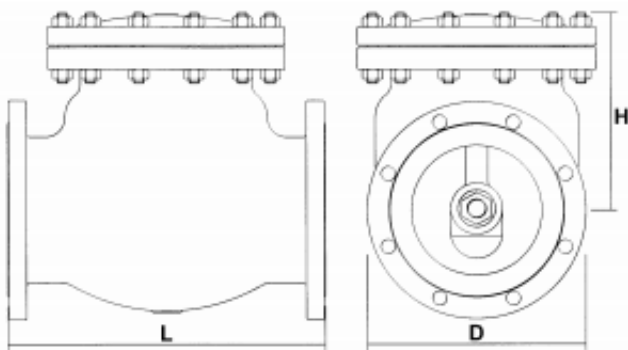


No.	Part Name
1	Body
2	Seat Ring
3	Disc
4	Hinge
5	Disc Washer
6	Disc Nut
7	Hinge Pin
8	Bracket
9	Stud Bolt
10	Hex Nut
11	Washer
13	Capscrew
14	Nameplate
15	Cover
16	Lifting Lug

Note: Weld end valves available upon request

- ◆ Heavy duty BODY with shell thickness to API / BS standards (where applicable)
- ◆ SEAT RING and DISC ground and lapped to a mirror finish to provide matching sealing surfaces
- ◆ Free rotating DISC design to minimize localized wear on sealing surface
- ◆ Y Body Pattern available
- ◆ Standard internal HINGE design eliminates body penetration and allows ease of maintenance since all parts are accessible from the top and the valve can be serviced insitu
- ◆ Through-body HINGE PIN design available for outside lever, counter weight or slam retarder
- ◆ High strength alloy steel STUD BOLTS and heavy series HEX NUTS used

DIMENSIONS



ANSI Class 150

Size	Dimensions (mm)			Approx. Wt.	
	L	H	D	(lb.)	(kg.)
2"	203	156	152	42	19
2½"	216	170	178	57	26
3"	241	180	191	62	28
4"	292	213	229	105	48
5"	330	229	254	152	69
6"	356	307	279	172	78
8"	495	357	343	293	133
10"	622	390	406	587	266
12"	699	410	483	765	347
14"	787	415	533	994	451
16"	864	460	597	1,226	556
18"	978	570	635	1,738	788
20"	978	625	699	2,020	916
24"	1,295	675	813	2,811	1,275

DPV Figure Numbers

Material	ANSI Class	
	150	300
A216 Gr. WCB	1532F	3032F
A352 Gr. LCC	153CF	303CF
A217 Gr. WC6	1536F	3036F
A217 Gr. WC9	1539F	3039F
A217 Gr. C5	1535F	3035F
A351 Gr. CF8	1534F	3034F
A351 Gr. CF3	1534LF	3034LF
A351 Gr. CF8M	1533F	3033F
A351 Gr. CF3M	1533LF	3033LF
A351 Gr. CN7M	1537F	3037F

ANSI Class 300

Size	Dimensions (mm)			Approx. Wt.	
	L	H	D	(lb.)	(kg.)
2"	267	198	165	46	21
2½"	292	203	191	66	30
3"	318	222	210	94	43
4"	356	266	254	146	66
5"	400	292	279	185	84
6"	445	326	318	276	125
8"	533	400	381	430	195
10"	622	455	445	666	302
12"	711	543	521	858	389
14"	838	500	584	1,433	650
16"	864	545	648	1,764	800
18"	978	605	711	2,139	970
20"	1,016	675	775	2,977	1,350
24"	1,346	785	914	4,873	2,210

STANDARD MATERIALS OF CONSTRUCTION

Part	ANSI B16.34 Material Group				
	Carbon Steel	C-Mn Steel	Alloy Steel		
	1.1	1.2	1.9	1.10	1.13
Body / Cover	A216 Gr. WCB	A352 Gr. LCC	A217 Gr. WC6	A217 Gr. WC9	A217 Gr. C5
Hinge / Bracket	A216 Gr. WCB	A352 Gr. LCC	A217 Gr. WC6	A217 Gr. WC9	A217 Gr. C5
Stud Bolts	A193 Gr. B7	A320 Gr. L7	← Alloy Steel ASTM A193 Gr. B16 →		
Hex Nuts	A194 Gr. 2H	A194 Gr. 7	← Carbon Steel ASTM A194 Gr. 2H →		
Washer / Capscrew	← Carbon Steel →		← Alloy Steel →		

