CAST & FORGED STEEL GATE, GLOBE, CHECK & BELLOWS SEALED VALVES

CAST STEEL BOLTED BONNET PARALLEL SLIDE GATE VALVES

ASME B16.34 Standard & Special Class

FORGED STEEL PRESSURE SEAL PARALLEL SLIDE GATE & CHECK VALVES

ASME B16.34 Standard & Special Class

HValves Ltd

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Cast & Forged Steel Gate, Globe, Check & Bellows Sealed Valves

Cast Steel Bolted Bonnet Parallel Slide Gate Valves

ASME B16.34 Standard & Special Class

Forged Steel Pressure Seal Parallel Slide Gate & Check Valves

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HH Valves are the "Manufacturer of Genuine Hattersley Heaton Design of Valves"

The Hattersley Heaton design of high integrity valves are widely used in the oil refining, petro-chemical, pharmaceutical and power industries.

The range consists of very low emission conventional valves and zero emission bellows sealed valves.
HH Valves serve many of the worlds hydrocarbon processing and chemical companies with an emphasis on safety, reliability and longevity.

HH Valves offer an extensive range of gate, globe and check valves in accordance with ASME B16.34, API6D, API600, API602 and compatible British and European standards BS EN ISO 10434 (formerly BS1414), BS EN ISO 15761 (formerly BS5352), BS1873 & BS1868. Forged valves are available in sizes 8 to 50mm (¼" to 2") nominal bore and cast steel valves in sizes 50 to 600mm (2" to 24") nominal bore. Larger sizes are available upon request.

HH Valves are available in pressure classes 150, 300, 600, 900 & 1500 and in a wide range of materials such as, WCB, LCB, WC6, WC9, C5, CF3, CF8, CF3M, CF8M and their forged equivalents, together with the usual trim options. Higher pressure classes and alternative materials are available upon request.
HH Valves also offer resilient seated double block and bleed wedge gate valves, NACE compliant valves, actuated valves and when necessary, bespoke designs to specific customer requirements.

HH Emission Free Valves

HH Valves conventional range have low emission expanded graphite gland packing fitted as standard and are suitable for high temperature and cryogenic applications in the range -200°C to 650°C.

Where emission levels below 50ppm are required HH Valves use Garlock EVSP 9000 Simplified gland packing or equivalent.

When 100% containment with zero emission is required HH Valves can supply their bellows sealed range of wedge gate and globe valves in a wide range of sizes and pressure classes.

CAST STEEL WEDGE GATE VALVES

Valve Specification Details

- BS EN ISO 10434 (formerly BS1414), API600, ASME B16.34. API591 compliant
- Flanged or Butt-Weld Ends
- Hardfaced seats as standard
- Seal-welded seats as standard
- Flexible wedge as standard on 6" and larger, Class 150 & 300 valves
- Bubble tight shut-off meeting requirements of BS EN ISO 12266-1 & API598
- Low emission graphite gland packing
- Castings meeting requirements of Level 3

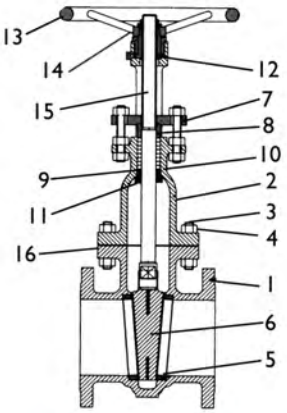
Optional Features

- Flexible wedge across full range
- Resilient soft seats for positive shut-off (200°C maximum temperature limitation)
- Double block and bleed option (see page 8)
- Bonnet extension for cryogenic service
- By-pass and drain connections (see page 11)
- Bevel gear operation where non-standard
- Indicator and locking devices
- Extension shafts for remote operation

Materials of Construction - Wedge Gate Valve

Component	Carbon Steel Specification	Stainless Steel Specification
1 Body	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
2 Bonnet	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
3 Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl. 2
4 Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 8
5 Seat Ring	ASTM A105 Hardfaced ASTM A182 Gr. F316 Hardfaced	ASTM A182 Gr. F316, or
6 Wedge	ASTM A182 Gr. F6, or ASTM A216 Gr. WCB 13% Cr. faced	ASTM A182 Gr. F316, or ASTM A351 Gr. CF8M
7 Gland Flange	ASTM A105	ASTM A182 Gr. F316
8 Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 316
9 Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
10 Junk Ring	ASTM A108 Gr. C1020	ASTM A276 Gr. 316
11 Backseat Bush	ASTM A276 Gr. 410	ASTM A276 Gr. 316
12 Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
13 Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
14 Handwheel Nut	Carbon Steel	Carbon Steel
15 Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 316
16 Gasket: Class 150 Class 300 Class 600 and above	 Stainless Steel Reinforced Tanged Graphite Stainless Steel Graphite Filled Spiral Wound Soft Iron Ring Joint	 F316 Ring Joint

† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent

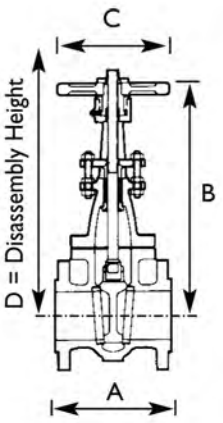


CAST STEEL WEDGE GATE VALVE DATA

Dimensions

Size (ins) (mm)	CV US GPM	Class 150 'A' FLG	'A' BW	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 300 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 600 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	306	7.00	8.50	12.40	8	18.10	35	8.50	14.80	8	20.70	50	11.50	15.00	10	21.30	75
50		178	216	315	200	460	16	216	375	200	525	23	292	380	250	540	34
2½"	480	7.50	9.50	13.80	8	20.30	60	9.50	16.10	8	22.80	75	13.00	17.70	12	24.80	130
65		191	241	350	200	515	27	241	410	200	580	34	330	450	300	630	59
3"	708	8.00	11.12	15.80	10	23.00	70	11.12	19.10	10	26.60	105	14.00	18.50	12	26.40	170
80		203	282	400	250	585	32	282	485	250	675	48	356	470	300	670	77
4"	1300	9.00	12.00	18.70	10	27.60	105	12.00	22.60	12	31.70	180	17.00	22.60	14	32.10	270
100		229	305	475	250	700	47	305	575	300	805	82	432	575	350	815	122
6"	3000	10.50	15.88	25.40	14	37.60	180	15.88	27.20	16	39.80	335	22.00	33.10	18	46.10	560
150		267	403	645	350	955	82	403	690	400	1010	152	559	840	450	1170	254
8"	5640	11.50	16.50	32.90	16	48.20	285	16.50	33.10	18	48.80	555	26.00	35.00	24	51.20	925
200		292	419	835	400	1225	129	419	840	450	1240	252	660	890	600	1300	420
10"	8880	13.00	18.00	39.00	18	57.50	525	18.00	38.60	20	57.50	805	31.00	45.10	28	64.60	1380
250		330	457	990	450	1460	238	457	980	500	1460	365	787	1145	700	1640	626
12"	13200	14.00	19.75	42.90	20	64.80	650	19.75	43.10	24	65.40	1130	33.00	52.80	30	75.60	2140
300		356	502	1090	500	1645	295	502	1095	600	1660	513	838	1340	750	1920	970
14"	16200	15.00	22.50	47.60	24	71.90	910	30.00	50.40	24	75.00	1865					
350		381	572	1210	600	1825	413	762	1280	600	1905	846					
16"	21500	16.00	24.00	52.40	24	79.90	1190	33.00	59.80	30*	87.80	2390					
400		406	610	1330	600	2030	540	838	1520	750*	2230	1085					
18"	28700	17.00	26.00	58.70	24	89.40	1545	36.00	63.00	36*	94.10	2910					
450		432	660	1490	600	2270	700	914	1600	900*	2390	1320					
20"	35800	18.00	28.00	66.50	28	100.40	1980										
500		457	711	1690	700	2550	900										
24"	52100	20.00	32.00	78.50	30*	118.90	2990										
600		508	813	1995	750*	3020	1355										

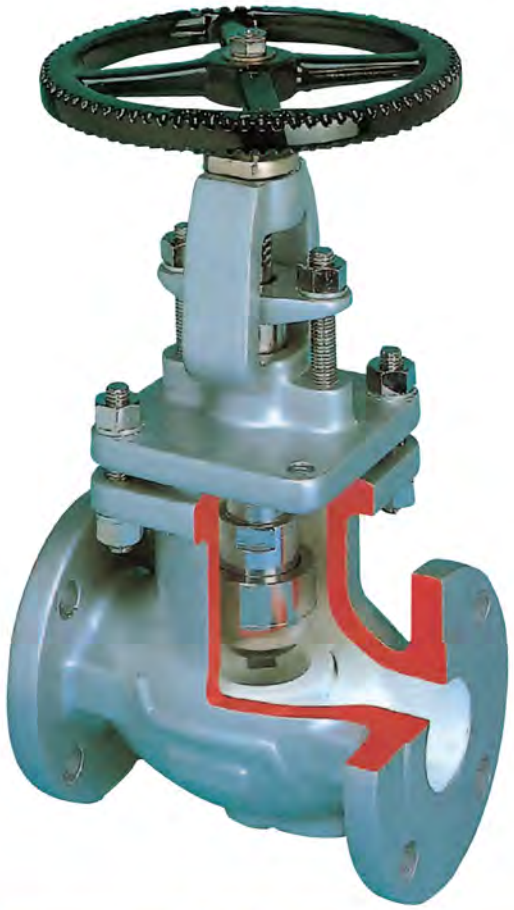
* Valve may require gear operator



Size (ins) (mm)	Class 900 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 1500 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	14.50	23.20	14	30.10	190	14.50	23.20	14	30.10	190
50	368	590	350	765	86	368	590	350	765	86
3"	15.00	20.90	16	29.30	255	18.50	25.20	18	34.30	395
80	381	530	400	745	116	470	640	450	870	179
4"	18.00	24.00	18	34.10	410	21.50	27.20	20	37.80	605
100	457	610	450	865	186	546	690	500	960	275
6"	24.00	34.30	20	47.60	815	27.75	41.00	24*	54.70	1235
150	610	870	500	1210	370	705	1040	600*	1390	560

Standard Figure Numbers		
Flanged Ends	Carbon Steel ASTM A216 WCB	Stainless Steel ASTM A351 CF8M
ASME Class 150 RF		
2" to 4"	1481	SP9481
6" and larger	1481FW	SP9481FW
ASME Class 300 RF		
2" to 4"	1482	SP9482
6" and larger	1482FW	SP9482FW
ASME Class 600 RF	1484	SP9484
ASME Class 900 RF	1485	SP9485
ASME Class 1500 RF	1486	SP9486

CAST STEEL GLOBE VALVES



Valve Specification Details

- BS1873, API600 (generally), ASME B16.34. API591 compliant
- Flanged or Butt-Weld Ends
- Hardfaced seat as standard
- Plug type disc
- Non-rotating stem on larger sizes
- Bubble tight shut-off meeting requirements of BS EN ISO 12266-1 & API598
- Low emission graphite gland packing
- Castings meeting requirements of Level 3

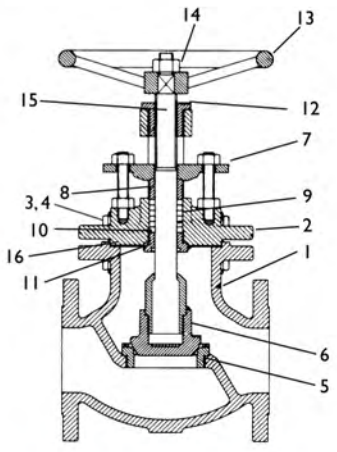
Optional Features

- Seal-welded seat
- Resilient soft seat for positive shut-off (200°C maximum temperature limitation)
- Check and feed (stop-check or screw-down non-return) option
- Parabolic disc (regulating disc) option
- Guided disc option (recommended when valve is used in a vertical pipeline)
- Vee-Reg option (see page 9)
- Bonnet extension for cryogenic service
- By-pass and drain connections (see page 11)
- Bevel gearbox operation where non-standard
- Indicator and locking devices

Materials of Construction - Globe Valve

Component	Carbon Steel Specification	Stainless Steel Specification
1 Body	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
2 Bonnet	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
3 Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl. 2
4 Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 8
5 Seat Ring	ASTM A105 Hardfaced ASTM A182 Gr. F316 Hardfaced	ASTM A182 Gr. F316, or
6 Disc	ASTM A182 Gr. F6, or ASTM A105 13% Cr. Faced	ASTM A182 Gr. F316, or ASTM A351 Gr. CF8M
7 Gland Flange	ASTM A105	ASTM A182 Gr. F316
8 Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 316
9 Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
10 Junk Ring	ASTM A108 Gr. C1020	ASTM A276 Gr. 316
11 Backseat Bush	ASTM A276 Gr. 410	ASTM A276 Gr. 316
12 Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
13 Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
14 Handwheel Nut	Carbon Steel	Carbon Steel
15 Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 316
16 Gasket: Class 150 & 300 Class 600 and above	 Stainless Steel Graphite Filled Spiral Wound Soft Iron Ring Joint	 F316 Ring Joint

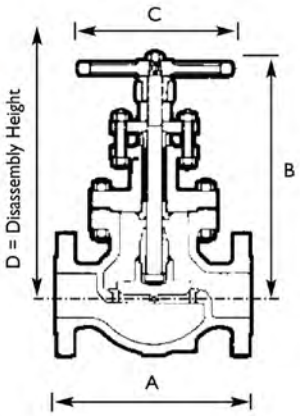
† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent



CAST STEEL GLOBE VALVE DATA

Dimensions

Size (ins) (mm)	CV US GPM	Class 150 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 300 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 600 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	48	8.00	12.20	8	17.10	45	10.50	13.20	8	18.30	65	11.50	15.00	10	20.50	85
50		203	310	200	435	20	267	335	200	465	29	292	380	250	520	39
2½"	74	8.50	13.60	10	18.90	65	11.50	15.00	10	20.50	90	13.00	16.50	12	22.40	130
65		216	345	250	480	30	292	380	250	520	40	330	420	300	570	59
3"	120	9.50	14.40	10	20.10	80	12.50	16.30	10	22.20	125	14.00	17.70	14	24.00	165
80		241	365	250	510	36	318	415	250	565	57	356	450	350	610	75
4"	190	11.50	16.50	12	22.80	120	14.00	19.30	14	25.80	210	17.00	20.90	18	27.80	275
100		292	420	300	580	55	356	490	350	655	96	432	530	450	705	125
6"	390	16.00	19.70	16	27.60	235	17.50	22.20	18	30.50	395	22.00	26.40	28	35.00	640
150		406	500	400	700	106	445	565	450	775	179	559	670	700	890	290
8"	730	19.50	25.00	18	34.30	385	22.00	27.20	24	36.80	655					
200		495	635	450	870	175	559	690	600	935	297					
10"	1336	24.50	34.70	20	45.30	550	24.50	39.00	28	50.00	890					
250		622	880	500	1150	250	622	990	700	1270	404					
12"	1600	27.50	40.20	24	52.20	1015	28.00	44.10	30	56.50	1555					
300		699	1020	600	1325	460	711	1120	750	1435	705					
14"	2400	31.00	53.50	28	67.10	1365	33.00	54.30	30	68.30	2150					
350		787	1360	700	1705	620	838	1380	750	1735	975					
16"	3200	36.00	57.90	30	72.80	1785	34.00	58.70	36	74.00	2820					
400		914	1470	750	1850	810	864	1490	900	1880	1280					



Differential pressures for handwheel operation (bar)										
Size	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"
Class	50	65	80	100	150	200	250	300	350	400
150	Ps	Ps	Ps	Ps	Ps	14	9	6	4.5	3.5
300	Ps	Ps	Ps	Ps	21	14	9	6	4.5	3.5
600	Ps	Ps	70	44	21	14	9	6	4.5	3.5

Ps = maximum allowable pressure at 20°C

All valves with size and pressure class combinations above the marked step-line are capable of isolating the flow with pressure under the disc at the differential pressure Ps.

All valves with size and pressure class combinations below the marked step-line are capable of isolating the flow with pressure under the disc at the differential pressure stated.

If a valve is required to isolate at a higher differential than stated then a gearbox would be needed.

The following valves are fitted with a gearbox as standard: 12" to 16" class 150, 8" to 16" class 300, 6" class 600 & 900, 4" class 1500

Size (ins) (mm)	Class 900 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 1500 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	14.50	27.20	16	33.30	135	14.50	27.20	16	33.30	135
50	368	690	400	845	61	368	690	400	845	61
3"	15.00	22.40	18	29.30	210	18.50	32.30	20	39.80	485
80	381	570	450	745	95	470	820	500	1010	220
4"	18.00	34.30	20	41.70	350	DETAILS ON APPLICATION				
100	457	870	500	1060	159					
6"	DETAILS ON APPLICATION					DETAILS ON APPLICATION				
150										

Standard Figure Numbers		
Flanged Ends	Carbon Steel ASTM A216 WCB	Stainless Steel ASTM A351 CF8M
ASME Class 150 RF	1881	SP9881
ASME Class 300 RF	1882	SP9882
ASME Class 600 RF	1884	SP9884
ASME Class 900 RF	1885	SP9885
ASME Class 1500 RF	1886	SP9886

CAST STEEL SWING CHECK VALVES

Valve Specification Details

- BS1868, API6D regular opening, ASME B16.34
- Flanged or Butt-Weld Ends
- Hardfaced seat as standard
- Seal-welded seat as standard
- Low pressure drop design
- Non-rotating disc design
- Special hinge pin plug design having a graphite secondary plug seal ensuring non-wetted threads
- Suitable for horizontal or vertically upwards flow
- Castings meeting requirements of Level 3

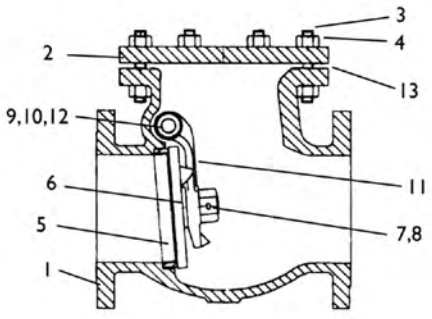
Optional Features

- Outside lever and weight arrangement
- Facility to lock the valve in the fully open and/or fully closed position
- Damping devices
- By-pass and drain connections (see page 11)

Materials of Construction - Swing Check Valve

Component	Carbon Steel Specification	Stainless Steel Specification
1 Body	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
2 Cover	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M or equivalent
3 Body/Cover Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl. 2
4 Body/Cover Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 8
5 Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F316, or ASTM A182 Gr. F316 Hardfaced
6 Disc	ASTM A182 Gr. F6, or ASTM A216 Gr. WCB 13% Cr. faced	ASTM A182 Gr. F316, or ASTM A351 Gr. CF8M
7 Disc Retaining Nut	ASTM A105	ASTM A182 Gr. F316
8 Split Pin	ASTM A276 Gr. 410	ASTM A276 Gr. 316
9 Hinge Pin Plug	ASTM A105	ASTM A182 Gr. F316
10 Hinge Pin Plug Gasket	Flexible Graphite	Flexible Graphite
11 Hinge	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
12 Hinge Pin	ASTM A276 Gr. 410	ASTM A276 Gr. 316
13 Gasket:		
Class 150 & 300	Stainless Steel Graphite Filled Spiral Wound	
Class 600 and above	Soft Iron Ring Joint	F316 Ring Joint

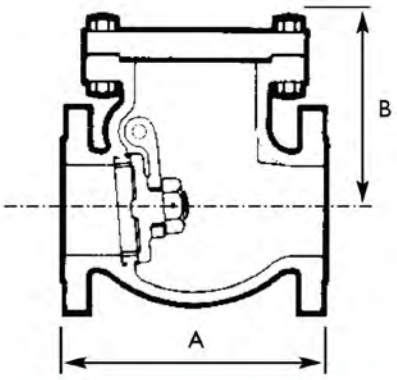
† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent



CAST STEEL SWING CHECK VALVES

Dimensions

Size (ins) (mm)	CV US GPM	Class 150 Bore Size	'A'	'B'	Weight (lbs) (kgs)	Class 300 Bore Size	'A'	'B'	Weight (lbs) (kgs)	Class 600 Bore Size	'A'	'B'	Weight (lbs) (kgs)
2"	120	2.00	8.00	6.10	30	2.00	10.50	6.50	45	2.00	11.50	7.90	70
50		51	203	155	14	51	267	165	21	51	292	200	32
2½"	186	2.50	8.50	6.70	50	2.50	11.50	7.10	70	2.50	13.00	9.10	95
65		64	216	170	23	64	292	180	32	64	330	230	43
3"	276	3.00	9.50	7.10	65	3.00	12.50	7.90	90	3.00	14.00	10.00	130
80		76	241	180	30	76	318	200	41	76	356	255	59
4"	516	4.00	11.50	8.30	120	4.00	14.00	9.30	160	4.00	17.00	12.00	230
100		102	292	210	55	102	356	235	72	102	432	305	104
6"	1236	6.00	14.00	9.90	170	6.00	17.50	10.60	250	6.00	22.00	13.60	470
150		152	356	250	77	152	445	270	113	152	559	345	213
8"	2280	8.00	19.50	12.40	330	8.00	21.00	14.20	550	7.87	26.00	17.30	795
200		203	495	315	150	203	533	360	250	200	660	440	361
10"	3480	10.00	24.50	14.00	465	10.00	24.50	16.10	805	9.75	31.00	20.50	1255
250		254	622	355	211	254	622	410	365	248	787	520	570
12"	5280	12.00	27.50	16.70	685	12.00	28.00	18.90	990				
300		305	699	425	310	305	711	480	450				
14"	6480	13.25	31.00	18.10	950	13.25	33.00	19.70	1500				
350		337	787	460	431	337	838	500	680				
16"	8520	15.25	34.00	20.00	1280	15.25	34.00	22.00	1850				
400		387	864	510	580	387	864	560	840				
18"	11400	17.25	38.50	21.60	1710								
450		438	978	550	775								



To determine minimum line velocity required to fully open valve without flutter, use $C=50\sqrt{V}$, where:
C = Flow Velocity in metres per second
V = Specific Volume in cubic metres per kilogram

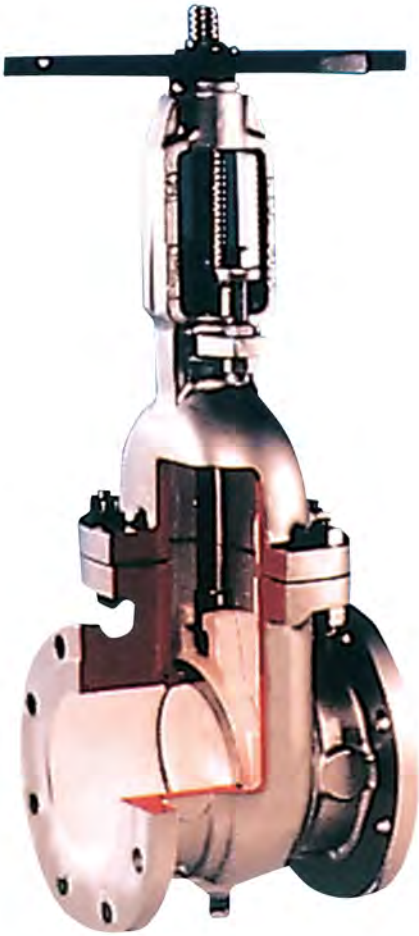
Size (ins) (mm)	Class 900 Bore Size	'A'	'B'	Weight (lbs) (kgs)	Class 1500 Bore Size	'A'	'B'	Weight (lbs) (kgs)
2"	1.87	14.50	11.80	150	1.87	14.50	18.10	150
50	47	368	300	68	47	368	300	68
3"	2.87	15.00	11.80	205	2.75	18.50	14.20	310
80	73	381	300	93	70	470	360	141
4"	3.87	18.00	13.40	320	3.62	21.50	16.10	510
100	98	457	340	145	92	546	410	231
6"	5.75	24.00	16.50	870	5.37	27.75	19.90	1280
150	146	610	420	395	136	705	505	581

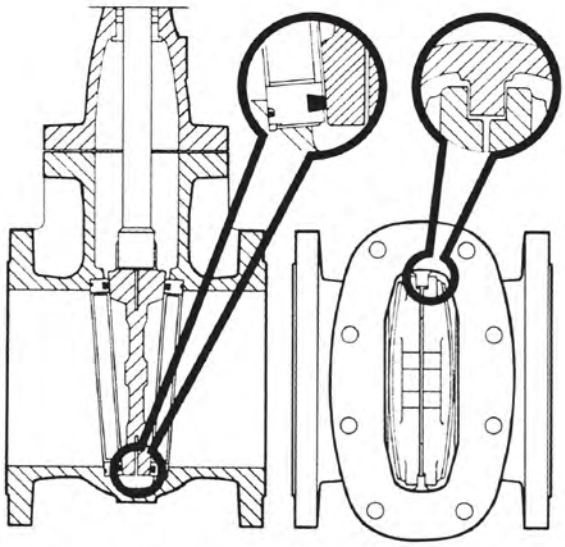
Standard Figure Numbers		
Flanged Ends	Carbon Steel ASTM A216 WCB	Stainless Steel ASTM A351 CF8M
ASME Class 150 RF	1981	SP4981
ASME Class 300 RF	1982	SP4982
ASME Class 600 RF	1984	SP4984
ASME Class 900 RF	1985	SP4985
ASME Class 1500 RF	1986	SP4986

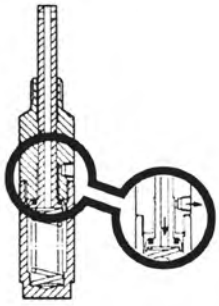
DOUBLE BLOCK & BLEED WEDGE GATE VALVES

Precision engineered double block and bleed wedge gate valve with secondary metal sealing

Class 150	BS EN ISO 10434 (formerly BS1414) and API600 Fig. No. 6481FW-BB Flanged. Size 2" to 24"
Class 300	BS EN ISO 10434 (formerly BS1414) and API600 Fig. No. 6482FW-BB Flanged. Size 2" to 18"
Class 600	BS EN ISO 10434 (formerly BS1414) and API600 Fig. No. 6484FW-BB Flanged. Size 2" to 12"





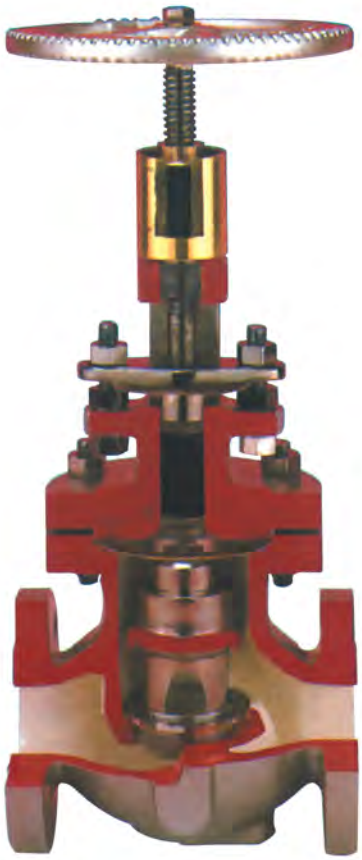


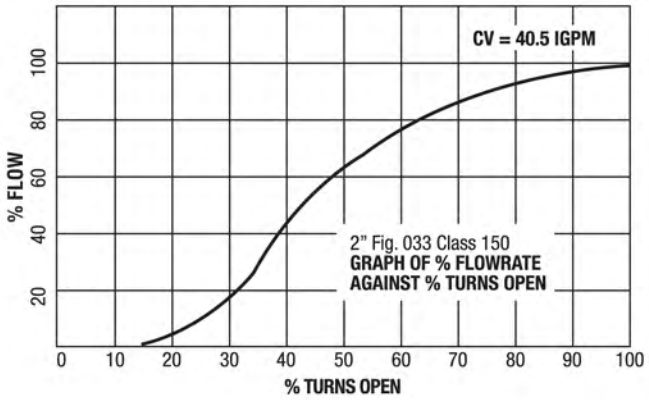
Features	Benefits
Flexible wedge design	Provides positive sealing on both faces of the wedge. Minimises the effect of pipeline stresses.
Controlled body/wedge guide clearances	Provides long term tight shut-off
Captive PTFE seat ring	Improves valve performance with bubble-tight sealing from -29°C to +200°C
Secondary metal to metal seal	Provides seal in the event of the PTFE being destroyed by high temperature or fire, with a maximum allowable leakage rate of only 10cc per hour for 1" of bore diameter for the secondary metal seals
Radiused wedge leading edges	No sharp edges avoids damage to PTFE seat faces
Alternative bleed valve tapping points	Allows for various orientations of the valve
Option for automatic soft seated bleed valve	Provides automatic body pressure relief and a vent to indicate positive sealing on clean services
Double block and bleed pressure tests	Your guarantee of the basic valve integrity

CAST STEEL VEE-REG GLOBE VALVES

Throttling Service

After many years service the Vee-Reg globe valve is recognised as the design which cuts out the problem of erosion or wire drawing when the valve is on, or passing through, the cracked position. This is particularly prevalent in steam service and the unique configuration of the Vee-Reg disc and seat ensures that the seating surfaces are protected at this critical stage.



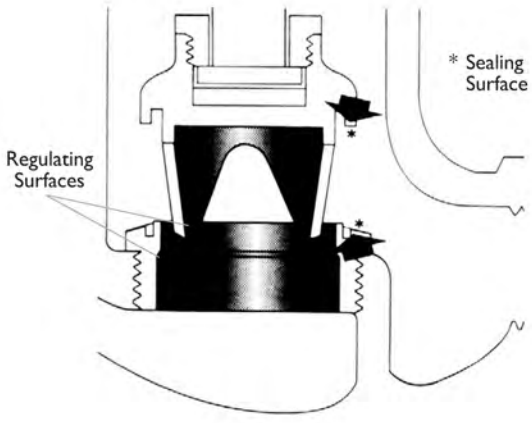


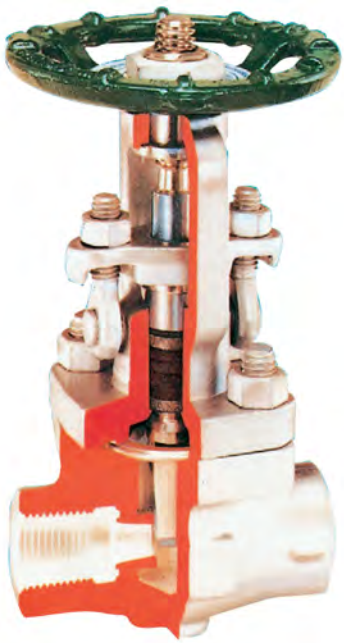
The main seating surfaces are the interfaces between the disc edge and the outside rim of the seat ring. When the valve is cracked open, flow is channelled between additional surfaces machined onto the top of the seat and disc ports. Any erosion will take place here but since these are only the regulating surfaces they do not affect the main isolation or first stage flow control characteristics of the valve.

Vee-Reg valves have the same basic dimensions and material specification as standard globe valves.

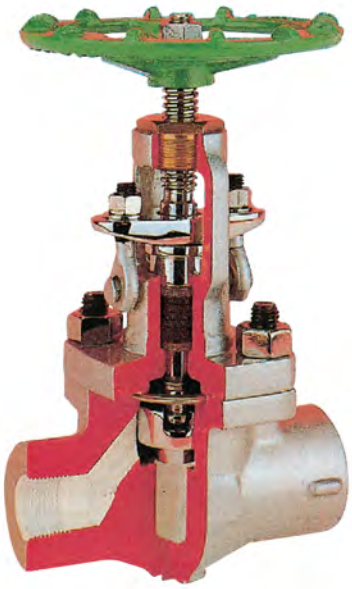
Cast Carbon Steel:

Class 150	Flanged. Fig. No. 033/150. Size 2" to 8"
Class 300	Flanged. Fig. No. 033/300. Size 2" to 8"
Class 600	Flanged. Fig. No. 033/600. Size 2" to 6"

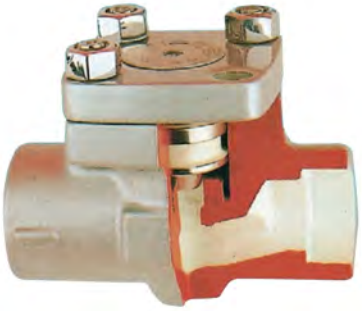




Forged Steel Wedge Gate Valve



Forged Steel Globe Valve



Forged Steel Piston Check Valve

Forged steel valves are available with socket-weld, butt-weld, threaded ends, class 800, 1500 & 2500 in carbon steel and stainless steel materials. Details available upon request.

