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Excellent Engineering Solutions

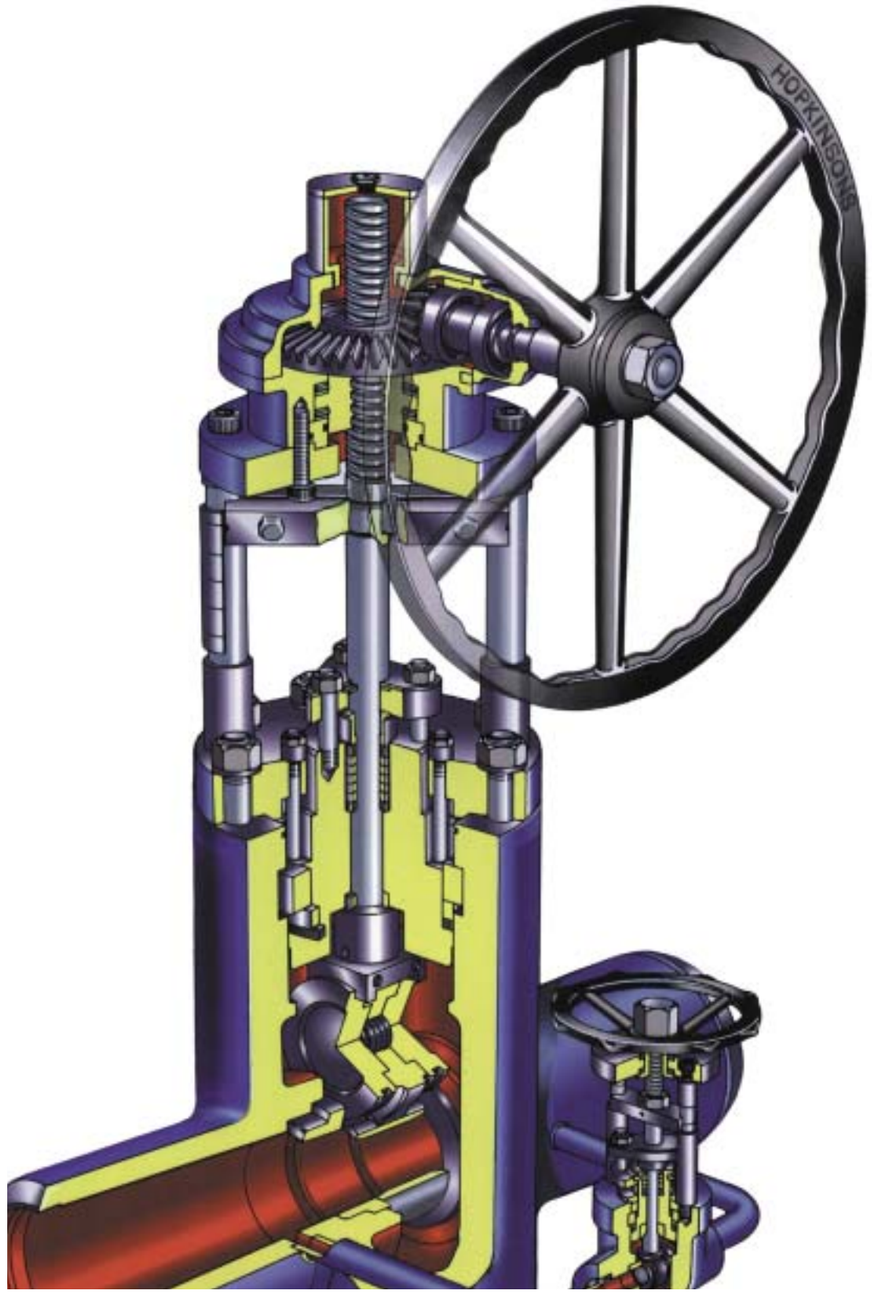
WEIR VALVES & CONTROLS

GATE, GLOBE, CHECK & SAFETY VALVES

Weir Valves & Controls UK Ltd

HOPKINSONS

Gate, Globe, Check & Safety Valves



Excellent Engineering Solutions

WEIR VALVES & CONTROLS

WEIR VALVES & CONTROLS

Weir Valves & Controls brings competitive unity to a group of specialist valve manufacturing companies located across the globe. Combining and maximising the strategic aims of the member companies, Weir Valves & Controls develop a versatile, comprehensive and proactive relationship with customers, contractors and end users.

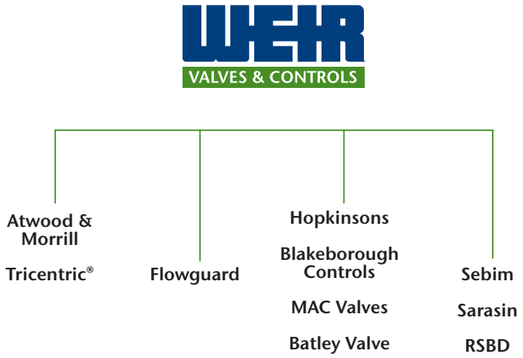
A rigorous programme of information management ensures each member company is aware of new developments on a worldwide basis. This means that the group is able to take a more anticipatory role in defining the future needs and expectations of the market by fully utilising the organisation's critical resources to create and add value to its customers while generating a real competitive advantage for Weir Valves & Controls.

Weir Valves & Controls is a leading world renowned OEM of isolation and control valve products for the global Energy sector.

The division continually meets market demands with proven reliability and flexibility by utilising engineered product configuration systems and a continuous programme of IT development in the move towards eBusiness.

With a comprehensive range of engineered valve products Weir Valves & Controls have developed an extensive global installed base and expertise across a wide range of industries sectors:

- Power Generation
- General Industrial
- Oil & Gas Production
- Refining
- Petrochemical
- Chemical
- Pulp & Paper
- Desalination



Atwood & Morrill Co., Inc.	3 Way valves Butterfly valves Check valves Gate valves Globe valves Isolation devices Safety valves
Tricentric	Tricentric valves
Batley Valve	Isolation & Control Butterfly valves
Blakeborough	Choke valves Globe Control valves Severe service valves & Desuperheaters
Flowguard	Pipeline Surge Absorbers Pulsation Dampers Thermal Expansion Compensators
Hopkinsons	Check valves Gate valves Globe valves Isolation Devices Safety valves
MACValves	Ball valves Pipeline Check valves & integrated systems Through Conduit Gate valves
Sebim	Nuclear Safety Valves
Sarasin-RSBD	Change Over Valves Flame Arresters Low Pressure and Vacuum Valves Pilot Operated Safety Relief Valves Pressure Relief Manhole Cover Spring Loaded Safety Relief Valves Tank Blanketing System

QUALITY ASSURANCE

Weir Valves & Controls limited operates quality programmes to cover the full scope of their activities. Comprehensive quality systems have been developed to serve the power, oil and gas and industrial markets which they serve.

Weir Valves & Controls holds approvals to:

- ASME Section III 'N', 'NPT', 'NV'
- ASME Section I 'V'
- BS EN ISO 9001:1994
- API Q1 TO API LICENCES API 6D (6D-0182) AND API 6A (6A-0445)
- TUV - AD MERKBLATT WRD HP 0

6A-0445
6D-0182

The Quality systems have been approved for the supply of products to meet the requirements of the pressure equipment directive and compliance modules A,D1,H,B&D have been applied in categories I through IV respectively.

Weir Valves & Controls is committed to compliance with legislation and has an established environment and health and safety policy.

An ongoing commitment to customer care is met through the process of continuous improvement and the further development of our systems and processes towards meeting ISO 9001:2000.

VALVE TESTING FACILITIES

All pressure containing items are hydrostatically tested, seat leakage tested and functionally tested. In addition, gas, packing emission, cryogenic and advanced functional testing can be arranged.

Steam Testing can be applied to ASME Safety Valves of up to 6" bore size and up to set pressures 100 barg (1450 psig). The Steam Test Facility comprises a Steam Generator which supplies saturated steam at pressures up to 120 barg to an Accumulator Vessel which stores the steam until required. This in turn supplies steam to a Test Vessel on which the safety valve is mounted for testing. Pop testing of the safety valve is performed - by admitting steam from the Accumulator Vessel via pipework and a flow/pressure control into the Test Vessel, and recording the set pressure, full lift pressure and re-seat pressure. A check on leak tightness is also made. All measurements are controlled by a fully integrated, computerised system simulating customers actual operating conditions.

MATERIAL TESTING FACILITIES

- Non-destructive examination by radiography, ultrasonics, magnetic particle and liquid penetrant.
- Chemical analysis by computer controlled direct reading emission spectrometer.
- Mechanical testing for tensile properties at ambient and elevated temperatures, bend and hardness testing. Charpy testing at ambient, elevated and sub-zero temperatures.

Further technical information can be obtained from our Web site http://www.weirvalve.com

HOPKINSONS

Hopkinsons manufacture valves and boiler mountings for use on steam raising plant of any size and type.

Hopkinsons brand products, renowned for long and dependable service life, can be seen on installations ranging from shell boilers for heating and process steam up to the highest capacity units on electricity generating stations.

In the nuclear power industry, Hopkinsons has particular expertise in the design and production of safety related items such as fast operating main steam and main feed isolation valves. The company also produces valves for isolation, regulating, pressure relief, instrument and drain, and specific plant protection duties on the new generation of Combined Cycle Gas Turbine Power Stations.

CONTENTS

FULL BORE & VENTURI PARALLEL SLIDE GATE VALVES

The Hopkinsons Full Bore & Venturi design of stop valve are our standard recommendation when a gate valve is required for steam or feedwater duty in the medium and high pressure ranges.

MAIN APPLICATIONS

- General purpose stop valve
- Main steam and feedwater isolation
- Boiler circulating pump isolation

- The basic design is also incorporated in valves for other duties such as:
- Feedwater heater protection
- Feed pump leak-off
- Nuclear Applications (ASME Section III, Class 1,2 & 3) (Described in other publications available on request)
- Regulating duty with V-ported seat

SPECIAL FEATURES

Valves can be offered to incorporate features such as quick closure, live loaded gland, double stuffing box with lantern ring and bleed-off point, back seat, seal welded body/cover joint.

MAIN ADVANTAGES

- Fluid tightness achieved by fluid pressure - not from mechanical wedging action thus eliminating thermal binding*
- Complete flow isolation in either direction
- Minimum pressure drop
- Freedom from leakage independent of temperature or pressure changes
- Self-aligning fully supported discs
- Inherent self-cleaning action
- In-line maintenance

*Thermal Binding is associated with Wedge Gate Valves and occurs when a Wedge Gate Valve is closed at high temperature and is allowed to cool before attempting opening. Thermal binding cannot occur with a parallel slide gate valve.

Parallel Slide Gate Valves

Ratings:	ASME Class 150 to 4500
Sizes:	15 to 1200 mm ½ to 48 in
Temperature Ratings:	-29ºC to 593ºC -20ºF to 1100ºF
Materials:	Carbon Steel, Alloy Steel, Stainless Steel, Bronze.
End Connections:	Flanged, butt weld, socket weld.

PRESSURE/TEMPERATURE RATINGS

Pressure/Temperature ratings are in accordance with ASME B16.34 1996. Alternatively, valves can be supplied to other national standards. Details will be supplied on request.

Full bore parallel slide gate valves in low carbon steel for a nuclear power plant.

Volume production of gate valves for low/ medium general purpose industrial duties.

PARALLEL SLIDE ACTION

FULL BORE

The outstanding feature of the parallel slide design is that of maintaining fluid-tightness without the aid of wedging action. No mechanical stress is exerted between the discs, and there are no problems associated with cool-down of the fluid.

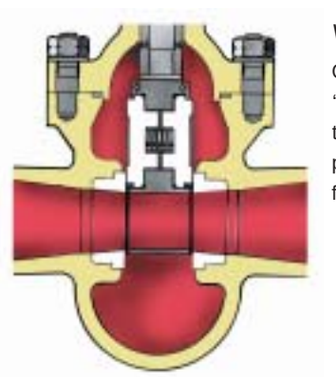
Specially designed non-corrodible springs ensure the discs maintain contact with the seats when the valve is not under pressure. When the valve is closed and the system pressurized, isolation is achieved by the pressure acting on the outlet disc against its seat face.
The sliding action of the discs during opening and closing removes any loose foreign matter from the seat faces. A Sliding stem stop guide provides external guidance and indication of disc position. When the stem guide comes to rest against the shoulders of the pillars, no further operating effort is necessary.

The Full Bore design is used when minimum pressure drop is paramount. The design is based on the seat bore having a diameter approximately equal to 90% of the bore of the connecting pipe.

VENTURI DESIGN

The Venturi design is used when a slightly higher pressure drop is acceptable. The well established principle of fluid flow through a Venturi is used in order to minimise pressure drop. Venturi valves incorporate the design feature of an eye follower. In the fully open position the eye follower bridges the gap between the seats thus giving a smooth flow path and completing the Venturi profile.

Valve Travel and components being smaller than a comparative Full Bore Valve results in a compact superstructure - an advantage where space is restricted. A considerable saving in weight and actuator costs is also achievable due to the reduced seat size. A further advantage is that the design lends itself to steam purging operation without the need to introduce sacrificial valves.

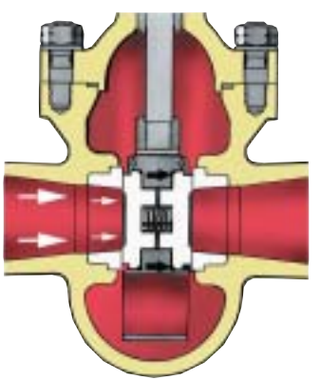


Valve Open

Gives unobstructed flow. ‘eye -piece’ bridges gap to complete Venturi form passage and protect seat faces.

Valve Closed

Fluid pressure (indicated by arrows) holds disc on outlet side in contact with seat.



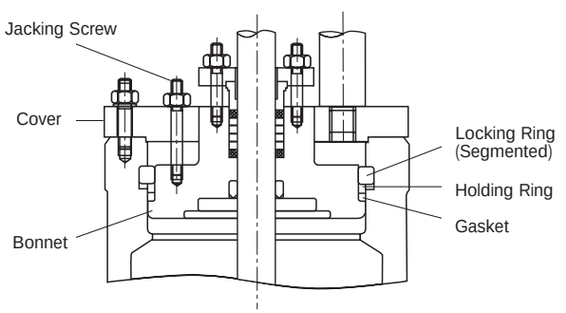
BONNET CLOSURES

CLASS 150 - 600

The bonnet to body closure joint is achieved by a bolted bonnet design incorporating an exfoliated graphite gasket for classes 150 and 300. Ideal for low pressure applications. Class 600 incorporates an exfoliated graphite filled spiral wound gasket. Ideal for medium pressure applications.

CLASS 1000 - 3100

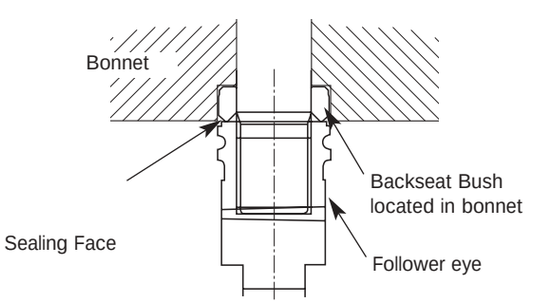
On class 1000 and above a pressure sealed bonnet is incorporated. Hydrostatic pressure acting on the bonnet activates a resilient gasket of exfoliated graphite and thus forms the bonnet seal. This is a very effective seal for high pressure valves.



BACK SEATS

Both Full Bore and Venturi design of valve incorporate a Back Seat. This feature can only be utilised when the valve is in the fully open position with the handwheel wound back until the Eye Follower contacts the mechanical Stop which incorporates the Back Seating facility.

The principle of Back Seating should only be utilised in the unlikely event of gland leakage to isolate the gland from the system pressure until such time that the plant is shut down and repairs may be carried out. Under no circumstances should Back Seating of a valve be carried out with the intention of repairing the faulty gland while the system is pressurized. Under normal operation the valve should only be opened to within 3mm of the Back Seat.



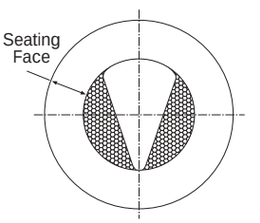
Detail of Backseat Arrangement

GLAND PACKINGS

High efficiency materials such as exfoliated graphite and carbon fibre are used for gland packings and sealing gaskets. Live loaded gland packing system designed for attention-free stem sealing is available as an extra.

REGULATING DUTIES

Parallel slide gate valves can be supplied with V-ported outlet seat making them ideally suitable for regulating duties.



'V' Ported Seat

STEM GUIDE

On a Parallel slide valve, an external Stem Guide serves two important functions:-

a) Stem anti-rotation device

b) Visual indicator of disc position relative to Seat Bore.

To prevent damage to the stem guide and internal fittings of a parallel slide valve particularly on smaller size and those valves which are electrically or gear operated the concept of position seating to effect closure should always be adhered to. For example,

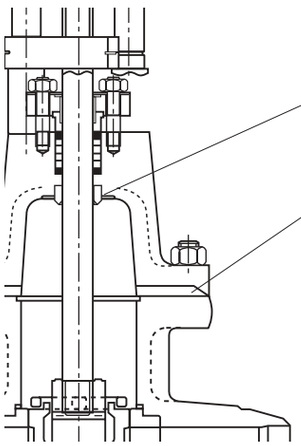
a) When isolating a hand operated valve, once the discs have been moved to the closed position, the handwheel should be turned back to eliminate the backlash.

b) Electrically operated valves should always be set to function on the 'LIMIT' switches and never on TORQUE otherwise extensive damage can be caused through overstressing of the valve components

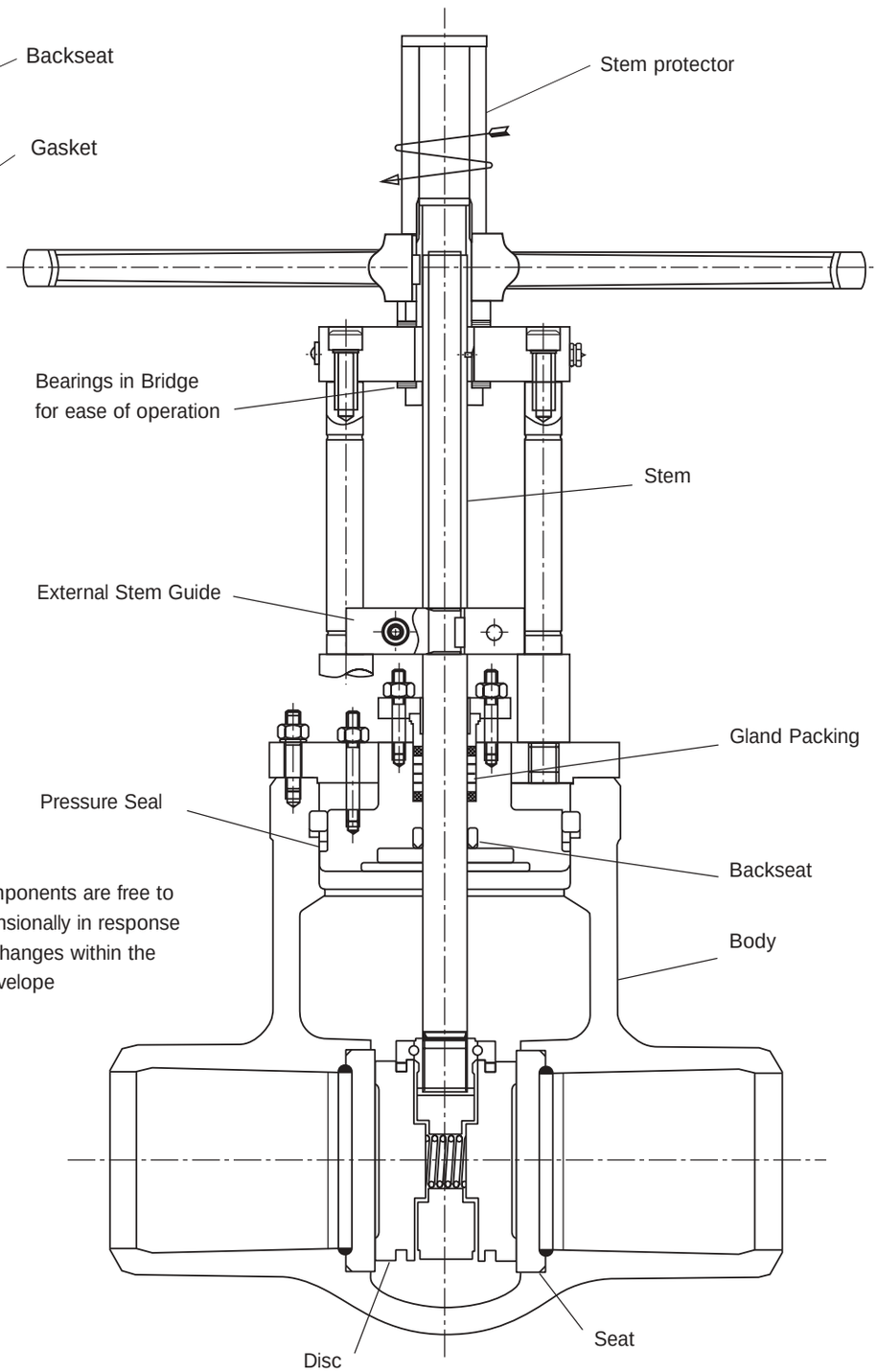
DISC AND SEATS

Disc and seats are of all metal design and suitable for a wide range of temperatures. Where sealing surfaces are produced by depositing hard faced materials a generous thickness is allowed. This allows for many re lapping operations during maintenance.

Bolted bonnet on Class 150 - 600
(Excluding Class 600 Modified 9% Cr
valves). Diagram shows 150 Class valve.



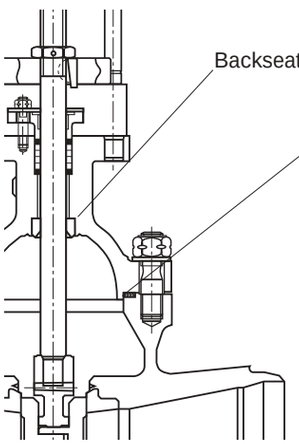
Pressure sealed bonnet on
Class 1000 and above.
Class 600 Modified 9% Cr valves.



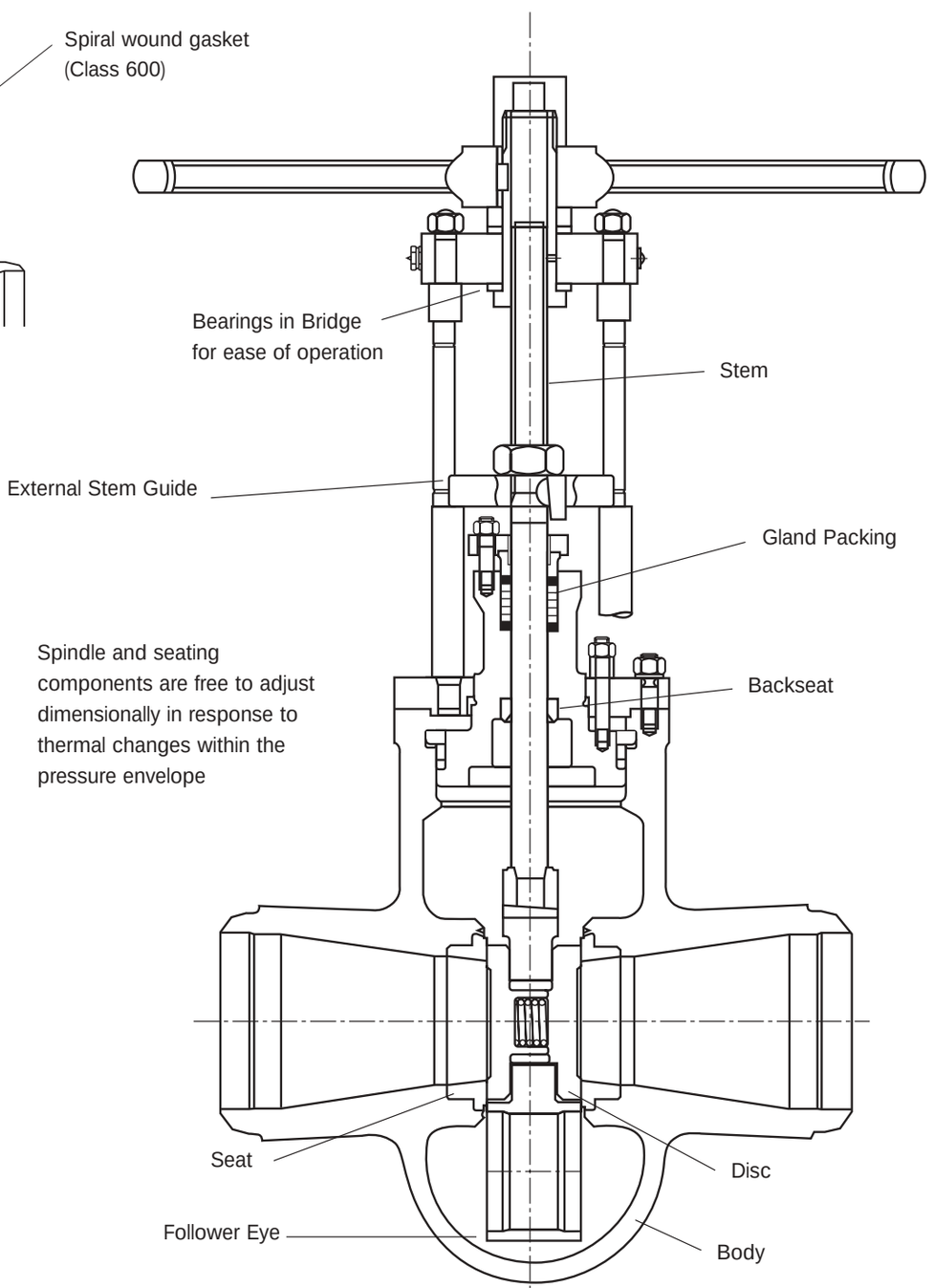
Seating components are free to
adjust dimensionally in response
to thermal changes within the
pressure envelope

VENTURI PARALLEL SLIDE VALVE

Bonnet bolted (as shown)
on valves Class 600



Pressure sealed bonnet on
Class 1000 and above & Class 600
Modified 9% Cr valves
(shown below)



BYPASS VALVES

Bypass valves can be supplied along with associated piping as an integral unit to the main valve if required.
The Bypass valve is used to equalize pressure on either side of a closed main valve. It can also be used to warm up downstream pipe work with the main valve closed.
The Bypass valve is also often used as a means to over come pressure locking. This is achieved by the fitting of an equalizing pipe between the main valve and the Bypass valve.

PRESSURE LOCKING

Pressure locking (or as sometimes referred to as intergate over pressurization) can occur with parallel slide valves. This is described in ASME B16.34 under paragraph 2.3.3. Fluid Thermal Expansion. Pressure locking occurs when a fluid at ambient temperature is trapped in the intergate cavity of the valve body. If heat, as associated with plant warm up is applied and the valve is in the closed position excessive pressure can be generated. The pressure is generated in the intergate cavity and can build up to a value in excess of the pressure rating of the valve.

If the valve is open or part open during warm up pressure locking cannot occur. If pressure locking is a possibility Hopkinsons can offer the following solutions.

• The provision of a small hole drilled in the up stream seat is an inexpensive means of preventing pressure locking. As the valve would be then uni-directional the inlet and outlet of the valve then have to be clearly marked with identifying plates and flow direction arrow.

• The fitting of an equalizing pipe connecting the intergate cavity to the highest pressure side of the valve body provides a simple and clearly visible means of preventing pressure lock. The disadvantage of such an arrangement is that it renders the valve uni-directional

• The fitting of an equalizing pipe as previously described, but with the addition of an isolating globe valve prevents pressure locking with the added advantage of making the main valve bi-directional. During normal plant operation, the globe isolator would be closed and open during pipeline warm up or in any other circumstance where pressure locking might occur.

• Provision of an Equalizing Bypass Valve, which in addition to acting as a Bypass also provides a means of preventing pressure build up in the intergate cavity. During normal plant operation, the Equalizing Bypass would be closed and open during main valve closure, pipeline warm up, or in any other circumstance where pressure locking might occur.

STEM INSERTION PRESSURE BUILD UP

When a parallel slide valve is used with water such as on high pressure feed applications it is possible to generate a pressure in excess of the line pressure in the body intergate cavity when the valve is being closed, resulting in a hydraulic lock.

As the stem is moved from the open position it displaces water as a hydraulic ram. For most of its travel the displaced water passes into the pipeline but when the disc overlaps the seat bore it can no longer do this. A situation can now arise when, during completion of the valve travel, excessive pressure builds up in the intergate cavity.

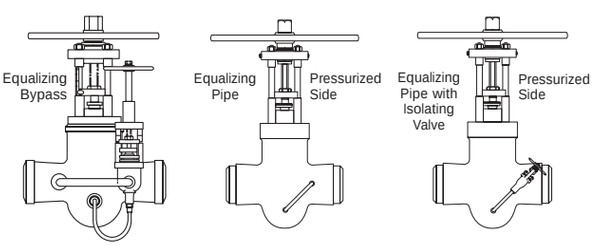
The solutions to this problem are identical to those used to prevent pressure locking.

ELECTRIC ACTUATOR OPERATED BYPASS

Separate actuators are provided when it is deemed necessary to power-operate the Bypass valve. The Bypass valve actuator can be provided with local or remote push buttons so that it is impossible to 'inch' the Bypass valve open for 'warming' purposes. The Bypass valve must be interlocked with the main valve to ensure the Bypass is fully open before the main valve can be opened electrically. A further interlock is provided to close the Bypass automatically when the main valve reaches the 'full open' position.

INTERLOCKS ON HAND - OPERATED BYPASS AND DRAIN VALVE

Electrical interlocks can be provided on hand-operated Bypass and drain valves to ensure that the correct sequence of operation is followed before the main valve can be operated electrically.



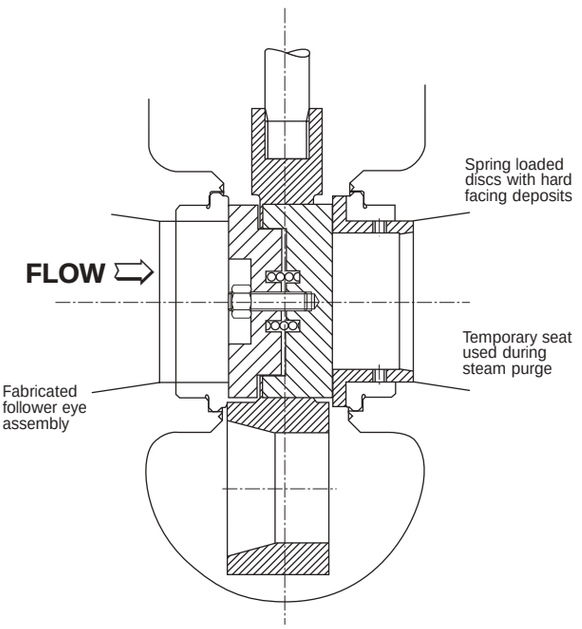
STEAM PURGING

With Venturi Design Main Steam Isolation Valve

Common practice during the commissioning of new boiler or after extensive repairs to existing installations is to install a sacrificial valve in place of the Main Steam Stop Valve before commencing steam purging operations. This procedure ensures that the main steam stop valve internals do not suffer any damage from the inevitable debris in the system but it is a time consuming and expensive operation to change and replace these two valves.

A unique advantage of the Venturi Parallel Slide Valve is that it lends itself perfectly to Steam Purging Operations without having to be removed from the Boiler. Instead the valve is fitted with a temporary set of internal components which incorporate downstream seat protection, whilst the eyelet in the follower eye ensures a smooth stream flow through the Intergate space in the open discharge position.

Modified spindle and actuator inserts enable critical operating times to be achieved during steam purge sequences. Following completion of purging operations, the temporary internals may be removed and refurbished, ready for use on the next unit or held in store for future purging requirements.



MODIFIED 9% CHROME MATERIAL

A217-C12a Modified 9% Chrome is a cast ferritic steel much used as a valve body material in modern day power plant.

It finds important use on superheated, reheated and supercritical steam where its superior creep resistant properties and hot strength enables valves to be produced with thinner body walls compared with conventional materials.

Hopkinsons have been manufacturing valves in Modified 9% Chrome Steel since 1987 with the current range of valves specifically designed to meet Power Plant requirements of the future.

An installation reference list of Hopkinsons valves supplied in Modified 9% Chrome Steel is available on application.

WELDING TO CHROME VANADIUM PIPING

When required valves can be supplied suitable for welding directly into existing Chrome Vanadium pipe lines.