Part	Corrosion Resistant Steel				
	2.1		2.2		3.17
	Body / Cover	A351 Gr. CF8	A351 Gr. CF3	A351 Gr. CF8M	A351 Gr. CF3M
Hinge / Bracket	A351 Gr. CF8	A351 Gr. CF3	A351 Gr. CF8M	A351 Gr. CF3M	A351 Gr. CN7M
Stud Bolts	← ASTM A193 Gr. B8 →		← ASTM A193 Gr. B8M →		
Hex Nuts	← ASTM A194 Gr. 8 →		← ASTM A194 Gr. 8M →		
Washer / Capscrew	← Corrosion Resistant Steel →				

Note: Other materials available upon request.

Trim Materials

Part	API Trim No.										
	1	2	5	8	9	10	11	12	13	14	15
Disc	F6	304SS	HF	F6	Ni-Cu	316SS	Ni-Cu	316SS	Alloy 20	Alloy 20	HF
Seat Ring	F6	304SS	HF	HF	Ni-Cu	316SS	HF	HF	Alloy 20	HF	HF
Disc Washer	F6	304SS	F6	F6	Ni-Cu	316SS	Ni-Cu	316SS	Alloy 20	Alloy 20	304SS
Disc Nut	F6	304SS	F6	F6	Ni-Cu	316SS	Ni-Cu	316SS	Alloy 20	Alloy 20	304SS
Hinge Pin	F6	304SS	F6	F6	Ni-Cu	316SS	Ni-Cu	316SS	Alloy 20	Alloy 20	304SS

Part	API Trim No.					DPV Trim No.					
	16	17	18	A	B	C	D	E	F	G	H
Disc	HF	HF	HF	HF	Bronze	F6	304SS	316SS	Ni-Cu	Alloy 20	Bronze
Seat Ring	HF	HF	HF	HF	Bronze	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Disc Washer	316SS	347SS	Alloy 20	Ni-Cu	Bronze	F6	304SS	316SS	Ni-Cu	Alloy 20	Bronze
Disc Nut	316SS	347SS	Alloy 20	Ni-Cu	Bronze	F6	304SS	316SS	Ni-Cu	Alloy 20	Bronze
Hinge Pin	316SS	347SS	Alloy 20	Ni-Cu	Bronze	F6	304SS	316SS	Ni-Cu	Alloy 20	Bronze

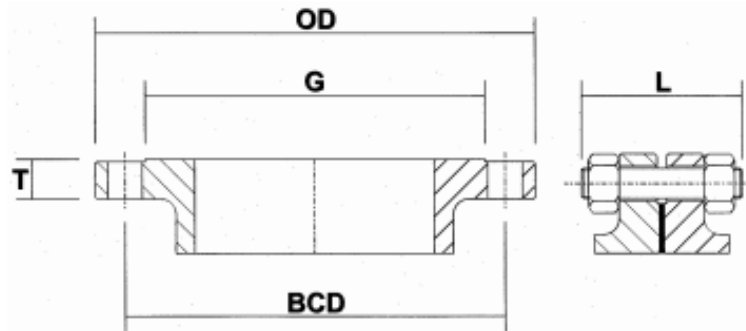
Note: Trim will be supplied either as a base material equal to body with overlay or solid trim at manufacturer's option.

Gasket Materials

Type	ANSI Class				
	150	300	600	900	1500
S.S. Spiral Wound	●	●	○	○	○
Soft Iron Ring	N/A	N/A	●	●	●

● Standard ○ Optional Other types available upon request.

END FLANGE DIMENSIONS (in.)