Forged Steel Bellows Sealed Wedge Gate Valve

Forged Steel Bellows Sealed Globe Valve

Forged steel bellows sealed valves are available with socket-weld, butt-weld, threaded ends, class 800 & 1500 in carbon steel and stainless steel materials

Details available upon request

BY-PASS & DRAIN CONNECTIONS VALVE TEST PRESSURES

Unless otherwise requested drain connections and by-passes will be supplied in accordance with the sizes specified in MSS SP-45 Type 'A'. Alternatively, gate and check valves above 12" size can be supplied in accordance with the sizes specified in BS EN ISO 10434 (formerly BS1414) and BS1868.

Standard location of by-passes

Gate Valves

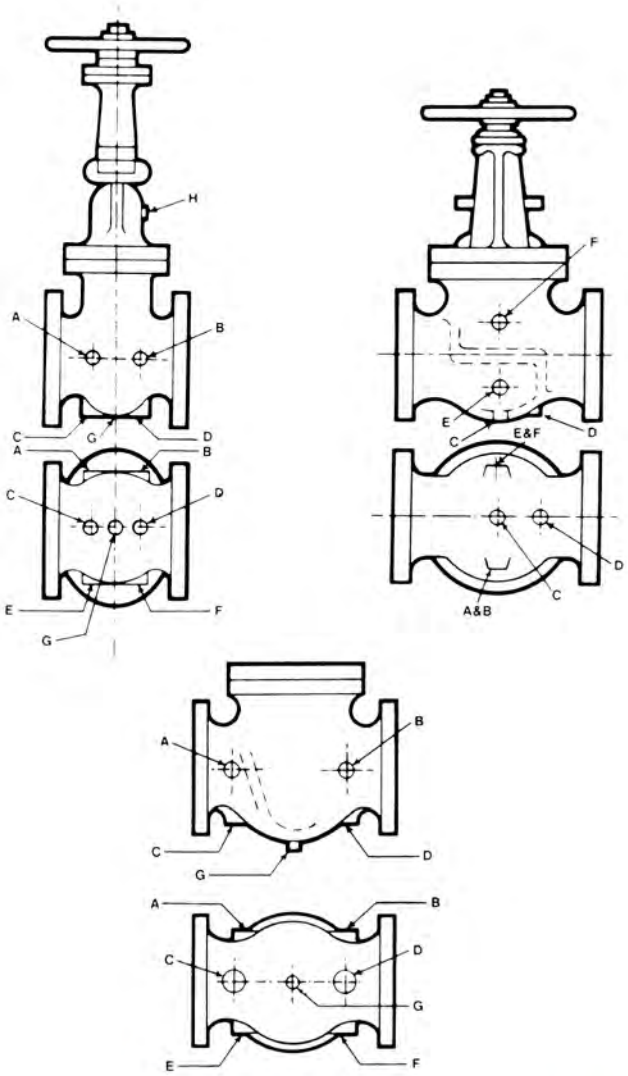
When gate valves are supplied with a by-pass arrangement the by-pass is fitted at the side of the main valve between locations A & B or C & D with the stems of both the main valve and by-pass valve pointing vertically upwards.

Globe Valves

When globe valves are supplied with a by-pass arrangement the by-pass is fitted to the right hand side of the main valve (when viewed facing the flow port leading to the underside of the disc) between locations E & F with the stems of both the main valve and by-pass valve pointing vertically upwards.

Check Valves

When check valves are supplied with a by-pass arrangement the by-pass is fitted to the right hand side of the main valve (when viewed facing the inlet port) between locations A & B with the stem of the by-pass valve pointing vertically upwards.



Test Pressures
Shell Test (Hydrostatic)

Material Group	150 bar	150 psi	300 bar	300 psi	600 bar	600 psi	800 bar	800 psi	900 bar	900 psi	1500 bar	1500 psi	2500 bar	2500 psi
WCB, A105, LF2	30	450	77	1125	154	2225	205	2975	230	3350	383	5575	635	9275
WCC, LCC, LC2, WC6, F11, WC9, F22, C5, F5a, C12A, F91	30	450	78	1125	156	2250	207	3000	233	3375	388	5625	647	9375
LCB, WC1, F1, LC1	28	400	72	1050	144	2100	193	2800	217	3150	361	5225	601	8725
CF8M, F316, CF8, F304, CF8C, F321, F347	29	425	75	1100	149	2175	199	2900	224	3250	373	5400	621	9000
CF3, F304L, CF3M, F316L	24	350	63	900	125	1800	166	2400	187	2700	311	4500	518	7500

Test Pressures
Seat Test (Hydrostatic)

Material Group	150 bar	150 psi	300 bar	300 psi	600 bar	600 psi	800 bar	800 psi	900 bar	900 psi	1500 bar	1500 psi	2500 bar	2500 psi
WCB, A105, LF2	21.6	314	56.3	814	112.4	1628	149.9	2171	168.6	2442	280.9	4076	468.1	6787
WCC, LCC, LC2, WC6, F11, WC9, F22	21.8	319	56.9	825	113.8	1650	151.7	2200	170.7	2475	284.5	4125	474.0	6875
C5, F5a, C12A, F91	22.0	319	56.9	825	113.8	1650	151.7	2200	170.7	2475	284.5	4125	474.0	6875
LCB, WC1, F1, LC1	20.3	292	52.8	765	105.6	1535	141.0	2044	158.6	2299	264.2	3828	440.2	6386
CF8M, F316, CF8, F304, CF8C, F321, F347	20.9	303	54.6	792	109.3	1584	145.7	2112	163.8	2376	273.1	3960	455.1	6600
CF3, F304L, CF3M, F316L	17.5	253	45.6	660	91.0	1320	121.4	1760	136.6	1980	227.5	3300	379.2	5500

We are able to actuate many of our valves with any preferred make of electric, pneumatic or hydraulic actuator.

Electric Actuation

Electric actuators fitted to our valves will be of the multi-turn type having either waterproof or explosionproof enclosures to suit the application. Actuators usually operate on a three-phase AC electrical supply incorporating a custom designed driving motor giving low inertia, high torque output. Single-phase AC and DC units can also be supplied. All actuators include torque and limit switches to allow the units to be set correctly for the design of valve on which they are to be fitted. Wedge gate and globe valves utilise a torque switch to stop the actuator in the closing direction and a limit switch to stop in the opening direction. Parallel side, slim-line and through conduit valves utilise limit switches to stop the actuator in both the closing and opening directions. All actuators incorporate local position indication and a manual operation override.

Actuators are generally supplied complete with integral reversing contactors and local control. Once the electrical supply has been connected this allows the actuator to be operated locally or remotely by means of various forms of site control systems. Actuators can also be provided in basic format with the end user independently providing the reversing contactors. This minimises the extent of the actuator equipment at the valve location where ambient temperatures and space restrictions can also be a consideration. Modulating actuators can also be fitted where continuous operation is required to provide accurate flow characteristics through vee-port design parallel slide gate valves for example.

Your enquiry should include the following basic information together with the preferred actuator manufacturer:-
Size and pressure class of the valve together with the maximum differential pressure against which the valve is required to operate and maximum operating temperature, if known.
Type of application (hazardous or non-hazardous) to determine the type of enclosure required.
Available electrical supply - voltage, phase, frequency.
With or without integral reversing contactors (starters).
Ambient temperature limitations.
Required operating time or speed of operation, if known.
Other additional features such as additional limit switch requirements and continuous position indication for example.

Pneumatic Actuation

Pneumatic actuators fitted to our valves will be of the linear type, either single-acting (spring return or spring extend) or double-acting, all with cushioned stroke. Pneumatic linear actuators are generally used where quick action operating times are required or in areas where an electrical supply is not available. Single-acting units utilise a spring return system that will either close or open the valve upon release of the air supply. The use of single-acting actuators is limited to the size and operating pressure of the valve. Double-acting units are more compact and can be used on larger size valves or valves working at high operating pressures. With double-acting units the operating air supply acts on both sides of the actuator piston to provide the open and close action. Actuators are usually supplied complete with all the necessary solenoid operated control equipment, filters and regulators. Control equipment can be certified watertight or explosionproof to suit the application. Manual overrides can also be provided if required.

Your enquiry should include the following basic information together with the preferred actuator manufacturer:-
Size and pressure class of the valve together with the maximum differential pressure against which the valve is required to operate and maximum operating temperature, if known.
Type of actuator, single or double-acting, together with valve action upon failure of air supply.
Type of application (hazardous or non-hazardous) to determine enclosure type for control equipment.
Available minimum air supply to operate the actuator (state the MINIMUM available rather than nominal).
Ambient temperature limitations.
Required operating time or speed of operation, if known.
Other additional features such as the requirement for manual handwheel override operation.

Hydraulic Actuation

Similar to pneumatic operators except available in double-acting design only.
Generally used in applications where high operating forces are required.

Your enquiry should include the same basic information as that stated for a pneumatic actuator except the method of powering the actuator should be specified.

All HH Valve designs are manufactured to the highest quality standards

Our castings and forgings are sourced from quality suppliers specialising in the manufacture of high integrity pressure containing components.
Manufacturing is carried out in carefully selected specialised valve plants having full ISO 9001 and PER (PED) material accreditation.
All manufacturing plants are selected and independently audited directly by HH Valves or their appointed representatives which is independent of any other accreditation audits.

All pressure containing castings are manufactured to meet the requirements of ASME B16.34 Level 3 for all types of defects.
All castings are visually inspected to meet the requirements of MSS SP-55.

Further non-destructive testing of pressure containing castings is performed to verify the more stringent stipulations of ASME B16.34 Special Class requirements which will include the following appropriate examination methods:-
Radiographic Examination (RT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.1.1 and Mandatory Appendix I
Ultrasonic Examination (UT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.1.3 and Mandatory Appendix IV
Magnetic Particle Examination (MT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.1.2 and Mandatory Appendix II
Liquid Penetrant Examination (PT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.1.2 and Mandatory Appendix III

All pressure containing forgings are manufactured in accordance with specified material standards.

All high pressure containing forgings have surface volumetric examination performed as standard in accordance with the following appropriate methods:-
Magnetic Particle Examination (MT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.2.2 and Mandatory Appendix II
Liquid Penetrant Examination (PT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.2.2 and Mandatory Appendix III

Further non-destructive testing of high pressure containing forgings is performed to verify the more stringent stipulations of ASME B16.34 Special Class requirements in accordance with the following examination methods:-
Ultrasonic Examination (UT) - NDE methods, acceptance criteria and standards to be in accordance with ASME B16.34, Section 8, paragraph 8.3.2.1 and Mandatory Appendix IV

During the manufacturing process castings and forgings are randomly inspected to verify the above basic quality Level 3 criteria is being maintained in accordance with the requirements of HH Valves quality procedures.
Liquid penetrant inspection of the weld deposit overlays for the seat and wedge/disc components is also performed on a random sample basis during manufacture to verify compliance with HH Valves quality procedures.

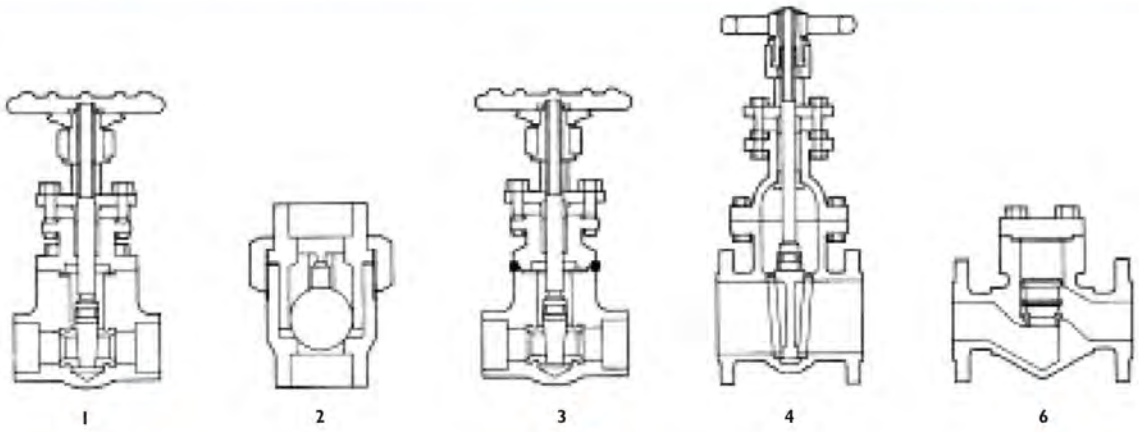
HH Valves has its own in-house pressure test facilities and can accommodate third party inspection visits if and when requested.
All valves are hydrostatically and pneumatically tested in accordance with the requirements of BS EN ISO 12266-1 and/or API598 before despatch.
All machined butt-weld end profiles are dye-penetrant checked at out factory before despatch.

We also sub-contract other methods of NDE such as radiographic/ultrasonic examination and magnetic particle examination of pressure containing castings and ultrasonic examination and magnetic particle examination of pressure containing forgings.
We can also carry out in-house positive material identification (PMI) of valve castings, forgings and components using qualified sub-contractors.
Where by-pass arrangements are required this work is sub-contacted to local approved facilities with ASME IX qualified welders. All welded fittings, pipe work and by-pass valve connections are subject to NDE of all welds and heat treatment where necessary.
Fugitive emission testing of valves can also be carried out using specialist sub-contractors.

HH Valves specialise in the fitting, setting and testing of electric, pneumatic and hydraulic actuators to valves.
Each valve is individually stroke tested to ensure proper operation and pressure tested to verify seat tightness against the specified design or operating pressure.

HH Valves has both ISO 9001 and PER (PED) accreditation in accordance with 97/23/EC.
All valves are supplied with HH Valves certification meeting the requirements of EN 10204 Type 3.1.
Valves can also be supplied with EN 10204 Type 3.2 certification where independent verification of pressure containing castings and forgings has been carried out.
Original mill certification for pressure containing cast and forged components can also be supplied upon request.

After test all valves are drained, dried and internally protected with a propriety de-watering agent and protective.
End connections are protected with purpose made plastic covers or hardboard/plywood end caps.
All valves leave our facility painted and protected in accordance with the relevant standards or customer requirements.
Valves are shipped on pallets or in cases or wooden boxing according to customer requirements.



EXAMPLE **0** **BODY MATERIAL** | **1** **TRIM MATERIAL** | **4** **VALVE TYPE**

Body Material

Prefix	Cast Steel Valves
None	Carbon Steel - ASTM A216 WCB
B	Type 316L Stainless Steel - ASTM A351 CF3M
C	Type 304L Stainless Steel - ASTM A351 CF3
D	Type 347 Stainless Steel - ASTM A351 CF8C
G	Type 321 Stainless Steel - ASTM A351 CF8C
H	5% Cr - ½% Mo Alloy Steel - ASTM A217 C5
J	Low Temp. Carbon Steel - ASTM A352 LCC
K	Low Temp. Carbon Steel - ASTM A352 LCB
L	1¼% Cr - ½% Mo Alloy Steel - ASTM A217 WC6
N	NACE - Low Temp. Carbon Steel - ASTM A352 LCB
P	Type 316 Stainless Steel - ASTM A351 CF8M
R	2¼% Cr - 1% Mo Alloy Steel - ASTM A217 WC9
S	Type 304 Stainless Steel - ASTM A351 CF8
T	NACE - Low Temp. Carbon Steel - ASTM A352 LCC
U	9% Cr - 1% Mo - V Alloy Steel - ASTM A217 C12A
X	NACE - Carbon Steel - ASTM A216 WCB

Prefix	Forged Steel Valves
None	Carbon Steel - ASTM A105N
B	Type 316L Stainless Steel - ASTM A182 F316L
C	Type 304L Stainless Steel - ASTM A182 F304L
D	Type 347 Stainless Steel - ASTM A182 F347
G	Type 321 Stainless Steel - ASTM A182 F321
H	5% Cr - ½% Mo Alloy Steel - ASTM A182 F5
K	Low Temp. Carbon Steel - ASTM A350 LF2
L	1¼% Cr - ½% Mo Alloy Steel - ASTM A182 F11
N	NACE - Low Temp. Carbon Steel - ASTM A350 LF2
P	Type 316 Stainless Steel - ASTM A182 F316
R	2¼% Cr - 1% Mo Alloy Steel - ASTM A182 F22
S	Type 304 Stainless Steel - ASTM A182 F304
U	9% Cr - 1% Mo - V Alloy Steel - ASTM A182 F91
X	NACE - Carbon Steel - ASTM A105N

API Trim No.	HH Trim Prefix
1	None
5	5
6	6
8	8
9	9
10	4
11	E
12	9
16	A

Trim Combination

Prefix	Stem/Hinge Pin Backseat Bush	Wedge or Disc Face	Body Seat Ring
None	13% Cr Steel	13% Cr Steel	13% Cr Steel
1	13% Cr Steel	13% Cr Steel	Hardfacing
2	13% Cr Steel	13% Cr Steel	Type 316 St. Steel
3	13% Cr Steel	Monel	Monel
†4	Type 316 St. Steel	Type 316 St. Steel	Type 316 St. Steel
5	13% Cr Steel	Hardfacing	Hardfacing
‡6	13% Cr Steel	13% Cr Steel with Polymer insert in seat or disc	
8	Monel	Monel	Monel
9	Type 316 St. Steel	Type 316 St. Steel	Hardfacing
A	Type 316 St. Steel	Hardfacing on Type 316 St. Steel	Hardfacing on Type 316 St. Steel
B	13% Cr Steel	13% Cr Steel	Monel
D	Bronze	Bronze	Bronze
E	Monel	Monel	Hardfacing on Type 316 St. Steel
F	13% Cr Steel	13% Cr Steel	Hardfacing on Type 316 St. Steel
‡G	Type 316 St. Steel	Type 316 St. Steel with Polymer insert in seat or disc	
J	Type 304 St. Steel	Type 304 St. Steel	Hardfacing on Type 304 St. Steel
M	Type 321 St. Steel	Hardfacing on Type 347 St. Steel	Hardfacing on Type 347 St. Steel
N	Type 316 St. Steel	Type 316 St. Steel	Hardfacing on Type 316L St. Steel
P	as body	as body	as body
Q	as body	Hardfacing	Hardfacing
R	as body	as body	Integral
S	Type 316L St. Steel	Hardfacing on Type 316L St. Steel	Hardfacing on Type 316L St. Steel
T	Type 304 St. Steel	Hardfacing on Type 304 St. Steel	Hardfacing on Type 304 St. Steel
U	Type 316L St. Steel	Type 316L St. Steel	Type 316L St. Steel
‡Z	Monel	Monel with Polymer insert in seat or disc	

Notes:
Hardfacing = Stellite 6 or Stellite 12, or equal
Prefix 'D' is available on cast steel valves only

Any of the disc, wedge or seat ring trims may be achieved by weld overlay, i.e. trim 8 may have seat rings with either carbon steel or type 316 stainless steel base material with a monel overlay

‡ Soft polymer (normally PTFE based) sealing location depends on valve design. Cast steel flanged wedge gate and swing check valves use a seat insert as standard, other designs used a disc insert.

† Prefix 4 was prefix 'Y' on cast stainless steel gate and globe valves.

Valve Type

	Description
1	Outside screw, reduced bore, bolted bonnet wedge gate valve (screwed or socket weld end)
2	Vertical lift check valve
3	Outside screw, reduced bore, welded bonnet wedge gate valve (screwed or socket weld end)
4	Outside screw, bolted bonnet wedge gate valve
5	Slimline, wafer type, gate valve
6	Horizontal lift check valve
7	Through conduit pipeline gate valve
8	Outside screw, bolted bonnet globe valve
9	Bolted cover swing check valve
0	Parallel slide gate valve
E	Bellows sealed, reduced bore, bolted bonnet wedge gate valve
F	Bellows sealed, full bore, bolted bonnet wedge gate valve
G	Bellows sealed, reduced bore, welded bonnet wedge gate valve Class 800 variant to BS5352 (obsolete)
H	Bellows sealed, full bore, welded bonnet wedge gate valve
J	Bellows sealed, reduced bore, bolted bonnet globe valve
K	Bellows sealed, full bore, bolted bonnet globe valve
U	Bellows sealed, reduced bore, welded bonnet globe valve Class 800 variant to BS5352 (obsolete)
V	Bellows sealed, reduced bore, welded bonnet wedge gate valve Class 800 to API602
W	Bellows sealed, reduced bore, welded bonnet globe valve Class 800 to API602
Y	Outside screw, bolted bonnet Y-pattern globe valve

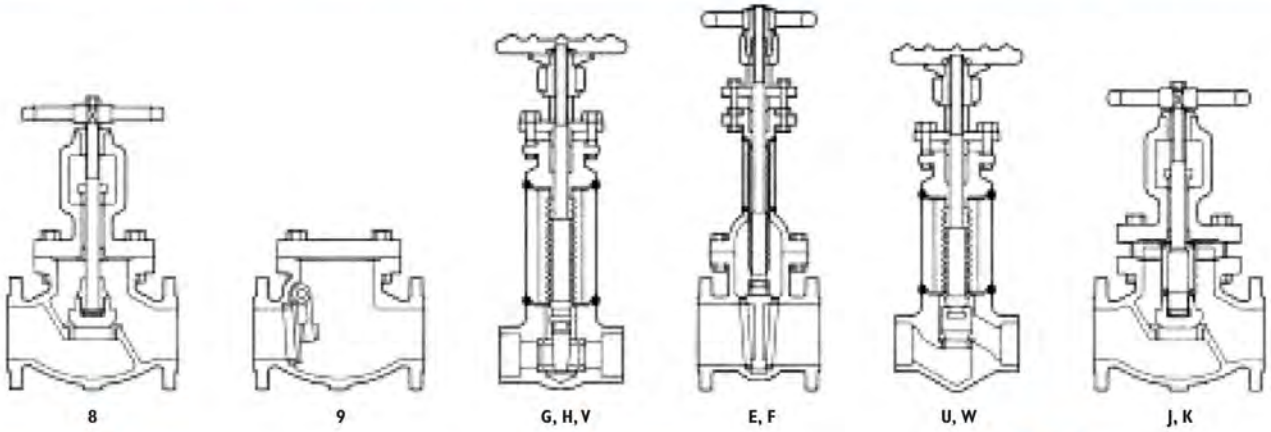
STAINLESS STEEL VALVES

All figure numbers for stainless steel valves are preceded with 'S' for cast steel valves and 'W' for forged steel valves

Examples:

Cast class 150 wedge gate valve - CF8M material = SP4481
Forged class 150 wedge gate valve - F316 material = WP4481

PRODUCT CODES & FIGURE NUMBER SYSTEM



8 | 9 | G, H, V | E, F | U, W | J, K

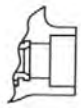
8 TYPE OF CONNECTION

2 PRESSURE CLASS

FW VARIATION

End Connections

	Description
4	Socket weld ends
5	Socket weld x threaded ends (gate valves)
7	Threaded female ends (NPT thread as standard)
*8	Flanged Ends (3.2 µm to 6.3 µm Ra raised face finish)* Flange standard to ASME B16.5
9	Butt weld ends



Socket Weld End
4

Threaded End
7

Flanged End
8

Butt Weld End
9

* Standard end flange raised face surface finish. This standard finish is suitable for all gasket types including reinforced tanged graphite, spiral wound and CAF.

Pressure Class

	Description	
1	150	
2	300	
4	600 800	flanged steel valves forged steel valves with screwed or socket weld ends
5	900 1000	all except parallel slide valves parallel slide valves
6	1500 1690	all except parallel slide valves parallel slide valves
9	2500 2850	all except parallel slide valves parallel slide valves
0	4500	

Standard Bonnet Bolting

Body	Body Material	Stud Material	Nut Material
None	WCB/A105	ASTM A193 B7	ASTM A194 2H
X	WCB/A105	ASTM A193 B7M	ASTM A194 2HM
K, J	LCB/LCC/LF2	ASTM A320 L7	ASTM A194 4
N	LCB/LF2	ASTM A320 L7M	ASTM A194 7M
P	CF8M, F316	ASTM A193 B8 Cl.2	ASTM A194 8
S	CF8, F304	ASTM A193 B8 Cl.2	ASTM A194 8
B	CF3M, F316L	ASTM A193 B8 Cl.2	ASTM A194 8
C	CF3, F304L	ASTM A193 B8 Cl.2	ASTM A194 8
H, L, R	C5, WC6, WC9	ASTM A193 B16	ASTM A194 7
U	C12A	ASTM A193 B16	ASTM A194 7

Additional Features

Suffix	Description
'E' etc	Flanges to BS10 Table 'E' etc
'PN10' etc	Flanges faced and drilled to BS EN 1092-1 'PN16' etc
RJF	Ring joint flanges
UND	Flanged left undrilled
FW	Flexible wedge
CF	Check and feed, stop check, SDNR globe valve
PD	Regulating globe valve fitted with parabolic disc
N	Globe valve with needle type disc
FB	Full bore valve (where non-standard)
BB	Block and bleed wedge gate valve
T & P	Boss or bosses tapped and plugged
BG	Bevel gearbox operated
SG	Spur gearbox operated
CHW	Fitted with chainwheel and chain operator
EXT	Fitted with extended spindle
SC	Sleeve coupling
ACT	Fitted with electric, pneumatic or hydraulic actuator
MTG	Fitted with actuator mounting flange
PC	Padlock and chain locking device
LD	Pin type locking device
DNI	Position indicator (globe and forged steel valves)
DOI	Position indicator (dome type - gate valves)
LDI	Pin type locking device and position indicator
BY	By-pass
EQBY	Equalising by-pass
OLW	Outside lever and weight
OLQ	Outside lever and quadrant
SPL	Valve to ASME B16.34 special class requirements
XR	Radiographic examination
MPI	Magnetic particle examination
DPI	Dye penetrant examination
SGM	Special gasket material
SPG	Special gland packing
SP	Special painting
Z	Other special features to be specified

Valve Bodyshell Materials

Material Group	Type	Designation	Castings	Forgings	Application Notes
Carbon Steels	CS	C - Si	ASTM A216 Gr. WCB	ASTM A105N	Non-corrosive service from -29°C (-20°F) to 425°C (800°F)
Low Temperature Carbon Steels	LTCS	C - Si C - Mn - Si	ASTM A352 Gr. LCB ASTM A352 Gr. LCC	ASTM A350 Gr. LF2	Non-corrosive service from -46°C (-50°F) to 345°C (650°F) LF2 to 425°C (800°F)
Low Temperature Alloy Steels	Nickel Steels	2½ Ni 3½ Ni	ASTM A352 Gr. LC2 ASTM A352 Gr. LC3	ASTM A350 Gr. LF3	Temperatures from: -73°C (-100°F) to 345°C (650°F) -101°C (-150°F) to 345°C (650°F)
Alloy Steels	Alloy Steels	C - ½Mo 1¼Cr - ½Mo 2¼Cr - 1Mo 5Cr - ½Mo 9Cr - 1Mo - V	ASTM A217 Gr. WC1 ASTM A217 Gr. WC6 ASTM A217 Gr. WC9 ASTM A217 Gr. C5 ASTM A217 Gr. C12A	ASTM A182 Gr. F1 ASTM A182 Gr. F11 ASTM A182 Gr. F22 ASTM A182 Gr. F5a ASTM A182 Gr. F91	Temperatures up to: 470°C (875°F) 595°C (1100°F) 595°C (1100°F) 650°C (1200°F) 650°C (1200°F)
Stainless Steels	300 series Stainless Steels	16Cr-12Ni-2Mo 16Cr-12Ni-2Mo 18Cr-8Ni 18Cr-8Ni 18Cr-10Ni-Cb 18Cr-10Ni-Cb 18Cr-10Ni-Ti	ASTM A351 Gr. CF8M ASTM A351 Gr. CF3M ASTM A351 Gr. CF8 ASTM A351 Gr. CF3 ASTM A351 Gr. CF8C	ASTM A182 Gr. F316 ASTM A182 Gr. F316L ASTM A182 Gr. F304 ASTM A182 Gr. F304L ASTM A182 Gr. F347 ASTM A182 Gr. F347H ASTM A182 Gr. F321	Temperatures from -196°C (-320°F) to: 538°C (1000°F). Up to 816°C (1500°F) with 0.04% min carbon 425°C (800°F). Up to 450°C (850°F) for F316L 538°C (1000°F). Up to 816°C (1500°F) with 0.04% min carbon 425°C (800°F) 538°C (1000°F). Up to 816°C (1500°F) with 0.04% min carbon* 816°C (1500°F) if heat treated 538°C (1000°F)
Stainless Steels	Alloy 20	29Ni-20½Cr-3½Cu-2½Mo	ASTM A351 Gr. CN7M		Temperatures up to: 325°C (600°F)
Stainless Steels	Duplex	22Cr-5Ni-3Mo-N UNS S31803	ASTM A351 Gr. CD3MN	ASTM A182 Gr. F51	Temperatures up to: 315°C (600°F)
Stainless Steels	Super Duplex	24Cr-10Ni-4Mo-V 25Cr-7Ni-4Mo-N UNS S32750	ASTM A351 Gr. CE8MN	ASTM A182 Gr. F53	Temperatures up to: 315°C (600°F) 315°C (600°F)
Stainless Steels	Super Austenitic 6Mo	20Cr-18Ni-6Mo UNS S31254	ASTM A351 Gr. CK3MCuN	ASTM A182 Gr. F44	Temperatures up to: 400°C (750°F)
Nickel - Iron Alloys	Incoloy 800 Incoloy 825	33Ni-42Fe-21Cr 42Ni-21.5Cr-3Mo-2.3Cu		ASTM B564 Gr. N08800 ASTM B564 Gr. N08825	Temperatures up to: 816°C (1500°F) 538°C (1000°F)
Nickel Alloys	Nickel	99Ni		ASTM B564 Gr. N02200	Temperatures up to: 325°C (600°F)
Nickel-Copper	Monel 400 Monel 400	67Ni-30Cu 67Ni-30Cu-S	ASTM A494 Gr. M35-1	ASTM B564 Gr. N04400	Temperatures up to: 475°C (900°F) 475°C (900°F)
Nickel Superalloys	Inconel 600 Inconel 625	72Ni-15Cr-8Fe 60Ni-22Cr-9Mo-3.5Cb		ASTM B564 Gr. N06600 ASTM B564 Gr. N06625	Temperatures up to: 650°C (1200°F) 645°C (1200°F)
Nickel Superalloys	Hastelloy C-276	54Ni-16Mo-15Cr		ASTM B564 Gr. N10276	Temperatures up to: 675°C (1250°F)

* F347 not to be used over 538°C (1000°F)

ASME B16.5 Flange Dimensions

ASME B16.5 CLASS 150 - 1/16" RAISED FACE

Nominal Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	Bolt Hole Dia.	No. of Bolts	Dia. of Bolts	Raised Face Dia.
1/2"	3.50	0.38	2.38	5/8	4	1/2	1.38
3/4"	3.88	0.41	2.75	5/8	4	1/2	1.69
1"	4.25	0.44	3.12	5/8	4	1/2	2.00
1 1/4"	4.62	0.50	3.50	5/8	4	1/2	2.50
1 1/2"	5.00	0.56	3.88	5/8	4	1/2	2.88
2"	6.00	0.62	4.75	3/4	4	5/8	3.62
2 1/2"	7.00	0.69	5.50	3/4	4	5/8	4.12
3"	7.50	0.75	6.00	3/4	4	5/8	5.00
4"	9.00	0.94	7.50	3/4	8	5/8	6.19
5"	10.00	0.94	8.50	7/8	8	3/4	7.31
6"	11.00	1.00	9.50	7/8	8	3/4	8.50
8"	13.50	1.12	11.75	7/8	8	3/4	10.62
10"	16.00	1.19	14.25	1	12	7/8	12.75
12"	19.00	1.25	17.00	1	12	7/8	15.00
14"	21.00	1.38	18.75	1 1/8	12	1	16.25
16"	23.50	1.44	21.25	1 1/8	16	1	18.50
18"	25.00	1.56	22.75	1 1/4	16	1 1/8	21.00
20"	27.50	1.69	25.00	1 1/4	20	1 1/8	23.00
24"	32.00	1.88	29.50	1 3/8	20	1 1/4	27.25

ASME B16.5 CLASS 300 - 1/16" RAISED FACE

Nominal Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	Bolt Hole Dia.	No. of Bolts	Dia. of Bolts	Raised Face Dia.
1/2"	3.75	0.56	2.62	5/8	4	1/2	1.38
3/4"	4.62	0.62	3.25	3/4	4	5/8	1.69
1"	4.88	0.69	3.50	3/4	4	5/8	2.00
1 1/4"	5.25	0.75	3.88	3/4	4	5/8	2.50
1 1/2"	6.12	0.81	4.50	7/8	4	3/4	2.88
2"	6.50	0.88	5.00	3/4	8	5/8	3.62
2 1/2"	7.50	1.00	5.88	7/8	8	3/4	4.12
3"	8.25	1.12	6.62	7/8	8	3/4	5.00
4"	10.00	1.25	7.88	7/8	8	3/4	6.19
5"	11.00	1.38	9.25	7/8	8	3/4	7.31
6"	12.50	1.44	10.62	7/8	12	3/4	8.50
8"	15.00	1.62	13.00	1	12	7/8	10.62
10"	17.50	1.88	15.25	1 1/8	16	1	12.75
12"	20.50	2.00	17.75	1 1/4	16	1 1/8	15.00
14"	23.00	2.12	20.25	1 1/4	20	1 1/8	16.25
16"	25.50	2.25	22.50	1 3/8	20	1 1/4	18.50
18"	28.00	2.38	24.75	1 3/8	24	1 1/4	21.00
20"	30.50	2.50	27.00	1 3/8	24	1 1/4	23.00
24"	36.00	2.75	32.00	1 5/8	24	1 1/2	27.75