Class150 (ASME B16.34 1996) Standard Class, Butt Weld and Flanged

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)											
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900
A21901W A21901	A105	A216 WCB	Std	285	260	230	200	170	140	125	110	95	80*	65*	50*

Class 300 (ASME B16.34 1996) Standard Class, Butt Weld and Flanged

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)											
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900
A21903W A21903	A105	A216 WCB	Std	740	675	655	635	600	550	535	535	505	410*	270*	170*

Class 600 (ASME B16.34 1996) Butt Weld & Flanged. NB. Flanged applies to standard class ONLY

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21906W A23906W A21906 A23906	A105	A216 WCB	Std	1480	1350	1315	1270	1200	1095	1075	1065	1010	825*	535*	345*	205*	105*	-	-	-	-
			Spec	1500	1500	1500	1500	1500	1425	1400	1390	1260	1030*	670*	430*	260*	130*	-	-	-	-
	-	A217 WC6	Std	1500	1500	1445	1385	1330	1210	1175	1135	1065	1015	975	900	640	430	290	190	125	75
			Spec	1500	1500	1500	1500	1500	1500	1500	1465	1460	1440	1355	1175	795	540	360	240	155	95
	A182 -F22	A217 WC9	Std	1500	1500	1445	1410	1330	1210	1175	1135	1065	1015	975	900	755	520	350	220	135	80
			Spec	1500	1500	1485	1450	1440	1440	1430	1425	1380	1345	1285	1200	945	650	435	275	170	105

Class 600 (ASME B16.34 1996) Butt Weld Modified 9% Chrome

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)						
	Forged	Cast		-20 to 100	1050	1060	1070	1080	1090	1100
A21906W A23906W	-	A217C12A	Std	1500	840	823	806	789	772	755

* ASTM A105 Material temperature limitations: Use at Temperatures above 800˚F/425˚C is permissible but not recommended for prolonged use. Short excursions up to 900˚F/482˚C are permissible.

Class 900 (ASME B16.34 1996) Butt Weld & Flanged. NB. Flanged applies to standard class ONLY

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21909W A23909W A21909 A23909	A105	A216 WCB	Std	2220	2025	1970	1900	1795	1640	1610	1600	1510	1235*	805*	515*	310*	155*	–	–	–	–
			Spec	2250	2250	2250	2250	2250	2140	2100	2080	1890	1545*	1005*	645*	385*	195*	–	–	–	–
	-	A217 WC6	Std	2250	2250	2165	2080	1995	1815	1765	1705	1595	1525	1460	1350	955	650	430	290	185	115
			Spec	2250	2250	2250	2250	2250	2250	2250	2200	2185	2160	2030	1760	1195	810	540	360	230	140
	A182 -F22	A217 WC9	Std	2250	2250	2185	2115	1995	1815	1765	1705	1595	1525	1460	1350	1130	780	525	330	205	125
			Spec	2250	2250	2225	2175	2160	2160	2145	2135	2070	2020	1930	1800	1415	975	655	410	255	155

For limited class ratings sizes ½" - 2½" refer to page 45.

Class 1000 int. (ASME B16.34 1996) Butt Weld

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21910W A23910W	A105	A216 WCB	Std	2467	2250	2188	2111	1995	1822	1789	1777	1678	1372*	894*	572*	344*	172*	–	–	–	–
			Spec	2500	2500	2500	2500	2500	2377	2332	2312	2100	1716*	1116*	715*	428*	215*	–	–	–	–
	-	A217 WC6	Std	2500	2500	2406	2311	2217	2017	1961	1894	1772	1694	1622	1499	1061	721	478	321	205	127
			Spec	2500	2500	2500	2500	2500	2500	2500	2444	2428	2400	2256	1956	1328	900	600	400	255	168
	A182 -F22	A217 WC9	Std	2500	2500	2427	2351	2217	2017	1961	1894	1772	1694	1622	1499	1256	867	583	366	228	138
			Spec	2500	2500	2472	2416	2400	2400	2384	2372	2300	2244	2144	2000	1571	1084	782	455	284	171

Class 1500 (ASME B16.34 1996) Butt Weld & Socket

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21915W A21915S	A105	A216 WCB	Std	3705	3375	3280	3170	2995	2735	2685	2665	2520	2060*	1340*	860*	515*	260*	–	–	–	–
			Spec	3750	3750	3750	3750	3750	3565	3495	3470	3150	2570*	1670*	1070*	645*	320*	–	–	–	–
	-	A217 WC6	Std	3750	3750	3610	3465	3325	3025	2940	2840	2660	2540	2435	2245	1595	1080	720	480	310	190
			Spec	3750	3750	3750	3750	3750	3750	3750	3665	3645	3600	3385	2935	1995	1350	900	600	385	235
	A182 -F22	A217 WC9	Std	3750	3750	3640	3530	3325	3025	2940	2840	2660	2540	2435	2245	1885	1305	875	550	345	205
			Spec	3750	3750	3705	3620	3600	3600	3580	3555	3450	3365	3215	3000	2355	1630	1095	685	430	255

* ASTM A105 Material temperature limitations: Use at Temperatures above 800˚F/425˚C is permissible but not recommended for prolonged use. Short excursions up to 900˚F/482˚C are permissible.

Class 1700 int. (ASME B16.34 1996) Butt Weld

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21917W A21917S	A105	A216 WCB	Std	4198	3825	3718	3592	3394	3100	3043	3020	2856	2334*	1518*	974*	584*	294*	–	–	–	–
			Spec	4250	4250	4250	4250	4250	4040	3961	3932	3570	2913*	1893*	1213*	730*	363*	–	–	–	–
	-	A217 WC6	Std	4250	4250	4091	3927	3768	3428	3333	3218	3014	2878	2760	2545	1807	1224	816	544	351	215
			Spec	4250	4250	4250	4250	4250	4250	4250	4154	4130	4080	3837	3327	2260	1530	1020	680	437	267
	A182 -F22	A217 WC9	Std	4250	4250	4126	4000	3768	3428	3333	3218	3014	2878	2760	2545	2137	1478	991	623	390	233
			Spec	4250	4250	4200	4103	4080	4080	4057	4030	3910	3813	3643	3400	2670	1847	1240	777	487	290

Class 2050 (ASME B16.34 1996) Butt Weld. Modified 9% Chrome

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)						
	Forged	Cast		-20 to 100	1050	1060	1070	1080	1090	1100
A21921W		A217 C12A	Spec	5125	2875	2816	2756	2697	2637	2578

For limited class ratings sizes ½" - 2½" refer to page 45.

Class 2350 int. (ASME B16.34 1996) Butt Weld

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21923W A23923W	A105	A216 WCB	Std	5800	5287	5141	4963	4690	4286	4206	4173	3948	3224	2096	1344*	808*	404*	–	–	–	–
			Spec	5875	5875	5875	5875	5875	5583	5475	5433	4935	4027	2617	1677*	1006*	502*	–	–	–	–
	-	A217 WC6	Std	5875	5875	5654	5428	5207	4737	4610	4446	4164	3976	3816	3520	2496	1692	1128	752	484	416
			Spec	5875	5875	5875	5875	5875	5875	5875	5743	5706	5640	5306	4601	3121	2115	1410	940	606	371
	A182 -F22	A217 WC9	Std	5875	5875	5705	5527	5207	4737	4610	4446	4164	3976	3816	3520	2956	2040	1368	860	536	324
			Spec	5875	5875	5808	5672	5640	5640	5607	5573	5405	5269	5034	4700	3693	2552	1711	1076	672	403

* ASTM A105 Material temperature limitations: Use at Temperatures above 800˚F/425˚C is permissible but not recommended for prolonged use. Short excursions up to 900˚F/482˚C are permissible.

Class 2500 (ASME B16.34 1996) Butt Weld & Socket

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21925W A21925S	A105	A216 WCB	Std	6170	5625	5470	5280	4990	4560	4475	4440	4200	3430*	2230*	1430*	860*	430*	–	–	–	–
			Spec	6250	6250	6250	6250	6250	5940	5825	5780	5250	4285*	2785*	1785*	1070*	535*	–	–	–	–
	-	A217 WC6	Std	6250	6250	6015	5775	5540	5040	4905	4730	4430	4230	4060	3745	2655	1800	1200	800	515	315
			Spec	6250	6250	6250	6250	6250	6250	6250	6110	6070	6000	5645	4895	3320	2250	1500	1000	645	395
	A182 -F22	A217 WC9	Std	6250	6250	6070	5880	5540	5040	4905	4730	4430	4230	4060	3745	3145	2170	1455	915	570	345
			Spec	6250	6250	6180	6035	6000	6000	5965	5930	5750	5605	5355	5000	3930	2715	1820	1145	715	430

Class 3100 int. (ASME B16.34 1996) Butt Weld & Socket

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in. at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21931W A23931W A21931S	A105	A216 WCB	Std	7652	6973	6782	6547	6187	6085	5634	5505	5208	4252*	2764*	1772*	1065*	532*	–	–	–	–
			Spec	7750	7750	7750	7750	7750	7365	7223	7167	6510	5314*	3454*	2214*	1328*	664*	–	–	–	–
	-	A217 WC6	Std	7750	7750	7459	7162	6867	6249	6081	5865	5492	5244	5033	4643	3294	2232	1488	992	638	390
			Spec	7750	7750	7750	7750	7750	7750	7750	7575	7528	7440	6999	6068	4118	2790	1860	1240	798	488
	A182 -F22	A217 WC9	Std	7750	7750	7526	7291	6867	6249	6081	5865	5492	5244	5033	4643	3901	2692	1814	1134	432	426
			Spec	7750	7750	7662	7484	7440	7440	7396	7352	7130	6952	6642	6200	3702	3366	2258	1418	886	532

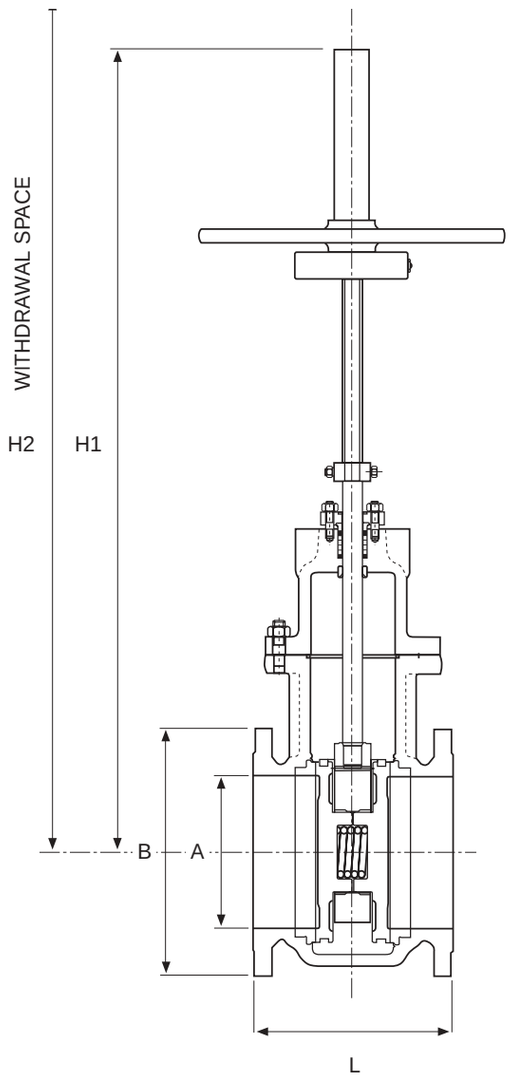
Class 3600 (ASME B16.34 1996) Butt Weld & Socket

Product No	ATSM Body Material		ASME Code B16.34	Pressure in lbf/sq. in.at Temp. ˚F (For intermediate ratings use linear interpolation)																	
	Forged	Cast		-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
A21936W	A182 -F22		Std	9000	8591	8120	7776	7676	7256	7061	6812	6377	6089	5845	5392	4528	3209	2389	1360	–	–
			Spec	9000	9000	9000	9000	8848	8848	8848	8797	8743	8640	8128	7200	5657	4011	2983	1697	–	–

For limited class ratings sizes ½" - 2½" refer to page 45.

PARALLEL SLIDE GATE VALVE – CARBON STEEL

ASME B.16.34 Class 150 Sizes 2½" - 24" Figure number A21901 Flanged Ends



Materials

Description	
Body:	Carbon Steel - A216 Gr WCB
Bonnet:	Carbon Steel - A216 Gr WCB
Stem:	A182 - 321
Gasket	Exfoliated graphite
Seats:	Nickel Moly-Alloy
Disc	Grade 6 stellite faced
Gland Packing	Exfoliated graphite and braided graphite fibre
Bonnet bolts	ASTM-A193 Grade B7

CLASS 150

Nominal Size		A		B		H1		H2		L		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	65	(2½)	178	(7)	365	(14⅜)	510	(20⅛)	190	(7½)	33	(73)
80	(3)	80	(3)	191	(7½)	535	(21⅛)	680	(26¾)	203	(8)	40	(88)
100	(4)	100	4)	229	(9)	685	(27)	835	(32⅞)	229	(9)	70	(154)
150	(6)	150	(6)	280	(11)	1000	(39⅜)	1165	(45⅞)	267	(10½)	129	(284)
200	(8)	200	(8)	343	(13½)	1130	(44½)	1300	(51¼)	292	(11½)	195	(430)
250	(10)	250	(10)	407	(16)	1330	(52⅜)	1560	(61½)	330	(13)	275	(606)
300	(12)	300	(12)	483	(19)	1545	(60⅞)	1820	(71¾)	356	(14)	370	(816)
350	(14)	335	(13.18)	533	(21)	1568	(61¼)	1925	(76)	381	(15)	508	(1120)
400	(16)	385	(15.16)	597	(23½)	1691	(66⅝)	2000	(79)	406	(16)	655	(1444)
450	(18)	440	(17.32)	635	(25)	1978	(77⅞)	2315	(91½)	432	(17)	840	(1852)
500	(20)	485	(19.10)	698	(27½)	2167	(85⅜)	2515	(99)	457	(18)	1065	(2304)
600	(24)	590	(23.23)	813	(32)	2720	(107)	3120	(123)	508	(20)	2000	(4400)

Withdrawal space shown refers to the valve being in the fully open position.

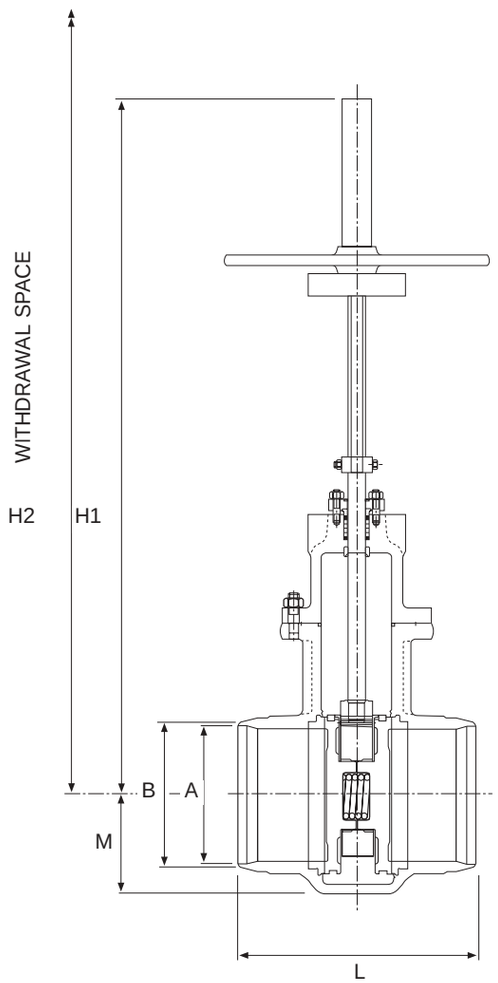
Flanged to ASME B16.5. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE – CARBON STEEL

ASME B.16.34 Class 150 Sizes 2½" - 24" Figure number A21901W Butt Weld Ends

Materials

Description	
Body:	Carbon Steel - A216 Gr WCB
Bonnet:	Carbon Steel - A216 Gr WCB
Stem:	A182 - 321
Gasket	Exfoliated graphite spiral wound
Seats:	Nickel Moly-Alloy
Disc	Grade 6 stellite faced
Gland Packing	Exfoliated graphite and braided graphite fibre
Bonnet bolts	ASTM-A193 Grade B7



CLASS 150

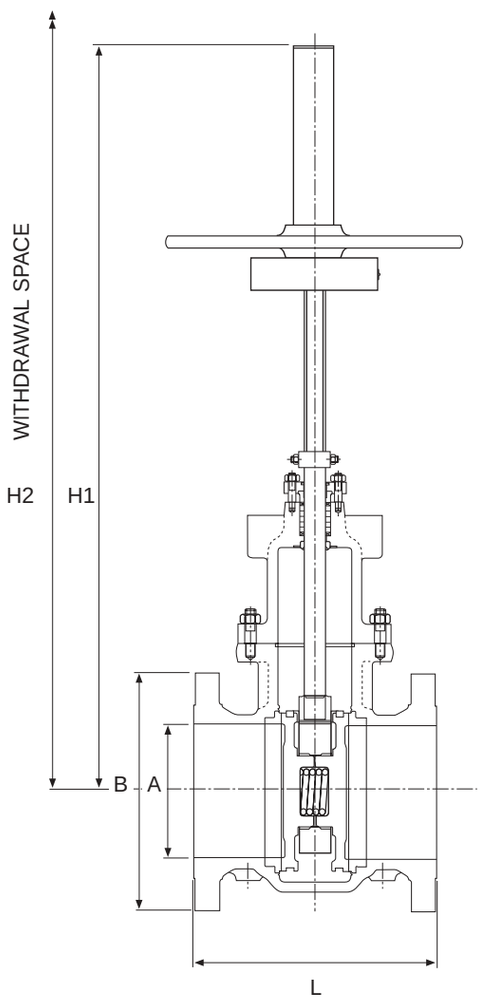
Nominal Size		A		B		H1		H2		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	60	(2.36)	90	(3.54)	365	(14⅜)	510	(20⅛)	241	(9 1/2)	70	(2¾)	32	(71)
80	(3)	74	(2.91)	100	(3.5)	535	(21⅛)	680	(26¾)	283	(11 1/8)	75	(3)	36	(79)
100	(4)	97	(3.81)	130	(5.12)	685	(27)	835	(32⅞)	305	(12)	90	(3⅝)	63	(139)
150	(6)	149	(5.87)	185	(7.28)	980	(38 5/8)	1165	(45⅞)	403	(15 9/8)	125	(5)	139	(306)
200	(8)	193	(7.60)	240	(9.44)	1130	(44½)	1300	(51¼)	419	(16 1/2)	160	(6⅜)	168	(370)
250	(10)	245	(9.6)	290	(11.42)	1330	(52⅜)	1560	(61½)	457	(18)	190	(7½)	250	(551)
300	(12)	295	(11.61)	345	(13.58)	1545	(60⅞)	1820	(71¾)	502	(19 3/4)	220	(8¾)	318	(701)
350	(14)	330	(12.99)	390	(15.35)	1568	(61¼)	1925	(76)	572	(22 1/2)	245	(9¾)	535	(1180)
400	(16)	380	(14.96)	445	17.5)	(66⅝)	2000	2000	(79)	610	(24)	270	(10¾)	630	(1389)
450	(18)	425	(16.73)	495	(19)	(77⅛)	2315	2315	(91½)	660	(26)	300	(11⅞)	952	(2099)
500	(20)	480	(18.90)	550	(21)	2167	(85⅜)	2515	(99)	711	(28)	365	(14¼)	1135	(2503)
600	(24)	575	(22.64)	650	(25.60)	2720	(107)	3120	(123)	787	(31)	390	(15⅜)	1500	(3300)

Withdrawal space shown refers to the valve being in the fully open position.

Butt Weld Ends to ASME B16.25. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 300 Sizes 2½" - 24" Figure number A21903 Flanged Ends



Materials

Description	
Body:	Carbon Steel - A216 Gr WCB
Bonnet:	Carbon Steel - A216 Gr WCB
Stem:	A182 - 321
Gasket	Exfoliated graphite
Seats:	Nickel Moly-Alloy
Disc	Grade 6 stellite faced
Gland Packing	Exfoliated graphite and braided graphite fibre
Bonnet bolts	ASTM-A193 Grade B7

CLASS 300

Nominal Size		A		B		H1		H2		L		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	65	(2½)	190	(7 1/2)	480	(18 7/8)	510	(20⅛)	241	(9 1/2)	39	(86)
80	(3)	80	(3)	210	(8 1/4)	535	(21 1/8)	680	(26¾)	283	(11 1/8)	46	(101)
100	(4)	100	(4)	254	(10)	685	(27)	835	(32⅞)	305	(12)	83	(183)
150	(6)	150	(6)	318	(12 1/2)	1000	(39 3/8)	1165	(45⅞)	403	(15 7/8)	170	(375)
200	(8)	200	(8)	381	(15)	1140	(45)	1300	(51¼)	419	(16 1/2)	245	(540)
250	(10)	250	(10)	444	(17 1/2)	1454	(57 1/4)	1560	(61½)	457	(18)	411	(906)
300	(12)	300	(12)	521	(20 1/2)	1599	(63)	1820	(71¾)	502	(19 3/4)	610	(1345)
350	(14)	335	(13.18)	584	(23)	1708	(67 1/4)	1925	(76)	572	(22 1/2)	780	(1726)
400	(16)	385	(15.16)	648	(25 1/2)	1896	(74 5/8)	2000	(79)	610	(24)	1008	(2223)
450	(18)	430	(16.93)	710	(28)	2081	(81 7/8)	2315	(91½)	660	(26)	1402	(3091)
500	(20)	485	(19.10)	775	(30 1/2)	2570	(101)	2515	(99)	711	(28)	1545	(3407)
600	(24)	585	(23.03)	914	(36)	3050	(120)	3120	(123)	787	(31)	2135	(4700)

Withdrawal space shown refers to the valve being in the fully open position.

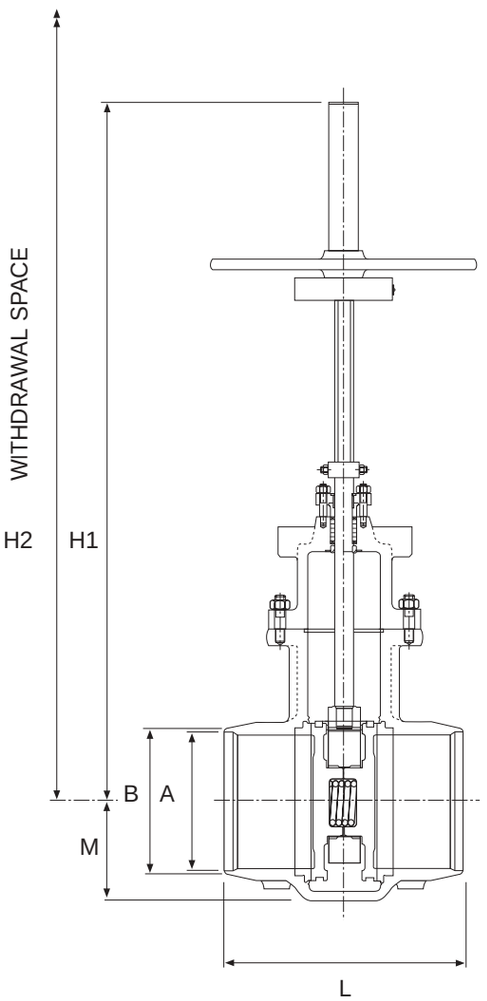
Flanged to ASME B16.5. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 300 Sizes 2½" - 24" Figure number A21903W Butt Weld Ends

Materials

Description	
Body:	Carbon Steel - A216 Gr WCB
Bonnet:	Carbon Steel - A216 Gr WCB
Stem:	A182 - 321
Gasket	Exfoliated graphite
Seats:	Nickel Moly-Alloy
Disc	Grade 6 stellite faced
Gland Packing	Exfoliated graphite and braided graphite fibre
Bonnet bolts	ASTM-A193 Grade B7



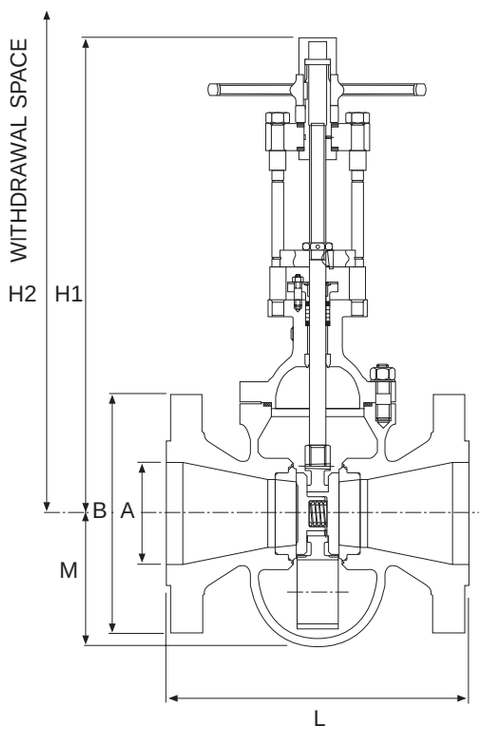
CLASS 300

Nominal Size		A		B		H1		H2		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	60	(2.36)	90	(3.54)	480	(18 7/8)	510	(20⅛)	241	(9 1/2)	70	(2⅞)	32	(71)
80	(3)	74	(2.91)	100	(3.94)	535	(21⅛)	680	(26⅞)	283	(11 1/8)	75	(3)	36	(79)
100	(4)	97	(3.8)	130	(5.12)	685	(27)	835	(32⅞)	305	(12)	90	(3⅝)	63	(139)
150	(6)	149	(5.8)	185	(7.28)	980	((38 5/8)	1165	(45⅞)	403	(15 9/8)	125	(5)	139	(306)
200	(8)	193	(7.60)	240	(9.44)	1143	(45)	1210	(47¾)	419	(16 1/2)	160	(6⅜)	210	(463)
250	(10)	245	(9.64)	300	(11.81)	1454	(57 1/4)	1690	(66⅝)	457	(18)	190	(7½)	397	(875)
300	(12)	295	(11.61)	345	(13.58)	1599	(59)	1850	(72⅞)	502	(19 3/4)	220	(8¾)	520	(1147)
350	(14)	345	(12.48)	390	(15.47)	1708	(67 1/4)	1980	(78)	572	(22 1/2)	255	(10⅛)	611	(1347)
400	(16)	380	(14.96)	445	(17.51)	1896	(79)	2020	(80)	610	(24)	275	(10⅞)	778	(1715)
450	(18)	425	(16.73)	495	(19.50)	2081	(95)	2440	(96)	660	(26)	310	(12¼)	1127	(2485)
500	(20)	480	(18.19)	550	(21.65)	2570	(101)	2975	(117½)	711	(28)	365	(14⅜)	1230	(2712)
600	(24)	575	(22.64)	650	(25.60)	2845	(112)	3365	(132½)	787	(31)	415	(16⅜)	1615	(3300)

Withdrawal space shown refers to the valve being in the fully open position. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 600 Sizes 5” - 24” Figure number A23906 Flanged Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 600

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	122	(4¾)	330	(13)	381	(15)	229	(9)	660	(26)	868	(34¼)	143	(316)
150	(6)	146	(5¾)	356	(14)	457	(18)	263	(10⅜)	740	(29⅛)	992	(39)	175	(386)
200	(8)	193	(7⅝)	419	(16½)	584	(23)	340	(13⅜)	840	(33)	1134	(44¾)	278	(613)
250	(10)	242	(9½)	508	(20)	711	(28)	413	(16¼)	1030	(40⅝)	1414	(55¾)	474	(1045)
300	(12)	288	(11⅜)	559	(22)	813	(32)	488	(19¼)	1210	(47⅝)	1684	(66⅜)	676	(1490)
350	(14)	317	(12¼)	603	(23¾)	889	(35)	531.5	(20⅞)	-	-	1794	(70⅝)	829	(1821)
400	(16)	363	(14¼)	689	(27⅛)	991	(39)	603	(23¾)	-	-	1973	(77¾)	1136	(2505)
450	(18)	409	(16⅛)	743	(29¼)	1092	(43)	673	(26½)	-	-	2137	(84⅛)	1495	(3296)
500	(20)	455	(18)	813	(32)	1194	(47)	741.5	(29¼)	-	-	2441	(96⅛)	1961	(4324)
550	(22)	501	(19¾)	813	(32)	1295	(51)	812.5	(32)	-	-	2700	(106⅜)	2352	(5185)
600	(24)	547	(21½)	940	(37)	1397	(55)	884.5	(34⅞)	-	-	2957	(116½)	3183	(6797)

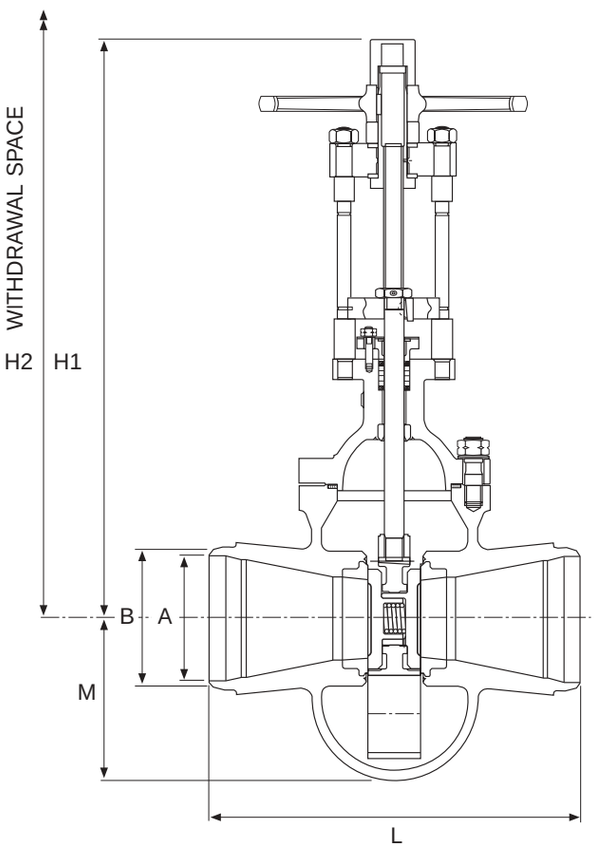
Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Flanged to ASME B16.5. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 600 Sizes 5”- 24” Figure number A23906W Butt Weld Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



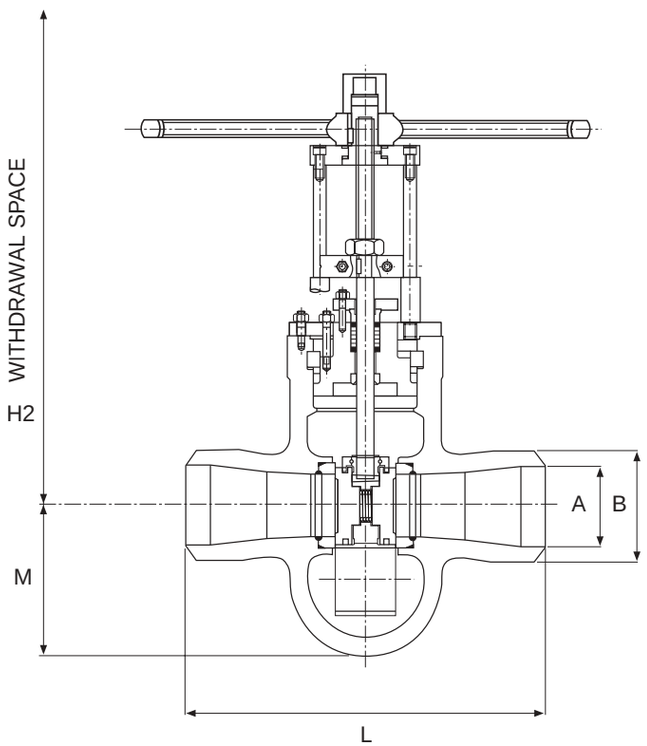
CLASS 600

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	122	(4¾)	144	(5.67)	381	(15)	229	(9)	660	(26)	868	(34¼)	89	(196)
150	(6)	146	(5¾)	172	(6.77)	457	(18)	263	(10⅜)	740	(29⅛)	992	(39)	116	(255)
200	(8)	193	(7⅝)	223	(8.78)	584	(23)	340	(13⅜)	840	(33)	1134	(39)	189	(416)
250	(10)	242	(9½)	278	(10.94)	711	(28)	413	(16¼)	1030	(40⅝)	1414	(55¾)	329	(725)
300	(12)	288	(11⅜)	329	(12.95)	813	(32)	488	(19¼)	1210	(47⅝)	1684	(66⅜)	504	(1111)
350	(14)	317	(12¼)	362	(14.25)	889	(35)	531.5	(20⅞)	-	-	1794	(70⅝)	623	(1373)
400	(16)	363	(14¼)	413	(16.26)	991	(39)	603	(23¾)	-	-	1973	(77¾)	847	(1867)
500	(20)	455	(18)	516	(20.31)	1194	(43)	741.5	(29¼)	-	-	2441	(96⅛)	1195	(2634)
550	(22)	501	(19¾)	567	(23.32)	1294	(47)	812.5	(32)	-	-	2700	(106⅜)	1516	(3342)
600	(24)	547	(21½)	619	(24.37)	1397	(51)	884.5	(34⅞)	-	-	2957	(116½)	1973	(4350)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – MODIFIED 9% CHROME STEEL

ASME B.16.34 Class 600 Sizes 16" - 24" Figure number A23906W Butt Weld Ends



Materials

Description	
Body:	ASTM A217-C12A
Bonnet:	ASTM A217-C12A
Back Seat:	Nickel molybdenum alloy
Gasket	Exfoliated graphite
Stem:	FV 559 (ASTM A453 Gr 660 Class B)
Seat:	No 6 Stellite faced
Disc:	Sizes 125 & 150 mm nickel molybdenum alloy
Gland Packing:	Exfoliated graphite & braided carbon fibre

NB. Materials shown in brackets are nearest comparable ASTM specifications

CLASS 600

Nominal Size		A		B		L		M		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
400	(16)	387	(15.23)	406.4	(16.00)	990	(39)	616	(24¼)	2099	(82⅝)	1033	(2277)
450	(18)	434	(17.08)	457	(18.00)	1092	(43)	689	(27⅛)	2274	(89⅝)	1394	(3073)
500	(20)	482	(18.97)	508	(20.00)	1194	(47)	760	(30)	2572	(101⅛)	1883	(4151)
550	(22)	533	(20.98)	578	(22.00)	1296	(51)	831	(32¾)	2898	(114⅛)	2512	(5538)
600	(24)	581	(22.87)	609	(24.00)	1397	(55)	903	(35⅝)	3148	(124)	3190	(7032)

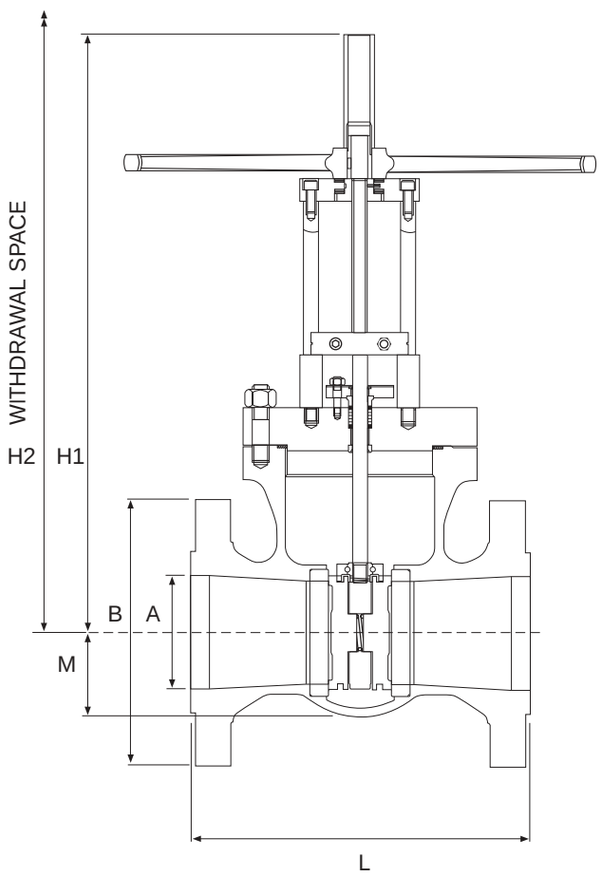
Withdrawal space shown refers to the valve being in the fully open position.
C12A Venturi to ASME B16.25 Alternatives are available on request.