ANSI / ASME B16.5 Class 150 R.F. (1/16" Raised Face)

Size	OD	T		G	BCD	Bolt Hole Ø	No. of Bolt Holes	Stud Bolt Ø	L	Size
	Outside Ø	Companion Flange	Valve Flange	R.F. Ø	Bolt Circle Ø				Bolt Length	
2	6	3/4	5/8	3 5/8	4 3/4	3/4	4	5/8	3	2
2½	7	7/8	11/16	4 1/8	5 1/2	3/4	4	5/8	3 1/4	2½
3	7 1/2	15/16	15/16	5	6	3/4	4	5/8	3 3/4	3
4	9	15/16	15/16	6 3/16	7 1/2	3/4	8	5/8	3 3/4	4
5	10	15/16	15/16	7 5/16	8 1/2	7/8	8	3/4	4	5
6	11	1	1	8 1/2	9 1/2	7/8	8	3/4	4	6
8	13 1/2	1 1/8	1 1/8	10 5/8	12	7/8	8	3/4	4 1/4	8
10	16	1 3/16	1 3/16	12 3/4	14 1/4	1	12	7/8	4 3/4	10
12	19	1 1/4	1 1/4	15	17	1	12	7/8	4 3/4	12
14	21	1 3/8	1 3/8	16 1/4	18 3/4	1 1/8	12	1	5 1/4	14
16	23 1/2	1 7/16	1 7/16	18 1/2	21 1/4	1 1/8	16	1	5 1/2	16
18	25	1 9/16	1 9/16	21	22 3/4	1 1/4	16	1 1/8	6	18
20	27 1/2	1 11/16	1 11/16	23	25	1 1/4	20	1 1/8	6 1/4	20
24	32	1 7/8	1 7/8	27 1/4	29 1/2	1 3/8	20	1 1/4	6 3/4	24

MSS SP-44 / ASME B16.47 Series A Class 150 R.F. (1/16" Raised Face)

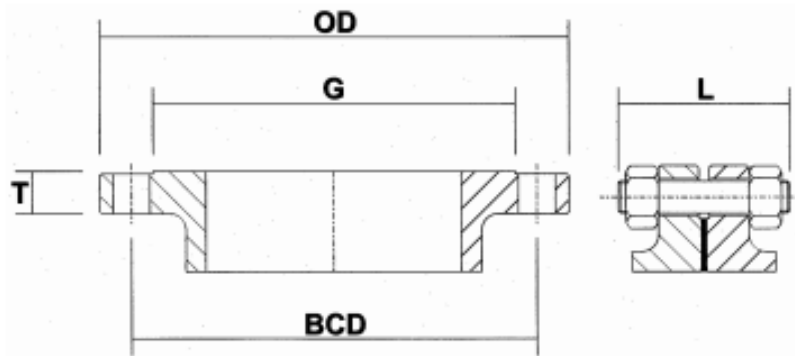
22	29 1/2	1 13/16	1 13/16	25 1/4	27 1/4	1 3/8	20	1 1/4	6 3/4	22
26	34 1/4	2 11/16	2 11/16	29 1/2	31 3/4	1 3/8	24	1 1/4	8 1/2	26
28	36 1/2	2 13/16	2 13/16	31 1/2	34	1 3/8	28	1 1/4	8 3/4	28
30	38 3/4	2 15/16	2 15/16	33 3/4	36	1 3/8	28	1 1/4	9	30
36	46	3 9/16	3 9/16	40 1/4	42 3/4	1 5/8	32	1 1/2	10 3/4	36

API 605 / ASME B16.47 Series B Class 150 R.F. (1/16" Raised Face)

26	30 15/16	1 5/8	1 5/8	28	29 5/16	7/8	36	3/4	5 1/2	26
28	32 15/16	1 3/4	1 3/4	30	31 5/16	7/8	40	3/4	5 3/4	28
30	34 15/16	1 3/4	1 3/4	32	33 5/16	7/8	44	3/4	5 3/4	30
36	41 5/8	2 1/16	2 1/16	38 1/4	39 3/4	1	44	7/8	6 1/2	36

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END FLANGE DIMENSIONS (in.) ONLINE



ANSI / ASME B16.5 Class 300 R.F. (1/16" Raised Face)