ASME B16.5 CLASS 600 - 1/4" RAISED FACE

Nominal Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	Bolt Hole Dia.	No. of Bolts	Dia. of Bolts	Raised Face Dia.
1/2"	3.75	0.56	2.62	5/8	4	1/2	1.38
3/4"	4.62	0.62	3.25	3/4	4	5/8	1.69
1"	4.88	0.69	3.50	3/4	4	5/8	2.00
1 1/4"	5.25	0.81	3.88	3/4	4	5/8	2.50
1 1/2"	6.12	0.88	4.50	7/8	4	3/4	2.88
2"	6.50	1.00	5.00	3/4	8	5/8	3.62
2 1/2"	7.50	1.12	5.88	7/8	8	3/4	4.12
3"	8.25	1.25	6.62	7/8	8	3/4	5.00
4"	10.75	1.50	8.50	1	8	7/8	6.19
5"	13.00	1.75	10.50	1 1/8	8	1	7.31
6"	14.00	1.88	11.50	1 1/8	12	1	8.50
8"	16.50	2.19	13.75	1 1/4	12	1 1/8	10.62
10"	20.00	2.50	17.00	1 3/8	16	1 1/4	12.75
12"	22.00	2.62	19.25	1 3/8	20	1 1/4	15.00
14"	23.75	2.75	20.75	1 1/2	20	1 3/8	16.25
16"	27.00	3.00	23.75	1 5/8	20	1 1/2	18.50

ASME B16.5 CLASS 900 - 1/4" RAISED FACE

Nominal Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	Bolt Hole Dia.	No. of Bolts	Dia. of Bolts	Raised Face Dia.
1/2"	4.75	0.88	3.25	7/8	4	3/4	1.38
3/4"	5.12	1.00	3.50	7/8	4	3/4	1.69
1"	5.88	1.12	4.00	1	4	7/8	2.00
1 1/4"	6.25	1.12	4.38	1	4	7/8	2.50
1 1/2"	7.00	1.25	4.88	1 1/8	4	1	2.88
2"	8.50	1.50	6.50	1	8	7/8	3.62
2 1/2"	9.62	1.62	7.50	1 1/8	8	1	4.12
3"	9.50	1.50	7.50	1	8	7/8	5.00
4"	11.50	1.75	9.25	1 1/4	8	1 1/8	6.19
5"	13.75	2.00	11.00	1 3/8	8	1 1/4	7.31
6"	15.00	2.19	12.50	1 1/4	12	1 1/8	8.50
8"	18.50	2.50	15.50	1 1/2	12	1 3/8	10.62
10"	21.50	2.75	18.50	1 1/2	16	1 3/8	12.75
12"	24.00	3.12	21.00	1 1/2	20	1 3/8	15.00

ASME B16.5 CLASS 1500 - 1/4" RAISED FACE

Nominal Size	Flange Dia.	Min. Flange Thickness	Bolt Circle Dia.	Bolt Hole Dia.	No. of Bolts	Dia. of Bolts	Raised Face Dia.
1/2"	4.75	0.88	3.25	7/8	4	3/4	1.38
3/4"	5.12	1.00	3.50	7/8	4	3/4	1.69
1"	5.88	1.12	4.00	1	4	7/8	2.00
1 1/4"	6.25	1.12	4.38	1	4	7/8	2.50
1 1/2"	7.00	1.25	4.88	1 1/8	4	1	2.88
2"	8.50	1.50	6.50	1	8	7/8	3.62
2 1/2"	9.62	1.62	7.50	1 1/8	8	1	4.12
3"	10.50	1.88	8.00	1 1/4	8	1 1/8	5.00
4"	12.25	2.12	9.50	1 3/8	8	1 1/4	6.19
5"	14.75	2.88	11.50	1 5/8	8	1 1/2	7.31
6"	15.50	3.25	12.50	1 1/2	12	1 3/8	8.50
8"	19.00	3.62	15.50	1 3/4	12	1 5/8	10.62

Flange thickness dimensions include the raised face height for ASME B16.5 Class 150 and Class 300 valves
All dimension are in inches

PRESSURE/TEMPERATURE Ratings - ASME B16.34 (2009) - Standard Class

Temp °C	A216 WCB / A105 / A350 LF2					
Class	150	300	600	800	900	1500
-29 to 38	19.6	51.1	102.1	136.2	153.2	255.3
50	19.2	50.1	100.2	133.7	150.4	250.6
100	17.7	46.6	93.2	124.3	139.8	233.0
150	15.8	45.1	90.2	120.2	135.2	225.4
200	13.8	43.8	87.6	116.8	131.4	219.0
250	12.1	41.9	83.9	111.8	125.8	209.7
300	10.2	39.8	79.6	106.2	119.5	199.1
325	9.3	38.7	77.4	103.2	116.1	193.6
350	8.4	37.6	75.1	100.2	112.7	187.8
375	7.4	36.4	72.7	97.0	109.1	181.8
400	6.5	34.7	69.4	92.6	104.2	173.6
425	5.5	28.8	57.5	76.7	86.3	143.8
450	4.6*	23.0*	46.0*	61.3*	69.0*	115.0*
475						
500						
538						
550						
575						
595						

* Permissible but not recommended for prolonged use above 425°C

A216 WCC / A352 LCC / A352 LC2					
150	300	600	800	900	1500
19.8	51.7	103.4	137.9	155.1	258.6
19.5	51.7	103.4	137.9	155.1	258.6
17.7	51.5	103.0	137.4	154.6	257.6
15.8	50.2	100.3	133.8	150.5	250.8
13.8	48.6	97.2	129.6	145.8	243.2
12.1	46.3	92.7	123.6	139.0	231.8
10.2	42.9	85.7	114.3	128.6	214.4
9.3	41.4	82.6	110.2	124.0	206.6
8.4	40.0	80.0	106.7	120.1	200.1
7.4	37.8	75.7	100.9	113.5	189.2
6.5	34.7	69.4	92.6	104.2	173.6
5.5	28.8	57.5	76.7	86.3	143.8
4.6*	23.0*	46.0*	61.3*	69.0*	115.0*

* Use of WCC material is permissible but not recommended for prolonged use above 425°C
LCC & LC2 material are not to be used above 345°C

ASTM A217 WC6 / A182 F11					
150	300	600	800	900	1500
19.8	51.7	103.4	137.9	155.1	258.6
19.5	51.7	103.4	137.9	155.1	258.6
17.7	51.5	103.0	137.3	154.4	257.4
15.8	49.7	99.5	132.6	149.2	248.7
13.8	48.0	95.9	127.9	143.9	239.8
12.1	46.3	92.7	123.6	139.0	231.8
10.2	42.9	85.7	114.3	128.6	214.4
9.3	41.4	82.6	110.2	124.0	206.6
8.4	40.3	80.4	107.3	120.7	201.1
7.4	38.9	77.6	103.5	116.5	194.1
6.5	36.5	73.3	97.6	109.8	183.1
5.5	35.2	70.0	93.4	105.1	175.1
4.6	33.7	67.7	90.2	101.4	169.0
3.7	31.7	63.4	84.5	95.1	158.2
2.8	25.7	51.5	68.6	77.2	128.6
1.4	14.9	29.8	39.7	44.7	74.5
1.4 †	12.7	25.4	33.9	38.1	63.5
1.4 †	8.8	17.6	23.5	26.4	44.0
1.4 †	6.6	13.3	17.7	19.9	33.2

All pressures shown in bar

† Flanged end ratings terminate at 538°C

Temp °C	ASTM A217 WC9 / A182 F22					
Class	150	300	600	800	900	1500
-29 to 38	19.8	51.7	103.4	137.9	155.1	258.6
50	19.5	51.7	103.4	137.9	155.1	258.6
100	17.7	51.5	103.0	137.4	154.6	257.6
150	15.8	50.3	100.3	133.8	150.6	250.8
200	13.8	48.6	97.2	129.6	145.8	243.4
250	12.1	46.3	92.7	123.6	139.0	231.8
300	10.2	42.9	85.7	114.3	128.6	214.4
325	9.3	41.4	82.6	110.2	124.0	206.6
350	8.4	40.3	80.4	107.3	120.7	201.1
375	7.4	38.9	77.6	103.5	116.5	194.1
400	6.5	36.5	73.3	97.6	109.8	183.1
425	5.5	35.2	70.0	93.4	105.1	175.1
450	4.6	33.7	67.7	90.2	101.4	169.0
475	3.7	31.7	63.4	84.5	95.1	158.2
500	2.8	28.2	56.5	75.3	84.7	140.9
538	1.4	18.4	36.9	49.2	55.3	92.2
550	1.4 †	15.6	31.3	41.7	46.9	78.2
575	1.4 †	10.5	21.1	28.1	31.6	52.6
595	1.4 †	7.6	15.3	20.3	22.9	38.0
625						
650						
675						
700						
725						
750						
775						
800						
816						

† Flanged end ratings terminate at 538°C

ASTM A217 C5 / A182 F5a					
150	300	600	800	900	1500
20.0	51.7	103.4	137.9	155.1	258.6
19.5	51.7	103.4	137.9	155.1	258.6
17.7	51.5	103.0	137.4	154.6	257.6
15.8	50.3	100.3	133.8	150.6	250.8
13.8	48.6	97.2	129.6	145.8	243.4
12.1	46.3	92.7	123.6	139.0	231.8
10.2	42.9	85.7	114.3	128.6	214.4
9.3	41.4	82.6	110.2	124.0	206.6
8.4	40.3	80.4	107.3	120.7	201.1
7.4	38.9	77.6	103.5	116.5	194.1
6.5	36.5	73.3	97.6	109.8	183.1
5.5	35.2	70.0	93.4	105.1	175.1
4.6	33.7	67.7	90.2	101.4	169.0
3.7	27.9	55.7	74.3	83.6	139.3
2.8	21.4	42.8	57.0	64.1	106.9
1.4	13.7	27.4	36.5	41.1	68.6
1.4 †	12.0	24.1	32.1	36.1	60.2
1.4 †	8.9	17.8	23.7	26.7	44.4
1.4 †	6.7	13.6	18.0	20.3	33.8
1.4 †	4.0	8.0	10.7	12.0	20.0
0.9 †	2.4	4.7	6.3	7.1	11.8

All pressures shown in bar

† Flanged end ratings terminate at 538°C

ASTM A351 CF8M / A182 F316					
150	300	600	800	900	1500
19.0	49.6	99.3	132.4	148.9	248.2
18.4	48.1	96.2	128.3	144.3	240.6
16.2	42.2	84.4	112.5	126.6	211.0
14.8	38.5	77.0	102.7	115.5	192.5
13.7	35.7	71.3	95.1	107.0	178.3
12.1	33.4	66.8	89.0	100.1	166.9
10.2	31.6	63.2	84.3	94.9	158.1
9.3	30.9	61.8	82.4	92.7	154.4
8.4	30.3	60.7	80.9	91.0	151.6
7.4	29.9	59.8	79.7	89.6	149.4
6.5	29.4	58.9	78.5	88.3	147.2
5.5	29.1	58.3	77.7	87.4	145.7
4.6	28.8	57.7	76.9	86.5	144.2
3.7	28.7	57.3	76.4	86.0	143.4
2.8	28.2	56.5	75.3	84.7	140.9
1.4	25.2	50.0	66.8	75.2	125.5
1.4 †	25.0	49.8	66.5	74.8	124.9
1.4 †	24.0	47.9	63.8	71.8	119.7
1.4 †	20.7	41.4	55.2	62.1	103.5
1.4 †	15.8	31.6	42.1	47.4	79.1
1.4 †	12.7	25.3	33.8	38.0	63.3
1.4 †	10.3	20.6	27.5	31.0	51.6
1.4 †	8.4	16.8	22.3	25.1	41.9
1.4 †	7.0	14.0	18.7	21.0	34.9
1.4 †	5.9	11.7	15.6	17.6	29.3
1.4 †	4.6	9.0	12.1	13.7	22.8
1.2 †	3.5	7.0	9.3	10.5	17.4
1.0 †	2.8	5.9	7.7	8.6	14.1

† Flanged end ratings terminate at 538°C
At temperatures above 538°C use only when the carbon content is 0.04% or higher

PRESSURE/TEMPERATURE Ratings - ASME B16.34 (2009) - Standard Class

Temp °F	ASTM A216 WCB / A105N / A350 LF2					
Class	150	300	600	800	900	1500
-20 to 100	285	740	1480	1973	2220	3705
200	260	680	1360	1810	2035	3395
300	230	655	1310	1747	1965	3270
400	200	635	1265	1688	1900	3170
500	170	605	1205	1608	1810	3015
600	140	570	1135	1515	1705	2840
650	125	550	1100	1467	1650	2745
700	110	530	1060	1413	1590	2665
750	95	505	1015	1352	1520	2535
800	80	410	825	1098	1235	2055
850	65*	320*	640*	850*	955*	1595*
900						
950						
1000						
1050						
1100						

* Permissible but not recommended for prolonged use above 800°F

Temp °F	ASTM A216 WCC / A352 LCC / A352 LC2					
Class	150	300	600	800	900	1500
-20 to 100	290	750	1500	2000	2250	3750
200	260	750	1500	2000	2250	3750
300	230	730	1455	1942	2185	3640
400	200	705	1405	1875	2110	3520
500	170	665	1330	1773	1995	3325
600	140	605	1210	1613	1815	3025
650	125	590	1175	1568	1765	2940
700	110	555	1110	1480	1665	2775
750	95	505	1015	1352	1520	2535
800	80	410	825	1098	1235	2055
850	65*	320*	640*	850*	955*	1595*
900						
950						
1000						
1050						
1100						

* Use of WCC material is permissible but not recommended for prolonged use above 800°F
LCC & LC2 material are not to be used above 650°F

Temp °F	ASTM A217 WC6 / A182 F11					
Class	150	300	600	800	900	1500
-20 to 100	290	750	1500	2000	2250	3750
200	260	750	1500	2000	2250	3750
300	230	720	1445	1925	2165	3610
400	200	695	1385	1848	2080	3465
500	170	665	1330	1773	1995	3325
600	140	605	1210	1613	1815	3025
650	125	590	1175	1568	1765	2940
700	110	570	1135	1515	1705	2840
750	95	530	1065	1418	1595	2660
800	80	510	1015	1355	1525	2540
850	65	485	975	1298	1460	2435
900	50	450	900	1200	1350	2245
950	35	320	640	850	955	1595
1000	20	215	430	577	650	1080
1050	20 †	145	290	383	430	720
1100	20 †	95	190	257	290	480

† Flanged end ratings terminate at 1000°F

All pressures shown in psi

Temp °F	ASTM A217 WC9 / A182 F22					
Class	150	300	600	800	900	1500
-20 to 100	290	750	1500	2000	2250	3750
200	260	750	1500	2000	2250	3750
300	230	730	1455	1942	2185	3640
400	200	705	1410	1880	2115	3530
500	170	665	1330	1773	1995	3325
600	140	605	1210	1613	1815	3025
650	125	590	1175	1568	1765	2940
700	110	570	1135	1515	1705	2840
750	95	530	1065	1418	1595	2660
800	80	510	1015	1355	1525	2540
850	65	485	975	1298	1460	2435
900	50	450	900	1200	1350	2245
950	35	385	755	1025	1160	1930
1000	20	265	535	712	800	1335
1050	20 †	175	350	467	525	875
1100	20 †	110	220	293	330	550
1150						
1200						
1250						
1300						
1350						
1400						
1450						
1500						

† Flanged end ratings terminate at 1000°F

Temp °F	ASTM A217 C5 / A182 F5a					
Class	150	300	600	800	900	1500
-20 to 100	290	750	1500	2000	2250	3750
200	260	750	1500	2000	2250	3750
300	230	730	1455	1942	2185	3640
400	200	705	1410	1880	2115	3530
500	170	665	1330	1773	1995	3325
600	140	605	1210	1613	1815	3025
650	125	590	1175	1568	1765	2940
700	110	570	1135	1515	1705	2840
750	95	530	1065	1418	1595	2660
800	80	510	1015	1355	1525	2540
850	65	485	975	1298	1460	2435
900	50	375	745	995	1120	1870
950	35	275	550	733	825	1370
1000	20	200	400	530	595	995
1050	20 †	145	290	383	430	720
1100	20 †	100	200	267	300	495
1150	20 †	60	125	165	185	310
1200	15 †	35	70	93	105	170
1250						
1300						
1350						
1400						
1450						
1500						

† Flanged end ratings terminate at 1000°F

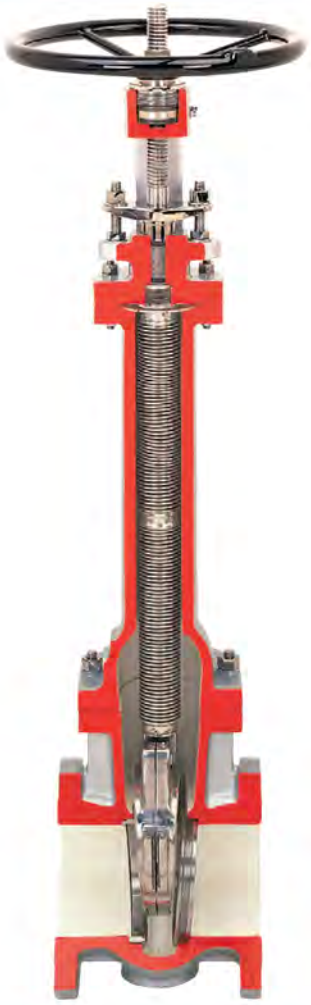
All pressures shown in psi

Temp °F	ASTM A351 CF8M / A182 F316					
Class	150	300	600	800	900	1500
-20 to 100	275	720	1440	1920	2160	3600
200	235	620	1240	1653	1860	3095
300	215	560	1120	1493	1680	2795
400	195	515	1025	1368	1540	2570
500	170	480	955	1275	1435	2390
600	140	450	900	1203	1355	2255
650	125	440	885	1178	1325	2210
700	110	435	870	1160	1305	2170
750	95	425	855	1138	1280	2135
800	80	420	845	1125	1265	2110
850	65	420	835	1115	1255	2090
900	50	415	830	1107	1245	2075
950	35	385	775	1032	1160	1930
1000	20	365	725	968	1090	1820
1050	20 †	360	720	960	1080	1800
1100	20 †	305	610	813	915	1525
1150	20 †	235	475	632	710	1185
1200	20 †	185	370	493	555	925
1250	20 †	145	295	392	440	735
1300	20 †	115	235	312	350	585
1350	20 †	95	190	257	290	480
1400	20 †	75	150	200	225	380
1450	20 †	60	115	155	175	290
1500	15 †	40	85	112	125	205

† Flanged end ratings terminate at 1000°F
At temperatures above 1000°F use only when the carbon content is 0.04% or higher

CAST STEEL BELLOWS SEALED WEDGE GATE VALVES

F Series - 2" to 24" Class 150, 300 & 600



Valve Specification Details

- Generally meeting BS EN ISO 10434 (formerly BS1414), API600 & ASME B16.34. API591 compliant
- Flanged or Butt-Weld Ends
- Hardfaced seats and wedge as standard
- Seal-welded seats as standard
- Flexible wedge as standard on 6" and larger, Class 150 & 300 valves
- Zero emissions, fire-safe construction
- Long life bellows available in 321, 316L or 304 stainless steel
- Bubble tight shut-off meeting requirements of BS EN ISO 12266-1 & API598
- Secondary stem seal by means of:-
  - backseat arrangement when fully open
  - low emission graphite gland packing
- Renewable bellows sealed bonnet assembly on bolted bonnet design
- Castings meeting requirements of Level 3

Optional Features

- Bellows and trim material options to suit specific services
- Optional seal welded bonnet on class 300 & class 600 giving guaranteed zero emissions
- Optional sealing check connection to the space above the bellows
- Flexible wedge across full range
- Bevel gearbox operation where non-standard

Materials of Construction - Bellows Sealed Wedge Gate Valve

Component	Carbon Steel Specification	Stainless Steel Specification
Body	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
Bonnet (2 piece)	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
Body & Gland Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl. 2
Body & Gland Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 8
Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Wedge	ASTM A216 Gr. WCB Hardfaced, or ASTM A105 Hardfaced	ASTM A351 Gr. CF8M Hardfaced, or ASTM A182 Gr. F316 Hardfaced
Body Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F316 Hardfaced
Backseat Bush	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Bellows	Type 321 Stainless Steel	Type 321 Stainless Steel
Gland Flange	ASTM A105	ASTM A182 Gr. F316
Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
Handwheel Nut	Carbon Steel	Carbon Steel
Gasket:		
Class 150	Stainless Steel Reinforced Tanged Graphite	
Class 300	Stainless Steel Graphite Filled Spiral Wound	
Class 600	Soft Iron Ring Joint	F316 Ring Joint

† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent

Max Body Test Pressure	Max Working Pressure
Carbon Steel Valves	Carbon Steel Valves
Class 150 450 psi (30 bar)	Class 150 285 psi (19.6 bar)
Class 300 1125 psi (77 bar)	Class 300 740 psi (51.1 bar)
Class 600 2225 psi (154 bar)	Class 600 1480 psi (102.1 bar)

Flange Ends	Carbon Steel (ASTM A216 WCB)		Stainless Steel (ASTM A351 CF8M)	
ASME class	Fig No	Factory Code	Fig No	Factory Code
150 RF	C8914/29/150FB	05F81	S8914/29/150FB	PAF81
300 RF	C8924/29/300FB	05F82	S8924/29/300FB	PAF82
600 RF	C8944/29/600FB	05F84	S8944/29/600FB	PAF84

Flange dimensions in accordance with ASME B16.5

BW Ends				
ASME class	Fig No	Factory Code	Fig No	Factory Code
*150 BW	C8914/15FB	05F91	S8914/16FB	PAF91
300 BW	C8924/15FB	05F92	S8924/16FB	PAF92
600 BW	C8944/15FB	05F94	S8944/16FB	PAF94

* For 2" to 4" sizes use class 300 valves

CAST STEEL BELLOWS SEALED WEDGE GATE VALVE DATA

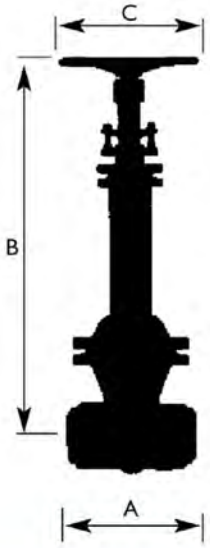
F Series - 2" to 24" Class 150, 300 & 600

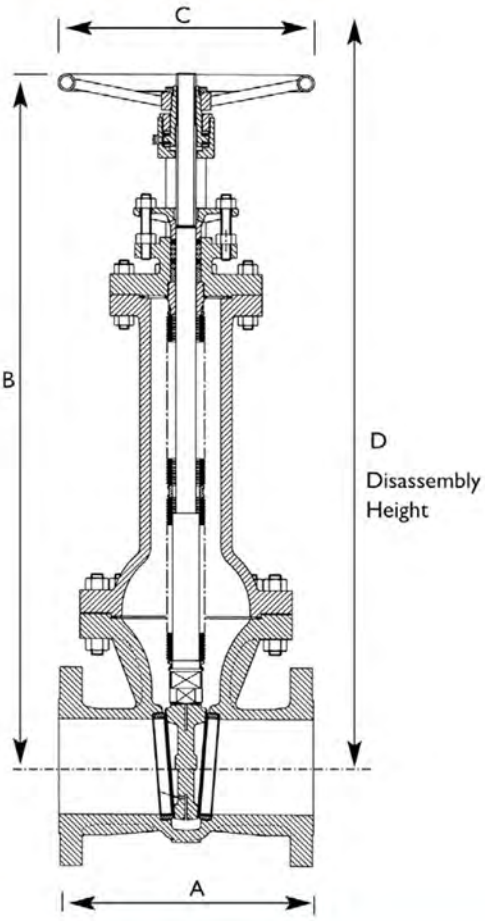
Size (ins) (mm)	CV US GPM	Class 150 'A' FLG	'A' BW	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 300 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 600 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	306	7.00	8.50	22.40	8	28.90	70	8.50	25.00	8	31.70	90	11.50	26.80	10	33.90	115
50		178	216	570	200	735	32	216	635	200	805	41	292	680	250	860	52
2½"	480	7.50	9.50	26.20	10	33.50	100	9.50	28.50	10	36.00	115	13.00	33.90	12	41.70	175
65		191	241	665	250	850	45	241	725	250	915	52	330	860	300	1060	79
3"	708	8.00	11.12	30.70	12	38.80	120	11.12	34.10	14	42.30	155	14.00	36.20	16	44.90	225
80		203	282	780	300	985	54	282	865	350	1075	70	356	920	400	1140	102
4"	1300	9.00	12.00	37.40	14	47.10	170	12.00	41.30	16	51.20	240	17.00	44.90	18	55.10	335
100		229	305	950	350	1195	77	305	1050	400	1300	109	432	1140	450	1400	152
6"	3000	10.50	15.88	48.80	16	61.90	275	15.88	50.80	18	64.20	410	22.00	62.20	20*	76.00	640
150		267	403	1240	400	1570	125	403	1290	450	1630	186	559	1580	500*	1930	290
8"	5640	11.50	16.50	63.00	18	79.10	415	16.50	63.40	20*	79.90	645	26.00	83.10	28*	100.00	1020
200		292	419	1600	450	2010	188	419	1610	500*	2030	293	660	2110	700*	2540	463
10"	8880	13.00	18.00	77.20	20*	96.50	705	18.00	77.20	24*	96.90	910	31.00	94.50	30*	115.00	1490
250		330	457	1960	500*	2450	320	457	1960	600*	2460	413	787	2400	750*	2920	676
12"	13200	14.00	19.75	91.00	24*	114.00	900	19.75	91.30	28*	115.00	1260	33.00	111.00	36*	135.00	2270
300		356	502	2310	600*	2900	408	502	2320	700*	2920	572	838	2820	900*	3430	1030
14"	16200	15.00	22.50	107.00	28*	132.00	1240	30.00	110.00	30*	136.00	2010					
350		381	572	2720	700*	3355	562	762	2800	750*	3455	912					
16"	21500	16.00	24.00	125.00	30*	154.00	1630	33.00	133.00	36*	162.00	2570					
400		406	610	3175	750*	3910	740	838	3380	900*	4115	1165					

Dimensions and weights are approximate

* Valve may require gear operator

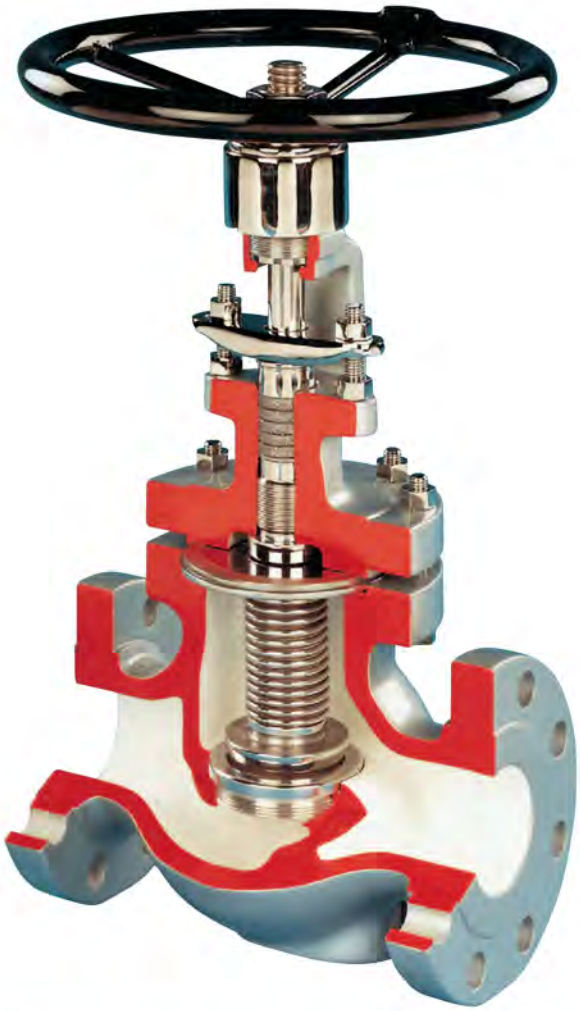
For 18" size and above dimensions on application





CAST STEEL BELLOWS SEALED GLOBE VALVES

K Series - 2" to 16" Class 150, 300 & 600



Valve Specification Details

- Generally meeting BS1873, API600 & ASME B16.34. API591 compliant
- Flanged or Butt-Weld Ends
- Hardfaced seat and disc as standard
- Seal-welded seat as standard
- Plug type disc
- Zero emissions, fire-safe construction
- Long life bellows available in 321, 316L or 304 stainless steel
- Bubble tight shut-off meeting requirements of BS EN ISO 12266-1 & API598
- Secondary stem seal by means of:-
  - backseat arrangement when fully open
  - low emission graphite gland packing
- Renewable bellows sealed bonnet assembly on bolted bonnet design
- Castings meeting requirements of Level 3

Optional Features

- Bellows and trim material options to suit specific services
- Optional seal welded bonnet giving guaranteed zero emissions
- Optional sealing check connection to the space above the bellows
- Bevel gearbox operation where non-standard

Materials of Construction - Bellows Sealed Globe Valve

Component	Carbon Steel Specification	Stainless Steel Specification
Body	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
Bonnet	ASTM A216 Gr. WCB †	ASTM A351 Gr. CF8M
Body & Gland Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl. 2
Body & Gland Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 8
Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Disc	ASTM A216 Gr. WCB Hardfaced, or ASTM A105 Hardfaced	ASTM A351 Gr. CF8M Hardfaced, or ASTM A182 Gr. F316 Hardfaced
Body Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F316 Hardfaced
Backseat Bush	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Bellows	Type 321 Stainless Steel	Type 321 Stainless Steel
Bellows Flange	Carbon Steel	ASTM A276 Gr. 316
Gland Flange	ASTM A105	ASTM A182 Gr. F316
Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 316
Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
Handwheel Nut	Carbon Steel	Carbon Steel
Gasket: Class 150 & 300 Class 600	 Stainless Steel Graphite Filled Spiral Wound Soft Iron Ring Joint	 F316 Ring Joint

† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent

Max Body Test Pressure	Max Working Pressure
Carbon Steel Valves	Carbon Steel Valves
Class 150 450 psi (30 bar)	Class 150 285 psi (19.6 bar)
Class 300 1125 psi (77 bar)	Class 300 740 psi (51.1 bar)
Class 600 2225 psi (154 bar)	Class 600 1480 psi (102.1 bar)

Flange Ends	Carbon Steel (ASTM A216 WCB)		Stainless Steel (ASTM A351 CF8M)	
ASME class	Fig No	Factory Code	Fig No	Factory Code
150 RF	C7914/29/150	05K81	S7914/29/150	PAK81
300 RF	C7924/29/300	05K82	S7924/29/300	PAK82
600 RF	C7944/29/600	05K84	S7944/29/600	PAK84
Flange dimensions in accordance with ASME B16.5				
BW Ends				
ASME class	Fig No	Factory Code	Fig No	Factory Code
150 BW	C7914/15	05K91	S7914/16	PAK91
300 BW	C7924/15	05K92	S8924/16	PAK92
600 BW	C7944/15	05K94	S8944/16	PAK94

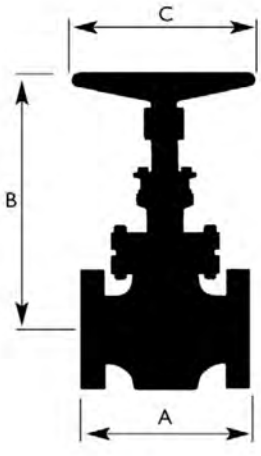
CAST STEEL BELLOWS SEALED GLOBE VALVE DATA