FULL BORE PARALLEL SLIDE GATE VALVE – CARBON STEEL

ASME B.16.34 Class 600 Sizes 5” - 24” Figure number A21906 Flanged Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



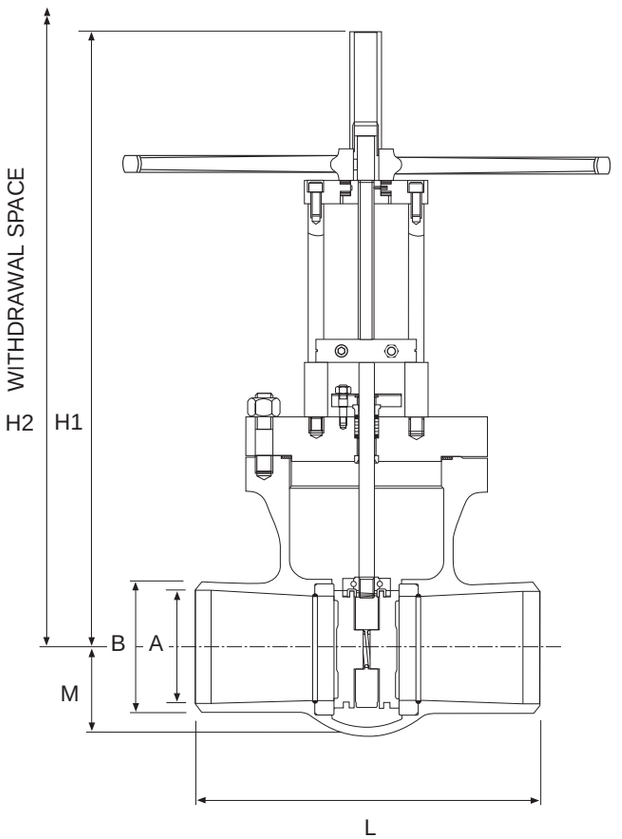
CLASS 600

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	122	(4¾)	330	(13)	508	(20)	101	(4)	740	(29⅛)	863	(34)	146	(322)
150	(6)	146	(5¾)	356	(14)	457	(18)	112	(4½)	840	(33)	982	(38¼)	175	(386)
200	(8)	193	(7⅝)	419	(16½)	584	(23)	145	(5¾)	1030	(40⅝)	1218	(48)	306	(675)
250	(10)	242	(9½)	508	(20)	711	(28)	173	(6⅞)	1220	(48)	1448	(57)	493	(1087)
300	(12)	288	(11⅜)	559	(22)	813	(32)	201	(8)	1410	(55½)	1686	(66⅜)	692	(1526)
350	(14)	317	(12¼)	603	(23¾)	889	(35)	218	(8⅝)	-	-	1824	(71⅞)	869	(1916)
400	(16)	363	(14¼)	689	(27⅛)	991	(39)	245.5	(9¾)	-	-	2085	(82⅛)	1210	(2668)
450	(18)	409	(16⅛)	743	(29¼)	1092	(43)	273.5	(10¾)	-	-	2302	(90⅝)	1617	(3565)
500	(20)	455	(18)	813	(32)	1194	(47)	301	(11⅞)	-	-	2519	(99¼)	2091	(4610)
550	(22)	501	(19¾)	813	(32)	1295	(51)	329	(13)	-	-	2723	(107¼)	2432	(5362)
600	(24)	547	(21½)	940	(37)	1397	(55)	357	(14⅛)	-	-	2993	(117⅞)	3302	(7280)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Flanged to ASME B16.5. Alternatives are available on request.

FULL BORE PARALLEL SLIDE GATE VALVE – CARBON STEEL

ASME B.16.34 Class 600 Sizes 5” - 24” Figure number A21906W Butt Weld Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 600

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	122	(4¾)	144	(13)	381	(15)	101	(4)	740	(29⅛)	863	(34)	92	(203)
150	(6)	146	(5¾)	172	(14)	457	(18)	112	(4½)	840	(33)	982	(38¼)	116	(256)
200	(8)	193	(7⅝)	223	(16½)	584	(23)	145	(4¾)	1030	(40⅝)	1218	(48)	217	(478)
250	(10)	242	(9½)	278	(20)	711	(28)	173	(6⅞)	1220	(48)	1448	(57)	348	(767)
300	(12)	288	(11⅜)	329	(22)	813	(32)	201	8)	1410	(55½)	1686	(66⅜)	520	(1146)
350	(14)	317	(12¼)	362	(23¾)	889	(35)	218	(8⅝)	-	-	1824	(71⅞)	663	(1462)
400	(16)	363	(14¼)	413	(27⅛)	991	(39)	245.5	(9¾)	-	-	2085	(82⅛)	921	(2030)
450	(18)	409	(16⅛)	464	29¼)	1092	(43)	273.5	(10¾)	-	-	2302	(90⅝)	1318	(2906)
500	(20)	455	(18)	516	(32)	1194	(47)	301	(11⅞)	-	-	2519	(99¼)	1646	(3629)
550	(22)	501	(19¾)	567	(32)	1294	(51)	329	(13)	-	-	2723	(107¼)	2053	(4526)
600	(24)	547	(21½)	619	(37)	1397	(55)	357	(14⅛)	-	-	2993	(117⅞)	2658	(5860)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

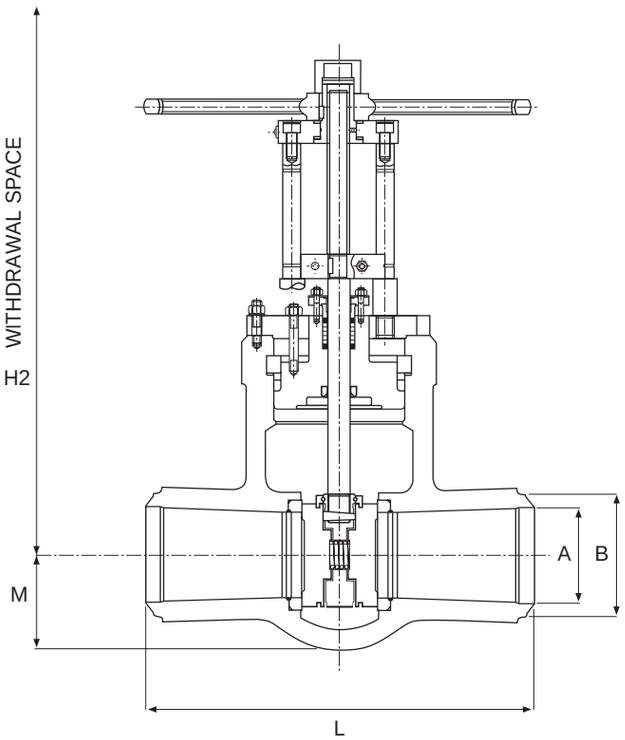
FULL BORE PARALLEL SLIDE GATE VALVE – MODIFIED 9% CHROME STEEL

ASME B.16.34 Class 600 Sizes 16” - 24” Figure number A21906W Butt Weld Ends

Materials

Description	
Body:	ASTM A217-C12A
Bonnet:	ASTM A217-C12A
Back Seat:	Nickel molybdenum alloy
Gasket	Exfoliated graphite
Stem:	FV 559 (ASTM A453 Gr 660 Class B)
Seat:	No 6 Stellite faced
Disc:	Sizes 125 & 150 mm nickel molybdenum alloy
Gland Packing:	Exfoliated graphite & braided carbon fibre

NB. Materials shown in brackets are nearest comparable ASTM specifications



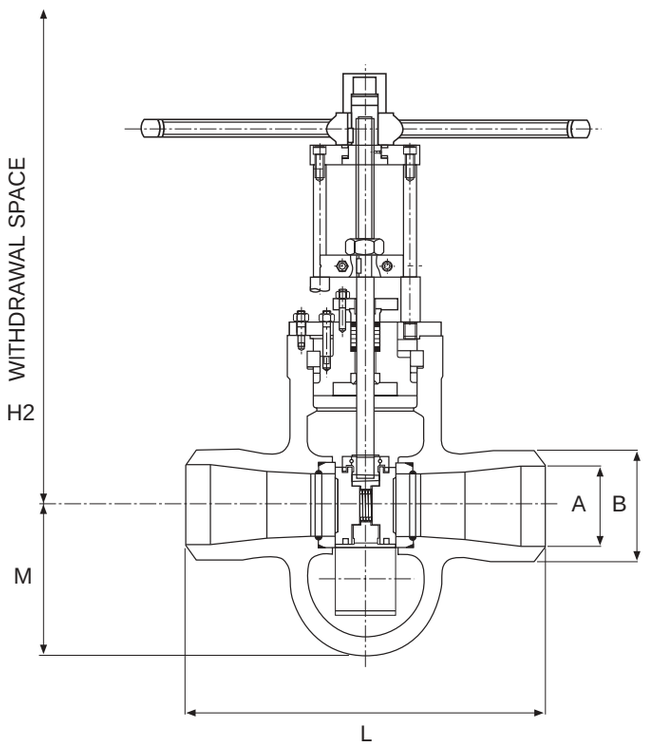
CLASS 600

Nominal Size		A		B		L		M		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
400	(16)	387	(15.23)	406.4	(16.00)	991	(39)	689	(27⅛)	2517	(99⅛)	1639	(3614)
450	(18)	434	(17.08)	457	(18.00)	1092	(43)	760	(30)	2727	(107⅜)	2093	(4614)
500	(20)	482	(18.97)	508	(20.00)	1194	(47)	831	(32¾)	3000	(118⅛)	2730	(6018)
550	(22)	533	(20.98)	578	(22.00)	1296	(51)	903	(35⅝)	3205	(126¼)	3377	(7445)
600	(24)	581	(22.87)	609	(24.00)	1397	(55)	1000	(39⅜)	3500	(137⅞)	4200	(9260)

Withdrawal space shown refers to the valve being in the fully open position. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 1000 Sizes 5”- 24” Figure number A23910W Butt Weld Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 1000

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	116	(4.57)	144	(5.67)	432	(17)	230	(9⅛)	660	(26)	886	(34⅞)	86	(190)
150	(6)	140	(5.51)	172	(6.77)	508	(20)	277.5	(11)	750	(29¾)	1018	(40⅛)	136	(300)
200	(8)	182	(7.16)	223	(8.78)	660	(26)	343	(13½)	870	(34¼)	1191	(47)	233	(514)
250	(10)	230	(9.05)	278	(10.94)	787	(31)	423.5	(16¾)	1050	(41⅜)	1462	(57⅝)	403	(888)
300	(12)	273	(10.74)	329	(12.95)	914	(36)	494.5	(19½)	-	-	1785	(70⅜)	648	(1429)
350	(14)	300	(11.81)	362	(14.25)	991	(39)	544.5	(21½)	-	-	1878	(74)	818	(1804)
400	(16)	344	(13.54)	413	(16.26)	1092	(43)	616	(24¼)	-	-	2099	(82⅝)	1148	(2531)
450	(18)	387	(15.24)	464	(18.26)	1219	(48)	688.5	(27⅛)	-	-	2274	(89⅝)	1549	(3415)
500	(20)	431	(16.96)	516	(20.31)	1321	(52)	760	(30)	-	-	2572	(101⅜)	2092	(4612)
550	(22)	476	(18.74)	567	(22.32)	1422	(56)	831	(32¾)	-	-	2898	(114⅛)	2791	(6153)
600	(24)	517	(20.35)	619	(24.37)	1549	(61)	902.5	(35¾)	-	-	3148	(124)	3545	(7815)

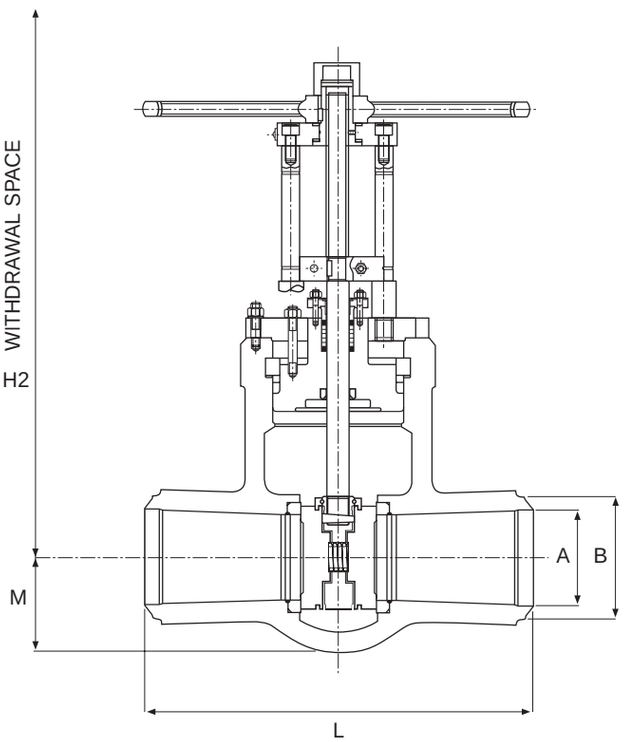
Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

FULL BORE PARALLEL SLIDE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 1000 Sizes 5” - 24” Figure number A21910W Butt Weld Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



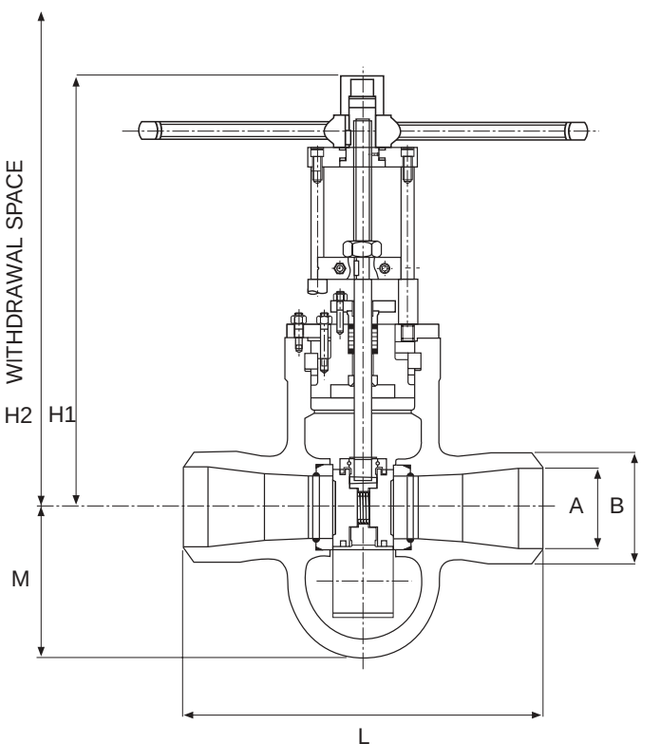
CLASS 1000

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	116	(4.57)	144	(5.67)	432	(17)	107	(4¼)	750	(29⅝)	893	(31¼)	83	(183)
150	(6)	140	(5.51)	172	(6.77)	508	(20)	130.5	(5⅛)	870	(34¼)	1051	(41½)	140	(309)
200	(8)	182	(7.16)	223	(8.78)	660	(26)	153.5	(6⅛)	1050	(41⅜)	1280	(50½)	233	(514)
250	(10)	230	(9.05)	278	(10.94)	787	(31)	188	(7½)	1260	(49⅝)	1557	(61⅜)	414	(913)
300	(12)	273	(10.74)	329	(12.95)	914	(36)	217.5	(8⅝)	-	-	1826	(72)	628	(1385)
350	(14)	300	(11.81)	362	(14.25)	991	(39)	240.5	(9½)	-	-	1975	(77⅞)	803	(1771)
400	(16)	344	(13.54)	413	(16.26)	1092	(43)	270.5	(10⅝)	-	-	2233	(88)	1152	(2540)
450	(18)	387	(15.24)	464	(18.26)	1219	(48)	300.5	(11⅞)	-	-	2517	(99⅛)	1639	(3614)
500	(20)	431	(16.96)	516	(20.31)	1321	(52)	330	(13)	-	-	2727	(107⅜)	2093	(4614)
550	(22)	476	(18.74)	567	(22.32)	1422	(56)	359.5	(14¼)	-	-	3000	(118⅛)	2730	(6018)
600	(24)	517	(20.35)	619	(24.37)	1549	(61)	389.5	(15⅜)	-	-	3205	(126¼)	3377	(7445).

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 1700 Sizes 5” - 24” Figure number A23917W Butt Weld Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 1700

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	106	(4.17)	144	(5.67)	483	(19)	242	(9⅝)	650	(25⅝)	876	(34½)	127	(280)
150	(6)	128	(5.04)	172	(6.77)	559	(22)	291.5	(11½)	760	(30)	1047	(41¼)	213	(470)
200	(8)	167	(6.57)	223	(8.78)	711	(28)	366.5	(14½)	870	(34¼)	1213	(47⅞)	389	(858)
250	(10)	209	(8.23)	278	(10.94)	864	(34)	451	(17⅞)	1080	(42⅝)	1534	(60½)	702	(1548)
300	(12)	249	(9.80)	329	(12.95)	991	(39)	524.5	(20¾)	-	-	1864	(73½)	1113	(2454)
350	(14)	273	(10.75)	362	(14.25)	1067	(42)	570.5	(22½)	-	-	1953	(77)	1367	(3014)
400	(16)	313	(12.32)	413	(16.26)	1194	(47)	651	(25¾)	-	-	2161	(85⅛)	1959	(4319)
450	(18)	352	(13.86)	464	(18.26)	1346	(53)	725.5	(28⅝)	-	-	2338	(92⅛)	2664	(5873)
500	(20)	392	(15.43)	516	(20.31)	1473	(58)	806	(31¾)	-	-	2651	(104⅜)	3732	(8228)
550	(22)	432	(17.00)	567	(22.32)	1575	(62)	880	(34¾)	-	-	2911	(114⅝)	4701	(10364)
600	(24)	471	(18.54)	619	(24.37)	1676	(66)	960	(37⅞)	-	-	3244	(127¾)	6200	(13668)

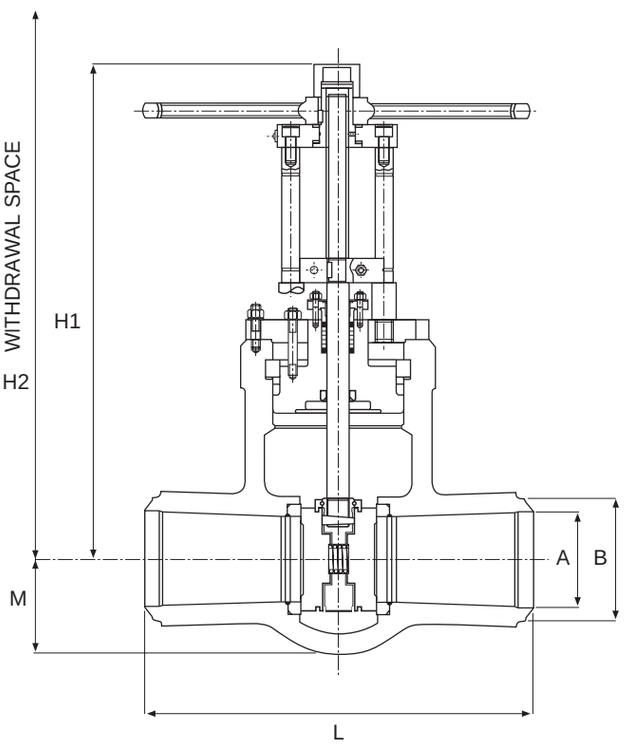
Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

FULL BORE PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 1700 Sizes 5”- 24” Figure number A21917W Butt Weld Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



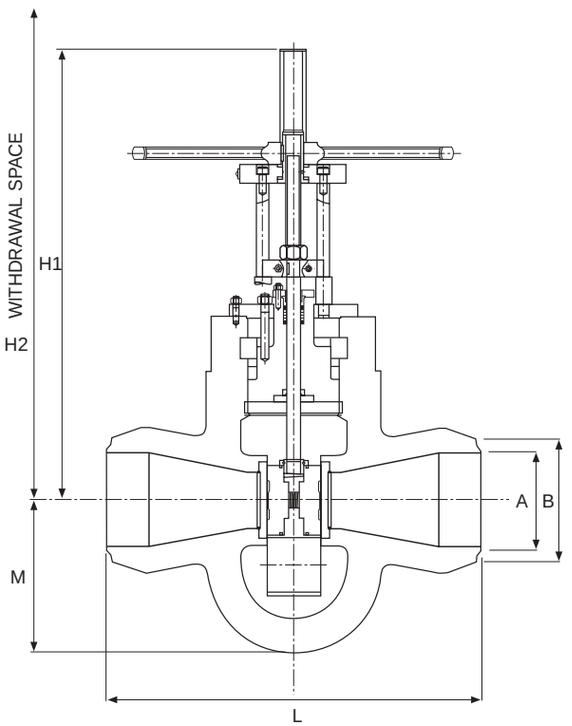
CLASS 1700

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	106	(4.17)	144	(5.67)	483	(19)	119	(4¾)	760	(30)	936	(36⅞)	124	(274)
150	(6)	128	(5.04)	172	(6.77)	559	(22)	144.5	(5¾)	870	(34¼)	1080	(42⅝)	201	(444)
200	(8)	167	(6.57)	223	(8.78)	711	(28)	177	(7)	1080	(42⅝)	1363	(53⅝)	385	(849)
250	(10)	209	(8.23)	278	(10.94)	864	(34)	215	(8½)	1320	(62)	1657	(65¼)	677	(1492)
300	(12)	249	(9.80)	329	(12.95)	991	(39)	247.5	(9¾)	-	-	1913	(75⅜)	1027	(2264)
350	(14)	273	(10.75)	362	(14.25)	1067	(42)	266.5	(10½)	-	-	2068	(81½)	1560	(3440)
400	(16)	313	(12.32)	413	(16.26)	1194	(47)	305.5	(12)	-	-	2345	(92⅜)	1928	(4250)
450	(18)	352	(13.86)	464	(18.26)	1346	(53)	337.5	(13¾)	-	-	2567	(101⅛)	2547	(5615)
500	(20)	392	(15.43)	516	(20.31)	1473	(58)	376	(14⅞)	-	-	2862	(112¾)	3522	(7765)
550	(22)	432	(17.00)	567	(22.32)	1575	(62)	408.5	(16⅛)	-	-	3029	(119¼)	4339	(9566)
600	(24)	471	(18.54)	619	(24.37)	1676	(66)	447	(17⅝)	-	-	3335	(131⅜)	5681	(12524)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE VALVE – MODIFIED 9% CHROME STEEL

ASME B.16.34 Class 2050 Sizes 5" - 24" Figure number A23921W Butt Weld Ends



Materials

Description	
Body:	ASTM A217-C12A
Bonnet:	ASTM A217-C12A
Back Seat:	Nickel molybdenum alloy
Gasket	Exfoliated graphite
Stem:	FV 559 (ASTM A453 Gr 660 Class B)
Seat:	No 6 Stellite faced
Disc:	Sizes 125 & 150 mm nickel molybdenum alloy
Gland Packing:	Exfoliated graphite & braided carbon fibre

NB. Materials shown in brackets are nearest comparable ASTM specifications

CLASS 2050

Nominal Size		A		B		H1		H2		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
150	(6)	131.8	(5.19)	168.3	(6.625)	840	(33⅛)	1184	(46⅝)	610	(24)	400	(15¾)	500	(1100)
200	(8)	172.9	(6.81)	219.1	(8.625)	-	-	1463	(57⅝)	762	(30)	487	(19¼)	881	(1942)
250	(10)	215.9	(8.5)	273.1	(10.75)	-	-	1785	(70⅜)	914	(36)	570	(22½)	1416	(3122)
300	(12)	259.3	(10.13)	323.8	(12.75)	-	-	1870	(73⅝)	1041	(41)	622	(24½)	1780	(3924)
350	(14)	284.2	(11.19)	355.6	(14.0)	-	-	2101	(82¾)	1118	(44)	705	(27⅝)	2225	(4905)
400	(16)	325.3	(12.81)	406.4	(16.0)	-	-	2543	(100⅛)	1245	(49)	872	(30⅜)	2782	(6133)
450	(18)	366.7	(14.44)	457.2	(18.0)	-	-	3128	(123½)	1397	(55)	963	(37⅞)	3477	(7665)
500	(20)	407.9	(16.06)	508	(20)	-	-	3754	(148)	1524	(60)	1046	(41¼)	4346	(9582)
550	(22)	450.8	(17.75)	558.8	(22)	-	-	4617	(182)	1625	(64)	1100	(43½)	5433	(11977)
600	(24)	490.4	(19.31)	609.6	(24)	-	-	5540	(218)	1727	(68)	1200	(47¼)	6791	(14971)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

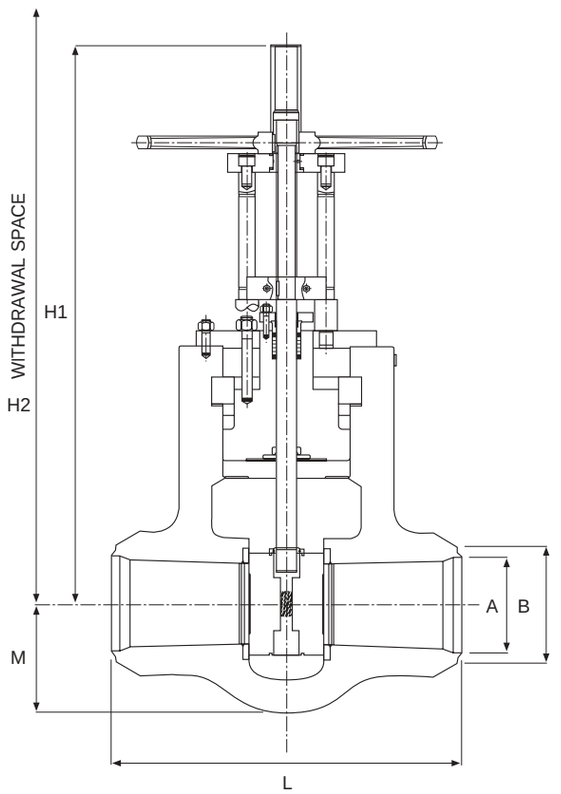
FULL BORE PARALLEL SLIDE GATE VALVE – MODIFIED 9% CHROME STEEL

ASME B.16.34 Class 2050 Sizes 6" - 24" Figure number A21921W Butt Weld Ends

Materials

Description	
Body:	ASTM A217-C12A
Bonnet:	ASTM A217-C12A
Back Seat:	Nickel molybdenum alloy
Gasket	Exfoliated graphite
Stem:	FV 559 (ASTM A453 Gr 660 Class B)
Seat:	No 6 Stellite faced
Disc:	Sizes 125 & 150 mm nickel molybdenum alloy
Gland Packing:	Exfoliated graphite & braided carbon fibre

NB. Materials shown in brackets are nearest comparable ASTM specifications



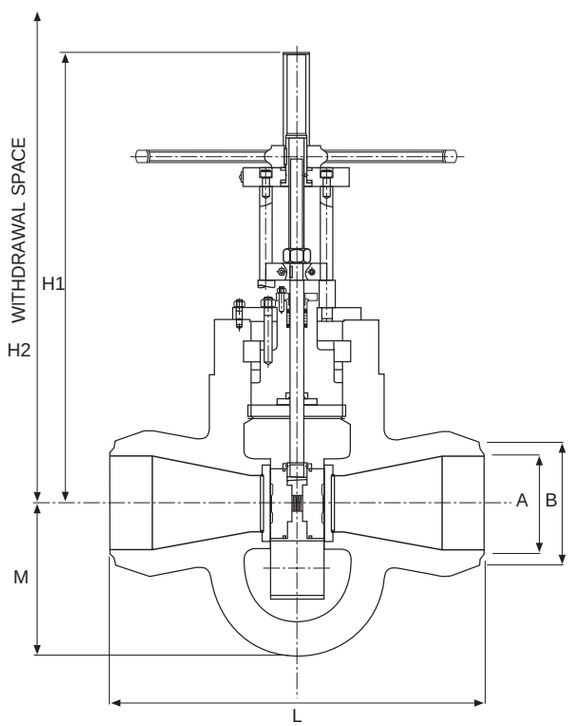
CLASS 2050

Nominal Size		A		B		H1		H2		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
150	(6)	131.8	(5.19)	168.3	(6.625)	1010	(39⅞)	1326	(52¼)	610	(24)	210	(8⅜)	451	(994)
200	(8)	172.9	(6.81)	219.1	(8.625)	-	-	1620	(63⅞)	762	(30)	251	(10)	813	(1792)
250	(10)	215.9	(8.5)	273.1	(10.75)	-	-	1902	(75)	914	(36)	293	(11½)	1260	(2778)
300	(12)	259.3	(10.13)	323.8	(12.75)	-	-	2047	(80⅝)	1041	(41)	318	(12½)	1598	(3523)
350	(14)	284.2	(11.19)	355.6	(14)	-	-	2297	(90½)	1118	(44)	359	(14¼)	2100	(4630)
400	(16)	325.3	(12.81)	406.4	(16)	-	-	2608	(102¾)	1245	(49)	442	(17⅜)	2730	(6018)
450	(18)	366.7	(14.44)	457.2	(18)	-	-	2870	(113)	1397	(55)	491	(19⅜)	3400	(7495)
500	(20)	407.9	(16.06)	508	(20)	-	-	3100	(122)	1524	(60)	533	(21)	4250	(9370)
550	(22)	450.8	(17.75)	558.8	(22)	-	-	3350	(132)	1625	(64)	600	(23⅝)	5332	(11750)
600	(24)	490.4	(19.31)	609.6	(24)	-	-	3600	(142)	1727	(68)	680	(26¾)	6665	(14693)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE GATE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 2350 Sizes 5" - 24" Figure number A23923W Butt Weld Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 2350