Size	OD	T	G	BCD	Bolt Hole Ø	No. of Bolt Holes	Stud Bolt Ø	L	Size
	Outside Ø	Flange Thickness	R.F. Ø	Bolt Circle Ø				Bolt Length	
2	6 1/2	7/8	3 5/8	5	3/4	8	5/8	3 1/2	2
2½	7 1/2	1	4 1/8	5 7/8	7/8	8	3/4	4	2½
3	8 1/4	1 1/8	5	6 5/8	7/8	8	3/4	4 1/4	3
4	10	1 1/4	6 3/16	7 7/8	7/8	8	3/4	4 1/2	4
5	11	1 3/8	7 5/16	9 1/4	7/8	8	3/4	4 3/4	5
6	12 1/2	1 7/16	8 1/2	10 5/8	7/8	12	3/4	4 3/4	6
8	15	1 5/8	10 5/8	13	1	12	7/8	5 1/2	8
10	17 1/2	1 7/8	12 3/4	15 1/4	1 1/8	16	1	6 1/4	10
12	20 1/2	2	15	17 3/4	1 1/4	16	1 1/8	6 3/4	12
14	23	2 1/8	16 1/4	20 1/4	1 1/4	20	1 1/8	7	14
16	25 1/2	2 1/4	18 1/2	22 1/2	1 3/8	20	1 1/4	7 1/2	16
18	28	2 3/8	21	24 3/4	1 3/8	24	1 1/4	7 3/4	18
20	30 1/2	2 1/2	23	27	1 3/8	24	1 1/4	8	20
24	36	2 3/4	27 1/4	32	1 5/8	24	1 1/2	9	24

MSS SP-44 / ASME B16.47 Series A Class 300 R.F. (1/16" Raised Face)

22	33	2 5/8	25 1/4	29 1/4	1 5/8	24	1 1/2	9	22
26	38 1/4	3 1/8	29 1/2	34 1/2	1 3/4	28	1 5/8	10 1/4	26
28	40 3/4	3 3/8	31 1/2	37	1 3/4	28	1 5/8	10 3/4	28
30	43	3 5/8	33 3/4	39 1/4	1 7/8	28	1 3/4	11 1/2	30
36	50	4 1/8	40 1/4	46	2 1/8	32	2	13	36

API 605 / ASME B16.47 Series B Class 300 R.F. (1/16" Raised Face)

26	34 1/8	3 1/2	29	31 5/8	1 3/8	32	1 1/4	10 1/4	26
28	36 1/4	3 1/2	31	33 3/4	1 3/8	36	1 1/4	10 1/4	28
30	39	3 11/16	33 1/4	36 1/4	1 1/2	36	1 3/8	10 3/4	30
36	46 1/8	4 1/16	39 3/4	42 7/8	1 3/4	32	1 5/8	12	36

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ANSI CLASS 150 PRESSURE-TEMP RATINGS

Temperature °F	Pressure (psig)										Temp. °C
	ANSI B16.34 Material Group										
	1.1	1.2	1.9	1.10	1.13	2.1		2.2		3.17	
	WCB ¹	LCC ²	WC6 ³	WC9 ³	C5 ³	CF8 ⁴	CF3 ⁵	CF8M ⁴	CF3M ⁶	CN7M ⁷	
-20 to 100	285	290	290	290	290	275	275	275	275	230	-29 to 38
200	260	260	260	260	260	230	230	235	235	200	93
300	230	230	230	230	230	205	205	215	215	180	149
350	215	215	215	215	215	198	198	205	205	170	177
400	200	200	200	200	200	190	190	195	195	160	204
450	185	185	185	185	185	180	180	183	183	155	232
500	170	170	170	170	170	170	170	170	170	150	260
550	155	155	155	155	155	155	155	155	155	145	288
600	140	140	140	140	140	140	140	140	140	140	316
650	125	125	125	125	125	125	125	125	125	125	343
700	110		110	110	110	110	110	110	110	110	371
750	95		95	95	95	95	95	95	95	95	399
800	80		80	80	80	80	80	80	80	80	427
850	65		65	65	65	65	65	65	65	65	454
900	50		50	50	50	50	50	50	50	50	482
950	35		35	35	35	35	35	35	35	35	510
1,000	20		20	20	20	20	20	20	20	20	538
1,050			20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	566
1,100			20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	593
1,150					20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	621
1,200					15 ^a	20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	649
1,250						20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	677
1,300						20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	704
1,350						20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	732
1,400						20 ^a	20 ^a	20 ^a	20 ^a	20 ^a	760
1,450						15 ^a	20 ^a	20 ^a	20 ^a	20 ^a	788
1,500						10 ^a	20 ^a	20 ^a	20 ^a	20 ^a	816

¹ Upon prolonged exposure to temperatures above 800 °F (427 °C), the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged use above 800 °F (427 °C).