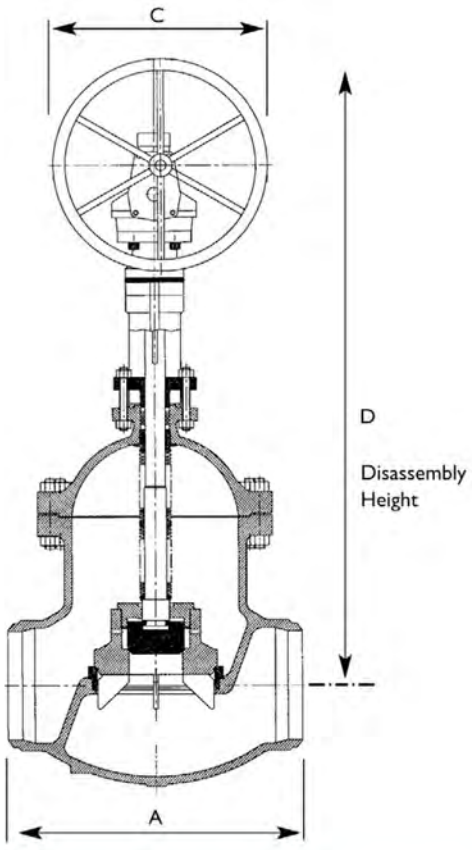
K Series - 2" to 16" Class 150, 300 & 600

Size (ins) (mm)	CV US GPM	Class 150 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 300 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)	Class 600 'A'	'B'	'C'	'D'	Weight (lbs) (kgs)
2"	48	8.00	14.20	8	19.90	75	10.50	15.20	10	21.10	95	11.50	16.90	12	23.20	125
50		203	360	200	505	34	267	385	250	535	43	292	430	300	590	57
2½"	74	8.50	15.90	10	22.10	100	11.50	17.30	12	23.60	125	13.00	18.90	14	25.60	175
65		216	405	250	560	45	292	440	300	600	57	330	480	350	650	79
3"	120	9.50	17.30	12	23.80	120	12.50	19.30	14	26.00	165	14.00	20.70	18	27.80	220
80		241	440	300	605	54	318	490	350	660	75	356	525	450	705	100
4"	190	11.50	20.30	16	27.40	170	14.00	23.00	18	30.30	260	17.00	24.60	24*	32.30	340
100		292	515	400	695	77	356	585	450	770	118	432	625	600*	820	154
6"	390	16.00	24.40	18	33.10	295	17.50	27.00	20*	36.00	455	22.00	31.10	28*	40.60	720
150		406	620	450	840	134	445	685	500*	915	206	559	790	700*	1030	327
8"	730	19.50	30.90	20*	40.90	460	22.00	33.10	24*	43.50	730					
200		495	785	500*	1040	209	559	840	600*	1105	331					
10"	1336	24.50	41.90	24*	53.40	640	24.50	46.30	28*	58.10	980					
250		622	1065	600*	1355	290	622	1175	700*	1475	445					
12"	1600	27.50	49.00	28*	61.80	1120	28.00	53.00	30*	66.10	1660					
300		699	1245	700*	1570	508	711	1345	750*	1680	753					
14"	2400	31.00	64.20	30*	78.50	1495	33.00	65.00	36*	79.70	2280					
350		787	1630	750*	1995	678	838	1650	900*	2025	1034					
16"	3200	36.00	70.50	36*	86.20	1935	34.00	71.30	36*	87.40	2975					
400		914	1790	900*	2190	878	864	1810	900*	2220	1349					

Dimensions and weights are approximate

* Valve may require gear operator





BELLOWS SEALED VALVES FIGURE NUMBER SYSTEM

Example of a Typical Valve Figure Number Build-up

1 2 / 3 4 5 6 / 7 / 8
□□ □□□□ □□□□□ □□□

Below is a typical valve figure number build-up
e.g. YC8914/15FB

1 Bellows Material

None - 321 Stainless
Y - 316 Stainless
W - Inconel 600
V - Incoloy 825
T - Inconel 718
U - Hastelloy C-276

Y — 316 STAINLESS

2 Body Material

C - Carbon Steel
K - Low Temperature Carbon Steel
M - Alloy Steel - ASTM A217 WC9 & ASTM A182 F22
S - Stainless Steel - ASTM A351 CF8M & ASTM A182 F316

C — CARBON STEEL

3 Basic Type

4 - Bellows Globe reduced bore
5 - Bellows Globe reduced bore to BS5352 (obsolete)
7 - Bellows Globe
8 - Bellows Gate (reduced bore for forged valves)

8 — BELLOWS GATE

4 Body Type

0 - Vertical design, welded bonnet
2 - Oblique design, welded bonnet
9 - Vertical design, bolted bonnet

9 — VERTICAL DESIGN BOLTED BONNET

5 Pressure Ratings

1 - Class 150 to ASME B16.34
2 - Class 300 to ASME B16.34
4 - Class 600 to ASME B16.34
5 - Class 800 to BS5352 (obsolete)
8 - Class 800 to API602
9 - Class 2500 to ASME B16.34

1 — CLASS 150 TO ASME B16.34

6 Disc and Gland

4 - Full depth conventional gland design
5 - Baffle gland design
6 - PTFE disc insert

4 — FULL DEPTH GLAND DESIGN

7 End Connections

15 - Carbon steel butt weld
16 - Stainless steel butt weld
17 - Alloy steel butt weld
21 - NPT female thread
22 - BSP taper female thread
29 - Flanged - followed by designation e.g. ASME rating
31 - Socket weld

15 — CARBON STEEL BUTT WELD END

8 Suffix

IND - Open and shut indicator
LD - Locking device
NP - Nameplate
FB - Full bore - only used where basic type indicates reduced bore.
IS - Integral seats where non-standard
S - Serrated flange finish 6.3 to 12.5 Ra micrometres (µm)*
BG - Fully enclosed bevel gears

FB — FULL BORE

***Note:** Standard flange finish is 3.2 to 6.3 Ra micrometres (µm)

Important:

The sequence must be followed in the order that it appears down the page, that is:
Bellows Material, Body Material, Basic Type, Body Type, Pressure Rating, Disc and Gland, End Connections and Suffix (where appropriate)

Cast Steel Parallel Slide Gate Valves

- ASME B16.34 Standard and Special Class
- Overall length to ASME B16.10
- Pressure Classes 150, 300 & 600
- Flanged ends to ASME B16.5 or BS EN 1092-1
- BWE connections to ASME B16.25
- Rising stem, outside screw and pillar design
- Stellite faced seats, discs & backseat
- Non-rising handwheel
- Open and shut position indication

Features of the HH Valves Cast Steel Parallel Slide Gate Valve:

- Valve can accommodate large temperature changes without the risk of the body seats gripping the sealing faces of the discs
- The pillar and stem-stop design provides accurate guidance for the valve stem and gives continuous visual position indication from open to closed
- Requires minimum effort to operate and the use of gearboxes or powered actuators are not necessary for normal valve operation
- Opening and closing loads are significantly less than that of an equivalent wedge gate valve.
  This allows a more cost effective electric actuator to be fitted without the requirement of a torque switch during closure
- The seat and disc design creates a wiping action to avoid build up of deposits on the sealing faces
- The stuffing box and valve stem have been designed and manufactured to reduce fugitive emissions from the gland
- Expanded graphite preformed rings maintain an emissions level of 100 ppm
- The design provides easier in-line maintenance since only the seat faces need to be nominally parallel
- The bonnet bolts and nuts are loaded to pre-determined values to ensure a pressure tight body/bonnet seal

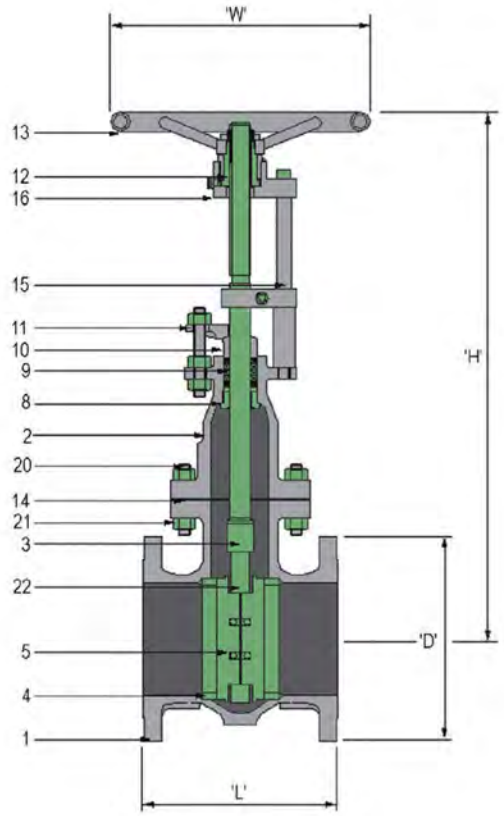
MATERIAL & PARTS SPECIFICATION

Fig. No. 5081 Class 150 Flanged Ends

ASME Class 150 Flanged Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Flange Dia. 'D' (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5081	45	7.00	6.00	15.40	8
50		20	178	152	390	200
2½"	5081	70	7.50	7.00	17.10	8
65		32	191	178	435	200
3"	5081	80	8.00	7.50	19.70	10
80		37	203	191	500	250
4"	5081	115	9.00	9.00	23.00	10
100		52	229	229	585	250
5"	5081	165	10.00	10.00	26.40	12
125		75	254	254	670	300
6"	5081	210	10.50	11.00	30.30	14
150		95	267	279	770	350
8"	5081	315	11.50	13.50	37.20	16
200		143	292	343	945	400
10"	5081	565	13.00	16.00	44.50	18
250		257	330	406	1130	450
12"	5081	705	14.00	19.00	48.50	20
300		320	356	483	1230	500
14"	5081	950	15.00	21.00	53.00	24
350		430	381	533	1345	600
16"	5081	1235	16.00	23.50	59.00	24
400		560	406	597	1500	600
18"	5081	1585	17.00	25.00	66.00	24
450		720	432	635	1675	600
20"	5081	2030	18.00	27.50	74.00	28
500		920	457	699	1880	700
24"	5081	2820	20.00	32.00	86.00	30*
600		1280	508	813	2185	750*

* Valve may require gear operator



Materials of Construction

Part No	Part Description	Fig. No. 5081 Carbon Steel Specification	Fig. No. L5081 or R5081 Carbon-Alloy Steel Specification
1	Body	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
2	Bonnet	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
3	Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 410
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F11 or F22 - Hardfaced
5	Disc	ASTM A216 Gr. WCB Hardfaced	ASTM A217 Gr. WC6 or WC9 - Hardfaced
8	Backseat Bush	ASTM A276 Gr. 410 Hardfaced	ASTM A276 Gr. 410 Hardfaced
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
10	Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 410
11	Gland Flange	ASTM A105	ASTM A217 Gr. WC6 or WC9
12	Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
14	Body/Bonnet Gasket	Stainless Steel Reinforced Tanged Graphite	
15	Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7
16	Bridge	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB
20	Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B7 or B16
21	Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 2H or Gr. 4
22	Belt Eye	ASTM A105 or equivalent	ASTM A182 Gr. F11 or F22 or equivalent

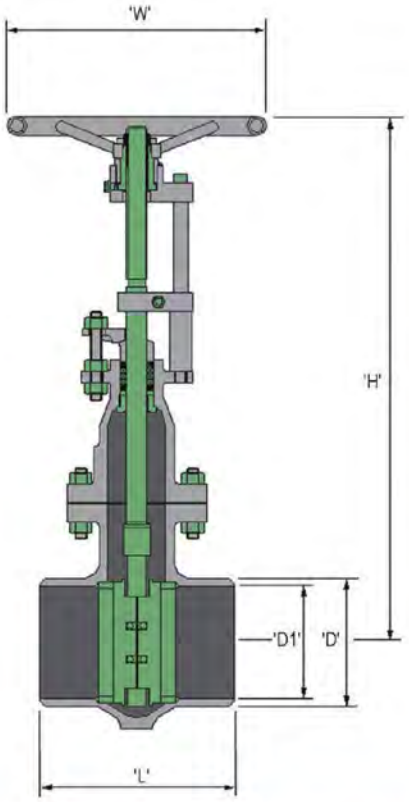
† 0.25% Carbon (maximum)

Hardfacing is Stellite or equivalent

Hydrostatic Test Pressures

Body Material	Class 150 psi	bar
ASTM A216 Gr. WCB		
Shell	450	30.0
Seat	314	21.6
ASTM A217 Gr. WC6		
Shell	450	30.0
Seat	319	21.8
ASTM A217 Gr. WC9		
Shell	450	30.0
Seat	319	21.8

Fig. No. 5091 Class 150 Butt-Weld Ends



ASME Class 150 Butt Weld Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Weld Prep. Dia 'D' (inch) (mm)	Pipe Bore 'D1' Sch 40 (inch) (mm)	Pipe Bore 'D1' Sch 80 (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5091	40	8.50	2.44	2.07	1.94	15.40	8
50		18	216	62	52.5	49.2	390	200
2½"	5091	60	9.50	2.96	2.47	2.32	17.10	8
65		27	241	75	62.5	59	435	200
3"	5091	70	11.12	3.59	3.07	2.90	19.70	10
80		32	282	91	78	73.5	500	250
4"	5091	95	12.00	4.62	4.03	3.83	23.00	10
100		43	305	117	102	97	585	250
5"	5091	130	15.00	5.69	5.05	4.81	26.40	12
125		60	381	144	128	122	670	300
6"	5091	165	15.88	6.78	6.07	5.76	30.30	14
150		75	403	172	154	146.5	770	350
8"	5091	240	16.50	8.78	7.98	7.63	37.20	16
200		110	419	223	203	193.5	945	400
10"	5091	450	18.00	10.94	10.02	9.56	44.50	18
250		205	457	278	254.5	243	1130	450
12"	5091	586	19.75	12.97	11.94	11.37	48.50	20
300		265	502	329	303	289	1230	500
14"	5091	815	22.50	14.25	13.12	12.50	53.00	24
350		370	572	362	333.5	317.5	1345	600
16"	5091	1070	24.00	16.25	15.00	14.31	59.00	24
400		485	610	413	381	363.5	1500	600
18"	5091	1390	26.00	18.28	16.88	16.12	66.00	24
450		630	660	464	428.5	409.5	1675	600
20"	5091	1795	28.00	20.31	18.81	17.94	74.00	28
500		815	711	516	478	455.5	1880	700
24"	5091	2535	32.00	24.38	22.62	21.56	86.00	30*
600		1150	813	619	574.5	547.5	2185	750*

* Valve may require gear operator

ASME B16.34 Standard Class and Special Class Pressure/Temperature Ratings

Class 150 Metric Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-29 to 38	Working Pressure in barg Temperature in °C 50	100	150	200	250	300	325	350	375	400	425	450	475	500	538	550	575	595
5081	Flanged	A216 WCB	Standard	19.6	19.2	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6*	-	-	-	-	-	-
5091	BWE	A216 WCB	Standard	19.6	19.2	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6*	-	-	-	-	-	-
5091-SPL	BWE	A216 WCB	Special	19.8	19.8	19.8	19.6	19.4	19.4	19.4	19.2	18.7	18.1	16.6	13.8	11.0*	-	-	-	-	-	-
L5081	Flanged	A217 WC6	Standard	19.8	19.5	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6	3.7	2.8	1.4	-	-	-
L5091	BWE	A217 WC6	Standard	19.8	19.5	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6	3.7	2.8	1.4	1.4	1.4	1.4
L5091-SPL	BWE	A217 WC6	Special	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.3	19.3	19.0	18.1	16.4	12.3	7.1	6.1	4.2	3.2
R5081	Flanged	A217 WC9	Standard	19.8	19.5	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6	3.7	2.8	1.4	-	-	-
R5091	BWE	A217 WC9	Standard	19.8	19.5	17.7	15.8	13.8	12.1	10.2	9.3	8.4	7.4	6.5	5.5	4.6	3.7	2.8	1.4	1.4	1.4	1.4
R5091-SPL	BWE	A217 WC9	Special	19.8	19.8	19.8	19.5	19.3	19.2	19.1	19.0	18.9	18.7	18.7	18.7	18.1	16.4	13.7	8.8	7.5	5.0	3.6

Class 150 Imperial Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-20 to 100	Working Pressure in psig Temperature in °F 200	300	400	500	600	650	700	750	800	850	900	950	1000	1025	1050	1075	1100
5081	Flanged	A216 WCB	Standard	285	260	230	200	170	140	125	110	95	80	65*	-	-	-	-	-	-	-
5091	BWE	A216 WCB	Standard	285	260	230	200	170	140	125	110	95	80	65*	-	-	-	-	-	-	-
5091-SPL	BWE	A216 WCB	Special	290	290	285	280	280	280	275	265	245	195	155*	-	-	-	-	-	-	-
L5081	Flanged	A217 WC6	Standard	290	260	230	200	170	140	125	110	95	80	65	50	35	27	20	-	-	-
L5091	BWE	A217 WC6	Standard	290	260	230	200	170	140	125	110	95	80	65	50	35	27	20	20	20	20
L5091-SPL	BWE	A217 WC6	Special	290	290	290	290	290	290	290	280	280	275	260	225	155	130	105	87	70	57	45
R5081	Flanged	A217 WC9	Standard	290	260	230	200	170	140	125	110	95	80	65	50	35	27	20	-	-	-	-
R5091	BWE	A217 WC9	Standard	290	260	230	200	170	140	125	110	95	80	65	50	35	27	20	20	20	20	20
R5091-SPL	BWE	A217 WC9	Special	290	290	285	280	280	275	275	270	270	270	260	230	180	155	130	107	85	70	55

* Use of WCB material is permissible but not recommended for prolonged use above 800°F (425°C)
WC6 & WC9 materials are not to be used above 1100°F (595°C)

Flanged end ratings terminate at 1000°F (538°C)
For intermediate ratings use linear interpolation

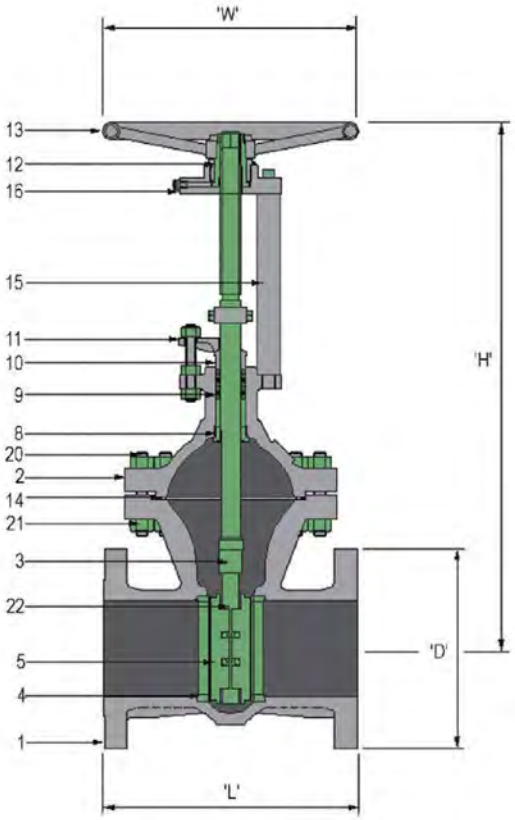
MATERIAL & PARTS SPECIFICATION

Fig. No. 5082 Class 300 Flanged Ends

ASME Class 300 Flanged Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Flange Dia. 'D' (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5082	60	8.50	6.50	17.10	8
50		27	216	165	435	200
2½"	5082	90	9.50	7.50	19.10	8
65		41	241	191	485	200
3"	5082	120	11.12	8.25	22.00	10
80		54	282	210	560	250
4"	5082	190	12.00	10.00	26.00	12
100		86	305	254	660	300
5"	5082	285	15.00	11.00	30.00	14
125		129	381	279	760	350
6"	5082	355	15.88	12.50	33.10	16
150		161	403	318	840	400
8"	5082	585	16.50	15.00	39.40	18
200		265	419	381	1000	450
10"	5082	850	18.00	17.50	44.90	20
250		385	457	445	1140	500
12"	5082	1190	19.75	20.50	49.20	24
300		540	502	521	1250	600
14"	5082	1930	30.00	23.00	54.00	24
350		875	762	584	1370	600
16"	5082	2470	33.00	25.50	62.00	30*
400		1120	838	648	1580	750*
18"	5082	3000	36.00	28.00	69.00	36*
450		1360	914	711	1740	900*
20"	5082	3860	39.00	30.50	78.00	36*
500		1750	991	775	1970	900*
24"	5082	5510	45.00	36.00	91.00	36*
600		2500	1143	914	2310	900*

* Valve may require gear operator



Materials of Construction

Part No	Part Description	Fig. No. 5082 Carbon Steel Specification	Fig. No. L5082 or R5082 Carbon-Alloy Steel Specification
1	Body	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
2	Bonnet	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
3	Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 410
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F11 or F22 - Hardfaced
5	Disc	ASTM A216 Gr. WCB Hardfaced	ASTM A217 Gr. WC6 or WC9 - Hardfaced
8	Backseat Bush	ASTM A276 Gr. 410 Hardfaced	ASTM A276 Gr. 410 Hardfaced
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
10	Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 410
11	Gland Flange	ASTM A105	ASTM A217 Gr. WC6 or WC9
12	Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
14	Body/Bonnet Gasket	Stainless Steel Graphite Filled Spiral Wound	
15	Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7
16	Bridge	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB
20	Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B7 or B16
21	Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 2H or Gr. 4
22	Belt Eye	ASTM A105 or equivalent	ASTM A182 Gr. F11 or F22 or equivalent

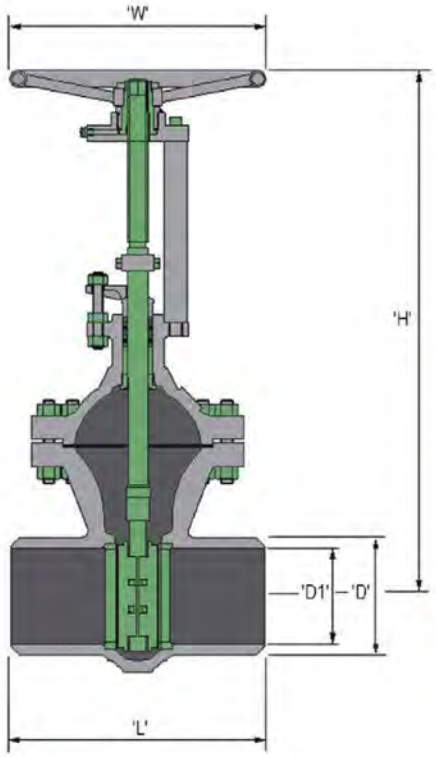
† 0.25% Carbon (maximum)

Hardfacing is Stellite or equivalent

Hydrostatic Test Pressures

Body Material	Class 300 psi	bar
ASTM A216 Gr. WCB		
Shell	1125	77.0
Seat	814	56.3
ASTM A217 Gr. WC6		
Shell	1125	78.0
Seat	825	56.9
ASTM A217 Gr. WC9		
Shell	1125	78.0
Seat	825	56.9

Fig. No. 5092 Class 300 Butt-Weld Ends



ASME Class 300 Butt Weld Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Weld Prep. Dia 'D' (inch) (mm)	Pipe Bore 'D1' Sch 40 (inch) (mm)	Pipe Bore 'D1' Sch 80 (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5092	55	8.50	2.44	2.07	1.94	17.10	8
50		25	216	62	52.5	49.2	435	200
2½"	5092	80	9.50	2.96	2.47	2.32	19.10	8
65		36	241	75	62.5	59	485	200
3"	5092	100	11.12	3.59	3.07	2.90	22.00	10
80		45	282	91	78	73.5	560	250
4"	5092	160	12.00	4.62	4.03	3.83	26.00	12
100		72	305	117	102	97	660	300
5"	5092	240	15.00	5.69	5.05	4.81	30.00	14
125		109	381	144	128	122	760	350
6"	5092	305	15.88	6.78	6.07	5.76	33.10	16
150		139	403	172	154	146.5	840	400
8"	5092	490	16.50	8.78	7.98	7.63	39.40	18
200		222	419	223	203	193.5	1000	450
10"	5092	730	18.00	10.94	10.02	9.56	44.90	20
250		330	457	278	254.5	243	1140	500
12"	5092	1035	19.75	12.97	11.94	11.37	49.20	24
300		470	502	329	303	289	1250	600
14"	5092	1740	30.00	14.25	13.12	12.50	54.00	24
350		790	762	362	333.5	317.5	1370	600
16"	5092	2260	33.00	16.25	15.00	14.31	62.00	30*
400		1025	838	413	381	363.5	1580	750*
18"	5092	2780	36.00	18.28	16.88	16.12	69.00	36*
450		1260	914	464	428.5	409.5	1740	900*
20"	5092	3595	39.00	20.31	18.81	17.94	78.00	36*
500		1630	991	516	478	455.5	1970	900*
24"	5092	5180	45.00	24.38	22.62	21.56	91.00	36*
600		2350	1143	619	574.5	547.5	2310	900*

* Valve may require gear operator

ASME B16.34 Standard Class and Special Class Pressure/Temperature Ratings

Class 300 Metric Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	538	550	575	595
				Working Pressure in barg Temperature in °C																		
5082	Flanged	A216 WCB	Standard	51.1	50.1	46.6	45.1	43.8	41.9	39.8	38.7	37.6	36.4	34.7	28.8	23.0*	-	-	-	-	-	-
5092	BWE	A216 WCB	Standard	51.1	50.1	46.6	45.1	43.8	41.9	39.8	38.7	37.6	36.4	34.7	28.8	23.0*	-	-	-	-	-	-
5092-SPL	BWE	A216 WCB	Special	51.7	51.7	51.6	51.0	50.6	50.5	50.5	50.1	48.9	47.1	43.4	36.0	28.8*	-	-	-	-	-	-
L5082	Flanged	A217 WC6	Standard	51.7	51.7	51.5	49.7	48.0	46.3	42.9	41.4	40.3	38.9	36.5	35.2	33.7	31.7	25.7	14.9	-	-	-
L5092	BWE	A217 WC6	Standard	51.7	51.7	51.5	49.7	48.0	46.3	42.9	41.4	40.3	38.9	36.5	35.2	33.7	31.7	25.7	14.9	12.7	8.8	6.6
L5092-SPL	BWE	A217 WC6	Special	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.7	51.5	50.6	50.3	49.6	47.3	42.8	32.2	18.6	15.9	11.0	8.3
R5082	Flanged	A217 WC9	Standard	51.7	51.7	51.5	50.3	48.6	46.3	42.9	41.4	40.3	38.9	36.5	35.2	33.7	31.7	28.2	18.4	-	-	-
R5092	BWE	A217 WC9	Standard	51.7	51.7	51.5	50.3	48.6	46.3	42.9	41.4	40.3	38.9	36.5	35.2	33.7	31.7	28.2	18.4	15.6	10.5	7.6
R5092-SPL	BWE	A217 WC9	Special	51.7	51.7	51.6	51.0	50.2	50.0	49.8	49.6	49.2	48.8	48.8	48.8	47.3	42.8	35.6	23.0	19.5	13.2	9.5

Class 300 Imperial Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	975	1000	1025	1050	1075	1100
				Working Pressure in psig Temperature in °F																		
5082	Flanged	A216 WCB	Standard	740	680	655	635	605	570	550	530	505	410	320*	-	-	-	-	-	-	-	-
5092	BWE	A216 WCB	Standard	740	680	655	635	605	570	550	530	505	410	320*	-	-	-	-	-	-	-	-
5092-SPL	BWE	A216 WCB	Special	750	750	740	735	735	735	715	690	635	515	400*	-	-	-	-	-	-	-	-
L5082	Flanged	A217 WC6	Standard	750	750	720	695	665	605	590	570	530	510	485	450	320	267	215	-	-	-	-
L5092	BWE	A217 WC6	Standard	750	750	720	695	665	605	590	570	530	510	485	450	320	267	215	180	145	120	95
L5092-SPL	BWE	A217 WC6	Special	750	750	750	750	750	750	750	735	730	720	680	585	400	335	270	225	180	150	120
R5082	Flanged	A217 WC9	Standard	750	750	730	705	665	605	590	570	530	510	485	450	385	325	265	-	-	-	-
R5092	BWE	A217 WC9	Standard	750	750	730	705	665	605	590	570	530	510	485	450	385	325	265	220	175	142	110
R5092-SPL	BWE	A217 WC9	Special	750	750	740	730	725	720	715	705	705	705	680	600	470	402	335	277	220	177	135

* Use of WCB material is permissible but not recommended for prolonged use above 800°F (425°C)
WC6 & WC9 materials are not to be used above 1100°F (595°C)

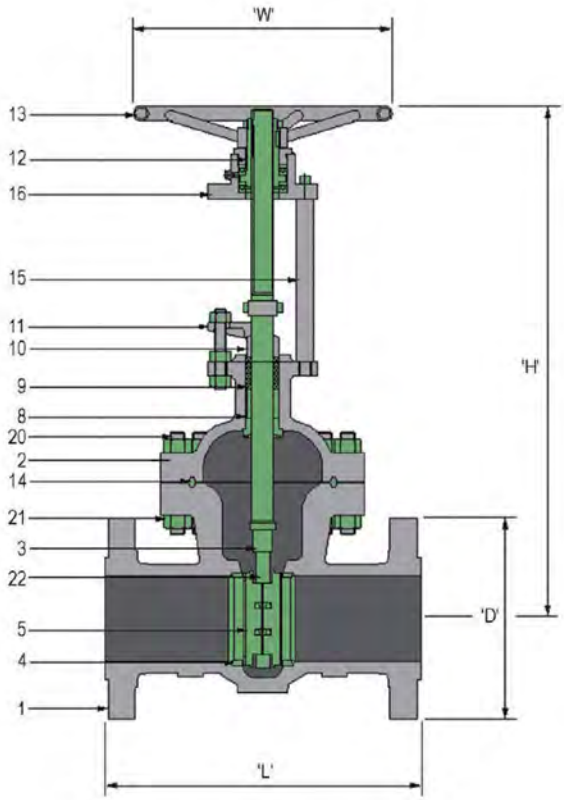
Flanged end ratings terminate at 1000°F (538°C)
For intermediate ratings use linear interpolation

Fig. No. 5084 Class 600 Flanged Ends

ASME Class 600 Flanged Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Flange Dia. 'D' (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5084	80	11.50	6.50	17.30	10
50		37	292	165	440	250
2½"	5084	145	13.00	7.50	19.10	12
65		66	330	191	485	300
3"	5084	180	14.00	8.25	22.20	12
80		82	356	210	565	300
4"	5084	280	17.00	10.75	26.80	14
100		127	432	273	680	350
5"	5084	440	20.00	13.00	31.90	18
125		200	508	330	810	450
6"	5084	580	22.00	14.00	36.60	20
150		263	559	356	930	500
8"	5084	960	26.00	16.50	42.10	24
200		435	660	419	1070	600
10"	5084	1435	31.00	20.00	51.00	28
250		650	787	508	1295	700
12"	5084	2225	33.00	22.00	54.00	30
300		1010	838	559	1370	750
14"	5084	3420	35.00	23.75	59.00	36*
350		1550	889	603	1500	900*
16"	5084	4365	39.00	27.00	70.00	36*
400		1980	991	686	1780	900*
18"	5084	5315	43.00	29.25	83.00	36*
450		2410	1092	743	2110	900*
20"	5084	6835	47.00	32.00	94.00	36*
500		3100	1194	813	2390	900*
24"	5084	9480	55.00	37.00	110.00	36*
600		4300	1397	940	2800	900*

* Valve may require gear operator



Materials of Construction

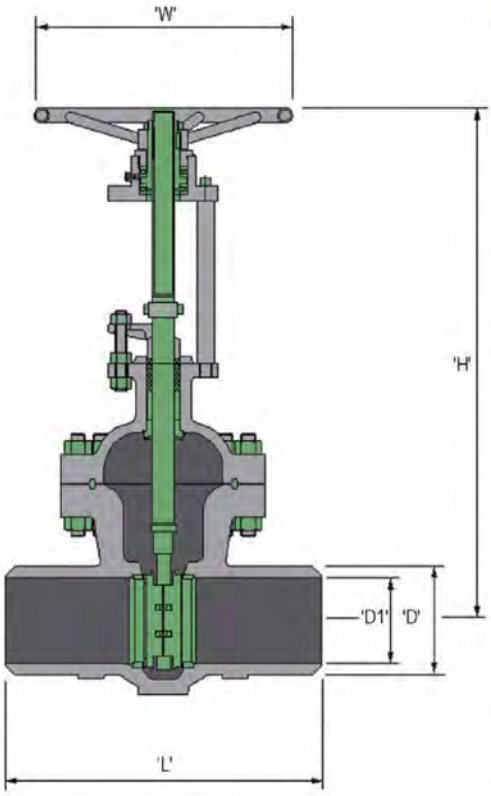
Part No	Part Description	Fig. No. 5084 Carbon Steel Specification	Fig. No. L5084 or R5084 Carbon-Alloy Steel Specification
1	Body	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
2	Bonnet	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC6 or WC9
3	Stem	ASTM A276 Gr. 410	ASTM A276 Gr. 410
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F11 or F22 - Hardfaced
5	Disc	ASTM A216 Gr. WCB Hardfaced	ASTM A217 Gr. WC6 or WC9 - Hardfaced
8	Backseat Bush	ASTM A276 Gr. 410 Hardfaced	ASTM A276 Gr. 410 Hardfaced
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom	
10	Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 410
11	Gland Flange	ASTM A105	ASTM A217 Gr. WC6 or WC9
12	Yoke Sleeve	ASTM A439 Gr. D2	ASTM A439 Gr. D2
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel
14	Body/Bonnet Gasket	Soft Iron Ring Joint	Stainless Steel Ring Joint
15	Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7
16	Bridge	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB
20	Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B7 or B16
21	Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 2H or Gr. 4
22	Belt Eye	ASTM A105 or equivalent	ASTM A182 Gr. F11 or F22 or equivalent

† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent

Hydrostatic Test Pressures

Body Material	Class 600 psi	bar
ASTM A216 Gr. WCB		
Shell	2225	154.0
Seat	1628	112.4
ASTM A217 Gr. WC6		
Shell	2250	156.0
Seat	1650	113.8
ASTM A217 Gr. WC9		
Shell	2250	156.0
Seat	1650	113.8

Fig. No. 5094 Class 600 Butt-Weld Ends



ASME Class 600 Butt Weld Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Weld Prep. Dia 'D' (inch) (mm)	Pipe Bore 'D1' Sch 80 (inch) (mm)	Pipe Bore 'D1' Sch 160 (inch) (mm)	Height 'H' (closed) (inch) (mm)	H/W Dia. 'W' (inch) (mm)
2"	5094	75	11.50	2.44	1.94	1.69	17.30	10
50		34	292	62	49.2	42.8	440	250
2½"	5094	130	13.00	2.96	2.32	2.13	19.10	12
65		59	330	75	59	54	485	300
3"	5094	155	14.00	3.59	2.90	2.62	22.20	12
80		70	356	91	73.5	66.5	565	300
4"	5094	245	17.00	4.62	3.83	3.44	26.80	14
100		111	432	117	97	87.5	680	350
5"	5094	390	20.00	5.69	4.81	4.31	31.90	18
125		177	508	144	122	109.5	810	450
6"	5094	495	22.00	6.78	5.76	5.19	36.60	20
150		225	559	172	146.5	132	930	500
8"	5094	850	26.00	8.78	7.63	6.81	42.10	24
200		385	660	223	193.5	173	1070	600
10"	5094	1300	31.00	10.94	9.56	8.50	51.00	28
250		590	787	278	243	216	1295	700
12"	5094	2060	33.00	12.97	11.37	10.13	54.00	30
300		935	838	329	289	257	1370	750
14"	5094	3220	35.00	14.25	12.50	11.19	59.00	36*
350		1460	889	362	317.5	284	1500	900*
16"	5094	4135	39.00	16.25	14.31	12.81	70.00	36*
400		1875	991	413	363.5	325.5	1780	900*
18"	5094	5060	43.00	18.28	16.12	14.44	83.00	36*
450		2295	1092	464	409.5	366.5	2110	900*
20"	5094	6500	47.00	20.31	17.94	16.06	94.00	36*
500		2950	1194	516	455.5	408	2390	900*
24"	5094	9060	55.00	24.38	21.56	19.31	110.00	36*
600		4110	1397	619	547.5	490.5	2800	900*

* Valve may require gear operator

ASME B16.34 Standard Class and Special Class Pressure/Temperature Ratings

Class 600 Metric Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	538	550	575	595
				Working Pressure in barg Temperature in °C																		
5084	Flanged	A216 WCB	Standard	102.1	100.2	93.2	90.2	87.6	83.9	79.6	77.4	75.1	72.7	69.4	57.5	46.0*	-	-	-	-	-	-
5094	BWE	A216 WCB	Standard	102.1	100.2	93.2	90.2	87.6	83.9	79.6	77.4	75.1	72.7	69.4	57.5	46.0*	-	-	-	-	-	-
5094-SPL	BWE	A216 WCB	Special	103.4	103.4	103.3	102.1	101.1	101.1	101.1	100.2	97.8	94.2	86.8	71.9	57.5*	-	-	-	-	-	-
L5084	Flanged	A217 WC6	Standard	103.4	103.4	103.0	99.5	95.9	92.7	85.7	82.6	80.4	77.6	73.3	70.0	67.7	63.4	51.5	29.8	-	-	-
L5094	BWE	A217 WC6	Standard	103.4	103.4	103.0	99.5	95.9	92.7	85.7	82.6	80.4	77.6	73.3	70.0	67.7	63.4	51.5	29.8	25.4	17.6	13.3
L5094-SPL	BWE	A217 WC6	Special	103.4	103.4	103.4	103.4	103.4	103.4	103.4	103.4	102.8	101.0	100.6	99.3	94.4	85.5	64.3	37.2	31.8	22.0	16.6
R5084	Flanged	A217 WC9	Standard	103.4	103.4	103.0	100.3	97.2	92.7	85.7	82.6	80.4	77.6	73.3	70.0	67.7	63.4	56.5	36.9	-	-	-
R5094	BWE	A217 WC9	Standard	103.4	103.4	103.0	100.3	97.2	92.7	85.7	82.6	80.4	77.6	73.3	70.0	67.7	63.4	56.5	36.9	31.3	21.1	15.3
R5094-SPL	BWE	A217 WC9	Special	103.4	103.4	103.2	101.9	100.4	100.0	99.6	99.2	98.4	97.5	97.5	97.5	94.4	85.5	71.5	46.1	39.1	26.3	19.0

Class 600 Imperial Units

Fig. No.	End Conn.	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	975	1000	1025	1050	1075	1100
				Working Pressure in psig Temperature in °F																		
5084	Flanged	A216 WCB	Standard	1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640*	-	-	-	-	-	-	-	-
5094	BWE	A216 WCB	Standard	1480	1360	1310	1265	1205	1135	1100	1060	1015	825	640*	-	-	-	-	-	-	-	-
5094-SPL	BWE	A216 WCB	Special	1500	1500	1480	1465	1465	1465	1430	1380	1270	1030	795*	-	-	-	-	-	-	-	-
L5084	Flanged	A217 WC6	Standard	1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	535	430	-	-	-	-
L5094	BWE	A217 WC6	Standard	1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	535	430	360	290	240	190
L5094-SPL	BWE	A217 WC6	Special	1500	1500	1500	1500	1500	1500	1500	1465	1460	1440	1355	1175	795	667	540	450	360	300	240
R5084	Flanged	A217 WC9	Standard	1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	645	535	-	-	-	-
R5094	BWE	A217 WC9	Standard	1500	1500	1455	1410	1330	1210	1175	1135	1065	1015	975	900	755	645	535	442	350	285	220
R5094-SPL	BWE	A217 WC9	Special	1500	1500	1480	1455	1450	1440	1430	1415	1415	1415	1355	1200	945	807	670	552	435	355	275

* Use of WCB material is permissible but not recommended for prolonged use above 800°F (425°C)
WC6 & WC9 materials are not to be used above 1100°F (595°C)

Flanged end ratings terminate at 1000°F (538°C)
For intermediate ratings use linear interpolation

Flange Dimensions (metric) ASME B16.5 & EN ISO 1092-1 Rating

ASME Class 150 Design Valves

Nom. Size (inch)	(mm)	Fig. No.	Face-to-Face Length 'L' (mm)	Flange Diameter 'D' (mm) B16.5	PN10	PN16	Min. Flange Thickness (mm) B16.5	PN10	PN16	Bolt Circle Diameter (mm) B16.5	PN10	PN16	No. x Dia. of Bolt Holes (no x dia. in mm) B16.5	PN10	PN16	Raised Face Dia. x Height (mm x mm) B16.5	PN10	PN16
2"	50	5081	178	152	165	165	16	18	18	121	125	125	4 x 19	4 x 18	4 x 18	92 x 1.6	102 x 2	102 x 2
2½"	65	5081	191	178	185	185	18	18	18	140	145	145	4 x 19	8 x 18*	8 x 18*	105 x 1.6	122 x 2	122 x 2
3"	80	5081	203	191	200	200	19	20	20	152	160	160	4 x 19	8 x 18	8 x 18	127 x 1.6	138 x 2	138 x 2
4"	100	5081	229	229	220	220	24	20	20	191	180	180	8 x 19	8 x 18	8 x 18	157 x 1.6	158 x 2	158 x 2
5"	125	5081	254	254	250	250	24	22	22	216	210	210	8 x 22	8 x 18	8 x 18	186 x 1.6	188 x 2	188 x 2
6"	150	5081	267	279	285	285	25	22	22	241	240	240	8 x 22	8 x 22	8 x 22	216 x 1.6	212 x 2	212 x 2
8"	200	5081	292	343	340	340	29	24	24	298	295	295	8 x 22	8 x 22	12 x 22	270 x 1.6	268 x 2	268 x 2
10"	250	5081	330	406	395	405	30	26	26	362	350	355	12 x 25	12 x 22	12 x 26	324 x 1.6	320 x 2	320 x 2
12"	300	5081	356	483	445	460	32	26	28	432	400	410	12 x 25	12 x 22	12 x 26	381 x 1.6	370 x 2	378 x 2
14"	350	5081	381	533	505	520	35	26	30	476	460	470	12 x 29	16 x 22	16 x 26	413 x 1.6	430 x 2	438 x 2
16"	400	5081	406	597	565	580	37	26	32	540	515	525	16 x 29	16 x 26	16 x 30	470 x 1.6	482 x 2	490 x 2
18"	450	5081	432	635	615	640	40	28	40	578	565	585	16 x 32	20 x 26	20 x 30	533 x 1.6	532 x 2	550 x 2
20"	500	5081	457	699	670	715	43	28	44	635	620	650	20 x 32	20 x 26	20 x 33	584 x 1.6	585 x 2	610 x 2
24"	600	5081	508	813	780	840	48	34	54	749	725	770	20 x 35	20 x 30	20 x 36	692 x 1.6	685 x 2	725 x 2

ASME Class 300 Design Valves

Nom. Size (inch)	(mm)	Fig. No.	Face-to-Face Length 'L' (mm)	Flange Diameter 'D' (mm) B16.5	PN25	PN40	Min. Flange Thickness (mm) B16.5	PN25	PN40	Bolt Circle Diameter (mm) B16.5	PN25	PN40	No. x Dia. of Bolt Holes (no x dia. in mm) B16.5	PN25	PN40	Raised Face Dia. x Height (mm x mm) B16.5	PN25	PN40
2"	50	5082	216	165	165	165	22	20	20	127	125	125	8 x 19	4 x 18	4 x 18	92 x 1.6	102 x 2	102 x 2
2½"	65	5082	241	191	185	185	25	22	22	149	145	145	8 x 22	8 x 18	8 x 18	105 x 1.6	122 x 2	122 x 2
3"	80	5082	282	210	200	200	29	24	24	168	160	160	8 x 22	8 x 18	8 x 18	127 x 1.6	138 x 2	138 x 2
4"	100	5082	305	254	235	235	32	24	24	200	190	190	8 x 22	8 x 22	8 x 22	157 x 1.6	162 x 2	162 x 2
5"	125	5082	381	279	270	270	35	26	26	235	220	220	8 x 22	8 x 26	8 x 26	186 x 1.6	188 x 2	188 x 2
6"	150	5082	403	318	300	300	37	28	28	270	250	250	12 x 22	8 x 26	8 x 26	216 x 1.6	218 x 2	218 x 2
8"	200	5082	419	381	360	375	41	30	34	330	310	320	12 x 25	12 x 26	12 x 30	270 x 1.6	278 x 2	285 x 2
10"	250	5082	457	445	425	450	48	32	38	387	370	385	16 x 29	12 x 30	12 x 33	324 x 1.6	335 x 2	345 x 2
12"	300	5082	502	521	485	515	51	34	42	451	430	450	16 x 32	16 x 30	16 x 33	381 x 1.6	395 x 2	410 x 2
14"	350	5082	762	584	555	580	54	38	46	514	490	510	20 x 32	16 x 33	16 x 36	413 x 1.6	450 x 2	465 x 2
16"	400	5082	838	648	620	660	57	40	50	572	550	585	20 x 35	16 x 36	16 x 39	470 x 1.6	505 x 2	535 x 2
18"	450	5082	914	711	670	685	60	46	57	629	600	610	24 x 35	20 x 36	20 x 39	533 x 1.6	555 x 2	560 x 2
20"	500	5082	991	775	730	755	64	48	57	686	660	670	24 x 35	20 x 36	20 x 42	584 x 1.6	615 x 2	615 x 2
24"	600	5082	1143	914	845	890	70	58	72	813	770	795	24 x 41	20 x 39	20 x 48	692 x 1.6	720 x 2	735 x 2

ASME Class 600 Design Valves

Nom. Size (inch)	(mm)	Fig. No.	Face-to-Face Length 'L' (mm)	Flange Diameter 'D' (mm) B16.5	PN63	PN100	Min. Flange Thickness (mm) B16.5	PN63	PN100	Bolt Circle Diameter (mm) B16.5	PN63	PN100	No. x Dia. of Bolt Holes (no x dia. in mm) B16.5	PN63	PN100	Raised Face Dia. x Height (mm x mm) B16.5	PN63	PN100
2"	50	5084	292	165	180	195	25	26	30	127	135	145	8 x 19	4 x 22	4 x 26	92 x 6.35	102 x 2	102 x 2
2½"	65	5084	330	191	205	220	29	26	34	149	160	170	8 x 22	8 x 22	8 x 26	105 x 6.35	122 x 2	122 x 2
3"	80	5084	356	210	215	230	32	28	36	168	170	180	8 x 22	8 x 22	8 x 26	127 x 6.35	138 x 2	138 x 2
4"	100	5084	432	273	250	265	38	30	40	216	200	210	8 x 25	8 x 26	8 x 30	157 x 6.35	162 x 2	162 x 2
5"	125	5084	508	330	295	315	44	34	40	267	240	250	8 x 29	8 x 30	8 x 33	186 x 6.35	188 x 2	188 x 2
6"	150	5084	559	356	345	355	48	36	44	292	280	290	12 x 29	8 x 33	12 x 33	216 x 6.35	218 x 2	218 x 2
8"	200	5084	660	419	415	430	56	42	52	349	345	360	12 x 32	12 x 36	12 x 36	270 x 6.35	285 x 2	285 x 2
10"	250	5084	787	508	470	505	64	46	60	432	400	430	16 x 35	12 x 36	12 x 39	324 x 6.35	345 x 2	345 x 2
12"	300	5084	838	559	530	585	67	52	68	489	460	500	20 x 35	16 x 36	16 x 42	381 x 6.35	410 x 2	410 x 2
14"	350	5084	889	603	600	655	70	56	74	527	525	560	20 x 38	16 x 39	16 x 48	413 x 6.35	465 x 2	465 x 2
16"	400	5084	991	686	670	715	76	60	78	603	585	620	20 x 41	16 x 42	16 x 48	470 x 6.35	535 x 2	535 x 2
18"	450	5084	1092	743			83			654			20 x 44			533 x 6.35	560 x 2	560 x 2
20"	500	5084	1194	813	800	870	89	68	94	724	705	760	24 x 44	20 x 48	20 x 56	584 x 6.35	615 x 2	615 x 2
24"	600	5084	1397	940	930		102	76		838	820		24 x 51	20 x 56		692 x 6.35	735 x 2	

* Subject to agreement between manufacturer and purchaser. Valve can be supplied with 4 holes instead of 8 holes
Flange thickness dimensions include the raised face height for ASME B16.5 Class 150 and Class 300 valves and all EN ISO 1092-1 valves
Face-to-face dimensions are in accordance with ASME B16.10 for both ASME B16.5 and EN ISO 1092-1 flanged valves
ASME B16.5 flange dimensions are direct conversions from imperial dimensions and rounded off to the nearest millimetre

Flange Dimensions for ASME B16.5

ASME Class 150 - 1/16" Raised Face

Nominal Size	Flange Diameter	Min. Flange Thickness	Bolt Circle Diameter	Bolt Hole Diameter	No. of Bolts	Diameter of Bolts	Raised Face Diameter
2"	6.00	0.62	4.75	3/4	4	5/8	3.62
2½"	7.00	0.69	5.50	3/4	4	5/8	4.12
3"	7.50	0.75	6.00	3/4	4	5/8	5.00
4"	9.00	0.94	7.50	3/4	8	5/8	6.19
5"	10.00	0.94	8.50	7/8	8	3/4	7.31
6"	11.00	1.00	9.50	7/8	8	3/4	8.50
8"	13.50	1.12	11.75	7/8	8	3/4	10.62
10"	16.00	1.19	14.25	1	12	7/8	12.75
12"	19.00	1.25	17.00	1	12	7/8	15.00
14"	21.00	1.38	18.75	1 1/8	12	1	16.25
16"	23.50	1.44	21.25	1 1/8	16	1	18.50
18"	25.00	1.56	22.75	1 1/4	16	1 1/8	21.00
20"	27.50	1.69	25.00	1 1/4	20	1 1/8	23.00
24"	32.00	1.88	29.50	1 3/8	20	1 1/4	27.25

ASME Class 300 - 1/16" Raised Face

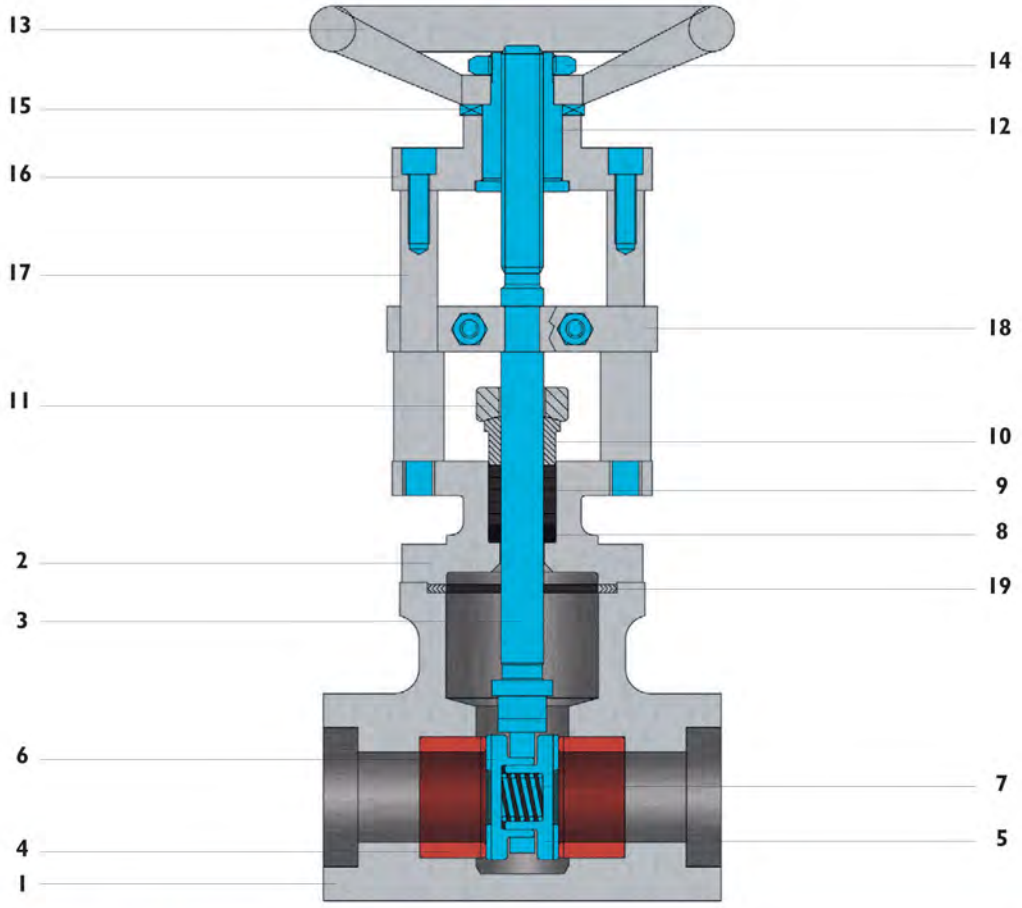
Nominal Size	Flange Diameter	Min. Flange Thickness	Bolt Circle Diameter	Bolt Hole Diameter	No. of Bolts	Diameter of Bolts	Raised Face Diameter
2"	6.50	0.88	5.00	3/4	8	5/8	3.62
2½"	7.50	1.00	5.88	7/8	8	3/4	4.12
3"	8.25	1.12	6.62	7/8	8	3/4	5.00
4"	10.00	1.25	7.88	7/8	8	3/4	6.19
5"	11.00	1.38	9.25	7/8	8	3/4	7.31
6"	12.50	1.44	10.62	7/8	12	3/4	8.50
8"	15.00	1.62	13.00	1	12	7/8	10.62
10"	17.50	1.88	15.25	1 1/8	16	1	12.75
12"	20.50	2.00	17.75	1 1/4	16	1 1/8	15.00
14"	23.00	2.12	20.25	1 1/4	20	1 1/8	16.25
16"	25.50	2.25	22.50	1 3/8	20	1 1/4	18.50
18"	28.00	2.38	24.75	1 3/8	24	1 1/4	21.00
20"	30.50	2.50	27.00	1 3/8	24	1 1/4	23.00
24"	36.00	2.75	32.00	1 5/8	24	1 1/2	27.25

ASME Class 600 - 1/4" Raised Face

Nominal Size	Flange Diameter	Min. Flange Thickness	Bolt Circle Diameter	Bolt Hole Diameter	No. of Bolts	Diameter of Bolts	Raised Face Diameter
2"	6.50	1.00	5.00	3/4	8	5/8	3.62
2½"	7.50	1.12	5.88	7/8	8	3/4	4.12
3"	8.25	1.25	6.62	7/8	8	3/4	5.00
4"	10.75	1.50	8.50	1	8	7/8	6.19
5"	13.00	1.75	10.50	1 1/8	8	1	7.31
6"	14.00	1.88	11.50	1 1/8	12	1	8.50
8"	16.50	2.19	13.75	1 1/4	12	1 1/8	10.62
10"	20.00	2.50	17.00	1 3/8	16	1 1/4	12.75
12"	22.00	2.62	19.25	1 3/8	20	1 1/4	15.00
14"	23.75	2.75	20.75	1 1/2	20	1 3/8	16.25
16"	27.00	3.00	23.75	1 5/8	20	1 1/2	18.50
18"	29.25	3.25	25.75	1 3/4	20	1 5/8	21.00
20"	32.00	3.50	28.50	1 3/4	24	1 5/8	23.00
24"	37.00	4.00	33.00	2	24	1 7/8	27.25

Flange thickness dimensions include the raised face height for ASME B16.5 Class 150 and Class 300 valves
All dimensions are in inches

Fig. Nos. 5094 Butt Weld Ends & 5044 Socket Weld Ends Class 800

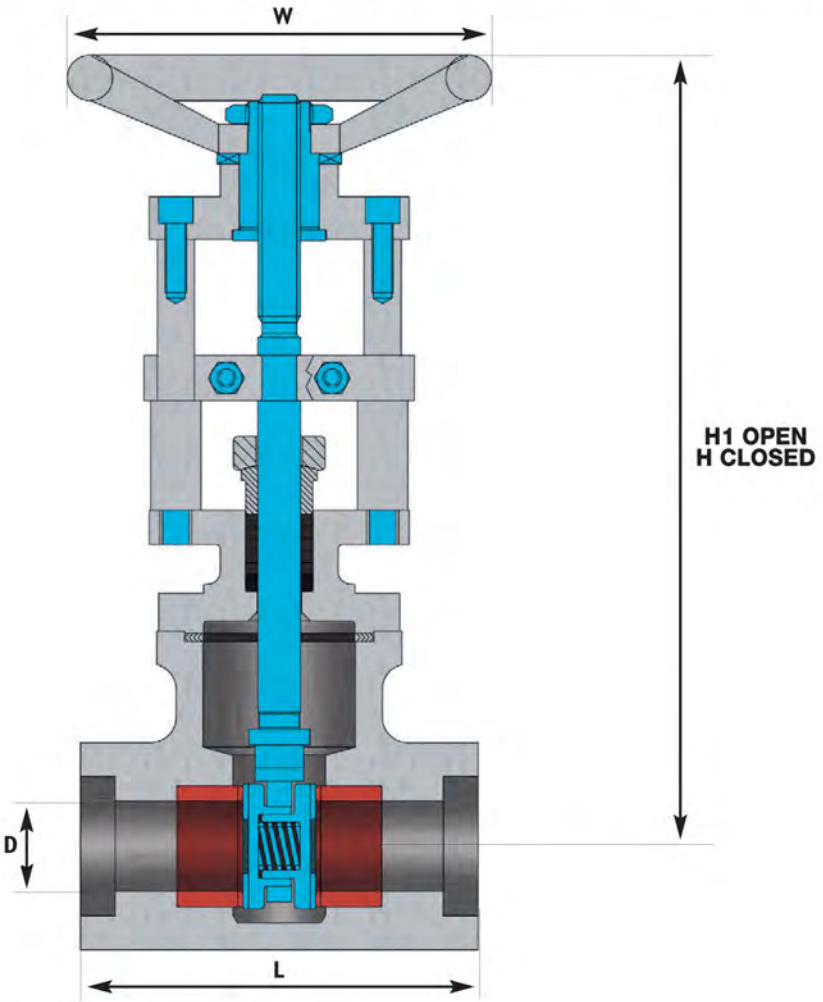


Materials of Construction

Part No	Part Description	Fig. No. 5094/5044 Carbon Steel	Fig. No. R5094/R5044 Carbon-Alloy Steel	Fig. No. U5094/U5044 Carbon-Alloy Steel
1	Body	ASTM A216 Gr. WCB †	ASTM A217 Gr. WC9	ASTM A217 Gr. C12A
2	Bonnet	ASTM A216 Gr. WCB † Hardfaced	ASTM A217 Gr. WC9 Hardfaced	ASTM A217 Gr. C12A Hardfaced
3	Stem	ASTM A182 Gr. F6	ASTM A182 Gr. F6	ASTM A182 Gr. F6
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
5	Male Disc	ASTM A182 Gr. F6 Hardfaced	ASTM A182 Gr. F6 Hardfaced	ASTM A182 Gr. F91 Hardfaced
6	Female Disc	ASTM A182 Gr. F6 Hardfaced	ASTM A182 Gr. F6 Hardfaced	ASTM A182 Gr. F91 Hardfaced
7	Spring	Inconel X-750	Inconel X-750	Inconel X-750
8	Junk Ring	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F91
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom		
10	Gland Follower	ASTM A276 Gr. 410	ASTM A276 Gr. 410	ASTM A276 Gr. 410
11	Gland Flange	ASTM A105	ASTM A182 Gr. F22	ASTM A182 Gr. F22
12	Yoke Sleeve	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel	Malleable Iron or Steel
14	Handwheel Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Thrust Bearing	Steel	Steel	Steel
16	Bridge	ASTM A105	ASTM A105	ASTM A105
17	Stepped Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
18	Stem Stop	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020
19	Gasket	Stainless Steel Graphite Filled Spiral Wound		
20	Body/Bonnet Studs	ASTM A193 Gr. B7	ASTM A193 Gr. B16	ASTM A193 Gr. B16
21	Body/Bonnet Nuts	ASTM A194 Gr. 2H	ASTM A194 Gr. 7	ASTM A194 Gr. 7

† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent
Items 20 & 21 - Studs & Nuts - not shown in above view

Fig. Nos. 5094 Butt Weld Ends & 5044 Socket Weld Ends Class 800



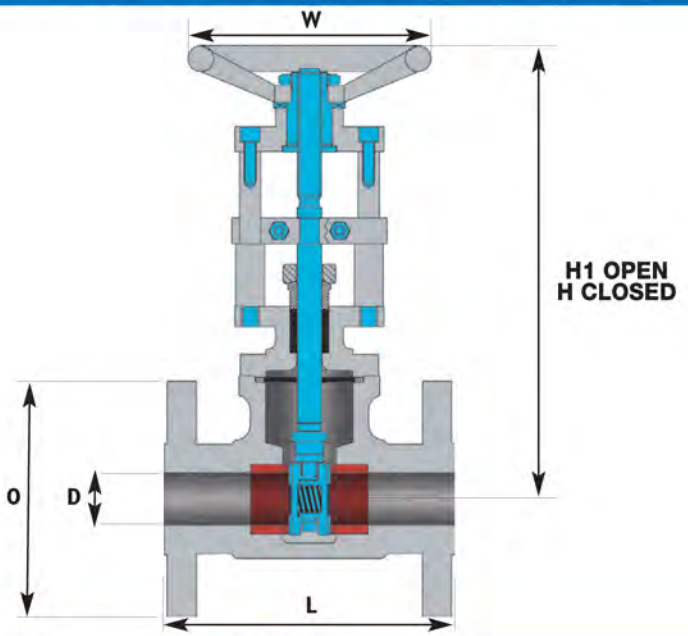
ASME Class 800 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch 80 (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5044*	24	5 3/4	0.71	N/A	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
15		11	146	18	N/A	286	327	160		
¾"	5094‡/5044	24	5 3/4	0.71	0.742	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
20		11	146	18	18.8	286	327	160		
1"	5094#/5044	24	5 3/4	0.71	0.957	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
25		11	146	18	24.3	286	327	160		
1¼"	5094/5044	24	5 3/4	0.906	1.278	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
32		11	146	23	32.5	286	327	160		
1½"	5094/5044	24	5 3/4	1.126	1.500	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
40		11	146	28.6	38.1	286	327	160		
2"	5094/5044	24	5 3/4	1.417	1.939	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
50		11	146	36	49.3	286	327	160		

End-to-end dimension 'L' is our standard but other lengths can be accommodated
Schedule 80 butt-weld end is our standard for a class 800 valve but other schedules can be accommodated
* ½" size valve is not available with butt-weld ends
‡ ¾" size valve is not available with schedule 160 and thicker pipe wall butt-weld ends
# 1" size valve is not available with schedule XXS butt-weld ends

Further information is available upon request

Fig. Nos. 5081, 5082 & 5084 Class 150, 300 & 600 Integral Flanged Ends



ASME Class 150 R.F. Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Flange Dia. 'O' (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5081	26	6.50	0.71	3.50	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
15		12	165	18	89	286	327	160		
¾"	5081	27	6.50	0.71	3.88	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
20		12	165	18	98	286	327	160		
1"	5081	28	6.50	0.91	4.25	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
25		12	165	23	108	286	327	160		
1¼"	5081	28	6.50	1.18	4.62	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
32		13	165	30	117	286	327	160		
1½"	5081	29	6.50	1.42	5.00	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
40		13	165	36	127	286	327	160		

ASME Class 300 R.F. Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Flange Dia. 'O' (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5082	28	7.50	0.71	3.75	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
15		13	191	18	95	286	327	160		
¾"	5082	30	7.50	0.71	4.62	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
20		14	191	18	117	286	327	160		
1"	5082	32	7.50	0.91	4.88	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
25		15	191	23	124	286	327	160		
1¼"	5082	34	7.50	1.18	5.25	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
32		15	191	30	133	286	327	160		
1½"	5082	36	7.50	1.42	6.12	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
40		16	191	36	155	286	327	160		

ASME Class 600 R.F. Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Flange Dia. 'O' (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5084	32	9.50	0.71	3.75	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
15		14	241	18	95	286	327	160		
¾"	5084	34	9.50	0.71	4.62	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
20		15	241	18	117	286	327	160		
1"	5084	36	9.50	0.91	4.88	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
25		16	241	23	124	286	327	160		
1¼"	5084	38	9.50	1.18	5.25	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
32		17	241	30	133	286	327	160		
1½"	5084	40	9.50	1.42	6.12	11.26	12.87	6 1/4	5/8" ACME x 8 TPI	13
40		18	241	36	155	286	327	160		

ASME B16.34 - Class 800 Standard & Special Class Pressure/Temperature Ratings

Class 800 Metric Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	538	550	575	595	625	650
				Working Pressure in barg Temperature in °C																				
5094/5044	BWE/SWE	A216 WCB	800 Standard	136.2	133.7	124.3	120.2	116.8	111.8	106.2	103.2	100.2	97.0	92.6	76.7	61.3*	-	-	-	-	-	-	-	-
5094-SPL/5044-SPL	BWE/SWE	A216 WCB	800 Special	137.9	137.9	137.7	136.1	134.8	134.8	134.8	133.6	130.4	125.6	115.7	95.9	76.7*	-	-	-	-	-	-	-	-
R5094/R5044	BWE/SWE	A217 WC9	800 Standard	137.9	137.9	137.4	133.8	129.6	123.6	114.3	110.2	107.3	103.5	97.6	93.4	90.2	84.5	75.3	49.2	41.7	28.1	20.3	-	-
R5094-SPL/R5044-SPL	BWE/SWE	A217 WC9	800 Special	137.9	137.9	137.7	135.9	133.9	133.3	132.7	132.3	131.2	130.0	130.0	130.0	125.7	114.0	95.2	61.4	52.1	35.1	25.3	-	-
U5094/U5044	BWE/SWE	A217 C12A	800 Standard	137.9	137.9	137.4	133.8	129.6	123.6	114.3	110.2	107.3	103.5	97.6	93.4	90.2	84.5	75.3	66.8	66.5	63.8	52.0	38.9	26.5
U5094-SPL/U5044-SPL	BWE/SWE	A217 C12A	800 Special	137.9	137.9	137.9	137.9	137.9	137.9	137.9	137.9	137.1	134.7	133.9	132.4	125.7	114.0	95.2	77.2	77.2	76.2	65.0	48.7	33.1

* Use of WCB material is permissible but not recommended for prolonged use above 425°C
WC9 material is not to be used above 595°C

For intermediate ratings use linear interpolation

Class 800 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
				Working Pressure in psig Temperature in °F																	
5094/5044	BWE/SWE	A216 WCB	800 Standard	1973	1810	1747	1688	1608	1515	1467	1413	1352	1098	850*	-	-	-	-	-	-	-
5094-SPL/5044-SPL	BWE/SWE	A216 WCB	800 Special	2000	2000	1973	1955	1955	1955	1907	1843	1693	1373	1062*	-	-	-	-	-	-	-
R5094/R5044	BWE/SWE	A217 WC9	800 Standard	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1025	712	467	293	-	-
R5094-SPL/R5044-SPL	BWE/SWE	A217 WC9	800 Special	2000	2000	1973	1942	1933	1923	1907	1885	1885	1885	1805	1600	1258	893	582	365	-	-
U5094/U5044	BWE/SWE	A217 C12A	800 Standard	2000	2000	1942	1880	1773	1613	1568	1515	1418	1355	1298	1200	1032	968	960	805	595	383
U5094-SPL/U5044-SPL	BWE/SWE	A217 C12A	800 Special	2000	2000	2000	2000	2000	2000	2000	1955	1943	1920	1805	1600	1258	1120	1120	1005	742	480

* Use of WCB material is permissible but not recommended for prolonged use above 800°F
WC9 material is not to be used above 1100°F

For intermediate ratings use linear interpolation

Forged Steel Pressure Seal Parallel Slide Gate Valve

Features of the HH Valves Forged Steel Parallel Slide Gate Valve:

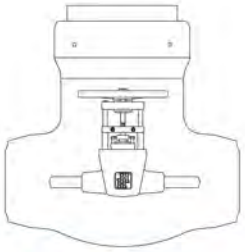
- Designed to ASME B16.34 Standard Class and Special Class
- Pressure classes 1690, 2850 & 4500
- Pressure seal design
- Butt-weld end & socket-weld end connections
- Forged carbon steel and carbon-alloy steel construction: ASTM A105N, ASTM A182 Gr. F22 & ASTM A182 Gr. F91
- Rising stem, outside screw and pillar design
- Stellite faced seats, discs and integral backseat
- Preformed expanded graphite gland packing and pressure seal ring
- Positive stem stop
- Non-rising handwheel
- Open and shut indication on pillars
- Size Range - ½" to 4"

BY-PASS, EQUALISING BY-PASS AND CONTROL

Parallel Slide Gate Valves when used as By-pass and Equalising By-pass Valves

By-pass Valve

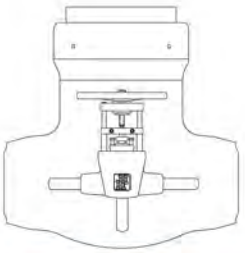
A by-pass valve is normally fitted to equalise the pressure on either side of the closed main valve to reduce the load on the handwheel or actuator prior to opening. It can also be used to warm up the downstream pipe-work and reduce the effects of thermal shock prior to opening the main valve. The HH Valves design of small-bore parallel slide gate valves is ideally suited for this purpose. They can be fitted at the factory, complete with all necessary pipe-work, to match the material of the main valve.