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	95	(3.78)	144	(5.67)	533	(21)	254	(10)	660	(26)	896	(35⅜)	173	(382)
150	(6)	113	(4.45)	172	(6.77)	610	(24)	299	(11⅞)	750	(29⅝)	1039	(41)	273	(602)
200	(8)	149	(5.86)	223	(8.78)	762	(30)	378	(15)	860	(33⅞)	1212	(47¾)	508	(1120)
250	(10)	187	(7.36)	278	(10.94)	914	(36)	466	(18⅜)	-	-	1500	(59⅛)	935	(2062)
300	(12)	223	(8.78)	329	(12.95)	1041	(41)	550	(21¾)	-	-	1800	(71)	1511	(3331)
350	(14)	245	(9.64)	362	(14.25)	1118	(44)	605.5	(23⅞)	-	-	1946	(76⅝)	1977	(4359)
400	(16)	281	(11.06)	413	(16.26)	1245	(49)	690	(27¼)	-	-	2131	(84)	2863	(6312)
450	(18)	317	(12.48)	464	(18.26)	1397	(55)	767.5	(30¼)	-	-	2332	(91⅞)	3891	(8578)
500	(20)	353	(13.89)	516	(20.31)	1524	(60)	845.5	(33⅜)	-	-	2674	(105⅜)	5243	(11559)
550	(22)	389	(15.31)	567	(22.32)	1626	(64)	922.5	(36⅜)	-	-	2926	(115¼)	6685	(14738)
600	(24)	424	(16.69)	619	(24.37)	1727	(68)	1007	(39¾)	-	-	3214	(126⅝)	8687	(19152)

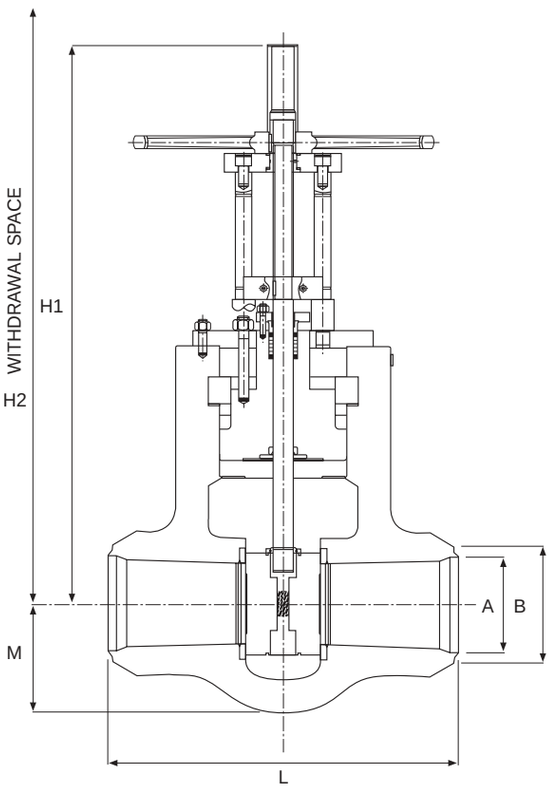
Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

FULL BORE PARALLEL SLIDE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 2350 Sizes 5” - 24” Figure number A21923W Butt Weld Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



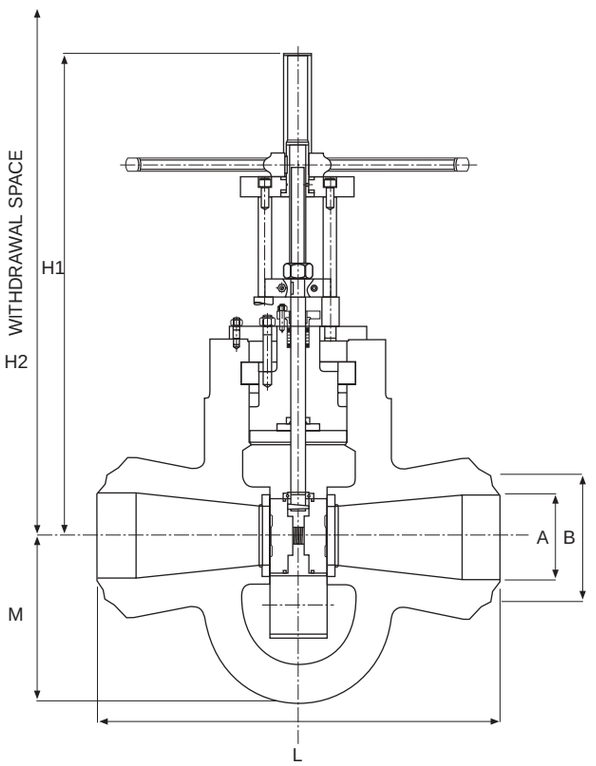
CLASS 2350

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	95	(3.78)	144	(5.67)	533	(21)	131	(5¼)	750	(29⅝)	939	(37)	164	(353)
150	(6)	113	(4.45)	172	(6.77)	610	(24)	152	(6)	860	(33⅞)	1094	(43⅛)	254	(560)
200	(8)	149	(5.86)	223	(8.78)	762	(30)	188.5	(7½)	1060	(41¾)	1348	(53⅛)	484	(1067)
250	(10)	187	(7.36)	278	(10.94)	914	(36)	230.5	(9⅛)	-	-	1616	(63⅝)	866	(1920)
300	(12)	223	(8.78)	329	(12.95)	1041	(41)	273	(10¾)	-	-	1909	(75¼)	1371	(3023)
350	(14)	245	(9.64)	362	(14.25)	1118	(44)	301.5	(12)	-	-	2090	(82⅜)	1821	(4015)
400	(16)	281	(11.06)	413	(16.26)	1245	(49)	344.5	(13⅝)	-	-	2400	(94½)	2722	(6000)
450	(18)	317	(12.48)	464	(18.26)	1397	(55)	379.5	(15)	-	-	2617	(103⅛)	3633	(8010)
500	(20)	353	(13.89)	516	(20.31)	1524	(60)	415.5	(16⅜)	-	-	2875	(113¼)	4783	(10545)
550	(22)	389	(15.31)	567	(22.32)	1626	(64)	451	(17⅞)	-	-	3080	(121⅜)	6023	(13279)
600	(24)	424	(16.69)	619	(24.37)	1727	(68)	494	(19½)	-	-	3357	(132¼)	7778	(17148)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

VENTURI PARALLEL SLIDE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 3100 Sizes 5” - 24” Figure number A23931W Butt Weld Ends



Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		

CLASS 3100

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	83	(3.27)	144	(5.67)	533	(21)	266.5	(10½)	650	(25⅝)	883	(34⅞)	220	(485)
150	(6)	100	(3.94)	172	(6.77)	610	(24)	315.5	(12½)	740	(29¼)	1042	(41⅛)	346	(763)
200	(8)	132	(5.20)	223	(8.78)	762	(30)	399.5	(15¾)	840	(33⅛)	1184	(46⅝)	663	(1462)
250	(10)	165	(6.50)	278	(10.94)	914	(36)	486.5	(19¼)	-	-	1463	(57⅝)	1175	(2590)
300	(12)	197	(7.75)	329	(12.95)	1041	(41)	569.5	(22½)	-	-	1785	(70⅜)	1889	(4165)
350	(14)	217	(8.54)	362	(14.25)	1118	(44)	621.5	(24½)	-	-	1870	(73⅝)	2374	(5234)
400	(16)	249	(9.80)	413	(16.26)	1245	(49)	704.5	(27⅞)	-	-	2101	(82¾)	3205	(7065)
450	(18)	280	(11)	464	(18.26)	1397	(55)	796.5	(31⅜)	-	-	2264	(90)	4327	(9539)
500	(20)	312	(12.28)	516	(20.31)	1524	(60)	871.5	(34⅜)	-	-	2543	(100⅛)	5841	(12877)
550	(22)	344	(13.54)	567	(22.32)	1626	(64)	962.5	(37⅞)	-	-	2850	(112)	7885	(17838)
600	(24)	375	(14.76)	619	(24.37)	1727	(68)	1045.5	(41¼)	-	-	3100	(122)	10645	(23468)

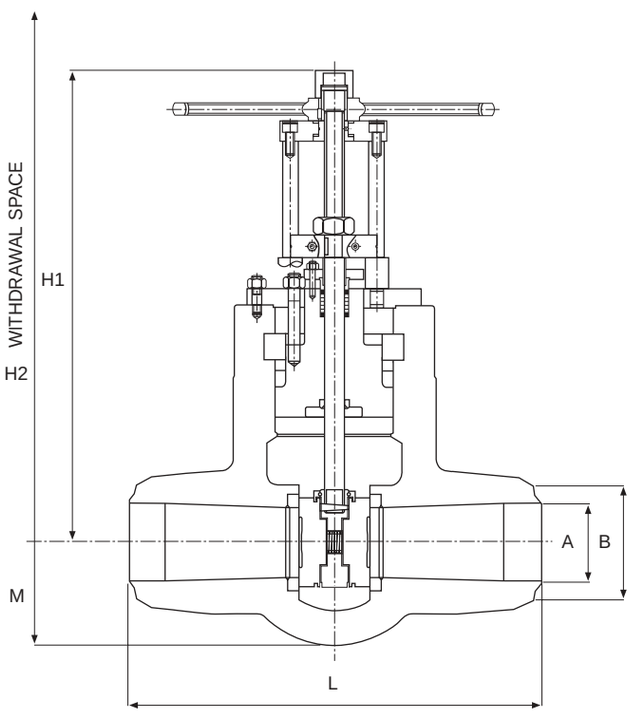
Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives are available on request.

FULL BORE PARALLEL SLIDE VALVE – CARBON & ALLOY STEEL

ASME B.16.34 Class 3100 Sizes 5” - 24” Figure number A21931W Butt Weld Ends

Materials

Description	Carbon Steel	Alloy Steel	Alloy Steel
Body:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Bonnet:	ASTM A216 Gr WCB	ASTM A217 Gr WC6	ASTM A217 Gr WC9
Stem:	BS 2S.143	ASTM A638 Gr 660	ASTM A638 Gr 660
Gasket	Metal reinforced exfoliated graphite		
Disc/Seat	ASTM A105 Stellite faced	ASTM A182 Gr F22 Stellite faced	
Gland Packing	Exfoliated graphite ring		
Bonnet bolts	ASTM A193 Gr B7		



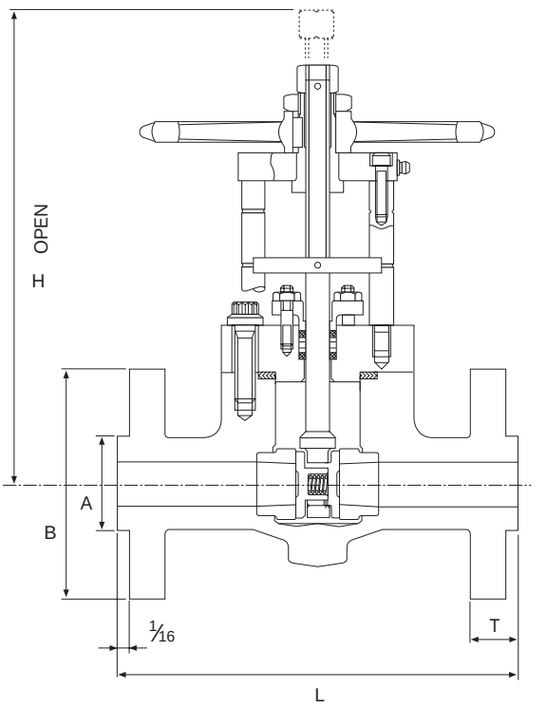
CLASS 3100

Nominal Size		A		B		L		M		H1		H2		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
125	(5)	83	(3.27)	144	(5.67)	533	(21)	143.5	(5¾)	740	(29¼)	951	(37½)	204	(450)
150	(6)	100	(3.94)	172	(6.77)	610	(24)	168.5	(6⅝)	840	(33⅛)	1077	(42½)	314	(693)
200	(8)	132	(5.20)	223	(8.78)	762	(30)	210	(8⅜)	1010	(39⅞)	1326	(52¼)	601	(1325)
250	(10)	165	(6.50)	278	(10.94)	914	(36)	251	(10)	-	-	1620	(63⅞)	1084	(2390)
300	(12)	197	(7.75)	329	(12.95)	1041	(41)	292.5	(11½)	-	-	1902	(75)	1681	(3706)
350	(14)	217	(8.54)	362	(14.25)	1118	(44)	317.5	(12½)	-	-	2047	(80⅝)	2130	(4696)
400	(16)	249	(9.80)	413	(16.26)	1245	(49)	359	(14¼)	-	-	2297	(90½)	3061	(6749)
450	(18)	280	(11.00)	464	(18.26)	1397	(55)	408.5	(16⅛)	-	-	2608	(102¾)	4474	(9864)
500	(20)	312	(12.28)	516	(20.31)	1524	(60)	441.5	(17⅜)	-	-	2807	(110⅝)	5680	(12523)
550	(22)	344	(13.54)	567	(22.32)	1626	(64)	491	(19⅜)	-	-	3250	(128)	7700	(16975)
600	(24)	375	(14.76)	619	(24.37)	1727	(68)	532.5	(21)	-	-	3500	(158)	10000	(22046)

Withdrawal space shown refers to the valve being in the fully open position. Dimension H1 when not shown is dependent on size of operator fitted. Butt Weld Ends to ASME B16.25. Alternatives available on request.

PARALLEL SLIDE GATE VALVES – FORGED CARBON STEEL

ASME B.16.34 Class 300 Sizes ½" - 2" Figure number A21903 Flanged Ends



Materials

Description	
Body:	Carbon Steel - A216 Gr WCB
Bonnet:	Carbon Steel - A216 Gr WCB
Stem:	A182 - 321
Gasket	Exfoliated graphite spiral wound
Seats:	Grade 6 stellite
Disc	13% Cr Stainless Steel hardened
Gland Packing	Exfoliated graphite and braided graphite fibre
Bonnet bolts	ASTM-A193 Grade B7

CLASS 300

Nominal Size		A		B		H		L		T		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
15	(½)	35	(1⅜)	95	(3¾)	220	(8⅝)	140	(5½)	14	(⁹⁄₁₆)	6	(13)
20	(¾)	43	(1¹¹⁄₁₆)	118	(4⅝)	220	(8⅝)	152	(6)	16	(⅝)	7	(15.5)
25)	(1)	51	(2)	124	(4⅞)	255	(10)	165	(6½)	18	(¹⅛)	10.5	(23)
32	(1¼)	64	(2½)	133	(5¼)	330	(13)	178	(7)	19	(¾)	16	(35)
40	(1½)	73	(2⅞)	156	(6⅛)	365	(14⅜)	190	(7½)	21	(¹³⁄₁₆)	21	(45)
50	(2)	92	(3⅝)	165	(6½)	425	(16¾)	216	(8¼)	22	(⅞)	29	(64)

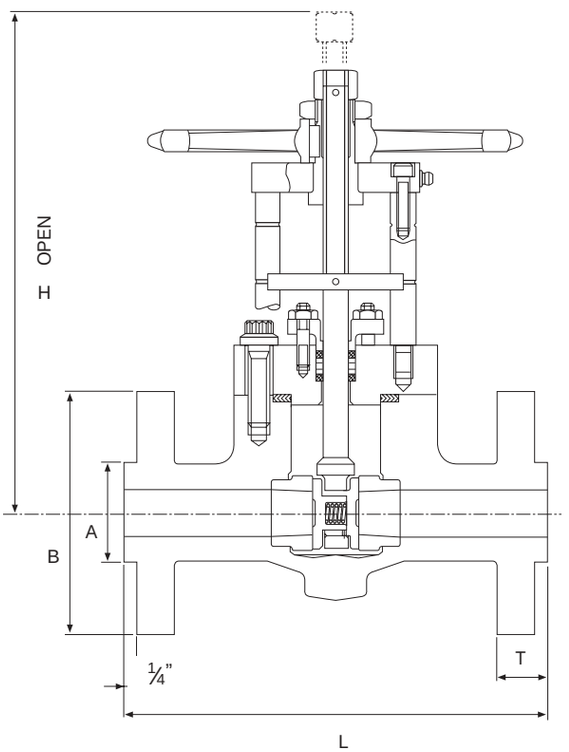
Flanged to ASME B16.5. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE – FORGED CARBON STEEL

ASME B.16.34 Class 600 Sizes ½" - 2" Figure number A21906 Flanged Ends

Materials

Description	
Body:	ASTM A105
Bonnet:	ASTM A105
Gasket:	Exfoliated graphite spiral wound
Stem:	BS970 431 S29
Seats:	Grade 6 Stellite
Disc:	13% Cr Stainless Steel hardened
Gland Packing:	Exfoliated graphite & braided carbon fibre
Bonnet bolts:	ASTM A193 Grade B7



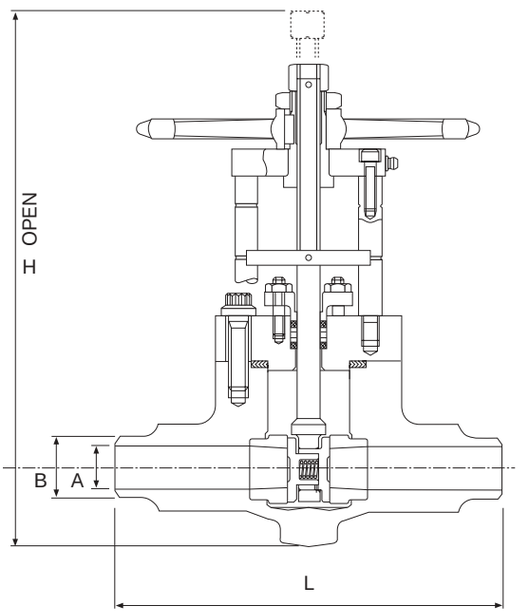
CLASS 600

Nominal Size		A		B		H		L		T		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
15	(½)	35	(1⅜)	95	(3¾)	220	(8⅝)	165	(6½)	21	(13/16)	7	(16)
20	(¾)	43	(1 1/16)	118	(4⅝)	220	(8⅝)	190	(7½)	22	(⅞)	7.5	(17)
25	(1)	51	(2)	124	(4⅞)	255	(10)	216	(8½)	24	(15/16)	12.5	(28)
32	(1¼)	64	(2½)	133	(5¼)	330	(13)	229	(9)	27	(1 1/16)	18.5	(41)
40	(1½)	73	(2⅞)	156	(6⅛)	365	(14⅜)	241	(9½)	29	(1⅛)	26	(56)
50	(2)	92	(3⅝)	165	(6½)	425	(16⅜)	292	(11½)	32	(1¼)	39	(86)

Flanged to ASME B16.5. Alternatives are available on request.

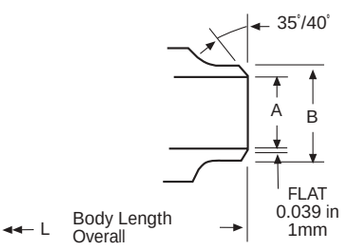
PARALLEL SLIDE GATE VALVES – FORGED CARBON STEEL

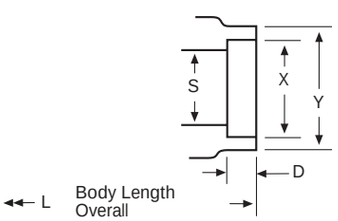
ASME B.16.34 Class 600 Sizes ½" - 2" Figure number A21906W Butt Weld Ends & A21906S Socket Weld Ends



Materials

Description	
Body:	ASTM A105
Bonnet:	ASTM A105
Gasket:	Exfoliated graphite spiral wound
Stem:	BS970 431 S29
Seats:	Grade 6 Stellite
Disc:	13% Cr Stainless Steel hardened
Gland Packing:	Exfoliated graphite & braided carbon fibre
Bonnet bolts:	ASTM A193 Grade B7





CLASS 600

Nominal Size mm	L mm	A mm	B mm	Weight kg	L mm	S mm	X mm	Y mm	D mm	Weight kg
15	–	–	–	–	140	18	21.97/21.72	40	10	4.5
20	190	19.10/18.60	27	5.5	140	18	27.30/27.05	40	13	5
25	216	24.55/24.05	34	8.5	165	24	34.04/33.78	45	3	7.5
32	229	32.70/32.20	43	14	178	32	42.80/42.54	54	13	13
40	241	38.30/37.80	49	21	190	38	48.90/48.64	61	13	20
50	292	49.50/49.00	61	32	241	49	61.37/61.11	74	16	30
in	in	in	in	lb	in	in	in	in	in	lb
½	–	–	–	–	5½	23/32	0.865/0.855	1 1/16	3/8	10
¾	7½	0.752/0.732	1 1/16	12	5½	23/32	1.075/1.065	1 1/16	½	11
1	8½	0.967/0.947	1 11/32	19	6½	15/16	1.340/1.330	1 25/32	½	16
1¼	9	1.288/1.268	1 11/16	31	7	1¼	1.685/1.675	2⅛	½	29
1½	9½	1.508/1.488	1 15/16	46	7½	1½	1.925/1.915	2 13/32	½	44
2	11½	1.949/1.929	2 13/32	71	9½	1 5/16	2.416/2.406	2 29/32	5/8	66

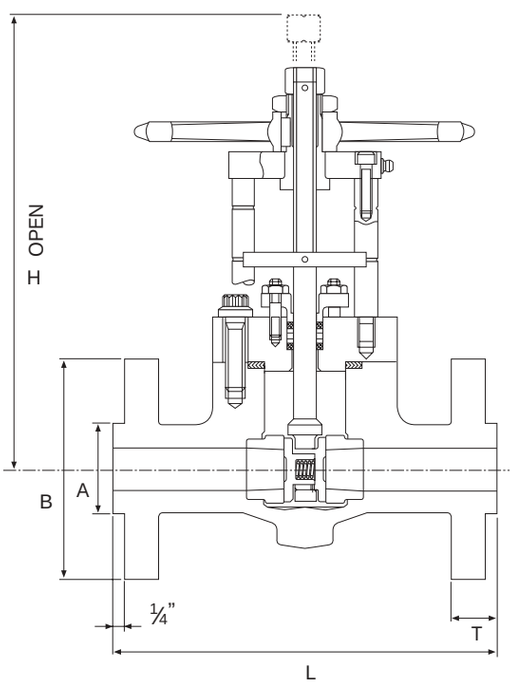
Butt Weld Ends to ASME B16.25. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE – FORGED CARBON STEEL

ASME B.16.34 Class 900 Sizes ½" - 2" Figure Number A21909 Flanged Ends

Materials

Description	
Body:	ASTM A105
Bonnet:	ASTM A105
Gasket:	Exfoliated graphite spiral wound
Stem:	BS970 431 S29
Seats:	Grade 6 Stellite
Disc:	13% Cr Stainless Steel hardened
Gland Packing:	Exfoliated graphite & braided carbon fibre
Bonnet bolts:	ASTM A193 Grade B7



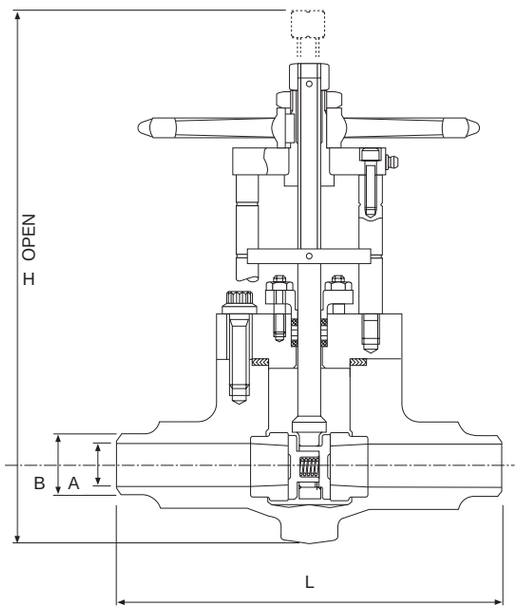
CLASS 900

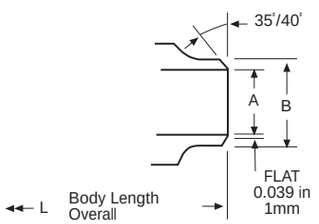
Nominal Size		A		B		H		L		T		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
15	(½)	35	(1⅜)	121	(4¾)	220	(8⅝)	216	(8½)	29	(1⅛)	10	(22)
20	(¾)	43	(1¹¹⁄₁₆)	130	(5⅛)	220	(8⅝)	229	(9)	32	(1¼)	10.5	(23)
25	(1)	51	(2)	149	(5⅞)	235	(9¼)	254	(10)	35	(1⅜)	16	(35)
32	(1¼)	64	(2½)	159	(6¼)	320	(12⅝)	279	(11)	35	(1⅜)	22.5	(50)
40	(1½)	73	(2⅞)	178	(7)	345	(13½)	305	(12)	38	(1½)	31	(67)
50	(2)	92	(3⅝)	3216	(8½)	390	(15⅜)	368	(14½)	45	(1¾)	42	(92)

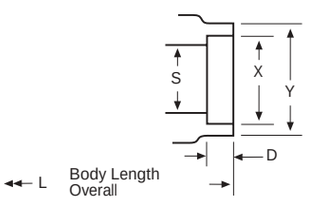
Flanged to ASME B16.5. Alternatives are available on request.

PARALLEL SLIDE GATE VALVES – FORGED CARBON STEEL

ASME B.16.34 Class 900 Sizes ½" - 2" Figure number A21909W Butt Weld Ends & A21909S Socket Weld Ends







Materials

Description	
Body:	ASTM A105
Bonnet:	ASTM A105
Gasket:	Exfoliated graphite spiral wound
Stem:	18/2 Stainless Steel
Seats:	Grade 6 Stellite
Disc:	13% Cr Stainless Steel hardened
Gland Packing:	Exfoliated graphite & braided carbon fibre
Bonnet bolts:	ASTM A193 Grade B7

CLASS 900

Nominal Size mm	L mm	A mm	B mm	Weight kg	L mm	S mm	X mm	Y mm	D mm	Weight kg
15	–	–	–	–	140	18	21.97/21.72	40	10	5
20	229	15.80/15.30	27	6	140	18	27.30/27.05	40	13	5.5
25	254	20.95/20.45	34	9	203	20	34.04/33.78	49	13	8.5
32	279	29.70/29.20	43	16	229	29	42.80/42.54	57	13	15
40	305	34.20/33.70	49	23	254	33	48.90/48.64	65	13	22
50	368	43.10/42.60	61	33	305	42	61.37/61.11	81	16	32
in	in	in	in	lb	in	in	in	in	in	lb
½	–	–	–	–	5½	23/32	0.865/0.855	1 3/16	3/8	11
¾	9	0.622/0.602	1 1/16	13	5½	23/32	1.075/1.065	1 3/16	½	12
1	10	0.825/0.805	1 11/32	19	8	25/32	1.340/1.330	1 15/32	½	19
1¼	11	1.170/1.150	1 11/16	35	9	1⅛	1.685/1.675	2¼	½	33
1½	2	1.347/1.327	1 15/16	50	10	1 3/32	1.925/1.915	2 3/16	½	48
2	14½	1.697/1.677	2 13/32	73	12	1 21/32	2.416/2.406	3 3/16	5/8	71

Butt Weld Ends to ASME B16.25. Alternatives are available on request.

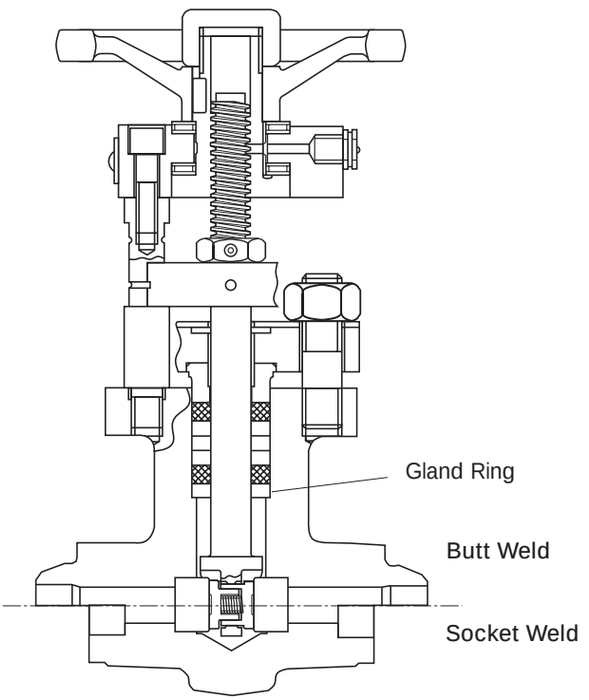
Bonnetless Type ½" & ¾" Sizes

Materials - Carbon Steel Valves

Body:	Carbon Steel - Forged	ASTM-A105
Gland Ring:	Nickel molybdenum alloy	
Stem:	18/10 Stainless Steel	
Seats:	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	

Materials - Alloy Steel Valves

Body:	Carbon Steel - Forged	ASTM-A182-F22
Gland Ring:	Nickel molybdenum alloy	
Stem:	18/10 Stainless Steel	
Seats:	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	



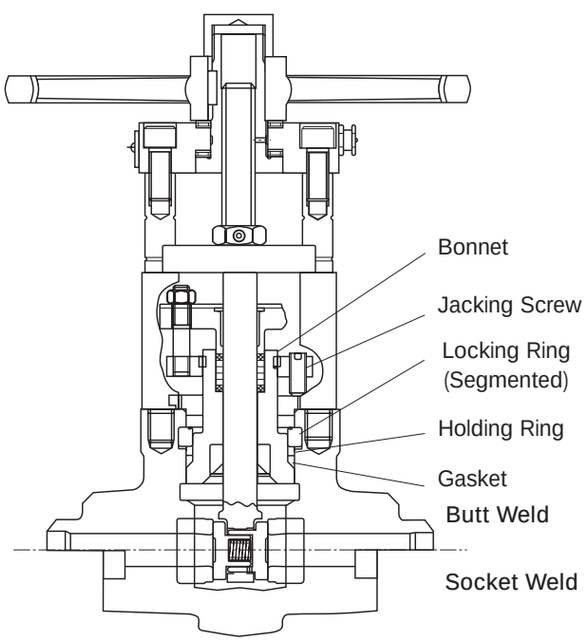
Pressure Seal Bonnet Type 1" to 2" Sizes

Materials - Carbon Steel Valves

Body:	Carbon Steel - Forged	ASTM-A105
Bonnet:	Alloy Steel - Forged	ASTM A182-F22
Back Seat:	Nickel molybdenum alloy	
Locking Ring:	13% Cr Stainless Steel	
Holding Ring:	13% Cr Stainless Steel	
Gasket:	Exfoliated graphite	
Stem:	18/10 Stainless Steel	
Seats	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	

Materials - Alloy Steel Valves

Body:	Alloy Steel - Forged	ASTM-A182-F22
Bonnet:	Alloy Steel - Forged	ASTM A182-F22
Back Seat:	Nickel molybdenum alloy	
Locking Ring:	High strength aust. s.s.	ASTM A638-660
Holding Ring:	13% Cr Stainless Steel	
Gasket:	Exfoliated graphite	
Stem:	18/10 Stainless Steel	
Seats	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	

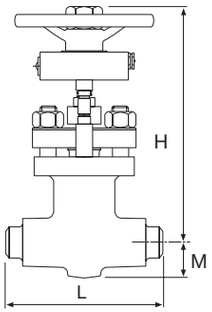


PARALLEL SLIDE GATE VALVES – FORGED CARBON & ALLOY STEEL

ASME B.16.34 Class 1500, 2500 & 3100 Sizes ½" - 2" Figure numbers A21915W, A21925W & A21931W
Butt Weld Ends A21915S, A21925S & A21931S Socket Weld Ends

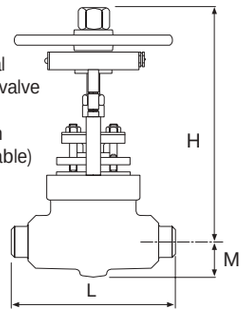
Bonnetless type valve

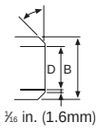
(Ref: 'BL' in Dimension Table)



Pressure Seal
Bonnet type valve

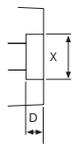
(Ref: 'PSB' in
Dimension Table)





1/16 in. (1.6mm)

Details of
Butt Weld
connection



Details of
Socket Weld
connection

					Butt Weld Valves					Socket Weld Valves				
	Nominal Size	H	M		Type	L	A	B	Weight	Type	L	X	D	Weight
Class 1500 Butt Welds Valves Figure No. A21915W	½	8¼	1¼		BL	5½	0.50	0.94	13lb	BL	4	0.857	½	12lb
	¾	10⅜	1 9/16		PSB	7 5/16	0.61	1.10	23	PSB	5	1.070	½	22
	1	10⅜	1 9/16		PSB	7 5/16	0.81	1.38	23	PSB	5	1.335	½	22
	1¼	12⅝	2		PSB	9⅛	1.16	1.69	46	PSB	6½	1.680	½	43
	1½	15¾	2⅝		PSB	11	1.34	2.05	91	PSB	7⅞	1.920	½	87
	2	15¾	2⅝		PSB	11	1.69	2.44	91	PSB	7⅞	2.411	⅝	87
Socket Weld Valves Figure No. A21915S	15	210	32		BL	140	12.70	24	6kg	BL	102	21.77	13	6kg
	20	264	40		PSB	186	15.54	28	11	PSB	217	27.17	13	10
	25	264	40		PSB	186	20.70	35	11	PSB	127	33.91	13	10
	32	322	51		PSB	232	29.46	43	21	PSB	165	42.67	13	20
	40	402	67		PSB	279	33.98	52	42	PSB	200	48.77	13	40
	50	402	67		PSB	279	42.89	62	42	PSB	200	61.24	16	40
Class 2500 Butt Welds Valves Figure No. A21925W	½	8½	1¼		BL	5½	0.50	0.94	13lb	BL	4	0.857	½	12lb
	¾*	8¼ (10⅜)	1¼ (1 9/16)		BL	5½	0.50	1.10	13	PSB	5	1.070	½	22
	1	10⅜	1 9/16		PSB	7 5/16	0.60	1.38	23	PSB	5	1.335	½	22
	1¼	12⅝	2		PSB	9⅛	0.89	1.81	46	PSB	6½	1.680	½	43
	1½	15¾	2⅝		PSB	11	1.10	2.17	91	PSB	7⅞	1.920	½	87
	2	15¾	2⅝		PSB	11	1.50	2.56	91	PSB	7⅞	2.411	⅝	87
Socket Weld Valves Figure No. A21925S	15	210	32		BL	140	12.70	24	6kg	BL	102	21.77	13	6kg
	20*	210 (264)	32(40)		BL	140	12.70	28	6	PSB	127	27.17	13	10
	25	264	40		PSB	186	15.21	35	11	PSB	127	33.91	13	10
	32	322	51		PSB	232	22.75	46	21	PSB	165	42.67	13	20
	40	402	67		PSB	279	27.94	55	42	PSB	200	48.77	13	40
	50	402	67		PSB	279	38.17	65	42	PSB	200	61.24	16	40
Class 3100 Butt Welds Valves Figure No. A21931W	½	8¼	1¼		BL	5½	0.50	0.94	13lb	BL	4	0.857	½	12lb
	¾*	8¼ (10⅜)	1¼ (1 9/16)		BL	5½	0.50	1.10	13	PSB	5	1.070	½	22
	1	10¾	1⅜		PSB	7 5/16	0.60	1.38	23	PSB	5	1.335	½	22
	1¼	12⅝	2		PSB	9⅛	0.89	1.81	46	PSB	6½	1.68	½	43
	1¼	15¾	2⅝		PSB	11	1.10	2.17	91	PSB	7⅞	1.920	½	87
	2	15¾	2		PSB	11	1.50	2.56	91	PSB	7⅞	2.411	⅝	87
Socket Weld Valves Figure No. A21931S	15	210	32		BL	140	12.70	24	6	BL	102	21.77	13	6kg
	20*	210 (264)	32(40)		BL	140	12.70	28	6kg	PSB	127	27.17	13	10
	25	264	40		PSB	186	15.21	35	11	PSB	127	33.91	13	10
	32	322	51		PSB	232	22.75	46	21	PSB	165	42.67	13	20
	40	402	67		PSB	279	27.94	55	42	PSB	200	48.77	13	40
	50	402	67		PSB	279	38.17	65	42	PSB	200	61.24	16	40

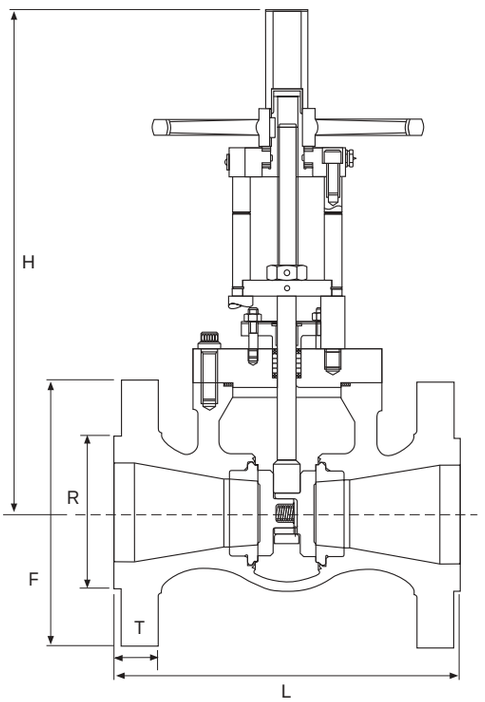
*Figures in parentheses relate to Socket Weld End valves.