² Not to be used over 650 °F (343 °C).

³ Use normalized and tempered material only.

⁴ At temperatures over 1,000 °F (538 °C), use only when the carbon content is 0.04% or higher.

⁵ Not to be used over 800 °F (427 °C).

⁶ Not to be used over 850 °F (454 °C).

⁷ Use solution annealed material only.

^a For welding end valves only. Flanged end ratings terminate at 1,000 °F (538 °C).

ANSI CLASS 300 PRESSURE-TEMP RATINGS

Temperature °F	Pressure (psig)										Temp. °C
	ANSI B16.34 Material Group										
	1.1	1.2	1.9	1.10	1.13	2.1		2.2		3.17	
	WCB ¹	LCC ²	WC6 ³	WC9 ³	C5 ³	CF8 ⁴	CF3 ⁵	CF8M ⁴	CF3M ⁶	CN7M ⁷	
-20 to 100	740	750	750	750	750	720	720	720	720	600	-29 to 38
200	675	750	750	750	745	600	600	620	620	520	93
300	655	730	720	730	715	540	540	560	560	465	149
350	645	718	708	718	710	518	518	538	538	443	177
400	635	705	695	705	705	495	495	515	515	420	204
450	618	685	680	685	685	480	480	498	498	405	232
500	600	665	665	665	665	465	465	480	480	390	260
550	575	635	635	635	635	450	450	465	465	375	288
600	550	605	605	605	605	435	435	450	450	360	316
650	535	590	590	590	590	430	430	445	445		343
700	535		570	570	570	425	425	430	430		371
750	505		530	530	530	415	415	425	425		399
800	410		510	510	510	405	405	420	420		427
850	270		485	485	485	395		420	420		454
900	170		450	450	370	390		415			482
950	105		320	375	275	380		385			510
1,000	50		215	260	200	320		350			538
1,050			145 ^a	175 ^a	145 ^a	310 ^a		345 ^a			566
1,100			95 ^a	110 ^a	100 ^a	255 ^a		305 ^a			593
1,150					60 ^a	200 ^a		235 ^a			621
1,200					35 ^a	155 ^a		185 ^a			649
1,250						115 ^a		145 ^a			677
1,300						85 ^a		115 ^a			704
1,350						60 ^a		95 ^a			732
1,400						50 ^a		75 ^a			760
1,450						35 ^a		60 ^a			788
1,500						25 ^a		40 ^a			816

¹ Upon prolonged exposure to temperatures above 800 °F (427 °C), the carbide phase of steel may be converted to graphite. Permissible, but not recommended for prolonged use above 800 °F (427 °C).

² Not to be used over 650 °F (343 °C).

³ Use normalized and tempered material only.

⁴ At temperatures over 1,000 °F (538 °C), use only when the carbon content is 0.04% or higher.

⁵ Not to be used over 800 °F (427 °C).

⁶ Not to be used over 850 °F (454 °C).

⁷ Use solution annealed material only.

^a For welding end valves only. Flanged end ratings terminate at 1,000 °F (538 °C).

SHELL MATERIAL SPECIFICATIONS

Carbon and Alloy Steel Castings						
	Unit	A216 Gr. WCB	A352 Gr. LCC	A217 Gr. WC6	A217 Gr. WC9	A217 Gr. C5
C ¹	%	0.300 ³	0.250 ⁴	0.05-0.20	0.05-0.18	0.200
Si ¹	%	0.600				0.750
Mn ¹	%	1.000 ³	1.200 ⁴	0.50-0.80	0.40-0.70	
P ¹	%	0.040				
S ¹	%	0.045				
Cr ¹	%	0.500	0.500 ⁵	1.00-1.50	2.00-2.75	4.00-6.50
Ni ¹	%	0.500	0.500 ⁵	0.500		
Mo ¹	%	0.200	0.200 ⁵	0.45-0.65	0.90-1.20	0.45-0.65
Cu ¹	%	0.300	0.300 ⁵	0.500		
V ¹	%	0.030	0.030 ⁵	-		
T.S.	MPa	485-655				620-795
Y.S. ²	MPa	250	275			415
EI. ²	%	22.0		20.0		18.0
R.A. ²	%	35.0				