By-pass arrangement

Equalising By-pass Valve

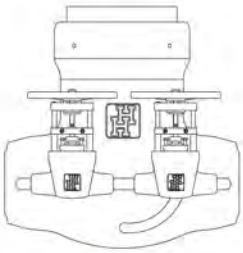
An equalising by-pass valve can be fitted to overcome the possibility of inter-gate pressure locking. This system uses a by-pass arrangement as described above but with an additional connection by means of a small bore pipe between the main valve inter-gate chamber and the by-pass valve. When the main valve is closed and the equalising by-pass valve is opened the inter-gate pressure is evacuated to the upstream and downstream sides of the main valve. The main valve in this configuration will be bi-directional.



Equalising by-pass arrangement

Auto-Equalising By-pass Valve

Under certain conditions the equalising by-pass valve can experience inter-gate pressure-locking when left in the closed position. To prevent this we can supply an auto-equalising by-pass valve where the valve discs are locked together to ensure they can only ever achieve single-block (seat/disc) sealing capability. This allows the valve to seal on either seat but never seal on both seats at the same time. The main valve inter-gate pressure is then automatically relieved to the side of the main valve having the higher line pressure. This ensures the inter-gate pressure in the by-pass valve is always the same as the higher line pressure either side of the main valve. The main valve in this configuration will also be bi-directional.



Equalising by-pass arrangement with isolating valve

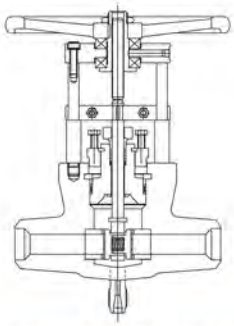
Inter-gate Pressure Build-up for Valves on Steam Service

Thermal expansion within the inter-gate chamber can cause pressure-locking of the valve discs when a steam line is on start up and the valve is in the closed position. In such cases excessive pressure can be generated within the inter-gate space to a point where it may even exceed the pressure rating of the valve. This will be evident by difficulty opening the valve manually or by the tripping out of the actuator owing to the excessive effort required when starting the opening sequence. The solution to this problem is to fit equalising devices as described above.

Pressure Build-up for Valves on Feed Water Service

Hydraulic pressure build-up can occur on high pressure feed water service when the valve is being closed. When the valve is moved from the open to closed position the stem displaces water within the inter-gate space. Until the valve is almost closed the displaced water passes down the pipeline but once the valve discs cover the seat bore any further travel cannot displace the water and pressure increases in the inter-gate chamber. Again the solution to this problem is to fit equalising devices as described above.

HH Valves can supply by-pass valves to be used as equalising devices for new plant requirements and also to replace existing by-pass valves on site during shutdown periods. Equalising valves can be supplied with prepared butt-weld pipe ends, socket-weld ends or stub-pipe connections to receive existing pipe-work.



By-pass valve with equalising pipe stub connection

Vee-port Seated Valves for Regulating Duty

For start-up and regulating duty a vee-port seated valve with full-faced discs can be supplied. The vee-port seat is fitted to the downstream (outlet) side of the valve and is designed to regulate flow at intermediate positions rather than any specific control curve. This type of valve can also be used for boiler and system cleaning applications owing to the extremely high velocities that can be achieved using the vee-port seat configuration. The vee-port seat face and discs faces are fully hard-faced with Stellite or equivalent. For extreme conditions we can use spray coated tungsten carbide hard-facings as an alternative to Stellite.

Vee-port disc configuration

ASME B16.34 - 1690, 2850 & 4500 Standard & Special Class Pressure/Temperature Ratings

Class 1690 Metric Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	Working Pressure in barg Temperature in °C 325	350	375	400	425	450	475	500	538	550	575	595	625	650
5096/5046	BWE/SWE	A105N	1690 Standard	287.6	282.3	262.5	253.9	246.7	236.3	224.3	218.1	211.6	204.8	195.6	162.0	129.6*	-	-	-	-	-	-	-	-
5096-SPL/5046-SPL	BWE/SWE	A105N	1690 Special	291.3	291.3	290.9	287.5	284.9	284.6	284.6	282.3	275.6	265.3	244.5	202.6	162.0*	-	-	-	-	-	-	-	-
R5096/R5046	BWE/SWE	A182 F22	1690 Standard	291.3	291.3	290.2	282.6	274.2	261.1	241.5	232.8	226.6	218.6	206.2	197.2	190.4	178.3	158.8	103.9	88.1	59.3	42.9	25.1†	-
R5096-SPL/R5046-SPL	BWE/SWE	A182 F22	1690 Special	291.3	291.3	290.8	287.1	282.9	281.6	280.4	279.4	277.2	274.7	274.7	274.7	265.7	240.8	201.2	129.8	110.1	74.1	53.6	31.4†	-
U5096/U5046	BWE/SWE	A182 F91	1690 Standard	291.3	291.3	290.2	282.6	274.2	261.1	241.5	232.8	226.6	218.6	206.2	197.2	190.4	178.3	158.8	141.3	140.7	134.9	114.9	82.3	55.9
U5096-SPL/U5046-SPL	BWE/SWE	A182 F91	1690 Special	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	289.7	284.5	282.9	279.6	265.7	240.8	201.2	163.5	163.5	161.1	142.1	102.9	69.9

Class 2850 Metric Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	Working Pressure in barg Temperature in °C 325	350	375	400	425	450	475	500	538	550	575	595	625	650
5099/5049	BWE/SWE	A105N	2850 Standard	485.1	476.2	442.7	428.2	416.1	398.4	378.3	367.8	356.8	345.5	329.8	273.3	218.5*	-	-	-	-	-	-	-	-
5099-SPL/5049-SPL	BWE/SWE	A105N	2850 Special	491.2	491.2	490.5	484.8	480.4	480.0	480.0	476.1	464.7	447.5	412.3	341.5	273.2*	-	-	-	-	-	-	-	-
R5099/R5049	BWE/SWE	A182 F22	2850 Standard	491.2	491.2	489.5	476.8	462.2	440.2	407.1	392.5	382.2	368.5	347.5	332.4	321.2	300.8	267.9	175.2	148.5	100.0	72.3	42.4†	-
R5099-SPL/R5049-SPL	BWE/SWE	A182 F22	2850 Special	491.2	491.2	490.4	484.0	477.1	474.8	472.9	471.2	467.4	463.2	463.2	463.2	448.1	406.2	339.1	219.0	185.6	125.0	90.4	53.0†	-
U5099/U5049	BWE/SWE	A182 F91	2850 Standard	491.2	491.2	489.5	476.8	462.2	440.2	407.1	392.5	382.2	368.5	347.5	332.4	321.2	300.8	267.9	238.1	237.1	227.4	193.7	138.7	94.3
U5099-SPL/U5049-SPL	BWE/SWE	A182 F91	2850 Special	491.2	491.2	491.2	491.2	491.2	491.2	491.2	491.2	488.6	479.8	476.9	471.6	448.1	406.2	339.1	275.5	275.5	271.6	239.5	173.4	117.9

Class 4500 Metric Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-29 to 38	50	100	150	200	250	300	Working Pressure in barg Temperature in °C 325	350	375	400	425	450	475	500	538	550	575	595	625	650
5090/5040	BWE/SWE	A105N	4500 Standard	765.9	751.9	699.0	676.1	657.0	629.1	597.3	580.7	563.5	545.5	520.8	431.5	345.1*	-	-	-	-	-	-	-	-
5090-SPL/5040-SPL	BWE/SWE	A105N	4500 Special	775.7	775.7	774.5	765.5	758.6	757.9	757.9	751.7	733.7	706.5	651.0	539.3	431.4*	-	-	-	-	-	-	-	-
R5090/R5040	BWE/SWE	A182 F22	4500 Standard	775.7	775.7	773.0	752.8	729.8	694.8	642.6	619.6	603.3	581.8	548.5	524.7	507.0	474.8	423.0	276.6	234.5	157.9	114.2	66.9†	-
R5090-SPL/R5040-SPL	BWE/SWE	A182 F22	4500 Special	775.7	775.7	774.3	764.3	753.4	749.7	746.7	743.9	738.1	731.3	731.3	731.3	707.6	641.3	535.4	345.7	293.1	197.4	142.8	83.7†	-
U5090/U5040	BWE/SWE	A182 F91	4500 Standard	775.7	775.7	773.0	752.8	729.8	694.8	642.6	619.6	603.3	581.8	548.5	524.7	507.0	474.8	423.0	375.8	374.2	359.1	305.8	219.1	148.9
U5090-SPL/U5040-SPL	BWE/SWE	A182 F91	4500 Special	775.7	775.7	775.7	775.7	775.7	775.7	775.7	775.7	771.4	757.4	753.2	744.6	707.6	641.3	535.4	435.1	435.1	428.8	378.2	273.8	186.2

* Use of A105N material is permissible but not recommended for prolonged use above 425°C
† Use of F22 material is permissible but not recommended for prolonged use above 595°C

For intermediate ratings use linear interpolation

ASME B16.34 - 1690, 2850 & 4500 Standard & Special Class Pressure/Temperature Ratings

Class 1690 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
				Working Pressure in psig Temperature in °F																	
5096/5046	BWE/SWE	A105N	1690 Standard	4173	3824	3684	3571	3397	3199	3093	2999	2857	2316	1796*	-	-	-	-	-	-	-
5096-SPL/5046-SPL	BWE/SWE	A105N	1690 Special	4225	4225	4169	4129	4129	4129	4028	3893	3572	2896	2247*	-	-	-	-	-	-	-
R5096/R5046	BWE/SWE	A182 F22	1690 Standard	4225	4225	4102	3977	3746	3408	3313	3199	2996	2861	2744	2530	2175	1505	985	619	388†	-
R5096-SPL/R5046-SPL	BWE/SWE	A182 F22	1690 Special	4225	4225	4163	4101	4079	4062	4033	3983	3983	3983	3814	3380	2658	1882	1233	772	484†	-
U5096/U5046	BWE/SWE	A182 F91	1690 Standard	4225	4225	4102	3977	3746	3408	3313	3199	2996	2861	2744	2530	2175	2050	2028	1701	1256	811
U5096-SPL/U5046-SPL	BWE/SWE	A182 F91	1690 Special	4225	4225	4225	4225	4225	4225	4225	4130	4106	4056	3814	3380	2658	2371	2371	2124	1571	1014

Class 2850 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
				Working Pressure in psig Temperature in °F																	
5099/5049	BWE/SWE	A105N	2850 Standard	7035	6448	6214	6019	5728	5392	5216	5044	4822	3910	3028*	-	-	-	-	-	-	-
5099-SPL/5049-SPL	BWE/SWE	A105N	2850 Special	7125	7125	7034	6961	6961	6961	6795	6566	6025	4885	3786*	-	-	-	-	-	-	-
R5099/R5049	BWE/SWE	A182 F22	2850 Standard	7125	7125	6920	6703	6314	5745	5591	5392	5050	4822	4628	4269	3671	2542	1660	1043	651†	-
R5099-SPL/R5049-SPL	BWE/SWE	A182 F22	2850 Special	7125	7125	7023	6914	6880	6851	6800	6719	6719	6719	6435	5700	4480	3175	2076	1304	815†	-
U5099/U5049	BWE/SWE	A182 F91	2850 Standard	7125	7125	6920	6703	6314	5745	5591	5392	5050	4822	4628	4269	3671	3454	3420	2867	2116	1368
U5099-SPL/U5049-SPL	BWE/SWE	A182 F91	2850 Special	7125	7125	7125	7125	7125	7125	7125	6965	6921	6840	6435	5700	4480	3996	3996	3584	2646	1710

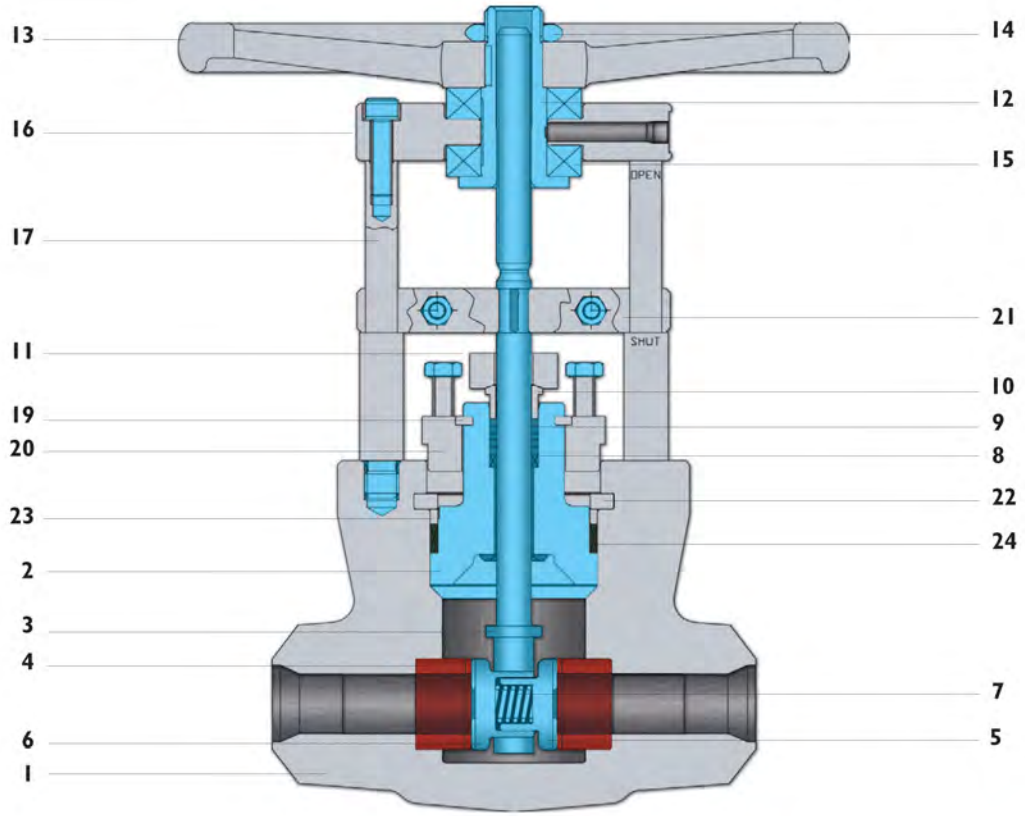
Class 4500 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
				Working Pressure in psig Temperature in °F																	
5090/5040	BWE/SWE	A105N	4500 Standard	11110	10185	9815	9505	9040	8515	8240	7960	7610	6170	4785*	-	-	-	-	-	-	-
5090-SPL/5040-SPL	BWE/SWE	A105N	4500 Special	11250	11250	11105	10995	10995	10995	10730	10365	9515	7715	5980*	-	-	-	-	-	-	-
R5090/R5040	BWE/SWE	A182 F22	4500 Standard	11250	11250	10925	10585	9965	9070	8825	8515	7970	7610	7305	6740	5795	4010	2625	1645	1030†	-
R5090-SPL/R5040-SPL	BWE/SWE	A182 F22	4500 Special	11250	11250	11090	10915	10865	10815	10735	10605	10605	10605	10160	9000	7070	5015	3280	2055	1285†	-
U5090/U5040	BWE/SWE	A182 F91	4500 Standard	11250	11250	10925	10585	9965	9070	8825	8515	7970	7610	7305	6740	5795	5450	5400	4525	3345	2160
U5090-SPL/U5040-SPL	BWE/SWE	A182 F91	4500 Special	11250	11250	11250	11250	11250	11250	11250	10995	10930	10800	10160	9000	7070	6310	6310	5655	4180	2700

* Use of A105N material is permissible but not recommended for prolonged use above 800°F
† Use of F22 material is permissible but not recommended for prolonged use above 1100°F

For intermediate ratings use linear interpolation

Fig. Nos. 5096 Butt Weld Ends & 5046 Socket Weld Ends Class 1690

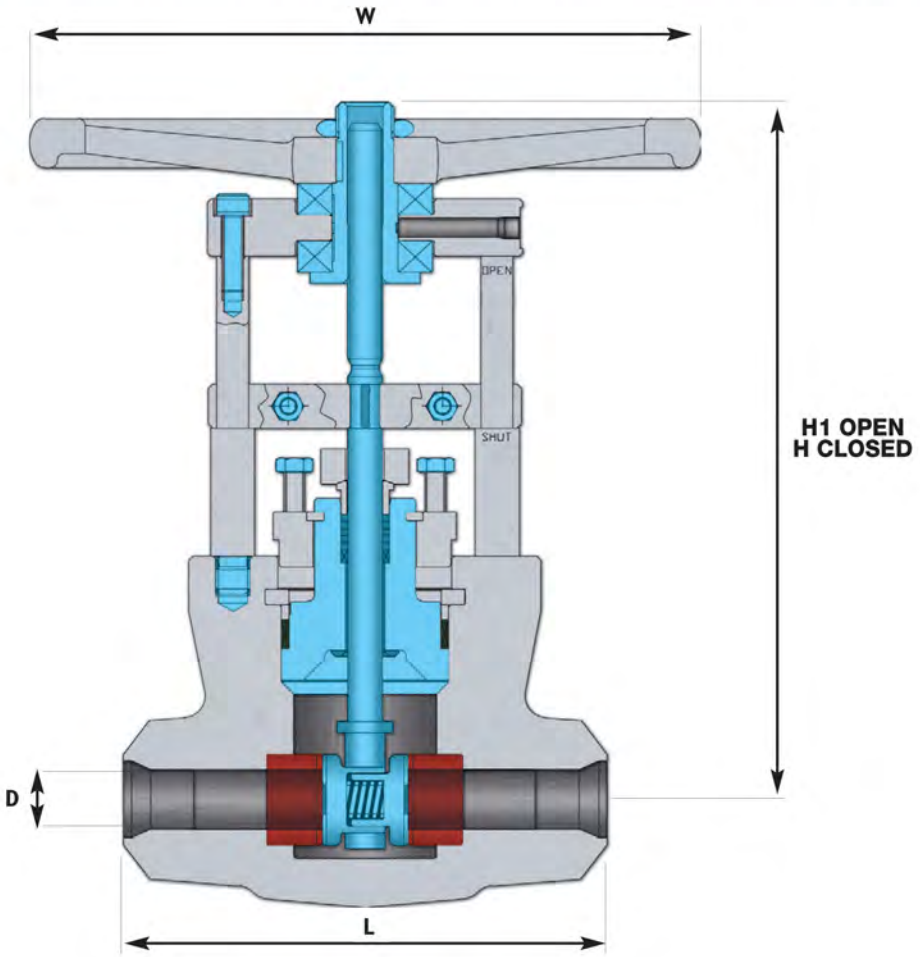


Materials of Construction

Part No	Part Description	Fig. No. 5096/5046 Carbon Steel	Fig. No. R5096/R5046 Carbon-Alloy Steel	Fig. No. U5096/U5046 Carbon-Alloy Steel
1	Body	ASTM A105N †	ASTM A182 Gr. F22	ASTM A182 Gr. F91
2	Bonnet	ASTM A105N † Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
3	Stem	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
5	Male Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
6	Female Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
7	Spring	Inconel X-750	Inconel X-750	Inconel X-750
8	Junk Ring	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F91
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom		
10	Gland Follower	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
11	Gland Flange	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F22
12	Yoke Sleeve	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel	Malleable Iron or Steel
14	Handwheel Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Thrust Bearing	Steel	Steel	Steel
16	Bridge	ASTM A516 Gr. 60	ASTM A516 Gr. 60	ASTM A516 Gr. 60
17	Stepped Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
18	Plain Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
19	Split Ring	ASTM A276 Gr. 410	ASTM A276 Gr. 410	ASTM A276 Gr. 410
20	Bonnet Collar	ASTM A105 or equivalent	ASTM A182 Gr. F22	ASTM A182 Gr. F22
21	Stem Stop	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020
22	Segment Ring	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
23	Distance Piece	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
24	Pressure Seal	Expanded Graphite	Expanded Graphite	Expanded Graphite

† 0.25% Carbon max.
Hardfacing is Stellite or equivalent
Item 18 - Plain Pillar - not shown in above view

Fig. Nos. 5096 Butt Weld Ends & 5046 Socket Weld Ends Class 1690



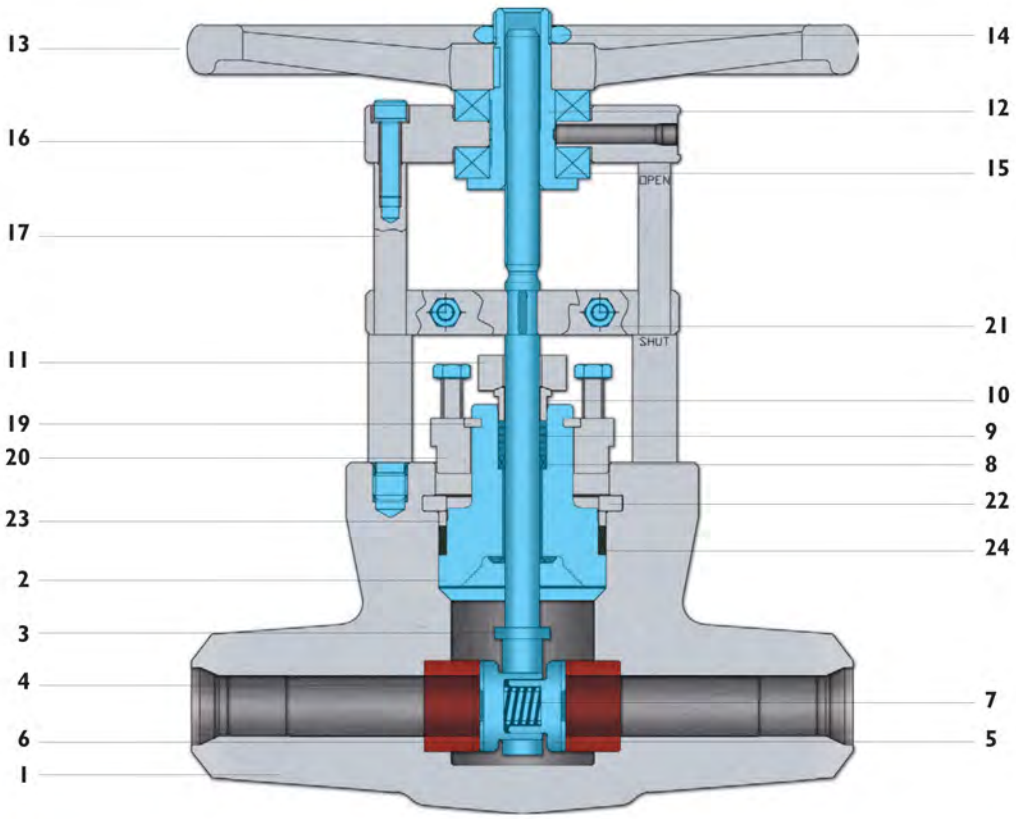
ASME Class 1690 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch 160 (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5046*	80	9.13	0.59	N/A	12.48	13.19	12	5/8" ACME x 8 TPI	8 3/4
15		36	232	15	N/A	317	335	305		
¾"	5096‡/5046	80	9.13	0.59	0.612	12.48	13.19	12	5/8" ACME x 8 TPI	8 3/4
20		36	232	15	15.5	317	335	305		
1"	5096/5046	80	9.13	0.75	0.815	12.48	13.27	12	5/8" ACME x 8 TPI	9 1/2
25		36	232	19	20.7	317	337	305		
1¼"	5096/5046	85	9.13	1.06	1.160	12.48	13.35	12	5/8" ACME x 8 TPI	10
32		38	232	27	29.5	317	339	305		
1½"	5096/5046	85	11	1.06	1.338	12.48	13.35	12	5/8" ACME x 8 TPI	10
40		38	279	27	34.0	317	339	305		
2"	5096/5046	85	11	1.06	1.687	12.48	13.35	12	5/8" ACME x 8 TPI	10
50		38	279	27	42.8	317	339	305		
2½"	5096/5046	93	10	1.30	2.125	12.48	13.62	12	5/8" ACME x 8 TPI	11 3/4
65		42	254	33	54.0	317	346	305		
3"	5096/5046	120	12	1.89	2.624	14.76	16.85	12	5/8" ACME x 8 TPI	17 3/4
80		54	305	48	66.6	375	428	305		
4"	5096/5046	225	16	2.44	3.438	19.84	22.20	15 3/4	3/4" ACME x 6 TPI	17
100		102	406	62	87.3	504	564	400		

End-to-end dimension 'L' is our standard but other lengths can be accommodated
Schedule 160 butt-weld end is our standard for a class 1690 valve but other schedules can be accommodated
* ½" size valve is available with socket-weld end connections only
‡ ¾" size valve is not available with schedule XXS butt-weld ends

Further information is available upon request

Fig. Nos. 5099 Butt Weld Ends & 5049 Socket Weld Ends Class 2850

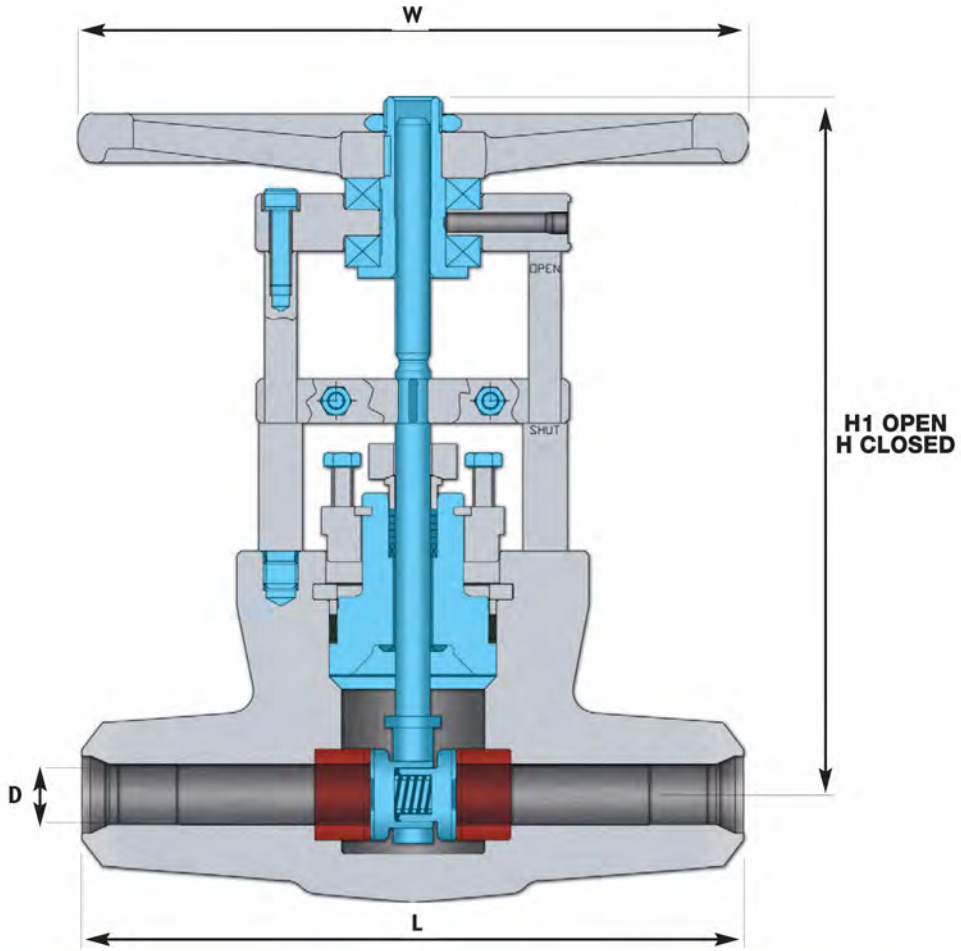


Materials of Construction

Part No	Part Description	Fig. No. 5099/5049 Carbon Steel	Fig. No. R5099/R5049 Carbon-Alloy Steel	Fig. No. U5099/U5049 Carbon-Alloy Steel
1	Body	ASTM A105N †	ASTM A182 Gr. F22	ASTM A182 Gr. F91
2	Bonnet	ASTM A105N † Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
3	Stem	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
5	Male Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
6	Female Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
7	Spring	Inconel X-750	Inconel X-750	Inconel X-750
8	Junk Ring	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F91
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom		
10	Gland Follower	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
11	Gland Flange	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F22
12	Yoke Sleeve	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel	Malleable Iron or Steel
14	Handwheel Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Thrust Bearing	Steel	Steel	Steel
16	Bridge	ASTM A516 Gr. 60	ASTM A516 Gr. 60	ASTM A516 Gr. 60
17	Stepped Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
18	Plain Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
19	Split Ring	ASTM A276 Gr. 410	ASTM A276 Gr. 410	ASTM A276 Gr. 410
20	Bonnet Collar	ASTM A105 or equivalent	ASTM A182 Gr. F22	ASTM A182 Gr. F22
21	Stem Stop	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020
22	Segment Ring	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
23	Distance Piece	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
24	Pressure Seal	Expanded Graphite	Expanded Graphite	Expanded Graphite