PARALLEL SLIDE GATE VALVE – CARBON STEEL

ASME B.16.34 Class 600 Sizes 2½" - 4" Figure number A21906 Flanged Ends

Materials

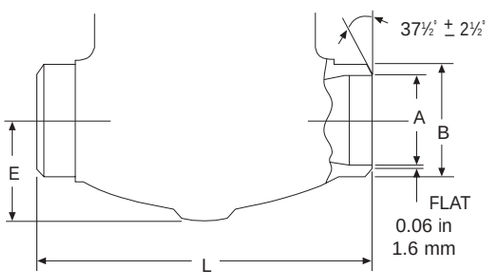
Description	
Body:	ASTM A216-WCB
Bonnet:	ASTM A105
Gasket:	Exfoliated graphite spiral wound
Stem:	BS970 431 S29
Seats:	Grade 6 Stellite
Disc:	13% Cr Stainless Steel hardened
Gland Packing:	Exfoliated graphite & braided carbon fibre
Bonnet bolts:	ASTM A193 Grade B7



CLASS 600

Nominal Size		T		F		H		L		R		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	35	(1⅜)	190	(7½)	425	(16¼)	330	(13)	105	(4⅛)	41	(90)
80	(3)	38	(1½)	210	(8¼)	425	(16¼)	356	(14)	127	(5)	52	(114)
100	(4)	45	(1¾)	273	(10¾)	510	(20)	356	(14)	157	(6³⁄₁₆)	83	(183)

Flanged to ASME B16.5. Alternatives are available on request.



Other dimensions as flanged valves

Figure No. A21906W

BUTT WELD VALVES

Nominal Size		E		L		A		B		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	65	(2⁹⁄₁₆)	216	(8½)	59	(2.32)	73	(2.88)	30	(66)
80	(3)	68	(2⅝)	254	(10)	73	(2.87)	89	(3.50)	31	(68)
100	(4)	80	(3⅛)	305	(12)	97	(3.81)	114	(4.50)	44	(97)

Flanged to ASME B16.5. Alternatives are available on request.

PARALLEL SLIDE GATE VALVE - FORGED CARBON & ALLOY STEEL

ASME B.16.34 Class 900, 1500, 2500, 3100 & 3600 Sizes 2½" - 4"

Figure number A21909W, A21915W, A21925W, A21931W, A21936W Butt Weld Ends

Materials - Carbon Steel Valves

Body:	Carbon Steel - Forged	ASTM-A105
Bonnet:	Sizes 2½ & 3in (65 & 80mm): Alloy steel - forged ASTM A182-F22 Size 4i (100mm): Carbon Steel - forged ASTM-A105	
Back Seat:	Nickel molybdenum alloy	
Locking Ring:	13% Cr Stainless Steel	
Holding Ring:	13% Cr Stainless Steel	
Gasket:	Exfoliated graphite	
Stem:	ASTM A564 Grade XM 12	
Belt Eye	Sizes 2½ & 3in (65 & 80mm): Austenitic SS ASTM A453 Grade 660B Size 4in (100mm): Alloy Steel -forged	ASTM-182-F22
Seats	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	

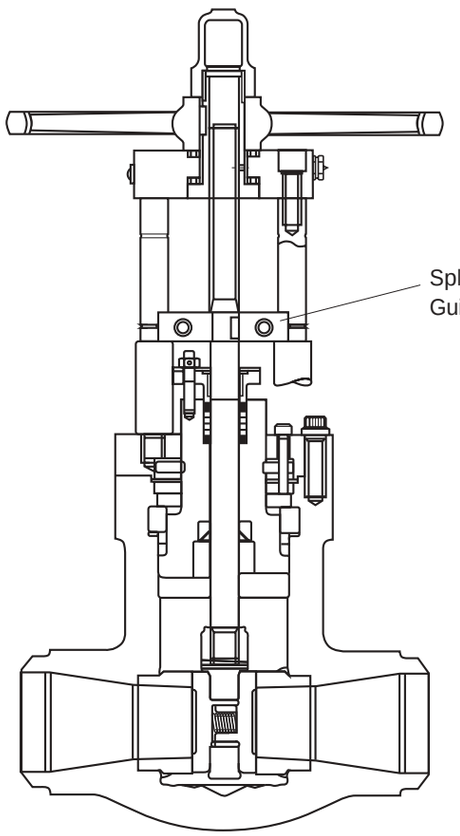
Materials - Alloy Steel Valves

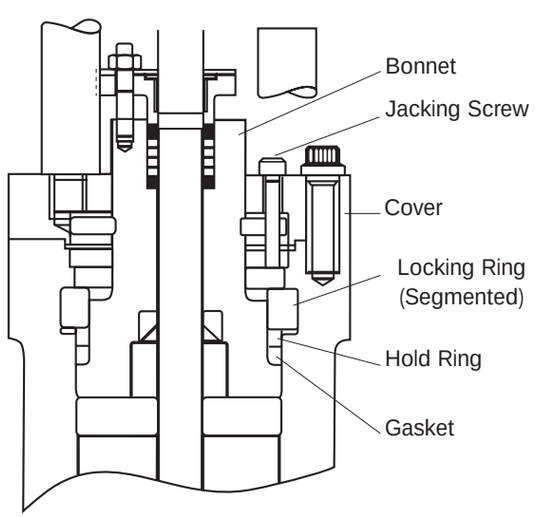
Body:	Alloy Steel - Forged	ASTM-A182-F22
Bonnet:	Alloy steel - forged	ASTM A182-F22
Back Seat:	Nickel molybdenum alloy	
Locking Ring:	Class 900, 1500, 2500 valves: 13% Cr Stainless Steel Class 3100, 3600 valves: ASTM A638 Grade 660	
Holding Ring:	13% Cr Stainless Steel	
Gasket:	Exfoliated graphite	
Stem:	ASTM A638 Grade 660	
Belt Eye	Sizes 2½ & 3in (65 & 80mm):	
	Austenitic SS ASTM A453 Grade 660B Size 4in (100mm): Alloy Steel - forged	ASTM-182-F22
Seats	Grade 6 Stellite	
Discs:	Nickel molybdenum alloy	
Gland Packing:	Exfoliated graphite & braided carbon fibre	

Butt Weld End Valves

Class 900	Figure No. A21909W
Class 1500	Figure No. A21915W
Class 2500	Figure No. A21925W
Class 3100	Figure No. A21931W
Class 3600	Figure No. A21936W

Nominal Sizes:			
inch	2½	3	4
mm	65	80	100





PARALLEL SLIDE GATE VALVE – FORGED CARBON & ALLOY STEEL

ASME B.16.34. Class 900, 1500, 2500, 3100, 3600 Sizes 2½" (65mm), 3"- 4"(80 & 100mm)
Alloy Steel only Figure number A21915W, A21925W, A21931W Butt Weld Ends

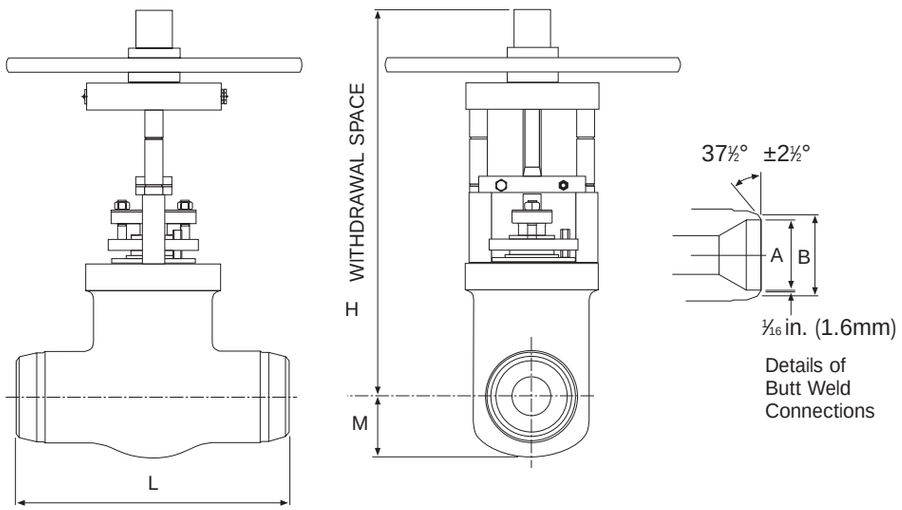


Figure No. A21909W — *CLASS 900*

Nominal Size		A		B		H		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	54	(2.12)	85	(3.34)	430	(17)	254	(10)	68	(2⅝)	35	(77)
80	(3)	66	(2.62)	100	(3.93)	435	(17⅛)	305	(12)	68	(2⅝)	37	(81)
100	(4)	87	(3.43)	120	(4.72)	615	(24¼)	356	(14)	94	(3¾)	82	(180)

Figure No. A21915W — *CLASS 1500*

Nominal Size		A		B		H		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	54	(2.12)	85	(3.34)	430	(17)	254	(10)	68	(2⅝)	35	(77)
80	(3)	66	(2.62)	100	(3.93)	435	(17⅛)	305	(12)	68	(2⅝)	37	(81)
100	(4)	87	(3.43)	125	(4.92)	615	(24¼)	406	(16)	94	(3¾)	86	(189)

Figure No. A21925W Class 2500
Figure No. A21931W Class 3100 Size 2½" (65mm) only, Alloy Steel only
Figure No. A21936W Class 3600 Sizes 3 & 4" (80 &100mm) only, Alloy Steel only — *CLASS 2500, 3100 & 3600*

Nominal Size		A		B		H		L		M		Weight	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	kg	(lb)
65	(2½)	45	(1.77)	85	(3.34)	430	(17)	330	(13)	70	(2¾)	41*	(90*)
80	(3)	55	(2.17)	100	(3.93)	430	(17⅛)	368	(14½)	70	(2¾)	43*	(95*)
100	(4)	66	(2.62)	125	(4.92)	615	(24¼)	457	(18)	96	(3¾)	93*	(205*)

*Weights shown in column are for Fig. A21925W. Other valves: Fig. A21931W 2½ in (65mm) = 106 lb (48kg). Fig. A21936W 3 in (80mm) = 110lb (50kg). 4in (100mm) = 253lb (115kg).

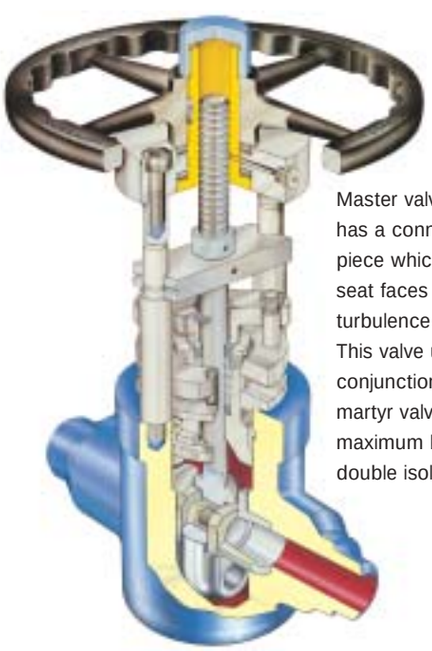
Butt Weld Ends to ASME B16.25 Alternatives are available on request.

HIGH PERFORMANCE DRAIN VALVES

For extreme service conditions such as on superheated steam drain lines, Hopkinsons have developed a new range of high performance parallel slide gate valves. They give extended service life and continued tight shut off when subject to frequent operation, two phase flow, thermal shock and large pressure drops. Unique features of the valves include square discs (gates) and 'winged' seats. These provide accurate gate guidance, low seat contact stresses and enhanced wear resistance for repeatedly handling large pressure drops in the part open position.

The valves can be installed singly but for maximum effect, two valves operating in a martyr valve and master valve configuration are recommended.

- Winged seats - the seating area is extended in the opening direction providing greater contact area with the gates.
- Square gates - provide greater contact area and support during operation. Titanium nitride coating gives improved erosion resistance.

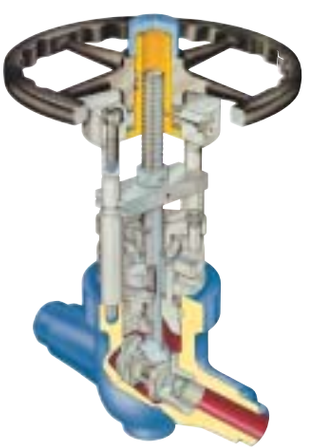


Master valve - has a connecting eye-piece which protects the seat faces and avoids turbulence in the valve. This valve used in conjunction with the martyr valve produces maximum benefits of double isolation.

High Performance Drain Valves

Ratings:	ASME Class 900 to 3600
Sizes:	20 to 100 mm ¾ to 4 in
Materials:	Carbon Steel, Alloy Steel.
End Connection:	Butt weld and socket weld.

Martyr valve - incorporates a 'V' port outlet seat and is ideal for regulating the flow. The 'V' port is set back from the sealing face and any wear associated with high velocities and throttling is confined to this and not the sealing face.



OPERATION

Manual or Actuated - Motorising frequently operated valves is essential for modern plant operation. Actuators can ensure the master valve is opened first and closed last, and that it is opened to its full open position.

OPTIONAL EXTRAS

Pipework - Pairs of valve can be supplied with a joining piece of pipework welded and tested thereby simplifying site installation.

Alternative 'V' ports - the standard 50% 'V' port provides excellent all round performance and is appropriate for the majority of applications. Where necessary, 'V' ports from 20% to 80% area, and parallel ports from 5% to 30% area for linear regulation can be selected for specific applications.

PRESSURE/TEMPERATURE RATINGS

PN 420 Rated Valves - Fig No: M218420W, M268420W, Sizes 20 - 50mm.
ASME Class 2500 Valves - Fig No. A21825W, A26825W, Sizes 1 - 2½ inch.
Body Material: Carbon Steel ASTM-105, ASTM-A216-WCB.
In accordance with ASME B16.34 Limited Class 2500

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Pressure bar	431.0	431.0	431.0	431.0	431.0	431.0	415.5	401.1	393.6	359.4	299.6*	208.7*	141.1*	123.1*					
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100			
Pressure lb/in	6250	6250	6250	6250	6250	5940	5825	5780	5250	4285*	2785*	1785*							

PN 520 Rated Valves - Fig No: M218520W, M268520W, Sizes 20 - 50mm.
ASME Class 3100 Valves - Fig No. A21831W, A26831W, Sizes 1 - 2½ inch.
Body Material: Alloy Steel ASTM A182-F22, WC9.
In accordance with ASME B16.34 Limited Class 3100

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Pressure bar	534.5†	534.5†	534.5†	534.5†	534.5†	527.1†	525.5†	524.8†	522.0†	518.9†	513.5†	487.6†	441.9†	-	378.9	378.9	243.7	174.3	117.3
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Pressure lb/in	7750†	7750†	7750†	7750†	7620†	7620†	7620†	7575†	7528†	7440†	7000†	6200	5097	3938	2961	1685	-	-	-

ASME Class 1500 Valves - Fig No. A21815W, A26815W, Sizes 1 - 2½ inch.
Body Material: Carbon Steel ASTM- 105, ASTM A216-WCB.
In accordance with ASME B16.34 Limited Class 1500

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Pressure bar	258.6	258.6	258.6	258.6	258.6	258.6	249.3	240.6	236.2	215.6	179.7*	125.2*	84.7*	73.8*	-	-	-	-	-
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Pressure lb/in	3750	3750	3750	3750	3750	3565	3495	3470	3150	2570*	1670*	1070*	-	-	-	-	-	-	-

ASME Class 1500 Valves - Fig No. A21815W, A26815W, Sizes 1 - 2½ inch.
Body Material: Alloy Steel ASTM A182-F22.
In accordance with ASME B16.34 Limited Class 1500

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Pressure bar	258.6	258.6	258.6	258.6	258.6	255.0	254.2	253.8	252.5	251.1	248.3	235.9	213.8	-	180.9	142.9	109.2	78.3	52.2
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Pressure lb/in	3750	3750	3750	3750	3685	3685	3685	3665	3645	3600	3385	3000	2411	1784	1330	758	-	-	-

ASME Class 900 Valves - Fig No. A21809W, A26809W, Sizes 1 - 2½ inch.
Body Material: Carbon Steel ASTM-105,ASTM A216-WCB.
In accordance with ASME B16.34 Limited Class 900

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
855.1	155.1	155.1	155.1	155.1	155.1	149.6	144.4	141.7	129.4	107.8*	75.1*	50.8*	44.4*	-	-	-	-	-	
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	1000	1050	1100	-	-	-	-
Pressure lb/in	2250	2250	2250	2250	2250	2140	2100	2080	1890	1545*	1005*	645*	-	-	-	-	-	-	-

ASME Class 900 Valves - Fig No. A21809W, A26809W, Sizes 1 - 2½ inch.
Body Material: Alloy Steel ASTM A182-F22.
In accordance with ASME B16.34 Limited Class 900

Temperature ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Pressure bar	155.1	155.1	155.1	155.1	155.1	153.0	152.5	152.3	151.5	150.7	149.1	141.5	128.3	-	107.9	84.3	63.8	45.5	30.4
Temperature ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Pressure lb/in	2250	2250	2250	2250	2210	2210	2210	2200	2185	2160	2030	1800	1433	1045	774	442	-	-	-

PRESSURES AND TEMPERATURES SHOWN IN THE BAR: °C TABLE ARE CONVERSIONS FROM lb/in²: °F RATINGS. FOR INTERMEDIATE VALUES IT IS RECOMMENDED THAT THEY ARE OBTAINED BY LINEAR INTERPOLATION USING THE TABLE OF lb/in²: F RATINGS. * ASTM A105 MATERIAL TEMPERATURE LIMITATIONS: USE AT TEMPERATURES ABOVE 425°C (800°F) IS PERMISSIBLE BUT IS NOT RECOMMENDED FOR PROLONGED USE. SHORT EXCURSIONS UP TO 482°C (900°F) ARE PERMISSIBLE.
† RESTRICTED SEATING: MAX PRESSURE DIFFERENTIAL ACROSS THE CLOSURE MEMBER IS LIMITED TO 431 BAR (6250 lb/in²).

ASME Class 2500 Valves - Fig No. A21825W, A26825W, Sizes 3 and 4 inch.
Body Material: Carbon Steel ASTM-105,ASTM A216-WCB.
In accordance with ASME B16.34 Class 2500

Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	425.4	417.1	386.5	376.9	365.1	347.6	327.7	308.0	303.8	287.5	239.7*	167.0*	112.9*	98.6*	-	-	-	-	-
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	6170	5625	5470	5280	4990	4560	4475	4440	4200	3430*	2230*	1430*	-	-	-	-	-	-	-

ASME Class 3600 Valves - Fig No. A21836W, A26836W, Sizes 3 and 4 inch.
Body Material: Alloy Steel ASTM A182-F22.
In accordance with ASME B16.34 Class 3600

Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	620.6†	614.4†	588.5†	559.5†	538.1†	530.6†	508.5†	482.8†	465.5†	439.0†	421.1	405.7	399.9	-	333.7	263.1	196.4	140.6	75.8
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	9000†	8591†	8120†	7776†	7676†	7256†	7061†	6812†	6377†	6089	5845	5392	4528	3209	2389	1360	-	-	-

ASME Class 1500 Valves - Fig No. A21815W, A26815W, Sizes 3 and 4 inch.
Body Material: Carbon Steel ASTM- 105, ASTM A216-WCB.
In accordance with ASME B16.34 Class 1500

Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	255.5	250.4	231.9	226.0	219.2	208.7	193.6	184.8	182.3	172.5	143.9*	100.3*	67.9*	59.3*	-	-	-	-	-
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	3705	3375	3280	3170	2995	2735	2685	2665	2520	2060*	1340*	860*	-	-	-	-	-	-	-

ASME Class 1500 Valves - Fig No. A21815W, A26815W, Sizes 3 and 4 inch.
Body Material: Alloy Steel ASTM A182-F22.
In accordance with ASME B16.34 Class 1500

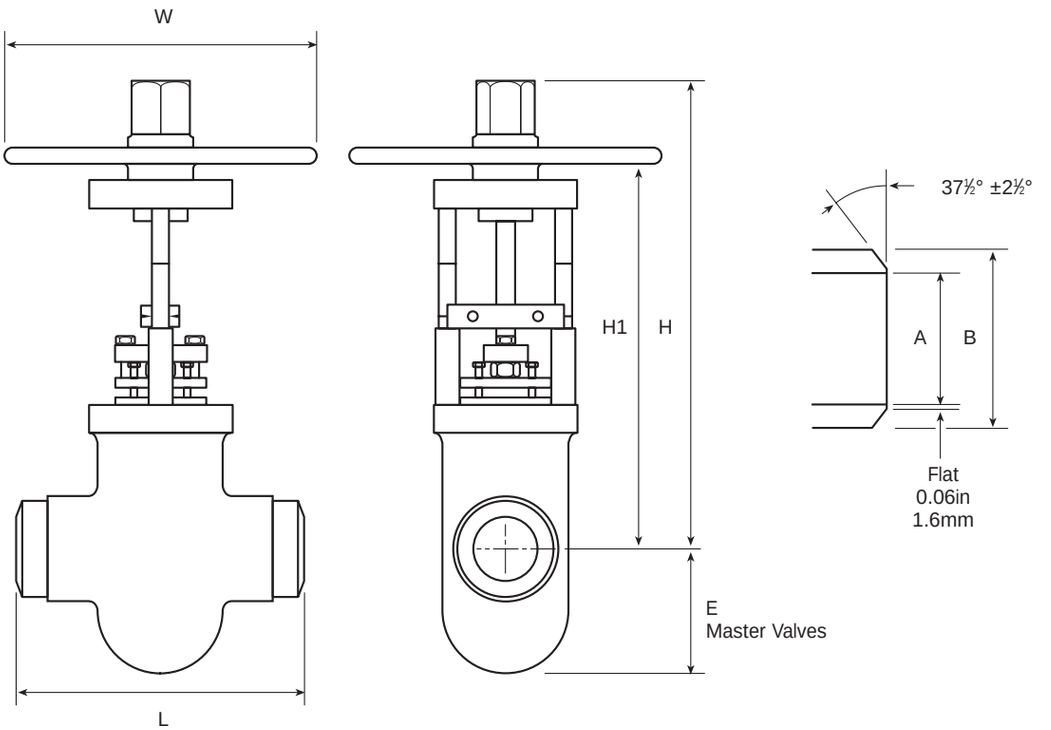
Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	258.6	256.0	245.2	233.2	224.2	221.1	211.9	201.1	194.1	183.1	175.6	169.0	158.2	-	138.9	109.7	81.9	58.5	39.0
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	3750	3580	3385	3240	3200	3025	2940	2840	2660	2540	2435	2245	1885	1340	995	565	-	-	-

ASME Class 900 Valves - Fig No. A21809W, A26809W, Sizes 3 and 4 inch.
Body Material: Carbon Steel ASTM-105,ASTM A216-WCB.
In accordance with ASME B16.34 Class 900

Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	153.1	150.1	139.2	135.7	131.4	125.1	116.1	110.8	109.4	103.4	86.3*	60.2*	40.7*	35.5*	-	-	-	-	-
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	2220	2025	1970	1900	1795	1640	1610	1600	1510	1235*	805*	515*	-	-	-	-	-	-	-

ASME Class 900 Valves - Fig No. A21809W, A26809W, Sizes 3 and 4 inch.
Body Material: Alloy Steel ASTM A182-F22.
In accordance with ASME B16.34 Class 900

Temp. ºC	-29 to 38	50	100	150	200	250	300	350	375	400	425	450	475	482	500	525	550	575	593
Press. bar	155.1	153.6	147.2	139.8	134.6	132.7	127.2	120.7	116.5	109.8	105.4	101.4	95.1	-	90.4	65.8	49.1	35.0	23.4
Temp. ºF	-20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000	1050	1100	-	-	-
Press. lb/in	2250	2150	2030	1945	1920	1815	1765	1705	1595	1525	1460	1350	1130	805	595	340	-	-	-



CLASS PN420 & PN520

Nominal Size		A		B PN420		B PN520		E		H		H1		L		W	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)
20	(¾)	20	(0.79)	35	(1.38)	40	(1.57)	78	(3.07)	321	(12.75)	277	(10.9)	254	(10)	280	(11)
25	(1)	25	(0.98)	42	(1.65)	46	(1.81)	78	(3.07)	321	(12.75)	277	(10.9)	254	(10)	280	(11)
32	(1¼)	32	(1.26)	57	(2.24)	60	(2.36)	110	(4.33)	401	(15.75)	349	(13.75)	305	(12)	380	(15)
40	(1½)	38	(1.5)	65	(2.56)	68	(2.68)	110	(4.33)	401	(15.75)	349	(13.75)	305	(12)	380	(15)
50	(2)	47	(1.85)	85	(3.35)	85	(3.35)	130	(5.12)	430	(17)	368	(14.5)	330	(13)	330	(13)

CLASS 900 & 1500

Nominal Size		A Cl.900		A Cl.1500		B		E		H		H1		L		W	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)
20	(¾)			15.44	(0.61)	28	(1.1)	65	(2.56)	264	(10.38)	242	(9.5)	186	(7.31)	178	(7)
25	(1)			20.7	(0.81)	35	(1.38)	65	(2.56)	264	(10.38)	242	(9.5)	186	(7.31)	178	(7)
32	(1¼)			29.46	(1.16)	43	(1.69)	78	(3.07)	321	(12.63)	277	(10.9)	232	(9.13)	260	(11)
40	(1½)			33.98	(1.34)	52	(2.05)	110	(4.33)	401	(15.75)	349	(13.75)	279	(11)	380	(15)
50	(2)			42.9	(1.69)	62	(2.44)	110	(4.33)	401	(15.75)	349	(13.75)	279	(11)	380	(15)
65	(2½)	54	(2.13)	54	(2.13)	73	(2.87)	130	(5.12)	430	(17)	368	(14.5)	254	(10)	330	(13)
80	(3)	66.65	(2.63)	66.65	(2.63)	89	(3.5)	130	(5.12)	436	(17.17)	374	(14.75)	305	(12)	330	(13)
100	(4)	87.32	(3.44)	87.32	(3.44)	114	(4.49)	175	(6.89)	618	(24.3)	519	(20.4)	356	(14)	330	(13)

DIMENSIONS

CLASS 2500, 3100 & 3600

Nominal Size		A		B		E		H		H1		L		W	
mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)	mm	(in)
25	(1)	15.21	(0.60)	35	(1.38)	65	(2.56)	264	(10.38)	242	(9.5)	186	(7.31)	178	(7)
32	(1¼)	22.75	(0.89)	46	(1.81)	78	(3.07)	321	(12.63)	277	(12.63)	232	(9.13)	280	(11)
40	(1½)	27.94	(1.10)	55	(2.17)	110	(4.33)	401	(15.75)	349	(13.75)	279	(11)	380	(15)
50	(2)	38.17	(1.50)	65	(2.56)	110	(4.33)	401	(15.75)	349	(13.75)	279	(11)	380	(15)
65	(2½)	45	(1.77)	73	(2.87)	130	(5.12)	430	(17)	368	(14.5)	330	(13)	380	(15)
80	(3)	58	(2.28)	89	(3.50)	130	(5.12)	436	(17.17)	375	(14.75)	368	(14.5)	330	(13)
100	(4)	80	(3.15)	114	(4.48)	175	(6.89)	618	(24.3)	519	(20.4)	457	(18)	470	(18.5)

VALVE AVAILABILITY

Martyr Valves - Fig No. M218520W, M218420W, A21831W, A21825W, A21815W, A21809W
Master Valves - Fig No.M268520W, M268420W, A26831W, A26825W, A26815W, A26809W
Combined Valves - as Master Valves - with 'V' port

Figure Number	Rating	Material	Sizes
M218520W, M268520W	PN520	F22/WC9	20mm to 50mm
M218420W, M268420W	PN420	A105/WCB	20mm to 50mm
A21831W, A26831W	ASME Class 3100*	F22/WC9	1" to 4" nom.
A21825W, A26825W	ASME Class 2500	A105/WCB, F22/WC9	1" to 4" nom.
A21815W, A26815W	ASME Class 1500	A105/WCB, F22/WC9	¾" to 4" nom
A21809W, A26809W	ASME Class 900	A105/WCB, F22/WC9	2½", 3",4" nom

* 3" AND 4" SIZES (80mm AND 100mm) AVAILABLE IN CLASS 3600 AS FIGURE NO. A21836W. PLEASE CONSULT US FOR OTHER SIZES OR PRESSURE CLASSES.
SOCKET WELD ENDS AVAILABLE ON SIZES UP TO AND INCLUDING 2½". DIMENSIONS IN THE TABLES OPPOSITE ARE FOR BUTT WELD ENDS. $2^{1}/_{2}$" SIZE AND ABOVE ARE FITTED WITH SPLIT STEM GUIDE.