Corrosion Resistant Steel Castings						
	Unit	A351 Gr. CF8	A351 Gr. CF8M	A351 Gr. CF3	A351 Gr. CF3M	A351 Gr. CN7M
C ¹	%	0.08		0.03		0.07
Si ¹	%	2.00	1.50	2.00	1.50	
Mn ¹	%	1.50				
P ¹	%	0.04				
S ¹	%	0.04				
Cr	%	18.0-21.0		17.0-21.0		19.0-22.0
Ni	%	8.0-11.0	9.0-12.0	8.0-12.0	9.0-13.0	27.5-30.5
Mo ¹	%	0.50	2.0-3.0	0.50	2.0-3.0	
Cu	%	-				3.0-4.0
T.S. ²	MPa	485				425
Y.S. ²	MPa	205				170
EI. ²	%	35.0				

¹ Values listed are permitted maximums, unless otherwise stated.

² Values listed are required minimums, unless otherwise stated.

³ For each reduction of 0.01% below the specified maximum carbon content, an increase of 0.04% Mn above the specified maximum will be permitted up to a maximum of 1.28%.

⁴ For each reduction of 0.01% below the specified maximum carbon content, an increase of 0.04% Mn above the specified maximum will be permitted up to a maximum of 1.40%.

⁵ Specified Residual Elements - The total content of these elements is 1.00% maximum.

TRIM MATERIAL SPECIFICATIONS

Corrosion Resistant Alloys					
	Unit	A182 Gr. F6a	A182 Gr. F304	A182 Gr. F316	A182 Gr. F347 ³
C ¹	%	0.150	0.080		
Si ¹	%	1.000			
Mn ¹	%	1.000	2.000		
P ¹	%	0.040			
S ¹	%	0.030			
Cr	%	11.5-13.5	18.0-20.0	16.0-18.0	17.0-20.0
Ni ¹	%	0.500	8.0-11.0	10.0-14.0	9.0-13.0
Mo	%	-		2.0-3.0	-
N ¹	%	-	0.100		-
Tensile Str. ²	MPa	485	515 ⁴		
Yield Str. ²	MPa	275	205		
Elongation ²	%	18.0	30.0		
Reduc. of Area ²	%	35.0	50.0		
Hardness	HB	143-187	-		

Nonferrous Alloys				Bolting	
	Unit	Alloy 20 ⁵ B462 UNS N08020	Ni-Cu Alloy UNS N04400 B164	Alloy Steel A193 Gr. B7	Carbon Steel A194 Gr. 2H
C ¹	%	0.070	0.300	0.37-0.49	0.400 Min.
Si ¹	%	1.000	0.500	0.15-0.35	0.400
Mn ¹	%	2.000		0.65-1.10	1.000
P ¹	%	0.045	-	0.035	0.040
S ¹	%	0.035	0.024	0.040	0.050
Cr	%	19.0-21.0	-	0.75-1.20	-
Ni ²	%	32.0-38.0	63.0 ⁶	-	-
Mo ¹	%	2.0-3.0	-	0.15-0.25	-
Cu ¹	%	3.0-4.0	28.0-34.0	-	-
Fe ¹	%	Balance ⁶	2.500	-	-
Tensile Str. ²	MPa	551	480	860	-
Yield Str. ²	MPa	241	170	720	-
Elongation ²	%	30.0	35.0	18.0	-
Reduc. of Area ²	%	50.0	-	50.0	-

¹ Values listed are permitted maximums, unless otherwise stated.

² Values listed are required minimums, unless otherwise stated.

³ Shall have a columbium plus tantalum content of not less than ten times the carbon content and not more than 1.10%.

⁴ For sections over 5 inches in thickness, the minimum tensile strength shall be 485 MPa.

⁵ Shall have a columbium plus tantalum content of not less than eight times the carbon content and not more than 1.0%.

⁶ Shall be determined arithmetically by difference.