† 0.25% Carbon max.
Hardfacing is Stellite or equivalent
Item 18 - Plain Pillar - not shown in above view

Fig. Nos. 5099 Butt Weld Ends & 5049 Socket Weld Ends Class 2850



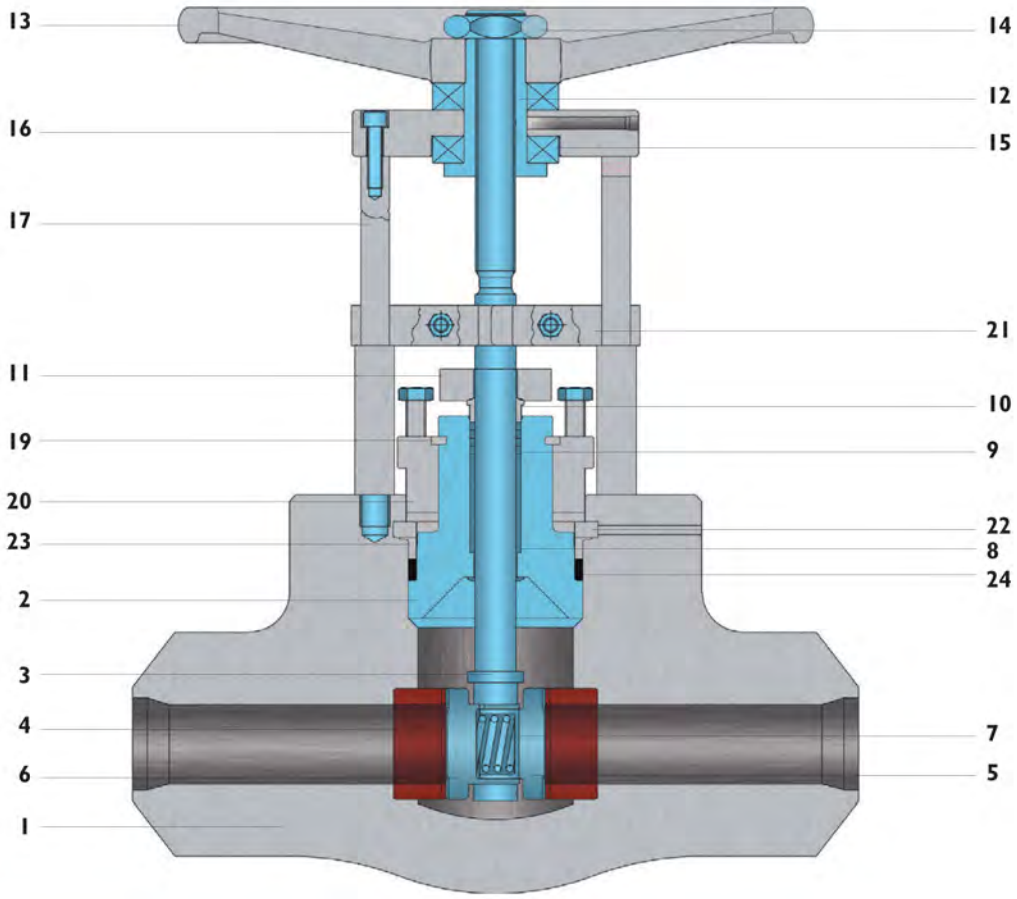
ASME Class 2850 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch XXS (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5049*	80	9.13	0.59	N/A	12.48	13.19	12	5/8" ACME x 8 TPI	8 3/4
15		36	232	15	N/A	317	335	305		
¾"	5099‡/5049	80	9.13	0.59	N/A	12.48	13.19	12	5/8" ACME x 8 TPI	8 3/4
20		36	232	15	N/A	317	335	305		
1"	5099/5049	80	9.13	0.59	0.599	12.48	13.27	12	5/8" ACME x 8 TPI	8 3/4
25		36	232	15	15.2	317	337	305		
1¼"	5099/5049	80	9.13	0.75	0.896	12.48	13.35	12	5/8" ACME x 8 TPI	9 1/2
32		36	232	19	22.8	317	339	305		
1½"	5099/5049	85	11	1.06	1.100	12.48	13.35	12	5/8" ACME x 8 TPI	10
40		38	279	27	27.9	317	339	305		
2"	5099/5049	85	11	1.06	1.503	12.48	13.35	12	5/8" ACME x 8 TPI	10
50		38	279	27	38.2	317	339	305		
2½"	5099/5049	93	13	1.06	1.771	12.24	13.58	12	5/8" ACME x 8 TPI	10
65		42	330	27	45.0	311	345	305		
3"	5099/5049	115	14.50	1.61	2.300	14.76	16.61	12	5/8" ACME x 8 TPI	15 3/4
80		52	368	41	58.4	375	422	305		
4"	5099/5049	235	18	1.97	3.152	18.15	19.72	15 3/4	3/4" ACME x 6 TPI	14
100		107	457	50	80.1	461	501	400		

End-to-end dimension 'L' is our standard but other lengths can be accommodated
Schedule XXS butt-weld end is our standard for a class 2850 valve but other schedules can be accommodated
* ½" size valve is available with socket-weld end connections only
‡ ¾" size valve is not available with schedule XXS butt-weld ends

Further information is available upon request

Fig. Nos. 5090 Butt Weld Ends & 5040 Socket Weld Ends Class 4500

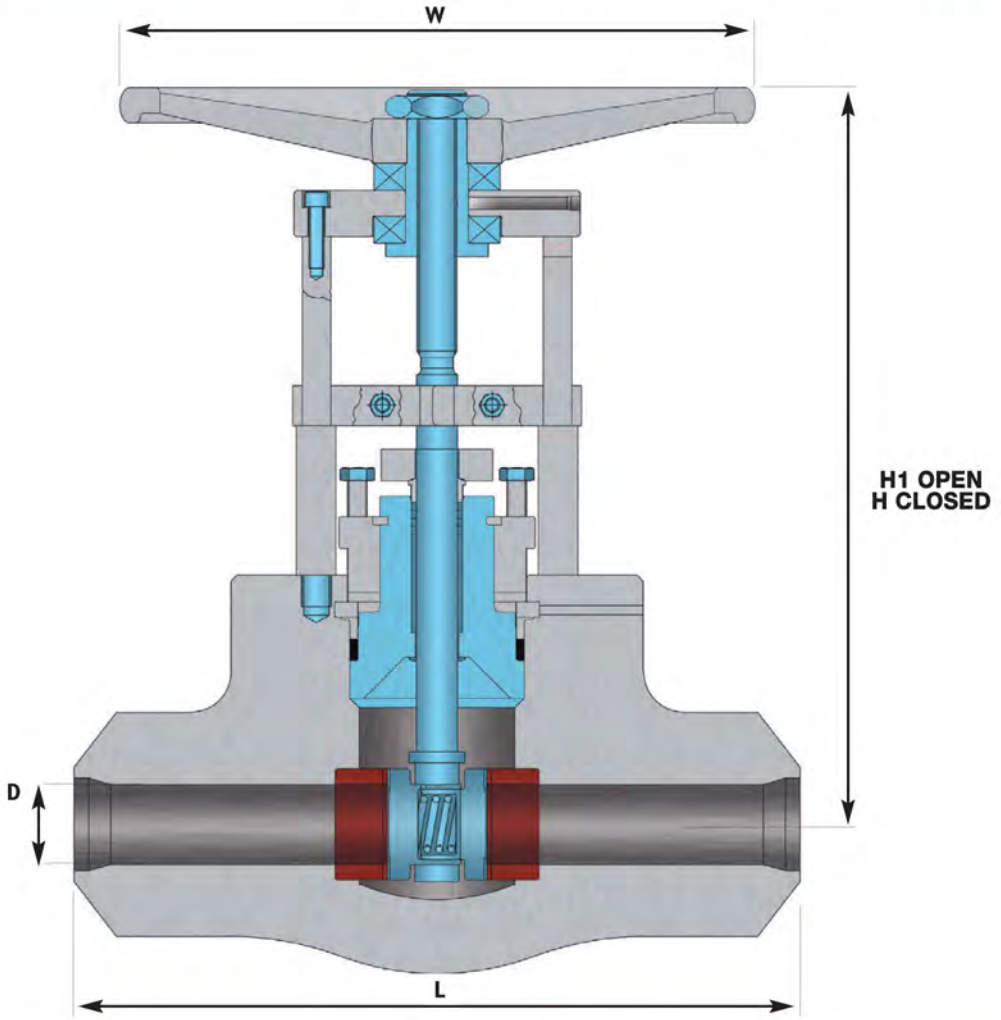


Materials of Construction

Part No	Part Description	Fig. No. 5090/5040 Carbon Steel	Fig. No. R5090/R5040 Carbon-Alloy Steel	Fig. No. U5090/U5040 Carbon-Alloy Steel
1	Body	ASTM A105N †	ASTM A182 Gr. F22	ASTM A182 Gr. F91
2	Bonnet	ASTM A105N † Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
3	Stem	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
4	Seat Ring	ASTM A105 Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
5	Male Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
6	Female Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
7	Spring	Inconel X-750	Inconel X-750	Inconel X-750
8	Junk Ring	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F91
9	Gland Packing	Flexible Graphite with Braided Graphite Filament Ring Top & Bottom		
10	Gland Follower	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
11	Gland Flange	ASTM A108 Gr. C1020	ASTM A182 Gr. F22	ASTM A182 Gr. F22
12	Yoke Sleeve	ASTM B150 Gr. 630	ASTM B150 Gr. 630	ASTM B150 Gr. 630
13	Handwheel	Malleable Iron or Steel	Malleable Iron or Steel	Malleable Iron or Steel
14	Handwheel Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Thrust Bearing	Steel	Steel	Steel
16	Bridge	ASTM A516 Gr. 60	ASTM A516 Gr. 60	ASTM A516 Gr. 60
17	Stepped Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
18	Plain Pillar	ASTM A108 Gr. C1020	ASTM A193 Gr. B7	ASTM A193 Gr. B7
19	Split Ring	ASTM A276 Gr. 410	ASTM A276 Gr. 410	ASTM A276 Gr. 410
20	Bonnet Collar	ASTM A105 or equivalent	ASTM A182 Gr. F22	ASTM A182 Gr. F22
21	Stem Stop	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020	ASTM A108 Gr. C1020
22	Segment Ring	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
23	Distance Piece	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
24	Pressure Seal	Expanded Graphite	Expanded Graphite	Expanded Graphite

† 0.25% Carbon max.
Hardfacing is Stellite or equivalent
Item 18 - Plain Pillar - not shown in above view

Fig. Nos. 5090 Butt Weld Ends & 5040 Socket Weld Ends Class 4500



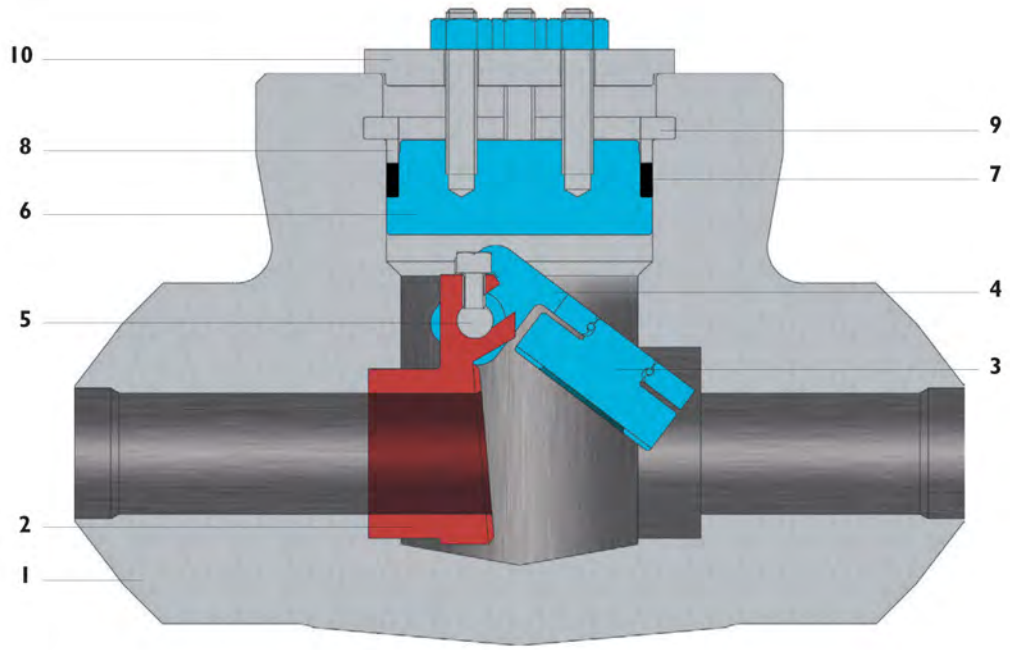
ASME Class 4500 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch XXS (inch) (mm)	Height 'H' (closed) (inch) (mm)	Height 'H1' (open) (inch) (mm)	H/W Dia. 'W' (inch) (mm)	Stem Details	Number of Turns (open/close)
½"	5040*	105	9.13	0.59	N/A	12.48	13.11	12	5/8" ACME x 8 TPI	8 3/4
15		48	232	15	N/A	317	333	305		
¾"	5090‡/5040	105	9.13	0.59	N/A	12.48	13.11	12	5/8" ACME x 8 TPI	8 3/4
20		48	232	15	N/A	317	333	305		
1"	5090/5040	105	9.13	0.59	0.599	12.48	13.11	12	5/8" ACME x 8 TPI	8 3/4
25		48	232	15	15.2	317	333	305		
1¼"	5090/5040	105	9.13	0.75	0.896	12.48	13.19	12	5/8" ACME x 8 TPI	9 1/2
32		48	232	19	22.8	317	335	305		
1½"	5090/5040	105	12	1.06	1.100	12.48	13.27	12	5/8" ACME x 8 TPI	10
40		48	305	27	27.9	317	337	305		
2"	5090/5040	105	12	1.06	1.503	12.48	13.27	12	5/8" ACME x 8 TPI	10
50		48	305	27	38.2	317	337	305		
2½"	5090/5040	280	18	1.73	1.771	18.40	20.75	15 3/4	1 1/8" ACME x 5 TPI	11 3/4
65		128	457	44	45.0	467	527	400		
3"	5090/5040	280	18	1.73	2.300	18.40	20.75	15 3/4	1 1/8" ACME x 5 TPI	11 3/4
80		128	457	44	58.4	467	527	400		
4"	5090/5040	280	18	1.73	3.152	18.40	20.75	15 3/4	1 1/8" ACME x 5 TPI	11 3/4
100		128	457	44	80.1	467	527	400		

End-to-end dimension 'L' is our standard but other lengths can be accommodated
Schedule XXS butt-weld end is our standard for a class 4500 valve but other schedules can be accommodated
* ½" size valve is available with socket-weld end connections only
‡ ¾" size valve is not available with schedule XXS butt-weld ends

Further information is available upon request

High Pressure Forged Steel Pressure Seal Swing Check Valves Class 1690 & 2850



Materials of Construction

Part No	Part Description	Fig. No. 5996/5999 Carbon Steel	Fig. No. R5996/R5999 Carbon-Alloy Steel	Fig. No. U5996/U5999 Carbon-Alloy Steel
1	Body	ASTM A105N †	ASTM A182 Gr. F22	ASTM A182 Gr. F91
2	Seat	ASTM A105 Hardfaced	ASTM A182 Gr. F22 Hardfaced	ASTM A182 Gr. F91 Hardfaced
3	Disc	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F347 Hardfaced	ASTM A182 Gr. F91 Hardfaced
4	Disc Holder	ASTM A105N	ASTM A182 Gr. F22	ASTM A182 Gr. F91
5	Hinge Pin	ASTM A276 Gr. 410	ASTM A276 Gr. 410	ASTM A276 Gr. 410
6	Bonnet	ASTM A105N	ASTM A182 Gr. F22	ASTM A182 Gr. F91
7	Pressure Seal	Expanded Graphite	Expanded Graphite	Expanded Graphite
8	Distance Piece	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
9	Segment Ring	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32	ASTM A565 Gr. XM32
10	Cover	ASTM A105N	ASTM A182 Gr. F22	ASTM A182 Gr. F22

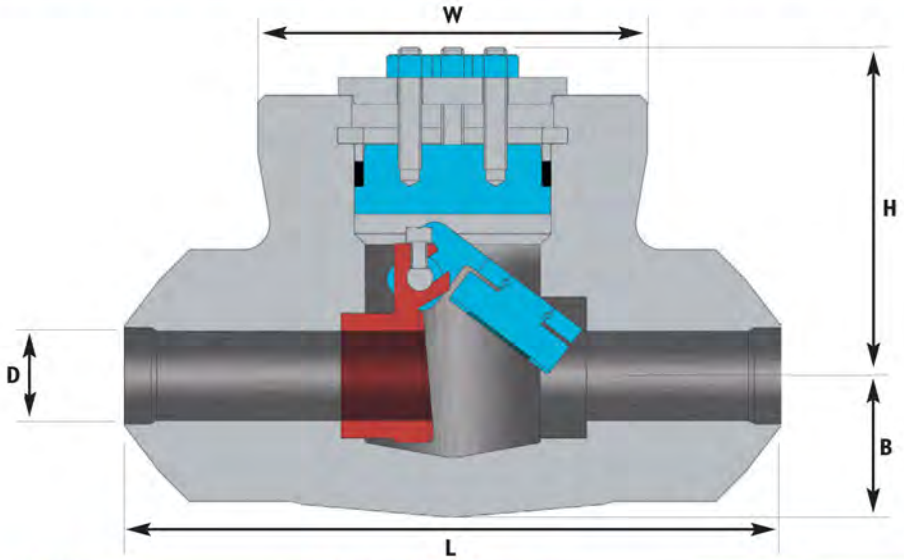
† 0.25% Carbon (maximum)
Hardfacing is Stellite or equivalent

Fig No. 5996 Class 1690 Butt Weld Ends
Fig No. 5999 Class 2850 Butt Weld Ends

Fig No. 5946 Class 1690 Socket Weld Ends
Fig No. 5949 Class 2850 Socket Weld Ends

VALVE DIMENSIONS

High Pressure Forged Steel Pressure Seal Swing Check Valves Class 1690 & 2850



ASME Class 1690 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch 160 (inch) (mm)	Height 'H' (inch) (mm)	Depth 'B' (inch) (mm)	Diameter 'W' (inch) (mm)
½"	5946 *	55	9.13	0.59	N/A	4.92	1.90	6.30
15		25	232	15	N/A	125	48	160
¾"	5996‡/5946	55	9.13	0.59	0.612	4.92	1.90	6.30
20		25	232	15	15.5	125	48	160
1"	5996/5946	55	9.13	0.75	0.815	4.92	1.90	6.30
25		25	232	19	20.7	125	48	160
1¼"	5996/5946	60	9.13	1.06	1.160	4.92	1.90	6.30
32		27	232	27	29.5	125	48	160
1½"	5996/5946	60	11	1.06	1.338	4.92	1.90	6.30
40		27	279	27	34.0	125	48	160
2"	5996/5946	60	11	1.06	1.687	4.92	1.90	6.30
50		27	279	27	42.8	125	48	160
2½"	5996/5946	75	10	1.61	2.125	7.09	2.60	7.09
65		34	254	41	54.0	180	66	180
3"	5996/5946	85	12	1.97	2.624	7.09	2.60	7.32
80		38	305	50	66.6	180	66	186
4"	5996/5946	160	16	2.44	3.438	8.11	3.15	8.58
100		72	406	62	87.3	206	80	218

ASME Class 2850 Valve Dimensions

Size (inch) (mm)	Fig. No.	Weight (lbs) (kgs)	Length 'L' (inch) (mm)	Valve Bore 'D' (inch) (mm)	Pipe Bore sch XXS (inch) (mm)	Height 'H' (inch) (mm)	Depth 'B' (inch) (mm)	Diameter 'W' (inch) (mm)
½"	5949 *	55	9.13	0.59	N/A	4.92	1.90	6.30
15		25	232	15	N/A	125	48	160
¾"	5999‡/5949	55	9.13	0.59	N/A	4.92	1.90	6.30
20		25	232	15	N/A	125	48	160
1"	5999/5949	55	9.13	0.59	0.599	4.92	1.90	6.30
25		25	232	15	15.2	125	48	160
1¼"	5999/5949	55	9.13	0.75	0.896	4.92	1.90	6.30
32		25	232	19	22.8	125	48	160
1½"	5999/5949	60	11	1.06	1.100	4.92	1.90	6.30
40		27	279	27	27.9	125	48	160
2"	5999/5949	60	11	1.06	1.503	4.92	1.90	6.30
50		27	279	27	38.2	125	48	160
2½"	5999/5949	80	13	1.06	1.771	7.09	2.60	7.09
65		36	330	27	45.0	180	66	180
3"	5999/5949	160	14.50	1.97	2.300	7.24	3.15	8.58
80		72	368	50	58.4	184	80	218
4"	5999/5949	165	18	1.97	3.152	7.24	3.15	8.58
100		75	457	50	80.1	184	80	218

End-to-end dimension 'L' is our standard but other lengths can be accommodated
Schedule 160 butt-weld end is our standard for a class 1690 valve but other schedules can be accommodated
Schedule XXS butt-weld end is our standard for a class 2850 valve but other schedules can be accommodated
* ½" size valve is available with socket-weld end connections only
‡ ¾" size valve is not available with schedule XXS butt-weld ends
Further information is available upon request

PARALLEL SLIDE GATE VALVES
1000 - 1690 - 2850 CLASS
SIZES 5” to 24”

HH Valves Ltd

Full Bore, Standard Bore and Reduced Bore Parallel Slide Gate Valves

The HH Valves range of full bore, standard bore and reduced bore high pressure parallel slide gate valves is primarily designed for isolation of steam and feed water as well as many other applications.

Features and advantages

A parallel slide valve seat achieves tightness by utilising the line pressure, rather than by mechanical effort which can be the case with a wedge gate valve design. This eliminates the possibility of binding which may occur with a wedge gate valve as a result of large temperature fluctuations within the valve during service.

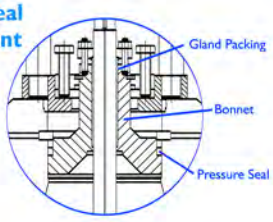
The effort required to seal a parallel slide valve is therefore much reduced over that required to seal a wedge gate valve. This is an advantage when fitting actuators with the parallel slide design allowing smaller sized actuators to be used, resulting in cost savings.

A parallel slide valve is ideally suited to in-line maintenance with the re-machining of all internal components being on-centre and with the seat faces only needing to be nominally parallel.

The self-aligning disc design of the parallel slide valve creates a wiping action over the seat faces to assist in the removal of contaminates. The hard-faced stellite seats and discs have a sufficient thickness of deposit to allow several re-machining operations to be performed during maintenance before new parts are required.

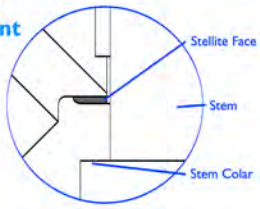
Pillar and stem stop design provides accurate guidance for the valve stem and gives open to close visual position indication.

Pressure Seal Arrangement



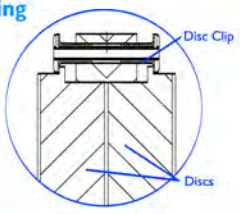
All high pressure valves incorporate a pressure seal bonnet design. The internal pressure acting on the bonnet acts on the resilient, pre-formed, compressed graphite seal ring to form the bonnet seal.

Backseat Arrangement



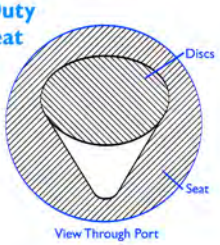
The parallel slide design includes a backseat feature which is used when the valve is in the fully open position. The backseat is integrally incorporated within the bonnet by means of a direct, stellite deposited seating face. The stem collar provides the other sealing face and when lapped together with the backseat face, the seal is made. The backseat should ONLY be used to isolate the gland from the line medium in instances when gland leakage is evident and until such time that the valve can be de-pressurised and repaired. UNDER NO CIRCUMSTANCES SHOULD THE BACKSEAT BE USED TO ALLOW GLAND REPAIR WHILE THE VALVE AND SYSTEM IS PRESSURISED.

Disc Retaining Clip



The disc retaining clips are screwed onto the stud during valve assembly and locked in position. This provides sufficient loading and freedom of movement to allow proper alignment and accurate contact to be maintained over the lapped seat and disc sealing faces during thermal expansion and contraction, regardless of the valve orientation.

Regulating Duty Vee Port Seat



For start-up and regulating duties a vee-port seat with full-faced stellite deposited discs can be provided, allowing accurate flow rate characteristics to be achieved.

BY-PASS EQUALISING DEVICES

HH Valves high pressure full bore, standard bore and reduced bore parallel slide valves are selected on the basis of the flow conditions and the allowable pressure drop for each application.

By-pass Valves

A by-pass valve can be fitted to equalise the pressure on either slide of a closed main valve. It can also be used to warm-up the downstream pipe-work for short periods of time before the main valve is opened, substantially reducing the load to open the valve.

An equalising by-pass valve is fitted to overcome the possibility of intergate pressure locking. This system uses a standard by-pass valve as described above, but has an additional small bore pipe that connects the main valve intergate chamber to that of the by-pass valve. When the main valve is closed and the by-pass is opened the intergate pressure is evacuated. The main valve, in this instance, remains bi-directional.

All by-pass valves will be HH Valves, small bore, forged steel design, matching the properties of the main valve and, if required, can be fitted at our factory together with the associated pipe-work.

A more basic method of overcoming the possibility of intergate pressure locking is to fit an equalising pipe. This consists of a simple pipe which connects the main valve intergate chamber to the upstream port. This will automatically equalise the pressure between that in the centre chamber and the upstream side of the valve.

An even simpler method is to drill a small hole in the upstream seat which will again automatically equalise the pressure in the centre chamber with that in the upstream side.

In both these instances the main valve will become uni-directional and would therefore be fitted with an arrow to clearly show the direction of flow.

Intergate Pressure Build-up and Lock-up

Thermal expansion can create pressure-locking when a fluid, at ambient temperature, is trapped in the intergate cavity of the valve body. When the plant is on start-up and heat is seen by the valve when in the closed position, excessive pressure can be generated in the intergate cavity, sometimes exceeding the maximum pressure rating of the valve. This can be demonstrated by difficulty in opening the valve or by the tripping out of the actuator when starting the opening sequence.

Pressure build-up or hydraulic pressure lock-up can occur on high pressure feed water services when the valve is being closed. The stem, when operating the valve from open to close, will displace the water and until the valve is almost closed the displaced water will disperse along the pipeline. Once the seat fully contacts the disc any further travel cannot displace the water and pressure build or hydraulic lock-up, within the intergate cavity, can occur.

The solution to both these problems is to fit one of the equalising devices described above.

Electric Motor Operation of the Main and By-pass Valves

The by-pass must be operated in the correct sequence with the opening and closing of the main valve.

With both the main valve and by-pass valve closed the actuators should be configured so that it is not possible to open the main valve until the by-pass valve is opened.

Open the by-pass valve fully (do not inch the opening process).

Open the main valve.

When the main valve is fully open, the by-pass valve should be set to close automatically.

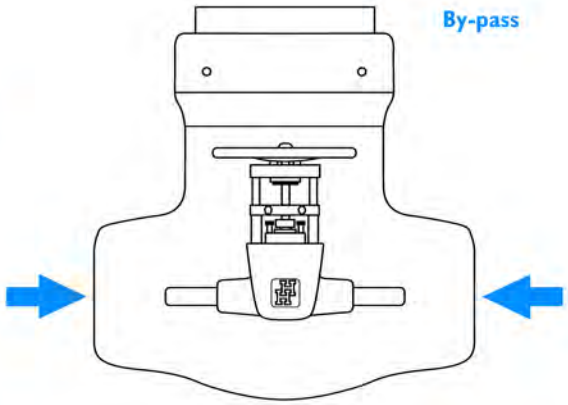
The signal to close the main valve should automatically open the by-pass valve.

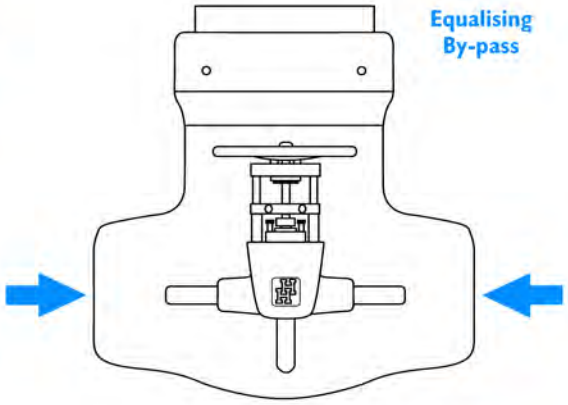
When the main valve reaches the fully closed position the by-pass valve should be set to automatically close.

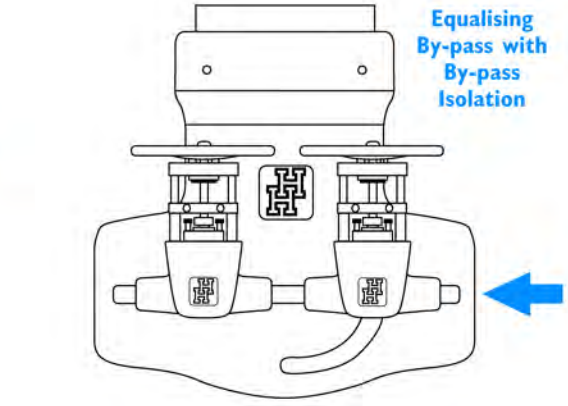
The cycle is now complete.

When an equalising pipe is connected between the by-pass valve and the main intergate cavity, the pressure will always equalise to the upstream when both valve are closed.

When the main valve is fitted with a pressure equalising valve, in addition to the standard by-pass valve, this is hand operated and should be locked in the open position during normal operation.

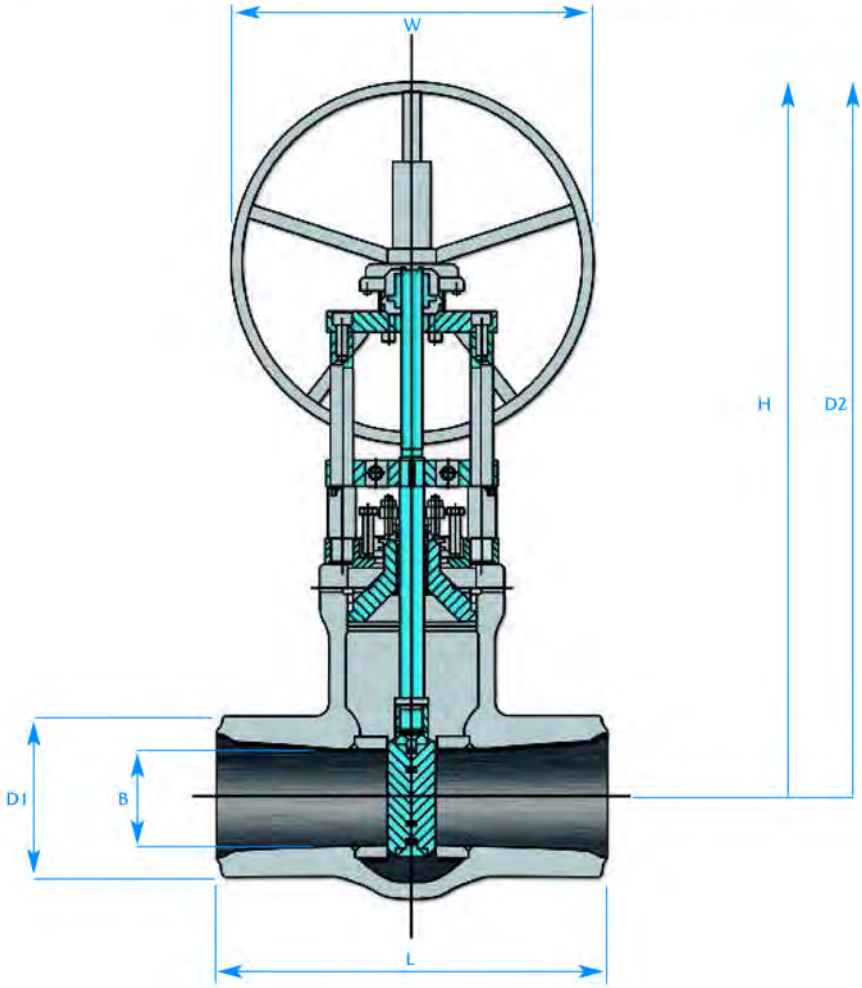






MATERIAL & PARTS SPECIFICATION

Fig No. 5095, Butt Weld Ends, Class 1000



Hydrostatic Shell & Seat Leak Test Pressures PSIG - BAR

Pressure Class	Materials							
	ASTM A-216 WCB		ASTM A-217 WC6		ASTM A-217 WC9		ASTM A-217 C12A	
	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat
1000	3725	2720	3750	2750	3750	2750	3750	2750
	256	187.5	259	189.7	259	189.7	259	189.7

The test values are calculated from separate sections in ASME B16.34 and are not exact equivalents.