DESCRIPTION

ASME Section 1 Safety Valves

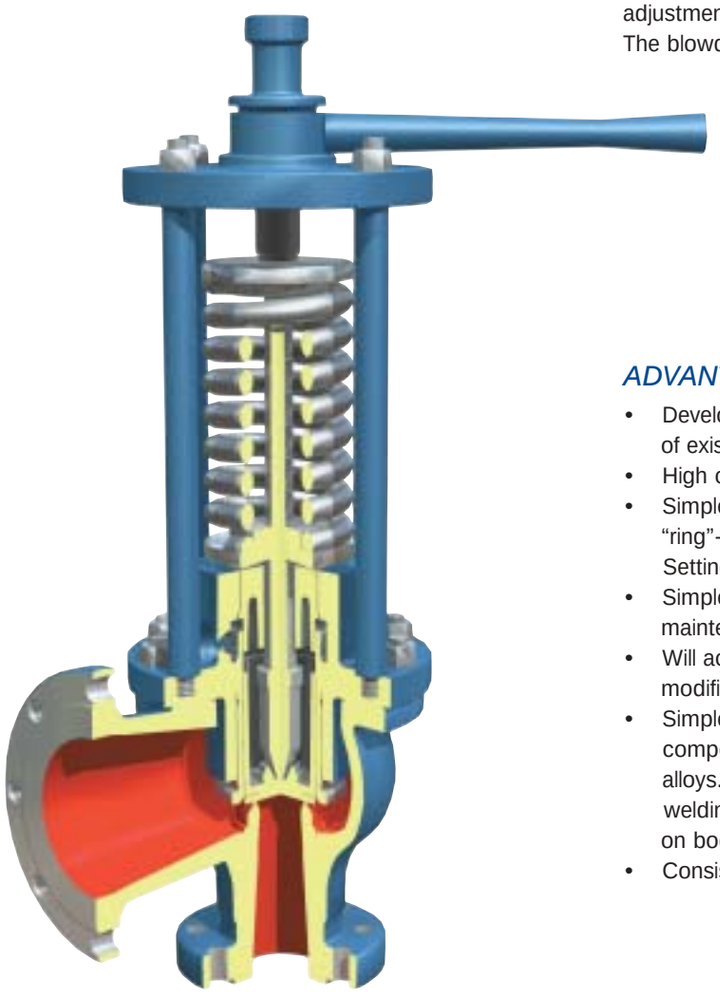
These high capacity valves are designed for operational pressures up to 3000 lb/in^2 (207 barA).

Ensuring the maximum discharge capacity for each size of valve, reduces the number of safety valves required on the installation.

Size Range: 2 to 6 in (50 to 150 mm Nominal)

Figure No: A7000 Series

Connections: Flanged or butt weld inlet, flanged outlet.



OPERATION

The set pressure of the safety valve is the 'pop' pressure at which the valve opens. On a rising pressure, the valve gives a warning of steam near the set pressure. The escaping steam exerts its pressure over the larger area of the disc face, lifting the disc into the valve guide. This deflects the steam downwards, creating a reaction force moving the valve to full lift within 3% above set pressure.

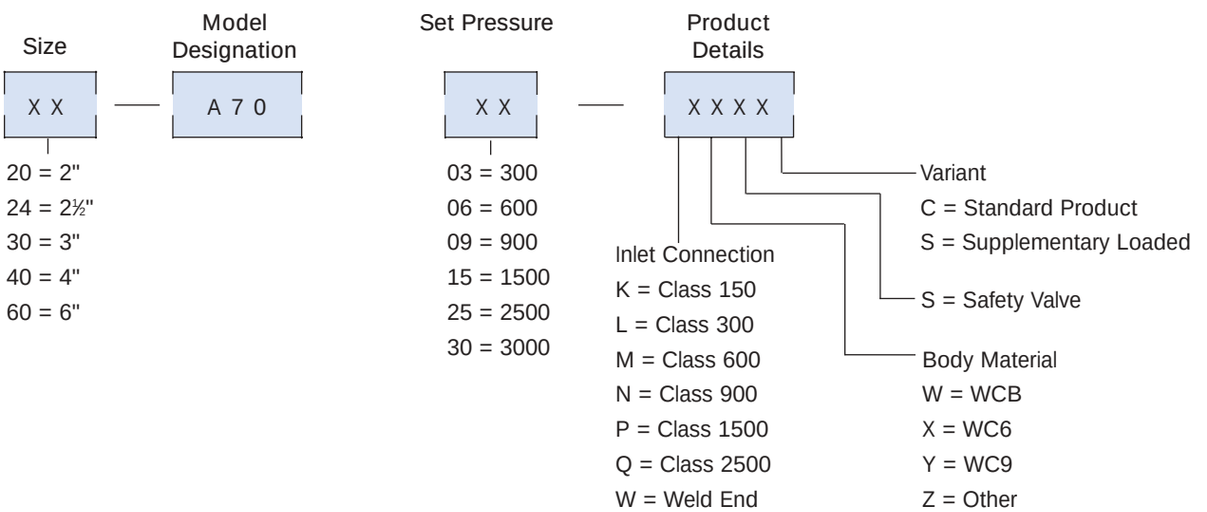
Closing of the safety valve occurs when the steam pressure has reduced due to the discharge through the valve. At a pressure below the set pressure, the forces become insufficient to maintain it at full lift, causing the valve to commerce closing. The reaction force becomes less as flow reduces, allowing the valve to shut off cleanly at its reseating pressure. The pressure at which this takes place is adjustable and is a feature known as the blowdown adjustment and setting.

The blowdown adjustment is made by rotating the valve guide, which raises or lowers its position in the valve. The lower its position, the lower the reseating pressure. Blowdown adjustment mechanism is easily accessible and has a wire lock and seal to deter unauthorised interference. The blowdown setting can be easily read from outside the valve by noting the position of the locking screw, which holds the valve guide in position.

ADVANTAGES

- Developed from a proven design with many years of existing operational experience.
- High capacity discharge nozzle.
- Simple external blowdown adjustment using one "ring"-no plugs to remove in body steam space. Setting position visible externally.
- Simple construction an advantage for maintenance.
- Will accept pressure setting equipment without modifications.
- Simple refurbishment of seat facing. Seating components are of high grade corrosion resisting alloys. Seat is secured in body by either press-in or welding depending on pressure class. Rolled lip on body provides back up seat security.
- Consistent set pressure.

MODEL NUMBERING



MATERIALS OF CONSTRUCTION

Body	ASME SA216 Gr WCB (up to 800°F)	ASME SA217 Gr WC6 (up to 1000°F)	ASME SA217 Gr WC9 (up to 1050°F)
Bonnet	ASME SA216 Gr WCB	ASME SA216 Gr WCB	ASME SA216 Gr WCB
Seat	Nickel Moly Alloy or A105 Base with Stellite Deposit	Nickel Moly Alloy or A182 Gr F22 Base with Stellite Deposit	Nickel Moly Alloy or A182 Gr F22 Base with Stellite Deposit
Disc	Nickel/Chromium Alloy		
Stem	13% Chromium Stainless Steel ASTM A276-420		
Spring	Chromium Vanadium Steel		
Bonnet Stud	ASME SA193 Gr B7	ASME SA193 Gr B16	ASME SA193 Gr B16
Bonnet Stud Nut	ASME SA194 Gr4		
Pillar	ASME SA193 GrB7		
Top Plate	ASME SA516 Gr70		
Pillar Nut	ASME SA194 Gr4		

PRODUCT RANGE

Valve Size (in)	2		2½		3		4		6	
Max Set Pressure (PSIG)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
300	2"/300#	3"/150#	2½"/300#	4"/150#	3"/300#	6"/150#	4"/300#	6"/150#	6"/300#	8"/150#
600	2"/600#	3"/150#	2½"/600#	4"/150#	3"/600#	6"/150#	4"/600#	6"/150#	6" /600#	8"/150#
900	2"/900#	4"/300#	2½"/900#	6"/300#	3"/900#	6"/300#	4"/900#	6"/300#	6"/900#	8"/300#
1500	2"/1500#	4"/300#	2½"/1500#	6"/300#	3"/1500#	6"/300#	4"/1500#	6"/300#	6"/1500#	8"/300#
2500	2"/2500#	4"/300#	2½"2500#	6"/300#	3"/2500#	6"/300#	-	-	-	-
3000	Butt Welded	4"/300#	Butt Welded	6"/300#	Butt Welded	6"/300#	-	-	-	-

Pressure Temperature Ratings: As per ASME B16.34 for Body material/flange rating.
Other valve sizes and pressures are available on request.

VALVE SIZING

Formula:

$$W = 51.5 \times A \times P \times K \times S \times F$$

where:-

W = capacity (lb/hr)

K = coefficient of discharge for the design = 0.878 (0.975 x 0.9)

P = (1.03 x SET PRESSURE) + 14.7 (PSIA)

S = superheat correction factor (Table - ASME Section III Div 1 Appendices)

F = correction for high pressures (1)

A = orifice area in^2

During qualification tests at the National Board Laboratory, the valves exceeded the maximum coefficient of discharge allowed by ASME I of 0.975. This figure, therefore, was accredited to the range, which is then multiplied by a factor of 0.9 to arrive at a rated discharge for the valve.

(1) Applicable for pressures over 1500 psig and up to 3200psig the value of W shall be multiplied by the correction factor:

$$F = \frac{0.1906P - 1000}{0.2292P - 1061}$$

REACTION FORCE

Determination of outlet reaction forces is the responsibility of the designer of the vessel and/or piping.
A method of determining safety valve discharge reaction forces is described in ASME B31.1 Appendix II, Para,2.3
Formula used:-

$$F = \frac{W V}{g} + (P - Pa) A$$

To determine the pressure P at the exit:

$$P = \frac{W}{A}\frac{(b - 1)}{b}\sqrt{\frac{2(h - a) J}{g(2b - 1)}}$$

where:-

F = reaction force, lbf at point of exit

W = mass flow rate, lbm/sec

g = gravitational constant = 32.2

V = exit velocity, ft/sec

P = static pressure at exit, psia

A = exit area, in^2

Pa = atmospheric pressure, psia

b = 11 (wet steam <90% quality), 4.33 (saturated steam >90% quality).

a = 291 (wet steam <90% quality), 823 (saturated steam >90% quality).

h = stagnation enthalpy at the safety valve inlet, Btu/lbm

J = 778.166 ft-lbf/Btu

To determine the velocity V at the exit:

$$V = \sqrt{\frac{2gJ(h-a)}{(2b - 1)}}$$

When designing the safety valve installation, consideration should be given to the effects of the suddenly applied load F.

SUPERHEAT CORRECTION FACTOR

Flowing Pressure (psia)	Superheat Correction Factor *S*, Total Temperature °F of Superheated Steam																
	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
50	0.987	0.957	0.930	0.905	0.882	0.861	0.841	0.823	0.805	0.789	0.774	0.759	0.745	0.732	0.719	0.708	0.696
100	0.998	0.963	0.935	0.909	0.885	0.864	0.843	0.825	0.807	0.790	0.775	0.760	0.746	0.733	0.720	0.708	0.697
150	0.984	0.970	0.940	0.913	0.888	0.866	0.846	0.826	0.808	0.792	0.776	0.761	0.747	0.733	0.721	0.709	0.697
200	0.979	0.977	0.945	0.917	0.892	0.869	0.848	0.828	0.810	0.793	0.777	0.762	0.748	0.734	0.721	0.709	0.698
250	-	0.972	0.951	0.921	0.895	0.871	0.850	0.830	0.812	0.794	0.778	0.763	0.749	0.735	0.722	0.710	0.698
300	-	0.968	0.957	0.926	0.898	0.874	0.852	0.832	0.813	0.796	0.780	0.764	0.750	0.736	0.723	0.710	0.699
350	-	0.968	0.963	0.930	0.902	0.877	0.854	0.834	0.815	0.797	0.781	0.765	0.750	0.736	0.723	0.711	0.699
400	-	-	0.963	0.935	0.906	0.880	0.857	0.836	0.816	0.798	0.782	0.766	0.751	0.737	0.724	0.712	0.700
450	-	-	0.961	0.940	0.909	0.883	0.859	0.838	0.818	0.800	0.783	0.767	0.752	0.738	0.725	0.712	0.700
500	-	-	0.961	0.946	0.914	0.886	0.862	0.840	0.820	0.801	0.784	0.768	0.753	0.739	0.725	0.713	0.701
550	-	-	0.962	0.952	0.918	0.889	0.864	0.842	0.822	0.803	0.785	0.769	0.754	0.740	0.726	0.713	0.701
600	-	-	0.964	0.958	0.922	0.892	0.867	0.844	0.823	0.804	0.787	0.770	0.755	0.740	0.727	0.714	0.702
650	-	-	0.968	0.958	0.927	0.896	0.869	0.846	0.825	0.806	0.788	0.771	0.756	0.741	0.728	0.715	0.702
700	-	-	-	0.958	0.931	0.899	0.872	0.848	0.827	0.807	0.789	0.772	0.757	0.742	0.728	0.715	0.703
750	-	-	-	0.958	0.936	0.903	0.875	0.850	0.828	0.809	0.790	0.774	0.758	0.743	0.729	0.716	0.703
800	-	-	-	0.960	0.942	0.906	0.878	0.852	0.830	0.810	0.792	0.774	0.759	0.744	0.730	0.716	0.704
850	-	-	-	0.962	0.947	0.910	0.880	0.855	0.832	0.812	0.793	0.773	0.760	0.744	0.730	0.717	0.704
900	-	-	-	0.965	0.953	0.914	0.883	0.857	0.834	0.813	0.794	0.777	0.760	0.745	0.731	0.718	0.705
950	-	-	-	0.969	0.958	0.918	0.886	0.860	0.836	0.815	0.796	0.778	0.761	0.746	0.732	0.718	0.705
1000	-	-	-	0.974	0.959	0.923	0.890	0.862	0.838	0.816	0.797	0.779	0.762	0.747	0.732	0.719	0.706
1050	-	-	-	-	0.960	0.927	0.893	0.864	0.840	0.818	0.798	0.780	0.763	0.748	0.733	0.719	0.707
1100	-	-	-	-	0.962	0.931	0.896	0.867	0.842	0.820	0.800	0.781	0.764	0.749	0.734	0.720	0.707
1150	-	-	-	-	0.964	0.936	0.899	0.870	0.844	0.821	0.801	0.782	0.765	0.749	0.735	0.721	0.708
1200	-	-	-	-	0.966	0.941	0.903	0.872	0.846	0.823	0.802	0.784	0.766	0.750	0.735	0.721	0.708
1250	-	-	-	-	0.969	0.946	0.906	0.875	0.848	0.825	0.804	0.785	0.737	0.751	0.736	0.722	0.709
1300	-	-	-	-	0.973	0.952	0.910	0.878	0.850	0.826	0.805	0.783	0.768	0.752	0.737	0.723	0.709
1350	-	-	-	-	0.977	0.958	0.914	0.880	0.882	0.828	0.807	0.787	0.769	0.753	0.737	0.723	0.710
1400	-	-	-	-	0.982	0.963	0.918	0.883	0.854	0.830	0.808	0.788	0.770	0.754	0.738	0.724	0.710
1450	-	-	-	-	0.987	0.968	0.922	0.886	0.857	0.832	0.809	0.790	0.771	0.754	0.739	0.724	0.711
1500	-	-	-	-	0.993	0.970	0.926	0.889	0.859	0.833	0.811	0.791	0.772	0.755	0.740	0.725	0.711
1550	-	-	-	-	-	0.972	0.930	0.892	0.861	0.835	0.812	0.792	0.773	0.756	0.740	0.726	0.712
1600	-	-	-	-	-	0.973	0.934	0.894	0.863	0.836	0.813	0.792	0.774	0.756	0.740	0.726	0.712
1650	-	-	-	-	-	0.973	0.936	0.895	0.863	0.812	0.791	0.772	0.755	0.739	0.739	0.724	0.710
1700	-	-	-	-	-	0.973	0.938	0.895	0.863	0.835	0.811	0.790	0.771	0.754	0.738	0.723	0.709
1750	-	-	-	-	-	0.974	0.940	0.896	0.862	0.835	0.810	0.789	0.770	0.752	0.736	0.721	0.707
1800	-	-	-	-	-	0.975	0.942	0.897	0.862	0.834	0.810	0.788	0.768	0.751	0.735	0.720	0.705
1850	-	-	-	-	-	0.976	0.944	0.897	0.862	0.833	0.809	0.787	0.767	0.749	0.733	0.718	0.704
1900	-	-	-	-	-	0.977	0.946	0.898	0.862	0.832	0.807	0.785	0.766	0.748	0.731	0.716	0.702
1950	-	-	-	-	-	0.979	0.949	0.898	0.861	0.832	0.806	0.784	0.764	0.746	0.729	0.714	0.700
2000	-	-	-	-	-	0.982	0.952	0.897	0.862	0.834	0.810	0.788	0.768	0.751	0.735	0.720	0.705
2050	-	-	-	-	-	0.985	0.954	0.899	0.860	0.830	0.804	0.781	0.761	0.742	0.726	0.710	0.696
2100	-	-	-	-	-	0.988	0.956	0.900	0.860	0.828	0.802	0.779	0.759	0.740	0.724	0.708	0.694
2150	-	-	-	-	-	-	0.956	0.900	0.859	0.827	0.801	0.778	0.757	0.738	0.722	0.706	0.692
2200	-	-	-	-	-	-	0.955	0.901	0.859	0.826	0.799	0.776	0.755	0.736	0.720	0.704	0.690
2250	-	-	-	-	-	-	0.954	0.901	0.858	0.825	0.797	0.774	0.753	0.734	0.717	0.702	0.687
2300	-	-	-	-	-	-	0.953	0.901	0.857	0.823	0.795	0.772	0.751	0.732	0.715	0.699	0.685
2350	-	-	-	-	-	-	0.952	0.902	0.856	0.822	0.794	0.769	0.748	0.729	0.712	0.697	0.682
2400	-	-	-	-	-	-	0.952	0.902	0.855	0.820	0.791	0.767	0.746	0.727	0.710	0.694	0.679
2450	-	-	-	-	-	-	0.951	0.902	0.854	0.818	0.789	0.765	0.743	0.724	0.707	0.691	0.677
2500	-	-	-	-	-	-	0.951	0.902	0.852	0.816	0.787	0.762	0.740	0.721	0.704	0.688	0.674
2550	-	-	-	-	-	-	0.951	0.902	0.851	0.814	0.784	0.759	0.738	0.718	0.701	0.685	0.671
2600	-	-	-	-	-	-	0.951	0.903	0.849	0.812	0.782	0.756	0.735	0.715	0.698	0.682	0.664
2650	-	-	-	-	-	-	0.952	0.903	0.848	0.809	0.779	0.754	0.731	0.712	0.695	0.679	0.664
2700	-	-	-	-	-	-	0.952	0.903	0.846	0.807	0.776	0.750	0.728	0.708	0.691	0.675	0.661
2750	-	-	-	-	-	-	0.953	0.903	0.844	0.804	0.773	0.747	0.724	0.705	0.687	0.671	0.657
2800	-	-	-	-	-	-	0.956	0.903	0.842	0.801	0.769	0.743	0.721	0.701	0.684	0.668	0.653
2850	-	-	-	-	-	-	0.959	0.902	0.839	0.798	0.766	0.739	0.717	0.697	0.679	0.663	0.649
2900	-	-	-	-	-	-	0.963	0.902	0.836	0.794	0.762	0.735	0.713	0.693	0.675	0.659	0.645
2950	-	-	-	-	-	-	-	0.902	0.834	0.790	0.758	0.731	0.708	0.688	0.671	0.655	0.640
3000	-	-	-	-	-	-	-	0.901	0.831	0.786	0.753	0.726	0.704	0.684	0.666	0.650	0.635
3050	-	-	-	-	-	-	-	0.899	0.827	0.782	0.749	0.722	0.699	0.679	0.661	0.645	0.630
3100	-	-	-	-	-	-	-	0.896	0.823	0.777	0.744	0.716	0.693	0.673	0.656	0.640	0.625
3150	-	-	-	-	-	-	-	0.894	0.819	0.772	0.738	0.711	0.688	0.668	0.650	0.634	0.620
3200	-	-	-	-	-	-	-	0.889	0.815	0.767	0.733	0.705	0.682	0.662	0.644	0.628	0.614

CAPACITY TABLES (lb/hr)

Set Pressure 0 to 600 PSIG					
Valve Size	2"	2½"	3	4	6
Orifice Size (in^2)	1.697	2.874	3.951	7.135	16.310
100	9031.5	15296	21027	37973	86802
110	9821.9	16634	22868	41296	94399
120	10612	17973	24708	44619	101995
130	11403	19311	26548	47942	109591
140	12193	20650	28388	51265	117187
150	12983	21988	30228	54588	124783
160	13774	23327	32068	57911	132379
170	14564	24665	33908	61234	139975
180	15354	26004	35748	64557	147572
190	16145	27342	37588	67880	155168
200	16935	28681	39429	71203	162764
210	17725	30019	41269	74526	170360
220	18516	31358	43109	77849	177956
230	19306	32696	44949	81172	185552
240	20096	34035	46789	84495	193148
250	20887	35373	48629	87818	200745
260	21677	36712	50469	91141	208341
270	22467	38050	52309	94464	215937
280	23258	39389	54150	97787	223533
290	24048	40727	55990	101110	231129
300	24839	42066	57830	104433	238725
310	25629	43405	59670	107756	246321
320	26419	44743	61510	111079	253918
330	27210	46082	63350	114402	261514
340	28000	47420	65190	117725	269110
350	28790	48759	67030	121048	276706
360	29581	50097	68870	124371	284302
370	30371	51436	70711	127694	291898
380	31161	52774	72551	131017	299494
390	31952	54113	74391	134340	307091
400	32742	55451	76231	137663	314687
410	33532	56790	78071	140986	322283
420	34323	58128	79911	144309	329879
430	35113	59467	81751	147632	337475
440	35903	60805	83591	150955	345071
450	36694	62144	85432	154278	352667
460	37484	63482	87272	157601	360264
470	38275	64821	89112	160924	367860
480	39065	66159	90952	164248	375456
490	39855	67498	92792	167571	383052
500	40646	68836	94632	170894	390648
510	41436	70175	96472	174217	398244
520	42226	71513	98312	177540	405840
530	43017	72852	100153	180863	413436
540	43807	74191	101993	184186	421033
550	44597	75529	103833	187509	428629
560	45388	76868	105673	190832	436225
570	46178	78206	107513	194155	443821
580	46968	79545	109353	197478	451417
590	47759	80883	111193	200801	459013
600	48549	82222	113033	204124	466609

SET PRESSURE (PSIG)

Set Pressure 600 to 1500 PSIG					
Valve Size	2"	2½"	3	4	6
Orifice Size (in^2)	1.697	2.874	3.951	7.135	16.310
610	49339	83560	114873	207447	474206
620	50130	84899	116714	210770	481802
630	50920	86237	118554	214093	489398
640	51711	87576	120394	217416	496994
650	52501	88914	122234	220739	504590
660	53291	90253	124074	224062	512186
670	54082	91591	125914	227385	519782
680	54872	92930	127754	230708	527379
690	55662	94268	129594	234031	534975
700	56453	95607	131435	237354	542571
710	57243	96945	133275	240677	550167
720	58033	98284	135115	244000	557763
730	58824	99622	136955	247323	565359
740	59614	100961	138795	250646	572955
750	60404	102300	140635	253969	580552
760	61195	103638	142475	257292	588148
770	61985	104977	144315	260615	595744
780	62775	106315	146156	263938	603340
790	63566	107654	147996	267261	610936
800	64356	108992	149836	270584	618532
810	65147	110331	151676	273907	626128
820	65937	111669	153516	277230	633725
830	66727	113008	155356	280553	641321
840	67518	114346	157196	283876	648917
850	68308	115685	159036	287199	656513
860	69098	117023	160876	290522	664109
870	69889	118362	162717	293845	671705
880	70679	119700	164557	297168	679301
890	71469	121039	166397	300491	686898
900	72260	122377	168237	303814	694494
920	73840	125054	171917	310460	709685.9
940	75421	127731	175597	317106	724878.2
960	77002	130408	179278	323752	740070.5
980	78583	133086	182958	330399	755262.8
1000	80163	135763	186638	337045	770455
1020	81744	138440	190318	343691	785647.3
1040	83325	141117	193999	350337	800839.6
1060	84905	143794	197679	356983	816031.9
1080	86486	146471	201359	363629	831224.2
1100	88067	149148	205039	370275	846416.4
1120	89647	151825	208720	376921	861608.7
1140	91228	154502	212400	383567	876801
1160	92809	157179	216080	390213	891993.3
1180	94390	159856	219760	396859	907185.6
1200	95970	162533	223441	403505	922377.8
1220	97551	165210	227121	410151	937570.1
1240	99132	167887	230801	416797	952762.4
1260	100712	170564	234481	423443	967954.7
1280	102293	173241	238161	430089	983146.9
1300	103874	175918	241842	436735	998339.2
1320	105455	178595	245522	443381	1013532
1340	107035	181272	249202	450027	1028724
1360	108616	183949	252882	456673	1043916
1380	110197	186626	256563	463319	1059108
1400	111777	189303	260243	469965	1074301
1420	113358	191981	263923	476611	1089493
1440	114939	194658	267603	483257	1104685
1460	116519	197335	271284	489903	1119877
1480	118100	200012	274964	496550	1135070
1500	119681	202689	278644	503196	1150262

SET PRESSURE (PSIG)

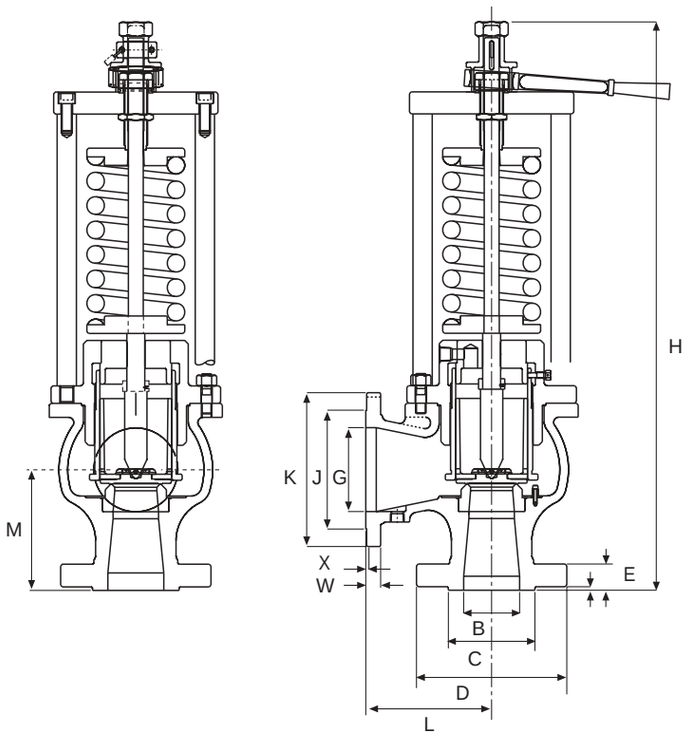
CAPACITY TABLES (lb/hr)

Set Pressure 1500 to 2500 PSIG						
Valve Size	2”	2½”	3			
Orifice Size (in^2)	1.697	2.874	3.951			
SET PRESSURE (PSIG) 1520	121261	205366	282324			
1540	122983	208281	286332			
1560	124710	211206	290353			
1580	126443	214140	294387			
1600	128181	217085	298435			
1620	129926	220039	302496			
1640	131676	223004	306572			
1660	133433	225979	310662			
1680	135196	228964	314766			
1700	136965	231961	318886			
1720	138741	234969	323021			
1740	140524	237988	327172			
1760	142314	241019	331338			
1780	144110	244062	335522			
1800	145914	247117	339722			
1820	147726	250185	343939			
1840	149544	253265	348173			
1860	151371	256358	352426			
1880	153205	259465	356696			
1900	155048	262585	360986			
1920	156898	265719	365295			
1940	158757	268868	369623			
1960	160625	272031	373972			
1980	162502	275209	378341			
2000	164387	278403	382731			
2020	166282	281612	387143			
2040	168187	284837	391577			
2060	170101	288079	396034			
2080	172025	291338	400514			
2100	173960	294614	405018			
2120	175905	297908	409546			
2140	177861	301221	414100			
2160	179827	304552	418679			
2180	181806	307902	423285			
2200	183795	311272	427917			
2220	185797	314662	432578			
2240	187811	318073	437267			
2260	189838	321505	441985			
2280	191877	324959	446734			
2300	193930	328436	451514			
2320	195997	331936	456325			
2340	198077	335459	461169			
2360	200173	339008	466047			
2380	202283	342581	470959			
2400	204408	346180	475907			
2420	206549	349806	480892			
2440	208706	353460	485915			
2460	210880	357141	490976			
2480	213071	360852	496077			
2500	215280	364593	501220			

Set Pressure 2500 to 3000 PSIG						
Valve Size	2”	2½”	3			
Orifice Size (in^2)	1.697	2.874	3.951			
SET PRESSURE (PSIG) 2520	217507	368364	506405			
2530	218627	370262	509013			
2540	219752	372168	511633			
2550	220883	374082	514265			
2560	222018	376004	516907			
2570	223158	377935	519562			
2580	224303	379874	522228			
2590	225453	381822	524906			
2600	226609	383779	527597			
2610	227770	385746	530300			
2620	228936	387721	533015			
2630	230108	389705	535743			
2640	231285	391699	538485			
2650	232468	393703	541239			
2660	233657	395717	544007			
2670	234852	397740	546789			
2680	236053	399773	549584			
2690	237260	401817	552394			
2700	238473	403872	555218			
2710	239692	405936	558057			
2720	240917	408012	560910			
2730	242150	410099	563779			
2740	243388	412197	566663			
2750	244634	414306	569563			
2760	245886	416427	572478			
2770	247145	418560	575410			
2780	248412	420704	578359			
2790	249685	422861	581324			
2800	250966	425030	584306			
2810	252254	427212	587305			
2820	253550	429407	590323			
2830	254854	431615	593358			
2840	256166	433836	596412			
2850	257485	436071	599484			
2860	258813	438320	602576			
2870	260149	440583	605686			
2880	261494	442860	608817			
2890	262847	445152	611968			
2900	264209	447459	615139			
2910	265580	449781	618331			
2920	266960	452118	621544			
2930	268350	454471	624779			
2940	269749	456841	628037			
2950	271158	459226	631316			
2960	272576	461629	634619			
2970	274005	464049	637946			
2980	275444	466486	641296			
2990	276893	468940	644671			
3000	278354	471413	648070			

GENERAL ARRANGEMENT

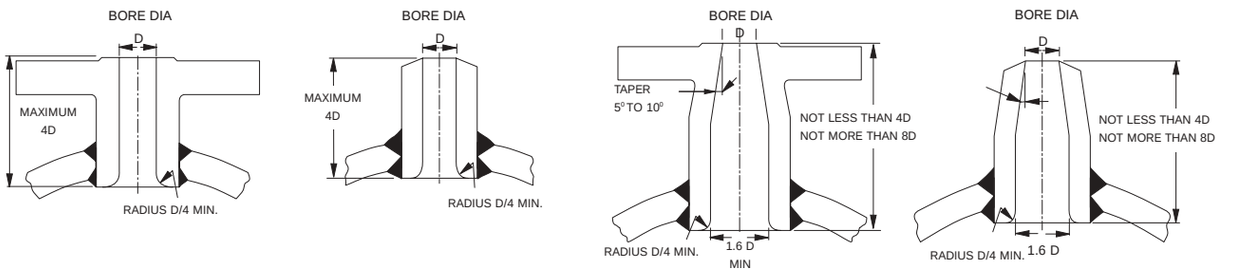
N = No. of Holes
0 = Dia. of Holes
P = No. of Holes
R = No. of Holes
S = Dia. of Holes
T = Pcd. off Centres



MAX SET PRESS PSIG	Inlet									Outlet								
	B	C	D	E	F	N	O	P	H	L	M	G	J	K	W	X	R	S	T
300	2	3 5/8	6 1/2	7/8	1/16	8	3/4	5	28 3/8	7	6	3	5	7 1/2	3/4	1/16	4	3/4	6
600	2	3 5/8	6 1/2	1 1/4	1/4	8	3/4	5	28 3/8	7	6	3	5	7 1/2	3/4	1/16	4	3/4	6
900	2	3 5/8	6 1/2	1 3/4	1/4	8	1	6 1/2	28 3/8	7	6	4	6 3/16	10	1 1/4	1/16	8	7/8	7 7/8
1500	2	3 5/8	8 1/2	1 3/4	1/4	8	1	6 1/2	28 3/8	7	6	4	6 3/16	10	1 1/4	1/16	8	7/8	7 7/8
2500	2	3 5/8	9 1/4	2 1/4	1/4	8	1 1/8	6 3/4	28 3/8	7	6	4	6 3/16	10	1 1/4	1/16	8	7/8	7 7/8
3000	2	Butt Weld							28 3/8	7	6	4	6 3/16	10	1 1/8	1/16	8	7/8	7 7/8
300	2 1/2	4 3/8	7 1/2	1	1/16	8	7/8	5 5/8	32 11/16	8	7	4	6 9/16	9	15/16	1/16	8	3/4	7 1/2
600	2 1/2	4 3/8	7 1/2	1 3/8	1/4	8	7/8	5 5/8	32 11/16	8	7	4	6 9/16	9	15/16	1/16	8	3/4	7 1/2
900	2 1/2	4 3/8	9 5/8	1 7/8	1/4	8	1 3/8	7 1/2	32 11/16	8	7	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
1500	2 1/2	4 3/8	9 5/8	1 7/8	1/4	8	1 3/8	7 1/2	32 11/16	8	7	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
2500	2 1/2	4 3/8	10 1/2	2 1/2	1/4	8	1 1/4	7 3/4	32 11/16	8	7	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
3000	2 1/2	Butt Weld							32 11/16	8	7	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
300	3	5	8 1/4	1 1/8	1/16	8	7/8	6 5/8	38 1/8	8 1/2	8	6	8 1/2	11	1	1/16	8	7/8	9 1/2
600	3	5	8 1/4	1 1/2	1/4	8	7/8	6 5/8	38 1/8	8 1/2	8	6	8 1/2	11	1	1/16	8	7/8	9 1/2
900	3	5	9 1/2	1 3/4	1/4	8	1	7 1/2	38 1/8	8 1/2	8	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
1500	3	5	10 1/2	2 1/8	1/4	8	1 1/4	8	38 1/8	8 1/2	8	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
2500	3	5	12	2 7/8	1/4	8	1 3/8	9	38 1/8	8 1/2	8	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
3000	3	Butt Weld						38 1/8	8 1/2	8	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8	
300	4	6 3/16	10	1 1/4	1/16	8	7/8	7 7/8	43 3/8	10	9	6	8 1/2	11	1	1/16	8	7/8	9 1/2
600	4	6 3/16	10 3/4	1 3/4	1/4	8	1	8 1/2	46 1/4	10	9	6	8 1/2	11	1	1/16	8	7/8	9 1/2
900	4	6 3/16	11 1/2	2	1/4	8	1 1/4	9 1/4	50 3/4	11	10	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
1500	4	6 3/16	12 1/4	2 3/8	1/4	8	1 3/8	9 1/2	55 3/4	11	10	6	8 1/2	12 1/2	1 7/16	1/16	12	7/8	10 5/8
300	6	8 1/2	12 1/2	1 1/16	1/16	12	7/8	10 5/8	73 13/16	12	11 1/4	8	10 5/8	13 1/2	1 1/8	1/16	8	7/8	11 3/4
600	6	8 1/2	14	2 1/8	1/4	12	1 1/8	11 1/2	73 13/16	12	11 1/4	8	10 5/8	13 1/2	1 1/8	1/16	8	7/8	11 3/4
900	6	8 1/2	15	2 1/16	1/4	12	1 1/4	12 1/2	73 13/16	12	11 1/4	8	10 5/8	15	1 5/8	1/16	12	1	13
1500	6	8 1/2	15 1/2	3 1/2	1/4	12	1 1/2	12 1/2	73 13/16	12	11 1/4	8	10 5/8	15	1 5/8	1/16	12	1	13

All Dimensions in Inches

INSTALLATION



Nozzle attachments shown are typical only.

GUIDANCE FOR SAFETY VALVE MOUNTING FOR STEAM & WATER

Excessive pressure loss at the inlet of a safety valve will cause extreme rapid opening and closing of the valve, which is known as “chatter”or “hammering”. This may result in reduced capacity, damage to seating faces and other parts of the valve. The adoption of the following recommendations will reduce or eliminate these factors.

a Safety valves should be installed at least 8 to 10 pipe diameters down stream from any converging or diverging ‘Y’ fitting or any bend in a pipework line. This distance should be increased if the direction of change of the fluid flow is from vertically upwards to horizontal in such a manner as to increase the density of the flow in the area directly beneath the safety valve nozzle.

b A safety valve should never be installed in pipework with the position directly opposite a branch on the lower side.

Inlet branches should have:

1 Corner radii to be not less than one quarter of the bore, or

2 a taper bore with an inlet area approximately twice that of the outlet, or

3 the branch entrance rounded at the downstream corner to a radius of not less than one quarter of the bore. This radius should be reduced gradually, leaving only a small portion of the upstream corner sharp.

4 The design of the valve end connections, whatever their type, shall be such that the internal area of the external pipe or stub connection at the safety valve inlet is at least equal to that of the valve inlet connection. The internal area of the external pipe connection at the safety valve outlet shall be at least equal to that of the valve outlet.

Excessive pipeline vibrations are known to produce inconsistencies in safety valve set pressures and induce ‘chatter’ and should be avoided.

All associated discharge pipework should be installed in such a way that it will not impose undue stresses on the safety valve which could result in distortion and leakage at pressures below the set point.

Discharge piping should not be supported by the safety valve. The maximum mass on the outlet of the valve should not exceed the mass of the valve exhaust pipe, i.e. flange elbow and short pipe and drip pan where fitted. The distance from the discharge piping centreline to the centreline of the valve should be kept to a minimum.

Clearances between the valve exhaust piping and the discharge piping should be sufficient to avoid any additional forces being applied to the valve due to thermal expansion of the boiler and discharge piping and/or discharge piping vibration.

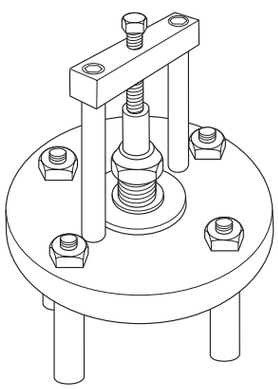
For each safety valve fitted with discharge piping, an individual unrestricted drain is necessary, requiring a continuous fall to a place where the discharge cannot injure any person.

SUPPLEMENTARY LOADING

Also known as servo-loading, this additional feature allows continuous simmer-free operation closer to the valve set pressure. Works by adding an extra small percentage of total load from a pneumatic cylinder mounted on the valve. At a pre-set pressure the supplementary load is removed, allowing the valve to lift and discharge if boiler pressure is above the mechanical set pressure. Closure is controlled by the reapplication of the supplementary load at a pressure below the set pressure sufficient to ensure a crisp closure. The valve will still operate correctly if the supplementary load remains on, thus providing its safety-related function but at a marginally higher pressure. Supplementary loading is most often fitted to the lowest set pressure valves in a boiler complement, which are operating closest to their set pressure and are the ones most likely to lift and discharge during an excursion in normal steam pressure.

TEST GAG

Site adjustment of Set Pressure and reseating pressure. All valves as supplied are adjusted to the set pressure as indicated on each valve and where possible the closing pressure. If adjustments are needed they may be carried out on each valve in its respective position on the boiler.
The usual procedure when setting a complement of valves on a boiler and superheater is first to adjust the boiler drum valve which is set at the highest pressure, working downwards to the superheater valves. All valves at a set pressure below that of the valve being tested must be prevented from lifting by the application of gags. When fitting the gag, turn the set screw until it is finger tight to the top of the spindle, finally, with a spanner, give the set screw half a turn only. This method of applying overload will not injure the valve head and seat faces.

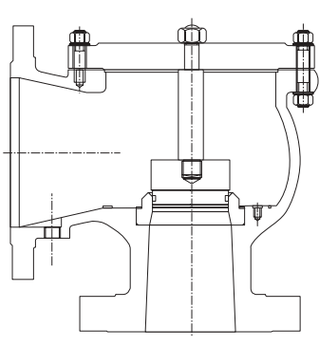


Care should be taken in the fitting and removal of gags to ensure that steam to the valve is below the set pressure so there is no danger to the fitter caused by the valve inadvertently blowing.

HYDROSTATIC TEST PLUG

Hydrostatic Test Plug Gags must not be used to facilitate hydraulic pressure tests on boilers and pipework etc. For such tests the top parts and valve head of the safety valve should be removed and a seat blanking - off device fitted (optional extra).

Care should be taken in the removal of test plugs to ensure that the hydraulic pressure has been removed completely from the system.



SILENCERS

HOPKINSONS VENT SILENCERS - FOR STEAM DISCHARGE DIFFUSER/ABSORPTIVE TYPE FIGURE M7330 DIFFUSER - ONLY TYPE FIGURE M7320

The Diffuser/Absorptive silencer comprises two main components, the diffuser - forming a perforated extension to the exhaust pipe, and an acoustically lined casing and baffle.

The diffuser divides the discharge flow into a multitude of small jets which, together with attenuating the transmitted noise, also modifies the noise regenerated at the atmospheric outlet. The casing and baffle further attenuate the noise present within the silencer.

The diffuser-only silencer has a diffuser which functions as described above but has an outer casing of single skin construction.

Both types of silencer have sealing arrangement at the inlet to allow for the thermal expansion of the exhaust pipe. Screwed drain holes are provided.

The two types of silencer described here are for use on applications where steam is discharged to atmosphere such as safety valve and start-up valve discharges. They are designed for outdoor vent duty in order to reduce annoying neighbourhood noise.

The determination of steam discharge noise levels is dependent on several parameters (see ordering details). The following can be regarded as a guide to overall sound pressure reduction:
Diffuser/Absorptive type - 30dB (A)*
Diffuser - only type - 15dB (A)*
*These are free field values.

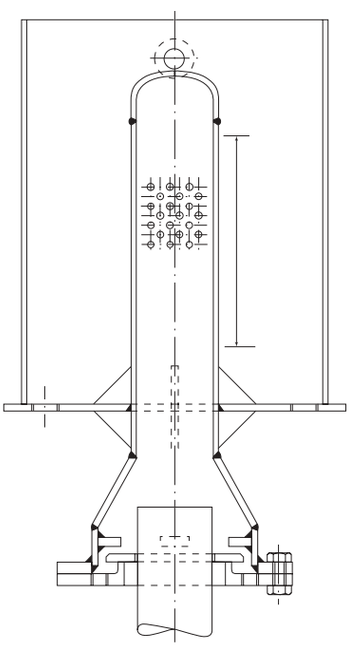
SELECTION GUIDE

Silencer Type		No.4	No.6	No.8	No.10	No.12	No.14
Exhaust Pipe Diameter (internal)	mm	100	150	200	250	300	350
	(in)	4	6	8	10	12	14

ORDERING DETAILS

When ordering, please submit the following information:
1 Fluid, pressure, temperature, flow rate.
2 Make, size and type of valve, valve outlet diameter.
3 Size of pipework to silencer.

The Hopkinsons can provide a complete safety valve, and silencer system solution tailored to customer specific requirements.



Swing Check Valves	
Ratings:	ASME Class 150 to 3750 Higher on request.
Sizes:	50 to 600 mm 2 to 24 in Larger on request.
Materials:	Carbon Steel, Alloy Steel, Stainless Steel.

Hopkinsons Swing Check valve range caters for a wide variety of non-return applications on power plant and pipelines where low head loss is a requirement.

BLED STEAM NON-RETURN DUTIES

Power assisted non-return valves prevent back-flow from feedheaters etc., and have an extremely rapid response and positive closing action to cope with emergencies. The valves may be actuated from any source including a pressure switch on the turbine oil system, and a feedheater water level switch.

Swing check valves with extended shafts to take lever mounted weights to counterbalance the valve discs.

Assembling high pressure swing check valves for a power plant contract.

Bled steam non-return valves arranged with pneumatic power assisted closure for turbine protection.

Hopkinsons automatic & power assisted check valves are designed to give maximum protection to extraction steam turbines. Their rapid, tight closure insures that the high level of energy found in feedwater heaters or process lines is quickly isolated from the turbine in the event of a load rejection.

The power cylinder is designed to give a strong closing moment to the valve when signalled to do so by plant instrumentation. A lost motion feature allows the valve disc to close independently of the power cylinder.

APPLICATIONS

Turbine Protection • Extraction steam non-return
Bled steam non-return. Over 70 years of experience

SPECIFICATIONS

Design Standard:	ASME B16.34 and applicable international specifications as required
Pressure Classes:	ASME 150-1500
Sizes:	Cast construction 3"-44"
Materials:	Carbon steel,alloy steel and Stainless Steel per ASTM specifications or applicable international standards
Trim:	Stainless steel ASTM A479 Type 410
Seats:	Stainless steel overlay or hardfacing alloy
Bonnet Design:	Bolted bonnet with non-asbestos gasket
End Connections:	Butt weld or flange end
Power Cylinder:	Pneumatic or hydraulic
Drain Connections:	As required

Limit Switches:	1, 2, or 3 SPDT or DPDT switches available
Cylinder Valves:	Solenoid operated air valves or pilot operated oil relay valves
Exerciser Valves:	Optional solenoid or manual valves available
Special Features:	Low friction stuffing boxes - standard Very low friction mechanical seals - optional (can not be overtightened) Non-destructive examination as required by customer specification or ASME B16.34 Special Class
Installation:	Horizontal or vertical upflow as specified.

The important role of a Non-Return Valve as a protective device demands a high level of reliability. The features found in all Hopkinsons Free Flow Reverse Current Valves assure that reliability. These features along with a high grade of workmanship and materials assure a superior and completely dependable valve.

FREE SWINGING DISC

(Fig. 1) Hopkinsons utilize a basic swinging disc Check Valve design. This uncomplicated design provides independent movement of the disc in the flow stream with fast closure upon loss or reversal of flow. The valve disc is of sturdy construction to prevent distortion under full design pressure.

SELF ALIGNING DISC AND DISC ARM

(Fig. 2) The disc and disc arm assembly are self aligning with the seat, assuring tight sealing. An internal stop provides the proper degree of disc opening while maintaining the edge of the disc within the flow stream, so that flow reversal will cause closure.

INCLINED SEAT DESIGN

(Fig. 3) Hopkinsons Bled Steam Check Valves have an inclined seat to improve the performance and operating characteristics of the valve. This design offers advantages not available with other seat configurations. The inclined seat combined with flat disc and body seat contact provides the best configuration available in Check Valve design. An opening angle of 75º from the vertical or 45º from the inclined seat results in low pressure drop. The reduced swing also enables the valve to close quickly. Full opening with a vertical seat would require a greater swing and a longer closing time. The centre of gravity of the disc assembly causes a positive seating moment, therefore, the weight of the disc is always acting to seat it and hold it firmly against its seat. A portion of the disc weight can be counterbalanced in larger valves to reduce pressure drop at low flows, so the flow is not required to raise the full weight of the disc.

The Hopkinsons inclined seat design features - POSITIVE, TIGHT SEATING - FAST CLOSURE - LOW PRESSURE DROP - all important Check Valve considerations.

Figure 1

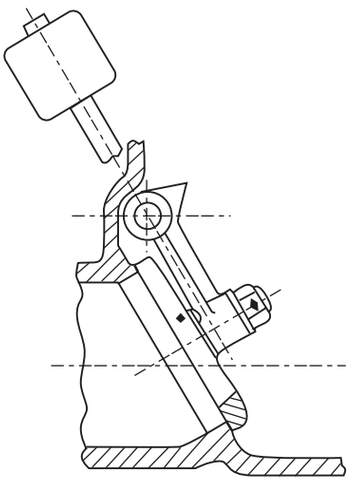


Figure 2

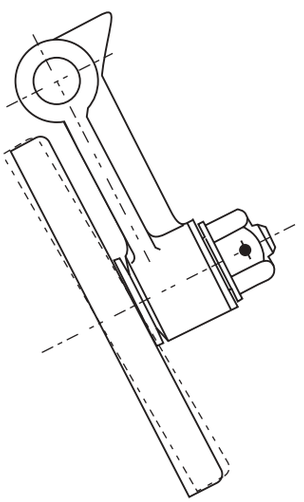


Figure 3

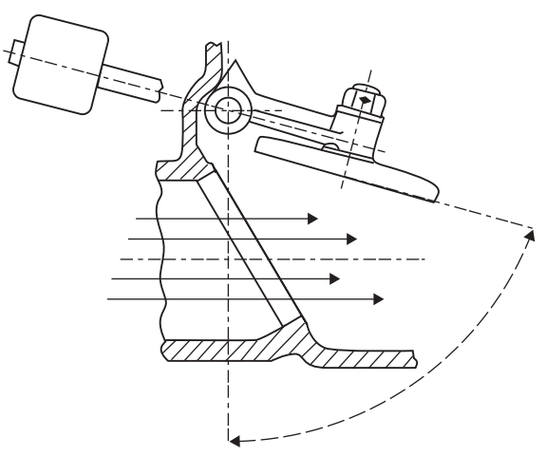


Figure 4

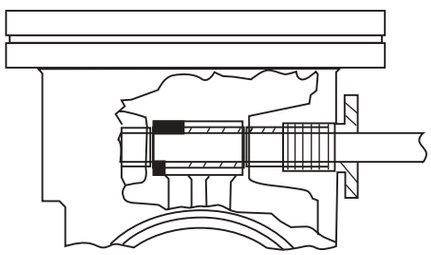


Figure 5

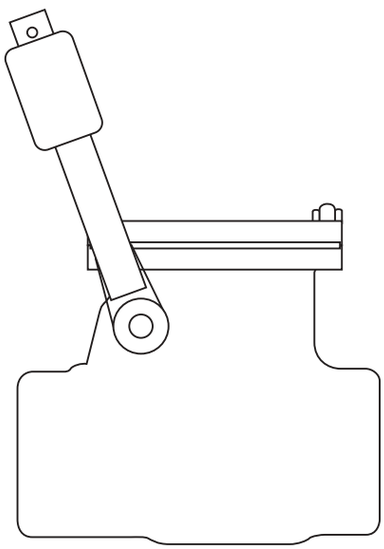
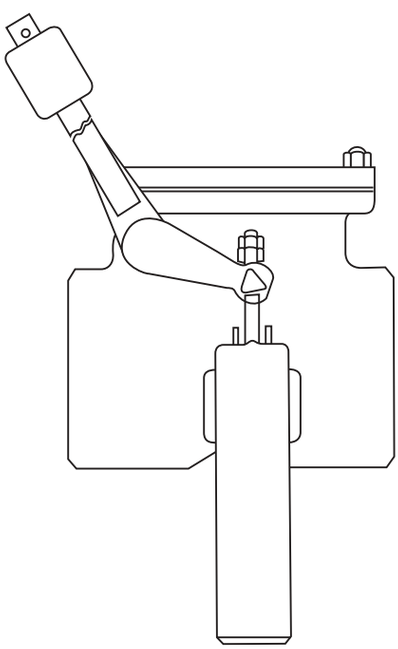


Figure 6



SHAFT AND BUSHING ASSEMBLY

(Fig. 4) Large diameter Stainless Steel shafts together with hardened Stainless Steel bushings are used on all Free Flow Reverse Current Valves. The results are lower stresses, less wear and longer life.

POSITIVE CLOSING

The powerful spring in the power cylinder assures rapid positive closing before reverse flow can occur.

BALANCED SHAFT CONSTRUCTION - INTERNAL LOST MOTION DEVICE

An “internally balanced” design is standard on all 12" and smaller valves equipped with a closure assisting cylinder. This feature eliminates stuffing box friction and shaft end thrust which might prevent free swinging of the valve disc.

VALVE BODY & BONNET

Hopkinsons employs a streamlined body contour designed for minimum flow resistance. Heavy body wall thickness assures rigidity and resistance to pipe strain distortion. A bolted top cover is provided for ease of access to valve internals, thus the valve need not be removed from the line for maintenance and inspections.

EXTERNAL LEVER

(Fig. 5) Valves of all sizes are available with a shaft mounted lever to manually exercise the valve. Larger size valves are supplied with a counter weight to reduce pressure drop at low flows to maintain full disc opening and reduce disc slamming.

CYLINDER OPERATED

(Fig. 6) Spring loaded positive closing air cylinders can be provided on all Bled Steam Check Valves. Oil operated cylinders are also available and may be ordered with an optional oil relay valve. Both types can be exercised by a lever operated Test Valve or Solenoid Valve.

AIR OPERATED SYSTEM

Figure 7 shows a Hopkinsons Air Operated Bled Steam Check Valve operated by turbine overspeed trip and high water level in the feedwater heater.

The oil operated Air Relay Dump valve (normally supplied by the turbine manufacturer) translates oil pressure from the turbine overspeed trip system into air pressure. With oil pressure established, compressed air flows through the Air Relay Dump Valve with the atmospheric vent closed. Upon loss of oil pressure due to turbine overspeed trip, incoming air pressure is closed off, and the atmospheric vent is opened to release air pressure from the Check Valve cylinder. This action allows the spring force to assist in closing the Bled Steam Check Valve.

IT IS IMPORTANT THAT THE SOLENOID OPERATED 3-WAY VALVE USED ALLOWS FLOW IN THE REVERSE DIRECTION.

The Solenoid Operated 3-Way Valve is installed in the air supply line to the cylinder. Upon receipt (or loss) of an electrical signal from the heater high water level alarm, the Solenoid Valve trips, closing the air supply and opening the vent to atmosphere.

Air is exhausted from the air cylinder, and the spring starts to close the valve.

The lever operated Air Test Valve equalizes pressure on both sides of the cylinder piston so that the spring force moves the piston downward and exercises the valve during operation.

The system shown in Figure 8 differs from Figure 7 as the oil operated Air Relay Dump Valve is replaced by an oil pressure switch which converts the loss of oil pressure due to a turbine overspeed trip to an electrical signal. This signal is connected to the solenoid valve in series with the heater high water level alarm circuit and trips the solenoid operated 3-Way Valve as in Figure 7.

The quick exhaust valve shown in Figure 8 senses a loss of pressure at its inlet and will shift allowing the air cylinder to exhaust more rapidly through its vent port. This valve can be used in any control system and is recommended whenever a solenoid valve with a low Cv factor is used.

Local exercising of the Bled Steam Check Valve can also be accomplished by actuating an integral test switch on the solenoid operated 3-Way Valve. Using this method for exercising, the solenoid valve is exercised as well as the Bled Steam Check Valve.

Combinations of control systems shown in Figures 7 and 8 can also be used.

CONTROL FOR TURBINE EXTRACTION SYSTEMS

Figure 7

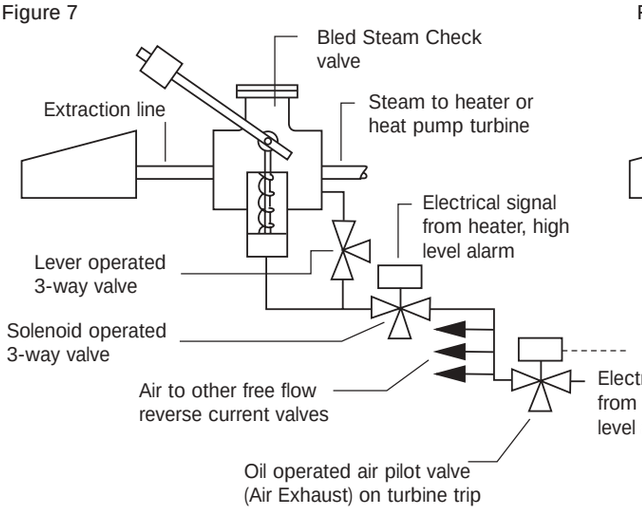
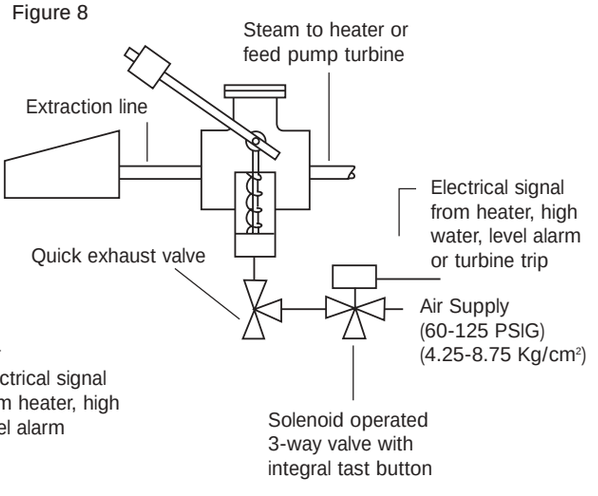
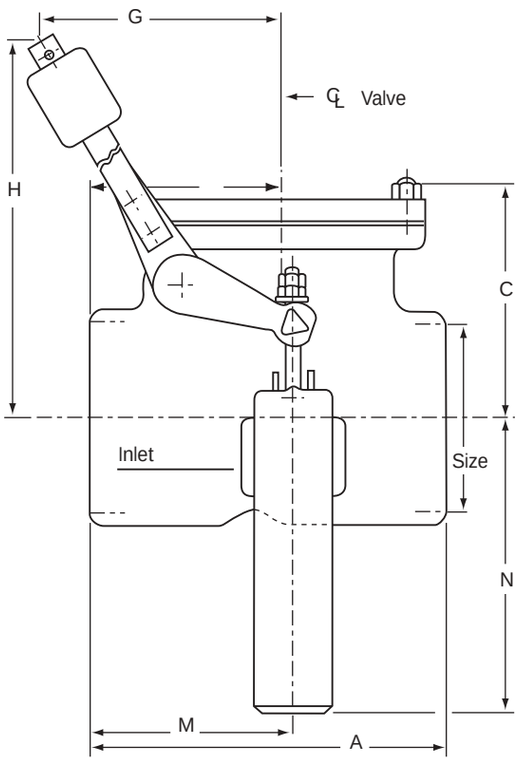
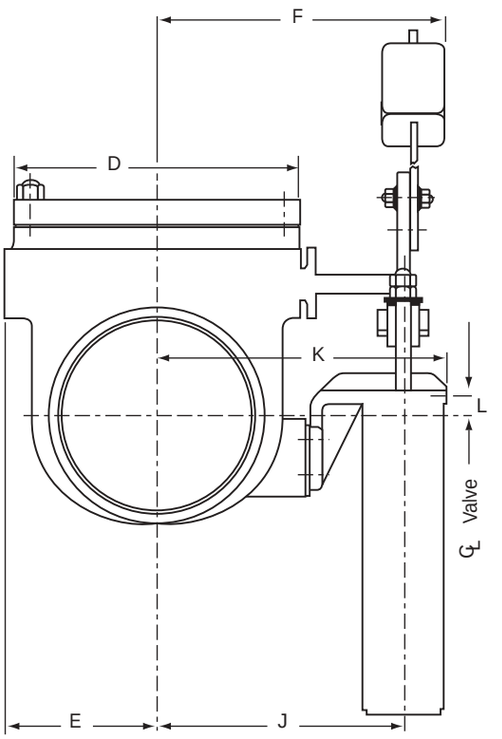


Figure 8



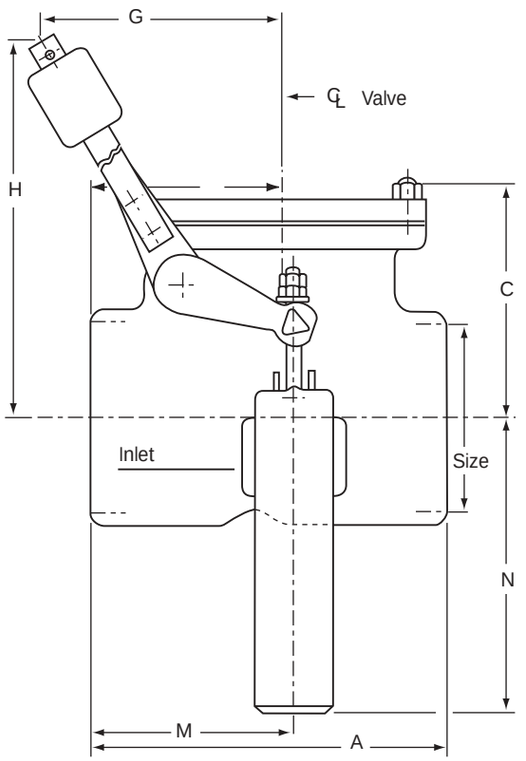


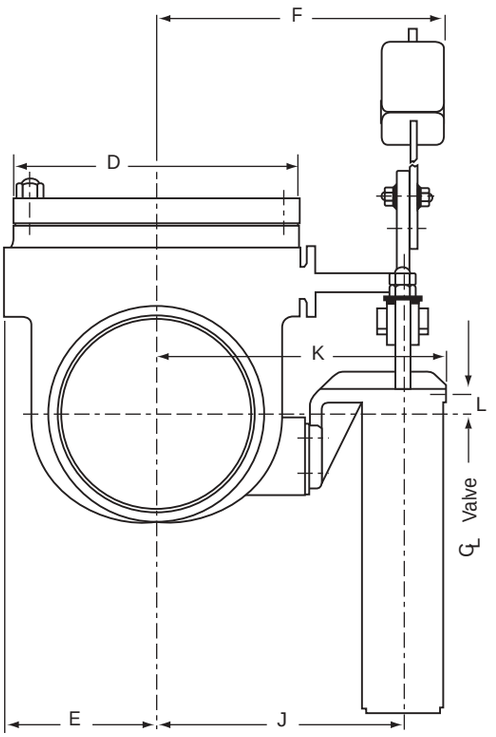


CLASS 150 - 300

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight (lb)	Cv
4	14	7.75	10.75	9.00	6.75	–	–	–	12.06	15.13	3.88	7.75	18.75	300	510
6	14.00	7.75	10.75	9.00	6.75	–	–	–	12.06	15.13	3.88	7.75	18.75	300	870
8	21.00	9.63	13.69	12.50	7.00	–	–	–	13.25	16.13	.69	10.75	15.50	490	1180
10	22.7	11.00	15.50	16.00	9.00	–	–	–	14.75	17.63	.88	10.25	14.00	700	3180
12	24.75	11.50	15.50	17.88	9.31	–	–	–	15.75	18.63	.94	10.50	14.00	730	4810
14	24.00	12.13	16.75	19.50	11.38	18.00	16.00	24.50	16.63	19.50	1.88	10.00	13.00	1100	6300
16	26.00	14.00	19.25	21.75	11.25	19.50	17.13	26.25	17.88	20.75	2.38	13.88	19.31	1900	8940
18	29.00	15.50	21.50	25.00	13.25	21.50	17.00	25.88	19.63	22.50	3.69	14.50	18.00	2100	10720
20	31.00	17.38	23.00	26.25	14.63	24.50	20.88	31.75	22.63	25.50	5.19	15.00	16.50	3100	13650
24	37.00	19.50	24.75	30.00	12.63	24.50	27.00	42.00	22.63	25.50	6.50	16.00	15.19	3700	17050
26	44.00	22.50	27.00	34.00	–	27.50	24.25	34.00	23.88	26.75	–	16.38	13.50	3850	24120
28	46.00	23.50	28.50	34.00	–	27.50	24.25	34.00	23.88	26.75	–	17.38	13.50	3960	25120
30	50.00	25.00	28.25	36.75	–	29.00	23.13	30.75	24.25	27.13	–	17.94	13.50	5200	29800
32	50.00	25.00	28.25	36.75	–	29.00	23.13	30.75	24.25	27.13	–	17.94	13.50	5200	36200
34	53.00	26.50	34.38	40.00	32.13	31.25	28.00	40.13	26.63	29.50	12.13	17.69	9.56	5800	–
36	53.00	26.50	34.38	40.00	32.13	31.25	28.00	40.13	26.63	29.50	12.13	17.69	9.56	6100	40120
42	66.00	33.00	45.00	49.00	35.38	34.75	41.63	64.25	29.88	32.75	17.50	21.50	4.19	14250	58320
44	66.00	33.00	45.00	49.00	35.38	34.75	41.63	64.25	29.88	32.75	17.50	21.50	4.19	14250	58320

All Dimensions in Inches





CLASS 400 - 600

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight	Cv
in	in	in	in	in	in	in	in	in	in	in	in	in	in	lb	
21	11.5	19.81	18	10.38				15.13	18	0.25	11.75	14.63	800	2500	
22.75	12	21.38	19	9.88				14.5	17.38	1.5	10.69	13.38	1150	4025	

CLASS 900

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight	Cv
in	in	in	in	in	in	in	in	in	in	in	in	in	in	lb	
8	21	11.5	19.81	18	10.38	15.13	18	0.25		11.75	14.63	800	2500		
10	22.75	12	21.38	19	9.88	14.5	17.38	1.5		10.69	13.38	1150)	4025		

The Hopkinsons Cold Reheat Check is a reliable, sturdy valve that protects the High Pressure (HP) Steam Turbine from damage caused by reverse flow during unit trip.
In newer Rankine and Combined Cycle plants the Cold Reheat Check Valve must also accommodate the increased demands of a Turbine Bypass System and isolate the HP Turbine Exhaust when the Bypass is in use.