Materials of Construction

Part Description	Carbon Steel Specification Fig No. 5095	Alloy Steel Specification Fig No. L5095	Alloy Steel Specification Fig No. R5095	C12A Alloy Steel Specification Fig No. U5095
Body	ASTM A216 Gr. WCB†	ASTM A217 Gr WC6	ASTM A217 Gr WC9	ASTM A217 Gr C12A
Bonnet	ASTM A216 Gr. WCB† Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Cover	ASTM A516 Gr.60	ASTM A182 F11	ASTM A182 F11	ASTM A182 F11
Stem	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32
Gland	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630
Seats	ASTM A105 Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Yoke Sleeve	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2
Handwheel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel
Disc	ASTM A216 Gr WCB Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Gland Packing	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings
Pressure Seal Ring	Expanded Graphite	Expanded Graphite	Expanded Graphite	Expanded Graphite
	† 0.25% Carbon max.	Hardfacing is stellite or equivelent		

Fig No. 5095, Butt Weld Ends, Class 1000

ASME Class 1000 FULL BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	5095 - FB	290	17.01 5	.79	4.41	46.06	30.35	18	1624	0.13
		132	432	147	112	1170	771	457		
6		466	20.00	7.05	5.75	56.22	37.60	24	2840	0.12
		212	508	179	146	1428	955	610		
8		1054	25.98	10.94	7.48	82.56	58.94	30	4945	0.11
		479	660	278	190	2097	1497	762		
10		1577	30.98	12.24	8.98	95.67	68.35	36	7255	0.11
		717	787	311	228	2430	1736	914		
12		2376	35.98	15.94	10.94	113.27	80.59	36	11004	0.11
		1080	914	405	278	2877	2047	914		
14		2988	39.02	16.46	12.20	121.57	84.72	24	13832	0.10
		1358	991	418	310	3088	2152	610		
16		4574	42.99	18.90	13.66	134.29	92.87	24	17523	0.10
		2079	1092	480	347	3411	2359	610		
18		7817	47.99	19.33	15.59	167.17	118.43	36	23116	0.10
		3553	1219	491	396	4246	3008	914		
20		7682	52.01	20.35	17.32	167.17	118.43	36	28828	0.10
		3492	1321	517	440	4246	3008	914		
24		9148	60.98	22.87	19.29	175.59	123.39	36	36125	0.09
		4158	1549	581	490	4460	3134	914		

ASME Class 1000 STANDARD BORE

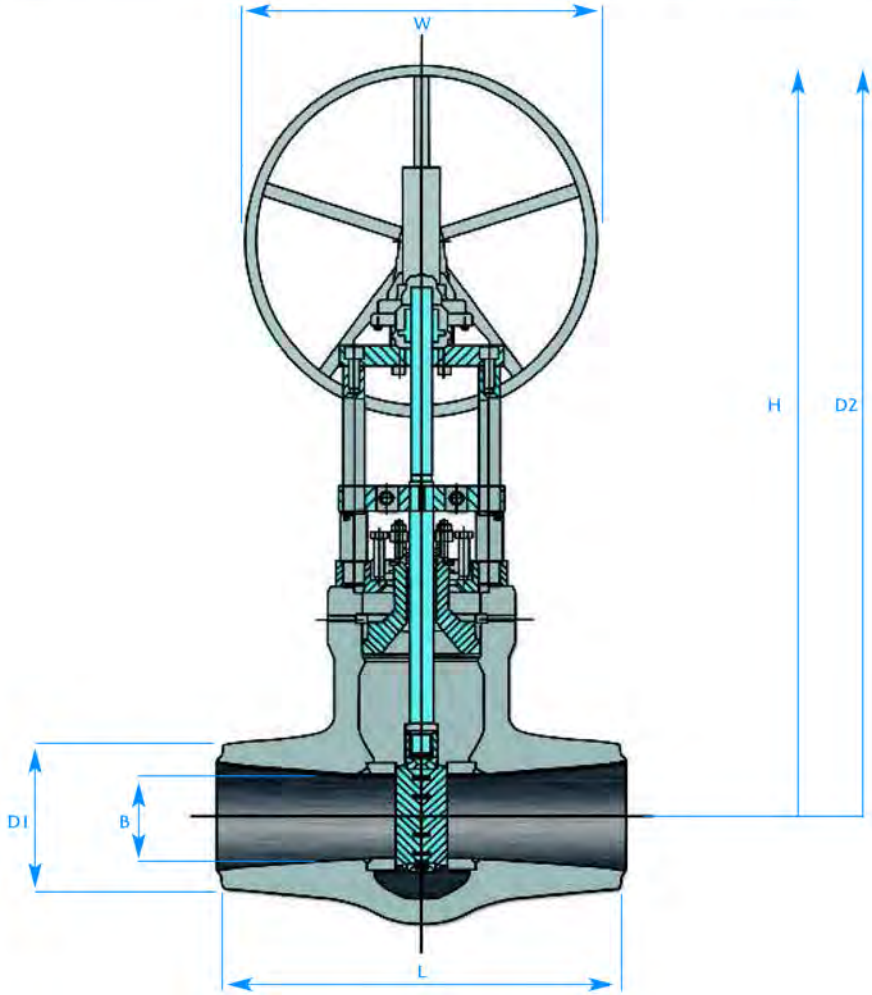
Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA				NA					
6	5095 - PB	323	20.00	7.44	4.41	46.06	30.35	18	1384	0.43
		147	508	189	112	1170	771	457		
8		579	25.98	10.08	5.75	56.22	37.60	24	2402	0.41
		263	660	256	146	1428	955	610		
10		1164	30.98	11.46	7.48	82.56	58.94	30	4280	0.33
		529	787	291	190	2097	1497	762		
12		1749	35.98	14.33	8.98	95.67	68.35	36	6370	0.29
		795	914	364	228	2430	1736	914		
14		2035	39.02	15.94	9.61	99.80	70.83	36	7024	0.35
		925	991	405	244	2535	1799	914		
16		2752	42.99	17.80	10.94	113.27	80.59	36	9047	0.37
		1251	1092	452	278	2877	2047	914		
18		3826	47.99	19.92	12.20	121.57	84.72	24	11152	0.39
		1739	1219	506	310	3088	2152	610		
20		5419	52.01	22.28	13.66	134.29	92.87	24	14092	0.37
		2463	1321	566	347	3411	2359	610		
24		8307	60.98	22.95	16.46	167.17	118.43	36	21042	0.35
		3776	1549	583	418	4246	3008	914		

ASME Class 1000 REDUCED BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA				NA					
6	NA				NA					
8	5095 - RB	383	25.98	8.90	4.41	46.06	30.35	18	997	2.39
		174	660	226	112	1170	771	457		
10		647	30.98	11.65	5.75	56.22	37.60	24	1743	1.98
		294	787	296	146	1428	955	610		
12		1263	35.98	14.37	7.48	82.56	58.94	30	3329	1.07
		574	914	365	190	2097	1497	762		
14		1826	39.02	15.83	8.98	95.67	68.35	36	5518	0.57
		830	991	402	228	2430	1736	914		
16		2132	42.99	16.93	9.61	99.80	70.83	36	5629	0.95
		969	1092	430	244	2535	1799	914		
18		2913	47.99	19.92	10.94	113.27	80.59	36	7495	0.86
		1324	1219	506	278	2877	2047	914		
20		3978	52.01	22.28	12.20	121.57	84.72	24	9262	0.87
		1808	1321	566	310	3088	2152	610		
24		5909	60.98	23.07	13.66	134.29	92.87	24	10463	1.40
		2686	1549	586	347	3411	2359	610		

MATERIAL & PARTS SPECIFICATION

Fig No. 5096, Butt Weld Ends, Class 1690



Hydrostatic Shell & Seat Leak Test Pressures PSIG - BAR

Pressure Class	Materials							
	ASTM A-216 WCB		ASTM A-217 WC6		ASTM A-217 WC9		ASTM A-217 C12A	
	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat
1690	6275	4595	6350	4650	6350	4650	6350	4650
	432	316.5	437	320.5	437	320.5	437	320.5

The test values are calculated from separate sections in ASME B16.34 and are not exact equivalents.

Materials of Construction

Part Description	Carbon Steel Specification Fig No. 5096	Alloy Steel Specification Fig No. L5096	Alloy Steel Specification Fig No. R5096	C12A Alloy Steel Specification Fig No. U5096
Body	ASTM A216 Gr. WCB†	ASTM A217 Gr WC6	ASTM A217 Gr WC9	ASTM A217 Gr C12A
Bonnet	ASTM A216 Gr. WCB† Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Cover	ASTM A516 Gr.60	ASTM A182 F11	ASTM A182 F11	ASTM A182 F11
Stem	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32
Gland	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630
Seats	ASTM A105 Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Yoke Sleeve	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2
Handwheel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel
Disc	ASTM A216 Gr WCB Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Gland Packing	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings
Pressure Seal Ring	Expanded Graphite	Expanded Graphite	Expanded Graphite	Expanded Graphite
	† 0.25% Carbon max.	Hardfacing is stellite or equivelent		

Fig No. 5096, Butt Weld Ends, Class 1690

ASME Class 1690 FULL BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	5096 - FB	337	19.02	5.47	3.94	41.34	27.13	24	945	0.34
		153	483	139	100	1050	689	610		
6		711	22.01	8.03	5.16	55.83	37.32	30	2210	0.13
		323	559	204	131	1418	948	762		
8		1148	27.99	10.24	6.42	79.33	56.89	30	2855	0.24
		522	711	260	163	2015	1445	762		
10		2114	34.02	11.81	7.87	89.88	63.54	30	4116	0.27
		961	864	300	200	2283	1614	762		
12		3674	39.02	15.43	9.84	113.46	80.63	36	7747	0.15
		1670	991	392	250	2882	2048	914		
14		4981	41.97	17.24	10.94	133.62	96.22	36	9976	0.14
		2264	1066	438	278	3394	2444	914		
16		6523	47.01	17.48	12.20	140.00	99.41	36	11215	0.19
		2965	1194	444	310	3556	2525	914		
18		10446	52.99	17.83	14.09	161.34	112.56	36	16725	0.14
		4748	1346	453	358	4098	2859	914		
20		11231	57.99	22.24	15.83	161.34	112.56	36	22210	0.12
		5105	1473	565	402	4098	2859	914		
24		13539	65.98	25.75	17.32	171.26	118.11	36	18650	0.36
		6154	1676	654	440	4350	3000	914		

ASME Class 1690 STANDARD BORE

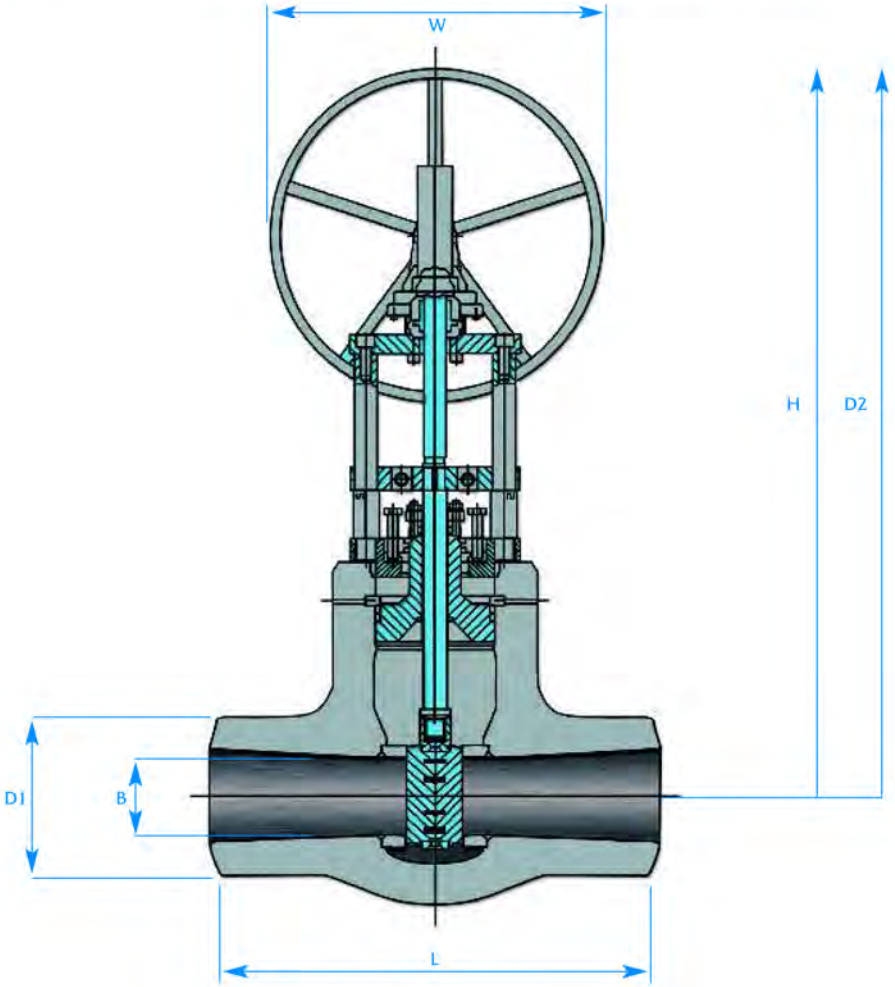
Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA			NA						
6	5096 - PB	392	22.01	7.36	3.94	41.34	27.13	24	1052	0.58
		178	559	187	100	1050	689	610		
8		821	27.99	9.09	5.16	55.83	37.32	30	1829	0.57
		373	711	231	131	1418	948	762		
10		1410	34.02	11.77	6.42	79.33	56.89	30	2858	0.57
		641	864	299	163	2015	1445	762		
12		2308	39.02	14.88	7.87	89.88	63.54	30	4506	0.46
		1049	991	378	200	2283	1614	762		
14		2913	41.97	14.41	8.54	106.02	76.85	36	5124	0.53
		1324	1066	366	217	2693	1952	914		
16		4030	47.01	17.87	9.84	113.46	80.63	36	6944	0.50
		1832	1194	454	250	2882	2048	914		
18		5555	52.99	20.24	10.94	133.62	96.22	36	8480	0.54
		2525	1346	514	278	3394	2444	914		
20		7590	57.99	21.42	12.20	140.00	99.41	36	10607	0.53
		3450	1473	544	310	3556	2525	914		
24		12294	65.98	24.84	14.09	162.05	112.56	36	15639	0.51
		5588	1676	631	358	4116	2859	914		

ASME Class 1690 REDUCED BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA			NA						
6	NA			NA						
8	5096 - RB	460	27.99	9.41	3.94	41.34	27.13	24	777	3.18
		209	711	239	100	1050	689	610		
10		942	34.02	11.26	5.16	55.83	37.32	30	1411	2.34
		428	864	286	131	1418	948	762		
12		1544	39.02	14.49	6.42	79.33	56.89	30	2276	1.81
		702	991	368	163	2015	1445	762		
14		2416	41.97	15.28	7.87	89.88	63.54	30	3910	0.91
		1098	1066	388	200	2283	1614	762		
16		3095	47.01	16.93	8.54	106.02	76.85	36	4251	1.33
		1407	1194	430	217	2693	1952	914		
18		5410	52.99	20.00	9.84	113.46	80.63	36	5887	1.12
		2459	1346	508	250	2882	2048	914		
20		5854	57.99	20.91	10.94	133.62	96.22	36	7207	1.14
		2661	1473	531	278	3394	2444	914		
24		8261	65.98	25.20	12.20	140.00	99.41	36	8066	1.90
		3755	1676	640	310	3556	2525	914		

MATERIAL & PARTS SPECIFICATION

Fig No. 5099, Butt Weld Ends, Class 2850



Hydrostatic Shell & Seat Leak Test Pressures PSIG - BAR

Pressure Class	Materials							
	ASTM A-216 WCB		ASTM A-217 WC6		ASTM A-217 WC9		ASTM A-217 C12A	
	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat
2850	10575	7740	10700	7840	10700	7840	10700	7840
	728	533.7	737	540.5	737	540.5	737	540.5

The test values are calculated from separate sections in ASME B16.34 and are not exact equivalents.

Materials of Construction

Part Description	Carbon Steel Specification Fig No. 5099	Alloy Steel Specification Fig No. L5099	Alloy Steel Specification Fig No. R5099	C12A Alloy Steel Specification Fig No. U5099
Body	ASTM A216 Gr. WCB†	ASTM A217 Gr WC6	ASTM A217 Gr WC9	ASTM A217 Gr C12A
Bonnet	ASTM A216 Gr. WCB† Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Cover	ASTM A516 Gr.60	ASTM A182 F11	ASTM A182 F11	ASTM A182 F11
Stem	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32	ASTM A565 - XM 32
Gland	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630	ASTM B150 Gr.630
Seats	ASTM A105 Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Yoke Sleeve	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2	ASTM A439 - D2
Handwheel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel	Cast Iron/Steel
Disc	ASTM A216 Gr WCB Stellite Faced	ASTM A182 F11 Stellite Faced	ASTM A182 F22 Stellite Faced	ASTM A182 F91 Stellite Faced
Gland Packing	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings	Flexible Graphite Rings
Pressure Seal Ring	Expanded Graphite	Expanded Graphite	Expanded Graphite	Expanded Graphite
	† 0.25% Carbon max.	Hardfacing is stellite or equivelent		

Fig No. 5099, Butt Weld Ends, Class 2850

ASME Class 2850 FULL BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	5099 - FB	427	20.98	5.39	3.15	54.76	41.57	30	424	1.35
		194	533	137	80	1391	1056	762		
6		884	24.02	7.99	4.17	64.09	47.13	30	896	0.64
		402	610	203	106	1628	1197	762		
8		1441	30.00	10.20	5.24	72.83	52.09	30	1171	1.40
		655	762	259	133	1850	1323	762		
10		2266	35.98	12.09	6.57	92.17	67.64	36	1876	1.32
		1030	914	307	167	2341	1718	914		
12		5181	40.98	13.98	8.27	109.49	78.58	36	3288	0.87
		2355	1041	355	210	2781	1996	914		
14		6490	43.98	16.54	8.98	108.15	74.88	36	3755	0.99
		2950	1117	420	228	2747	1902	914		
16		10424	49.02	17.17	10.28	136.02	97.60	36	4934	0.99
		4738	1245	436	261	3455	2479	914		
18		14291	55.00	17.72	12.20	140.00	99.41	36	7809	0.63
		6496	1397	450	310	3556	2525	914		
20		15286	60.00	18.78	12.99	145.00	103.66	36	8065	0.91
		6948	1524	477	330	3683	2633	914		
24		17901	67.99	24.06	15.24	172.72	116.69	36	10618	1.10
		8137	1727	611	387	4387	2964	914		

ASME Class 2850 STANDARD BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA			NA						
6	5099 - PB	486	24.02	7.68	3.15	54.76	41.57	30	571	1.57
		221	610	195	80	1391	1056	762		
8		972	30.00	9.06	4.17	64.09	47.13	30	936	2.19
		442	762	230	106	1628	1197	762		
10		1753	35.98	12.17	5.24	72.83	52.09	30	1493	2.09
		797	914	309	133	1850	1323	762		
12		2882	40.98	14.17	6.57	92.17	67.64	36	2480	1.52
		1310	1041	360	167	2341	1718	914		
14		3828	43.98	14.17	7.05	86.02	59.45	24	2725	1.88
		1740	1117	360	179	2185	1510	610		
16		5837	49.02	17.20	8.27	109.49	78.58	36	3855	1.62
		2653	1245	437	210	2781	1996	914		
18		7506	55.00	19.80	8.98	108.15	74.88	36	4346	2.05
		3412	1397	503	228	2747	1902	914		
20		11317	60.00	21.42	10.28	136.02	97.60	36	5904	1.70
		5144	1524	544	261	3455	2479	914		
24		16254	67.99	29.29	12.20	140.00	99.41	36	8159	1.86
		7388	1727	744	310	3556	2525	914		

ASME Class 2850 REDUCED BORE

Size mm	Fig No.	Weight lbs / kgs	Length L	Casting OD D1	Valve Bore B	Withdrawal Space D2	Height Closed H	H/W Dia W	CV	K Factor
5	NA			NA						
6	NA			NA						
8	5099 - RB	579	30.00	9.45	3.15	54.76	41.57	30	428	10.49
		263	762	240	80	1391	1056	762		
10		1122	35.98	11.14	4.17	64.09	47.13	30	776	7.73
		510	914	283	106	1628	1197	762		
12		1932	40.98	14.41	5.24	72.83	52.09	30	1261	5.89
		878	1041	366	133	1850	1323	762		
14		3007	43.98	15.08	6.57	92.17	67.64	36	2212	2.85
		1367	1117	383	167	2341	1718	914		
16		4085	49.02	17.09	7.05	86.02	59.45	24	2349	4.35
		1857	1245	434	179	2185	1510	610		
18		6237	55.00	20.51	8.27	109.49	78.58	36	3398	3.35
		2835	1397	521	210	2781	1996	914		
20		7922	60.00	20.71	8.98	108.15	74.88	36	3898	3.90
		3601	1524	526	228	2747	1902	914		
24		12217	67.99	24.61	10.28	136.02	97.60	36	4792	5.40
		5553	1727	625	261	3455	2479	914		

High Pressure Cast Steel Pressure Seal Parallel Slide Gate Valve

ASME B16.34 (2004) Interpolated 1000, 1690 and 2850 Standard & Special Class Pressure/Temperature Ratings

Class 1000 Metric Units

		ASTM	ASME								Working Pressure in barg				Temperature in °C								
	End	Body	B16.34	-29 to																			
Fig No	Conn	Material	Class	38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
5095	BWE	WCB	1000 Standard	170.2	167.1	155.3	150.2	146.0	139.8	132.8	129.0	125.2	121.2	115.8	95.9	76.7*	-	-	-	-	-	-	-	-
5095XR	BWE	WCB	1000 Special	172.4	172.4	172.1	170.1	168.6	168.4	168.4	167.0	163.0	157.0	144.7	119.9	95.9*	-	-	-	-	-	-	-	-
L5095	BWE	WC6	1000 Standard	172.4	172.4	171.6	165.8	159.9	154.5	142.9	137.8	134.1	129.4	122.0	116.8	112.7	105.6	85.8	49.7	42.3	29.3	20.3	-	-
L5095XR	BWE	WC6	1000 Special	172.4	172.4	172.4	172.4	172.4	172.4	172.4	172.4	171.4	168.3	167.4	165.5	159.2	142.5	107.2	62.0	53.0	36.7	25.5	-	-
R5095	BWE	WC9	1000 Standard	172.4	172.4	171.8	167.3	162.1	154.5	142.9	137.8	134.1	129.4	122.0	116.8	112.7	105.6	94.1	61.5	52.1	35.0	23.0	-	-
R5095XR	BWE	WC9	1000 Special	172.4	172.4	172.1	169.9	167.4	166.6	165.9	165.3	164.0	162.6	162.6	162.6	157.1	142.5	119.0	76.8	65.1	43.9	28.7	-	-
U5095	BWE	C12A	1000 Standard	172.4	172.4	171.8	167.3	162.1	154.5	142.9	137.8	134.1	129.4	122.0	116.8	112.7	105.6	94.1	83.6	83.2	79.8	65.0	48.7	33.1
U5095XR	BWE	C12A	1000 Special	172.4	172.4	172.4	172.4	172.4	172.4	172.4	172.4	171.4	168.3	167.4	165.5	159.2	142.5	119.0	96.6	96.6	95.3	81.2	60.9	41.4

Class 1690 Metric Units

		ASTM	ASME								Working Pressure in barg				Temperature in °C								
	End	Body	B16.34	-29 to																			
Fig No	Conn	Material	Class	38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
5096	BWE	WCB	1690 Standard	287.6	282.3	262.5	253.9	246.7	236.3	224.3	218.1	211.6	204.8	195.6	162.0	129.6*	-	-	-	-	-	-	-	-
5096XR	BWE	WCB	1690 Special	291.3	291.3	290.9	287.5	284.9	284.6	284.6	282.3	275.6	265.3	244.5	202.6	162*	-	-	-	-	-	-	-	-
L5096	BWE	WC6	1690 Standard	291.3	291.3	290.0	280.2	270.2	261.1	241.5	232.8	226.6	218.6	206.2	197.2	190.4	178.3	144.9	83.9	71.6	49.6	34.4	-	-
L5096XR	BWE	WC6	1690 Special	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	289.7	284.5	282.9	279.6	265.7	240.8	181.2	104.9	89.5	62.0	43.0	-	-
R5096	BWE	WC9	1690 Standard	291.3	291.3	290.2	282.6	274.2	261.1	241.5	232.8	226.6	218.6	206.2	197.2	190.4	178.3	158.8	103.9	88.1	59.3	38.8	-	-
R5096XR	BWE	WC9	1690 Special	291.3	291.3	290.8	287.1	282.9	281.6	280.4	279.4	277.2	274.7	274.7	274.7	265.7	240.8	201.2	129.8	110.1	74.1	48.5	-	-
U5096	BWE	C12A	1690 Standard	291.3	291.3	290.2	282.6	274.2	261.1	241.5	232.8	226.6	218.6	206.2	197.2	190.4	178.3	158.8	141.3	140.7	134.9	109.9	82.3	55.9
U5096XR	BWE	C12A	1690 Special	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	289.7	284.5	282.9	279.6	265.7	240.8	201.2	163.5	163.5	161.1	137.3	102.9	69.9

Class 2850 Metric Units

		ASTM	ASME								Working Pressure in barg				Temperature in °C								
	End	Body	B16.34	-29 to																			
Fig No	Conn	Material	Class	38	50	100	150	200	250	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
5099	BWE	WCB	2850 Standard	485.1	476.2	442.7	428.2	416.1	398.4	378.3	367.8	356.8	345.5	329.8	273.3	218.5*	-	-	-	-	-	-	-	-
5099XR	BWE	WCB	2850 Special	491.2	491.2	490.5	484.8	480.4	480.0	480.0	471.6	464.7	447.5	412.3	341.5	273.2*	-	-	-	-	-	-	-	-
L5099	BWE	WC6	2850 Standard	491.2	491.2	489.1	472.5	455.6	440.2	407.1	392.5	382.2	368.5	347.5	332.4	321.2	300.8	244.4	141.5	120.7	83.7	58.0	-	-
L5099XR	BWE	WC6	2850 Special	491.2	491.2	491.2	491.2	491.2	491.2	491.2	491.2	488.6	479.8	476.9	471.6	448.1	406.2	305.5	176.8	150.9	104.5	72.5	-	-
R5099	BWE	WC9	2850 Standard	491.2	491.2	489.5	476.8	462.2	440.2	407.1	392.5	382.2	368.5	347.5	332.4	321.2	300.8	267.9	175.2	148.5	100.0	65.4	-	-
R5099XR	BWE	WC9	2850 Special	491.2	491.2	490.4	484.0	477.1	474.8	472.9	471.2	467.4	463.2	463.2	463.2	448.1	406.2	339.1	219.0	185.6	125.0	81.7	-	-
U5099	BWE	C12A	2850 Standard	491.2	491.2	489.5	476.8	462.2	440.2	407.1	392.5	382.2	368.5	347.5	332.4	321.2	300.8	267.9	238.1	237.1	227.4	185.3	138.7	94.3
U5099XR	BWE	C12A	2850 Special	491.2	491.2	491.2	491.2	491.2	491.2	491.2	491.2	488.6	479.8	476.9	471.6	448.1	406.2	339.1	275.5	275.5	271.6	231.5	173.4	117.9

* Use of WCB is permissible, but not recommended for prolonged use above 425°F
WC6 and WC9 are not to be used above 595 °F

For intermediate ratings use linear interpolation

ASME B16.34 (2004) Interpolated 1000, 1690, and 2850 Standard & Special Class Pressure/Temperature Ratings

Class 1000 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	Working Pressure in psig 650	700	750	800	Temperature in °F 850	900	950	1000	1050	1100	1150	1200
5095	BWE	WCB	1690 Standard	2468	2262	2183	2112	2011	1894	1833	1769	1689	1372	1062*	-	-	-	-	-	-	-
5095XR	BWE	WCB	1690 Special	2500	2500	2467	2444	2444	2444	2383	2305	2116	1716	1328*	-	-	-	-	-	-	-
L5095	BWE	WC6	1690 Standard	2500	2500	2406	2311	2217	2017	1961	1894	1773	1694	1623	1499	1062	722	478	322	-	-
L5095XR	BWE	WC6	1690 Special	2500	2500	2500	2500	2500	2500	2500	2444	2428	2400	2256	1956	1328	900	600	400	-	-
R5095	BWE	WC9	1690 Standard	2500	2500	2428	2351	2217	2017	1961	1894	1773	1694	1623	1499	1288	889	583	367	-	-
R5095XR	BWE	WC9	1690 Special	2500	2500	2449	2428	2416	2405	2384	2356	2356	2356	2256	2000	1573	1116	728	456	-	-
U5095	BWE	C12A	1690 Standard	2500	2500	2428	2351	2217	2017	1961	1894	1773	1694	1623	1499	1288	1212	1200	1006	744	478
U5095XR	BWE	C12A	1690 Special	2500	2500	2500	2500	2500	2500	2500	2444	2428	2400	2256	2000	1573	1401	1401	1256	928	600

Class 1690 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	Working Pressure in psig 650	700	750	800	Temperature in °F 850	900	950	1000	1050	1100	1150	1200
5096	BWE	WCB	1690 Standard	4173	3824	3684	3571	3397	3199	3093	2999	2857	2316	1796*	-	-	-	-	-	-	-
5096XR	BWE	WCB	1690 Special	4225	4225	4169	4137	4137	4137	4028	3893	3572	2896	2247*	-	-	-	-	-	-	-
L5096	BWE	WC6	1690 Standard	4225	4225	4067	3904	3746	3408	3313	3199	2996	2861	2744	2530	1796	1217	811	541	-	-
L5096XR	BWE	WC6	1690 Special	4225	4225	4225	4225	4225	4225	4225	4130	4106	4056	3814	3307	2247	1521	1014	676	-	-
R5096	BWE	WC9	1690 Standard	4225	4225	4102	3977	3746	3408	3313	3199	2996	2861	2744	2530	2175	1505	985	619	-	-
R5096XR	BWE	WC9	1690 Special	4225	4225	4163	4101	4079	4062	4033	3983	3983	3983	3814	3380	2658	1882	1233	772	-	-
U5096	BWE	C12A	1690 Standard	4225	4225	4102	3977	3746	3408	3313	3199	2996	2861	2744	2530	2175	2050	2028	1701	1256	811
U5096XR	BWE	C12A	1690 Special	4225	4225	4225	4225	4225	4225	4225	4130	4106	4056	3814	3380	2658	2371	2371	2124	1571	1014

Class 2850 Imperial Units

Fig No	End Conn	ASTM Body Material	ASME B16.34 Class	-20 to 100	200	300	400	500	600	Working Pressure in psig 650	700	750	800	Temperature in °F 850	900	950	1000	1050	1100	1150	1200
5099	BWE	WCB	2850 Standard	7035	6448	6214	6019	5728	5392	5216	5044	4822	3910	3028*	-	-	-	-	-	-	-
5099XR	BWE	WCB	2850 Special	7125	7125	7034	6961	6961	6961	6795	6566	6025	4885	3786*	-	-	-	-	-	-	-
L5099	BWE	WC6	2850 Standard	7125	7125	6858	6584	6314	5745	5591	5392	5050	4822	4628	4269	3028	2052	1368	912	-	-
L5099XR	BWE	WC6	2850 Special	7125	7125	7125	7125	7125	7125	7125	6965	6921	6840	6435	5579	3786	2565	1710	1140	-	-
R5099	BWE	WC9	2850 Standard	7125	7125	6920	6703	6314	5745	5591	5392	5050	4822	4628	4269	3671	2542	1660	1214	-	-
R5099XR	BWE	WC9	2850 Special	7125	7125	7023	6914	6880	6851	6800	6719	6719	6719	6435	5700	4480	3175	2076	1304	-	-
U5099	BWE	C12A	2850 Standard	7125	7125	6920	6703	6314	5745	5591	5392	5050	4822	4628	4269	3671	3448	3420	2869	2116	1368
U5099XR	BWE	C12A	2850 Special	7125	7125	7125	7125	7125	7125	7125	6965	6921	6840	6435	5700	4480	4129	4129	3584	2646	1710

* Use of WCB is permissible, but not recommended for prolonged use above 800°F
WC6 and WC9 are not to be used above 1100°F

For intermediate ratings use linear interpolation