APPLICATIONS

Rankine and Combined Cycle Power Plants with Reheat prevents Reheat Steam from Returning to Turbine on Trip.

Simplifies Hydrotesting of the Reheater.

Protects the High Pressure Turbine Exhaust from Bypass Steam and Water when the Turbine Bypass system operates.

Isolates High Pressure turbine exhaust when auxiliary steam is supplied to the IP turbine in a combined cycle unit, to synchronize the steam turbine generator or start the gas turbine on a single shaft machine.

FEATURES

- Proven, Swinging Disc Design
- Wide, Flat, Non-jamming Seats for Tight Seal
- Closure Assisting or Double Acting Air Cylinder
- Smooth Flow Passages for Low Pressure Drop
- In Line Maintenance through Bolted Top Cover
- Inclined Seat for Short Travel & Quick Operation
- Rugged Construction
- Ability to Withstand Multiple Rapid Closures

OPERATION

During normal operation, the Hopkinsons Cold Reheat Check is open to forward flow. It becomes a critical, quick closing valve which protects the turbine during trips or equipment failure.

DEMANDS

Quick Acting, Turbine Bypass Systems rapidly change pressure and flow in the reheat piping, requiring the Cold Reheat Check Valve to close quickly.

The frequent Start ups and Shutdowns of Cycling Units require the Cold Reheat Check Valve to operate several times per day.

Very Tight Sealing is necessary to prevent steam and water from entering the HP turbine.

Low pressure drop is important to overall combined cycle unit performance.

AVAILABLE

Sizes:	20" to 42" and ASME Classes 300 to 600
Materials:	Carbon and Alloy Steels

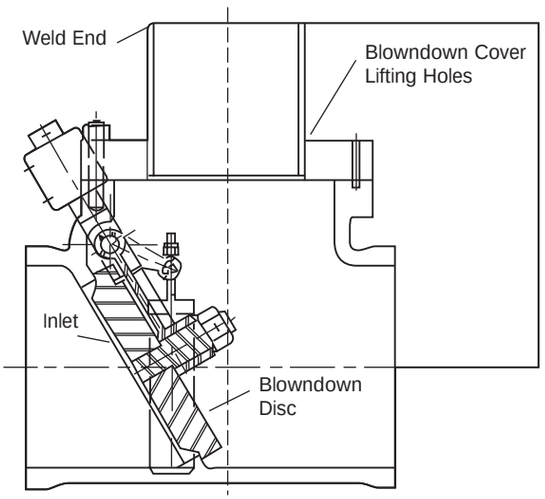
SIZING AND SELECTION

Proper sizing requires verification of flow conditions. Ideally the disc should be in the Full Open Position, Not Chattering or Fluttering in Flow Stream. This allows for Low Wear and Low Pressure Drop. The counterweight must be properly sized to allow optimum operating conditions and full open disc.

42" Class 600 Cold Reheat Check

BLOWNDOWN COVERS FOR COLD REHEAT CHECK VALVE

The Hopkinsons Blowdown Cover allows cleanout/ blowdown of the pipeline to be easily and efficiently done. The simple design bolts on in place of the valve's existing cover and provides an easy blowdown connection. An optional blowdown disc can also be supplied when large amounts of damaging debris are anticipated.



CONSTRUCTION

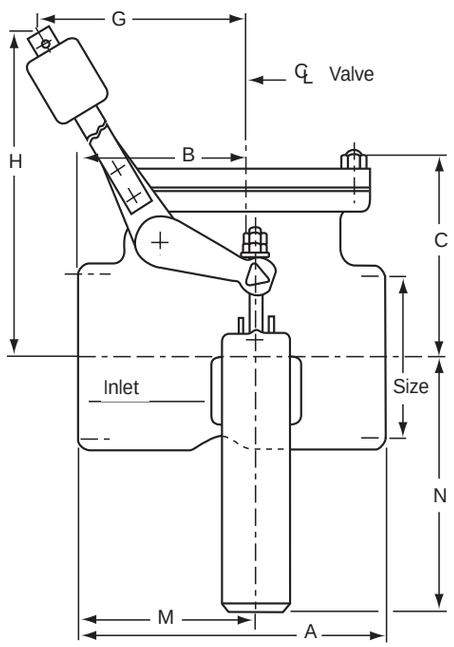
The fabricated blowdown cover has a weld end for easy pipe connection and lifting holes for easy removal after blowdown is complete. The optional valve disc is carbon or alloy steel.

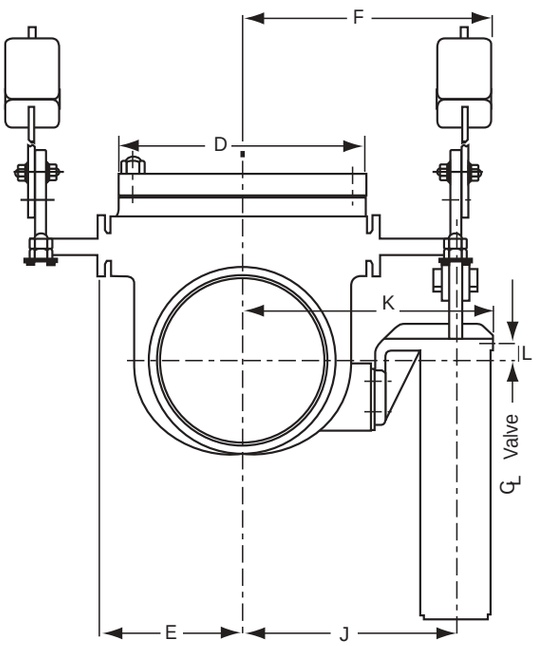
OPERATOR

After startup and blowdown, the Cold Reheat Check Valve's standard cover is replaced.

When using Cold Reheat Check Valves consider your blowout requirements carefully. When blowdown is started upstream of the Cold Reheat Check Valve, remove the disc to prevent damage. A seat protector ring is available. When blowdown is required but a cover is not provided, field fabrication can be time consuming. If blowdown is expected to carry a lot of debris, an additional disc may be useful. For help meeting your system's requirements, contact Hopkinsons sales or service department.

44" Cold Reheat Check Valves





CLASS 300

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight (lb)	Cv
28	46.00	23.50	28.50	34.00	–	27.50	24.25	34.00	23.88	26.75	–	17.38	13.50	3960	25120
30	50.00	25.00	28.25	36.75	–	29.00	23.13	30.75	24.25	27.13	–	17.94	13.50	5200	29800
32	50.00	25.00	28.25	36.75	–	29.00	23.13	30.75	24.25	27.13	–	17.94	13.50	5200	36200
34	53.00	26.50	34.38	40.00	32.13	31.25	28.00	40.13	26.63	29.50	12.13	17.69	9.56	5800	–
36	53.00	26.50	34.38	40.00	32.13	31.25	28.00	40.13	26.63	29.50	12.13	17.69	9.56	6100	40120
42	66.00	33.00	45.00	49.00	35.38	34.75	41.63	64.25	29.88	32.75	17.50	21.50	4.19	14250	58320
44	66.00	33.00	45.00	49.00	35.38	34.75	41.63	64.25	29.88	32.75	17.50	21.50	4.19	14250	58320

CLASS 600

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	Weight (lb)	Cv
14	28.00	14.00	21.75	24.00	11.25	19.00	17.13	26.25	17.88	20.75	4.19	13.81	19.31	2100	8050
16	28.00	14.00	21.75	24.00	11.25	19.00	17.13	26.25	17.88	20.75	4.19	13.81	19.31	2100	8470
18	30.00	15.00	25.38	27.00	12.50	22.25	16.88	26.38	19.00	21.88	4.19	14.00	17.56	2750	10780
20	33.00	17.38	29.50	29.25	16.00	25.81	20.88	31.75	22.63	25.50	4.19	16.00	17.56	3100	13460
24	44.00	22.00	38.63	37.00	–	29.25	22.75	34.00	23.75	26.63	9.50	16.50	12.25	7600	19960
26	44.00	22.00	38.63	37.00	–	29.25	22.75	34.00	23.75	26.63	9.50	16.50	12.25	7600	23560
28	50.00	27.13	32.00	37.00	–	29.50	26.00	35.13	24.25	27.13	8.25	19.81	13.50	7800	27500
30	50.00	27.13	32.00	37.00	–	29.50	26.00	35.13	24.25	27.13	8.25	19.81	13.50	7800	32330
32	55.00	27.50	36.50	42.00	–	31.75	32.00	45.50	27.13	30.00	11.00	18.69	10.75	9500	37650
34	55.00	27.50	36.50	42.00	–	31.75	32.00	45.50	27.13	30.00	11.00	18.69	10.75	9500	43425
36	59.00	29.50	43.75	47.50	–	33.50	35.25	50.13	28.50	31.88	13.75	18.31	8.00	15000	49665
38	59.00	29.50	43.75	47.50	–	33.50	35.25	50.13	28.50	31.88	13.75	18.31	8.00	15000	56425

All Dimensions in Inches

The Hopkinsons Compressor Check Valve is designed to provide positive protection for the blower or compressor. It is installed in the compressor discharge line when specified as:

- Tight sealing pressure
- Low differential pressure
- Power assisted
- Dashpot, non-slam valve

APPLICATIONS

Fluid Catalytic Cracking Air Blower Discharge, Compressor Discharge and Process Application. Fluids: Hydrocarbon (Cracked Gas), Ethylene, Propylene, Other Process Fluids

OPERATION/FEATURES

The Hopkinsons Compressor Discharge Check Valve is important in providing protection for critical equipment.

CLOSURE ASSIST AIR CYLINDER

The Compressor Check Valve operates normally with the disc in the open position for long periods. To ensure the check valve will close in the event of a blower/compressor trip, it is furnished with a closure assist air cylinder. Upon loss of power to the drive device of the blower/compressor, a three-way solenoid valve is de-energized. When the solenoid valve is tripped, the side air cylinder is vented allowing the internal spring to apply a closing force to the lever arm which, in turn, rotates the shaft and disc assembly to the closed position.

EXTERNAL COUNTER WEIGHTS

External counter weights help the valve remain in the full open position at normal operating flow. These weights counter balance approximately 50% of the disc closing moment assuring the valve disc will be fully open providing the lowest pressure drop possible. Hopkinsons check valves will be fully open at lower flow rates compared to conventional swing or wafer type check valves.

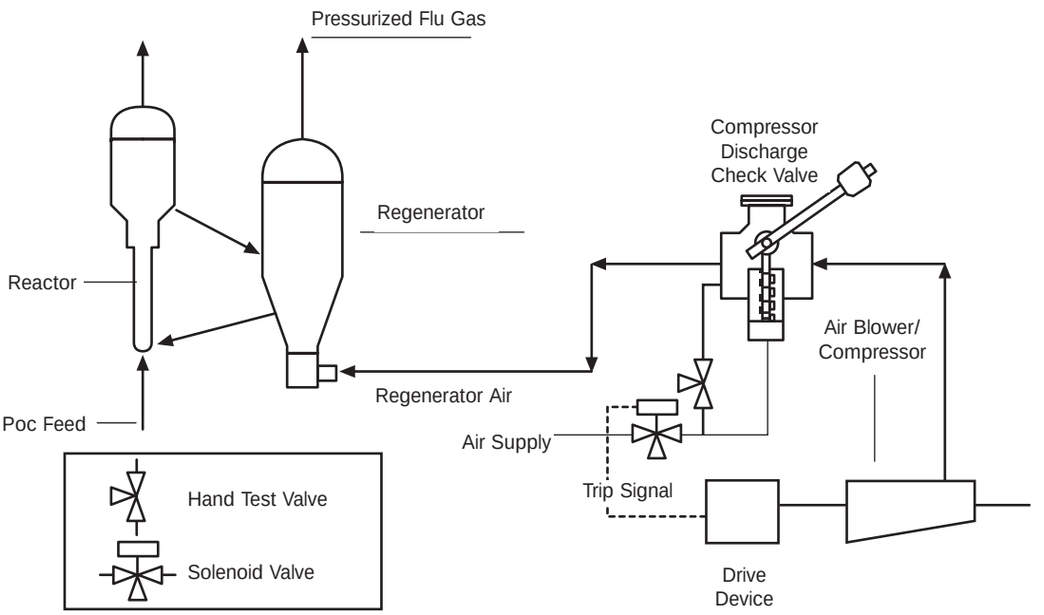
OIL DASHPOT

Years of experience with blower check valves has indicated that the valve disc will tend to flutter at various flow rates. This constant motion during operation may result in premature packing wear and/or valve failure. To prevent this flutter motion, Hopkinsons compressor check valves are supplied with an oil dashpot which can be adjusted to dampen the motion and reduce disc slamming.

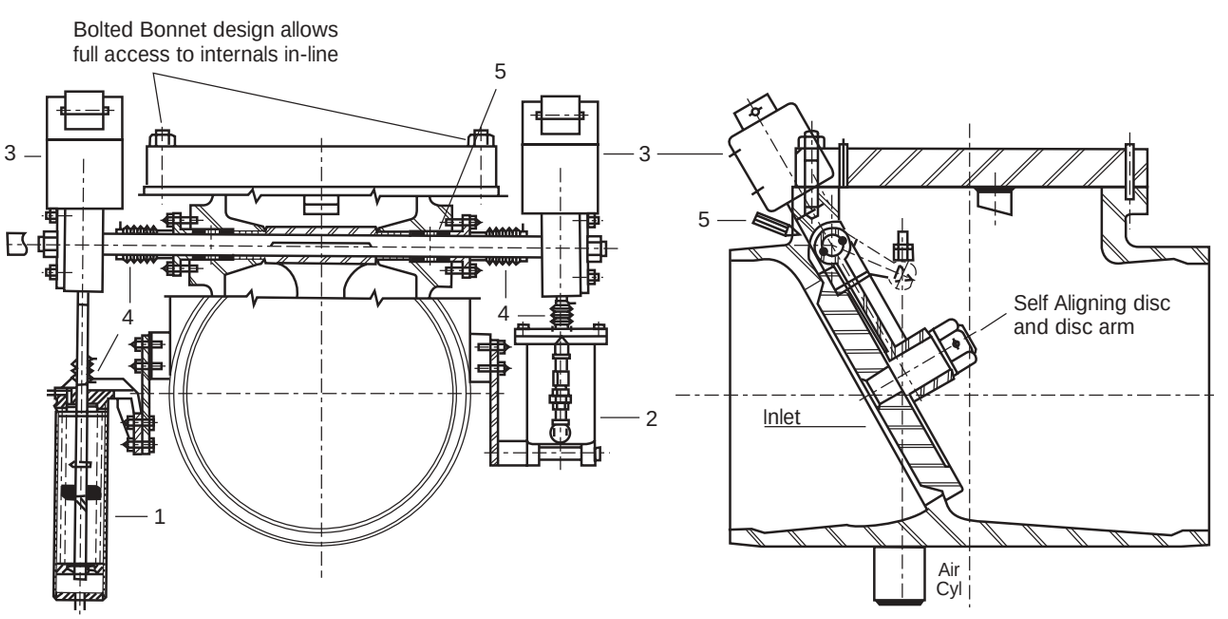
DEPENDABILITY

Compressor Check Valves are protective devices critical to safeguard the compressor/blower systems. Hopkinsons valves are designed to be completely reliable over extended periods of time. Severe damage may occur if the disc in a check valve is prevented from self closure. The Hopkinsons Compressor Check Valve offers positive protection against sticking or hang-up and insures rapid, reliable closing in the event of a trip-out or system shutdown.

32" Class 300 Compressor Discharge Check Valve



Typical Installation of Hopkinsons Compressor Discharge Check Valve in a Fluid Catalytic Cracking Process Unit



1 - Closure Assist Air Cylinder
2 - Oil Dashpot
3 - Counterweights act to counterbalance the disc providing the lowest pressure drop
4 - Protective Sleeves cover external linkages
5 - Lubricated Stuffing Boxes

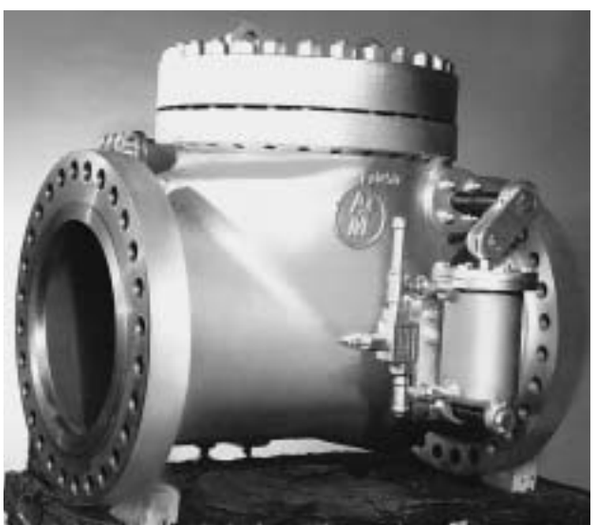
MATERIALS

Cast Carbon, Alloy and Stainless Steel

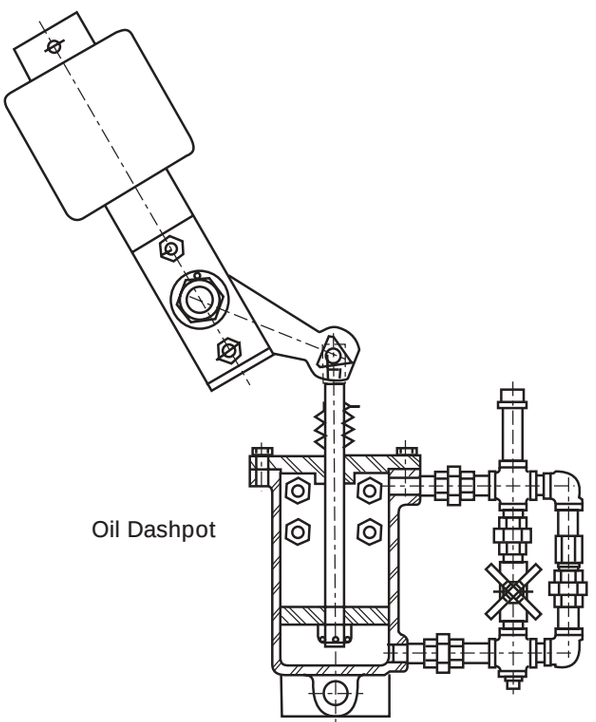
CONSTRUCTION

Design Standard:	ASME B16.34
Sizes:	4 - 60 inches sizes 44" through 60" (fabricated)
Pressure Ratings:	ASME Class 150 through 2500
Cover Design:	Bolted Bonnet (pressure seal for class 900 and higher)
End Connection:	Butt weld or flanged
Positive Closing Device:	Spring loaded cylinder (air controlled)
Disc Stabilization:	Oil Dashpot
Body Type:	Swinging disc design with inclined seat
Optional Equipment:	Hand Test valve Three-way solenoid valve Limit switches Protective Sleeves

Actual Oil Dashpot



Compressor Check Valve with Oil Dashpot



Oil Dashpot

APPLICATION

Hopkinsons manufactures Positive Closing Check Valves for the discharge lines of boiler feed pumps. These valves provide positive protection for feedwater systems and can prevent damage to costly pumping equipment. Failure to provide such protection could cause serious damage to the feed pumps and their drive mechanisms and may result in a plant outage with a loss of revenues far exceeding the initial investment necessary to provide protective equipment. Figure No. 1 illustrates the typical use of a Hopkinsons Valve with a motor-driven feed pump. Positive Closing Check Valves can be used to protect pumps that are motor-driven, turbine-driven, or those that are run by drive shaft off the main turbine thereby improving the reliability and dependability of the entire feedwater system. The Hopkinsons Valve also offers minimum pressure drop for every day operation.

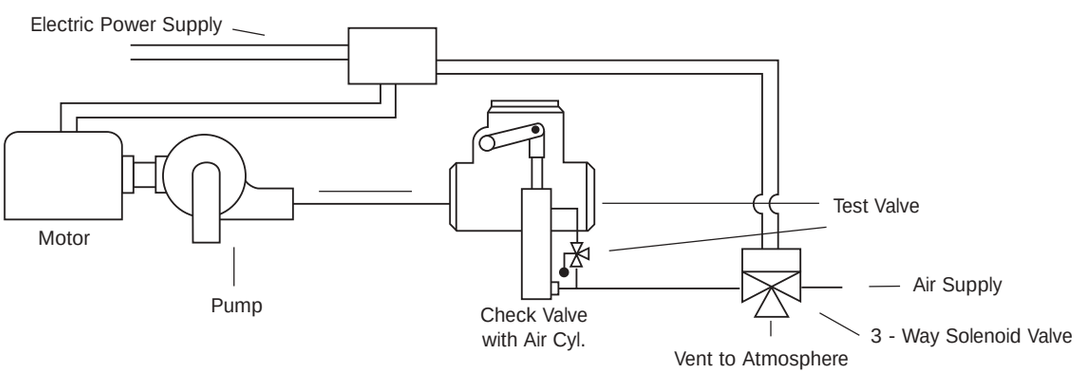
DESCRIPTION

Hopkinsons Positive Closing Check Valves achieve reliable and rapid closure by means of an auxiliary, spring loaded cylinder, usually actuated by compressed air. The positive closing cylinder acts to close the disc of the valve through a simple engaging mechanism. But, the engaging mechanism does not permit the cylinder to open the valve. In the case of a turbine drive, an Oil Operated Air Relay Valve is used to translate turbine control oil pressure to air pressure. An alternate method is to use a switch, actuated by the turbine trip mechanism, operating a solenoid valve which controls air pressure to the closing cylinder.

FEATURES

- Positive, power assisted closure provides fast and reliable protection.
- Valve closure before backflow. “Double protection”; including positive closure and power assisted closure.
- Streamlined flow design minimizes pressure drop.
- Fast closing minimizes water hammer.
- Flat seats for maximum tightness without wedging action.

Figure 1



OPERATION

When the piston of the closing cylinder is pushed upward by air pressure, the disc assembly of the valve is free to swing from a closed to a wide open position solely in response to feedwater flow. Disc movement is completely independent of the shaft. A stop on the back of the disc holds it at a slight incline into the flow when the valve is wide open. Normal velocities swing the disc to the full open position and the stop prevents undue flutter or movement.

WATER HAMMER PROTECTION

High pressure Boiler Feed Pumps operating at high speeds and low inertia can lose speed and stop almost instantaneously, particularly in close coupled systems with short runs of pipe. Should one of these pumps be tripped-out or shut-off, it could go into reverse rotation in a matter of seconds. If reverse flow starts due to the slow closing or failure of a check valve, serious water hammer will result when the valve finally closes. In systems where parallel pumps are used, if one pump is shut down, any surges caused by the working pump will be isolated from the pump which the valve is protecting.

Tests and experience have shown that when an Hopkinsons Positive Closing Check Valve is used, water hammer is reduced to a minimum and the pump is assured maximum protection against reverse flow.

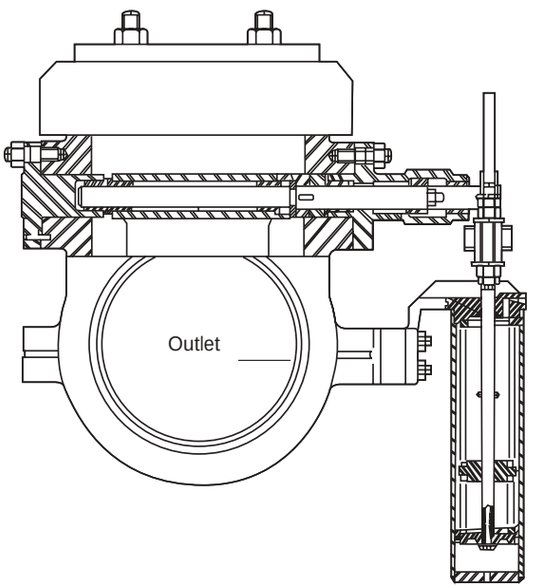
WATER HAMMER TESTS AND RESULTS

Portions of oscillograph tapes of tests made on production line Hopkinsons Valves are shown. The tests were conducted by an independent research facility to verify the advantages of fast closing and to demonstrate the effect of positive closing over a swinging disc check valve which was not positive closing. No numerical values are indicated. The following tests were run with the valve in the discharge of a motor driven pump.

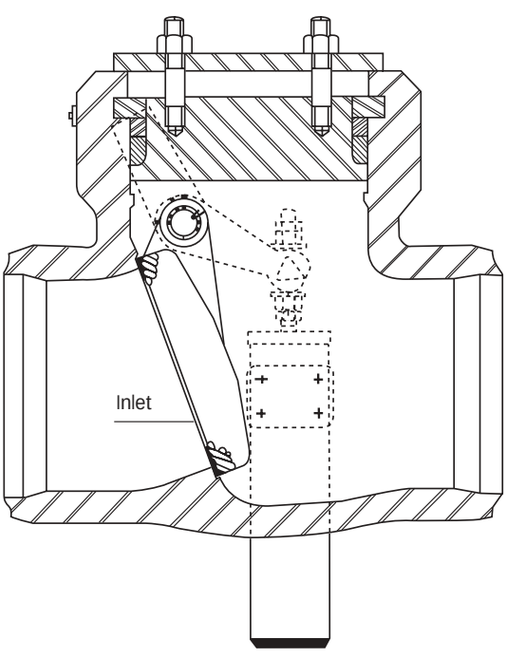
I A Swinging Disc Check Valve with added weight at the outer edge of the disc, with the valve depending only on gravity for its closing moment.

2 The same valve as in (I) above, but with a positive closing cylinder arranged so that air pressure could be released simultaneously with the opening of the electrical circuit of the motor drive.

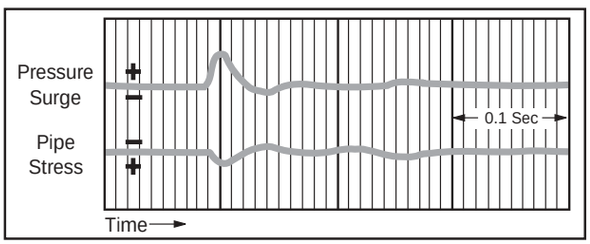
The trace lines indicate pressure during the test and at the moment of valve closure. The height of the line indicates the magnitude of the water hammer.



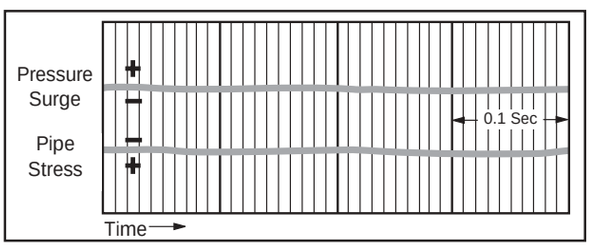
Cross Section Showing Inclined Seat & Swinging Disc



A comparison of the tapes shows the almost amazing results obtained when the positive closing cylinder was used. During the series of tests, it was also demonstrated that sluggish or retarded closing would severely increase water hammer, further proving the advantage of fast, positive closing. When summarizing the results of the tests, the laboratory report states:
"This intensity of water hammer (i.e., when positive closing was used) was almost inaudible and with no apparent vibration."



With Added Weight On Outer Edge of Disc



With Positive Closing Cylinder

FEATURES AND DESIGN ADVANTAGES DEPENDABILITY AND POSITIVE CLOSURE

Positive Closing Check Valves are protective devices that must be completely reliable over extended periods of time. An average pump is "on stream" for a number of months and flow holds the valve in a wide open position for long intervals. Serious damage may result if foreign matter or sediment accumulates between the shaft and the bushings and retards or prevents free self closure. Hopkinsons Valves offer positive protection against sticking or hanging-up and insure rapid, reliable closing in the event of a trip-out or shutdown.

DOUBLE PROTECTION

Some plants use two simple check valves in series as a means of insuring positive closure. Such double valving may be unnecessary, since a single is admitted to the cylinder. Second, it acts as a Power Actuated Valve when air pressure is released from the cylinder on a trip-out.

MINIMUM PRESSURE DROP AND FULL FLOW EFFICIENCY

Hopkinsons Boiler Feed Pump Check Valves assist in keeping pressure drop in the feedwater piping system at a minimum, particularly when a single Hopkinsons Valve replaces a "double valve" installation. The streamlined characteristics of the design make it an efficient valve to use, which is particularly important when longterm installed costs are considered.

"INTERNAL BALANCE"

The Hopkinsons Valve is designed so that the disc assembly is "pressure balanced". This means that the disc assembly is free to swing independently of the operating shaft. The disc is not subject to stuffing box friction or end-thrust tending to force it against the side of the valve. The operating shaft, which passes through the stuffing box is stationary under normal operating conditions. It is rotated only on a trip-out or shut-down by the closing cylinder, which has ample power to overcome stuffing box friction or other causes for sticking. In very high pressure installations, the operating shaft is "pressure balanced" by using double stuffing box construction.

ONE-PIECE BODY CONSTRUCTION AND SIMPLE DESIGN

Hopkinsons Boiler Feed Pump Check Valves are designed with a one-piece body and relatively few moving parts to minimize operating difficulties and simplify maintenance. Once installed, a valve can be inspected easily without removing it from line and the internals can be removed through the top cover. The closing mechanism can also be inspected easily without removing it from the valve by taking off the cylinder to expose the piston. The cylinder and piston assembly can then be examined for wear. If it becomes necessary to remove the piston, the threaded piston rod allows gradual backing off of the spring load so the rest of the cylinder can be dismantled without danger or the need for any special tools. Hopkinsons do not use internal springs, which are difficult to replace. Hopkinsons provides a closing spring external to valve which is readily accessible and can be removed from the cylinder assembly with ease. Possible spring failure could not seize the shaft or prevent self-closing of accessible and can be removed from the cylinder assembly with ease. Possible spring failure could not seize the shaft or prevent self-closing of the valve.

SPECIFICATIONS

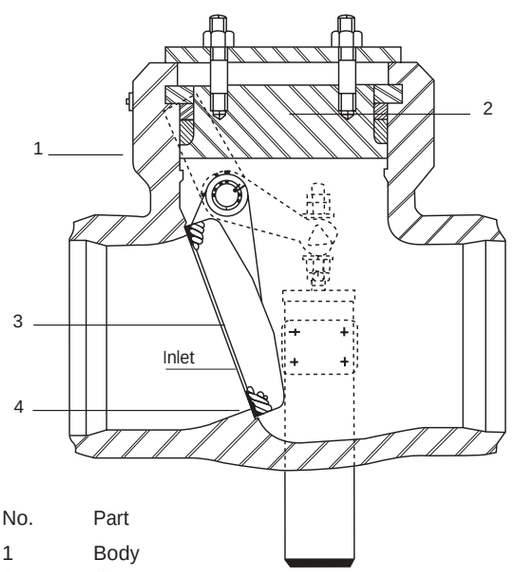
Size:	3" through 24" standard
Pressure Ratings:	ASME Class 400, 600, 900, 1500, 2500 (Special and higher ratings as applicable)
Materials:	Cast steel with Stainless Steel or Cobalt Alloy Hard Facing trim. Other materials furnished on request.
Cover Design:	Pressure Seal, Bolted Bonnet as specified.
Closing Device:	Spring loaded cylinder (air controlled).
Body Type:	Swinging disc design with inclined seat. Suitable for full ASME test pressures.
Disc Assembly:	One-piece construction, pressure balanced against lateral thrust. Positive stop on disc. Disc suitable for full pump shut-off pressure.
Shaft Bearing Design:	Single stuffing box for lower pressures. Double stuffing box for higher pressures. Outboard shaft support bearing on cylinder side. Shaft bushings are nitrided Stainless Steel.
Seats:	Integral Stainless Steel facings on both disc and body. Cobalt Alloy Hard Facings also available.
Stuffing Box Packing:	Graphoil type. Leak-off bushings available.

CLASS 1500

Size in	End to End in	Cv
4	13	357
6	15	826
8	18	1603
10	23	2585
12	25	3926
14	25	3926
16	29	5927

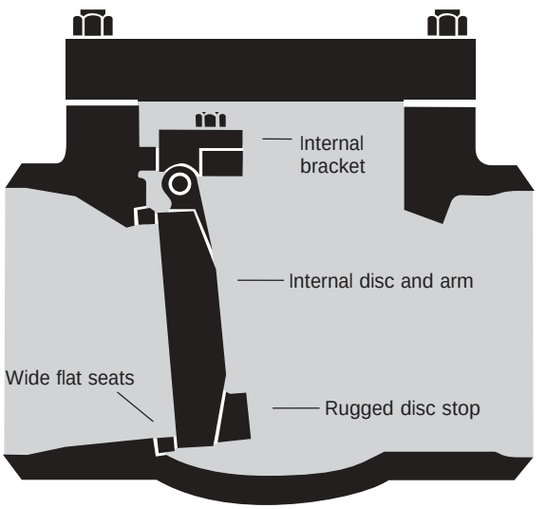
CLASS 2500

Size in	End to End in	Cv
4	13	357
6	18.5	826
8	23.5	1603
10	23.5	1603
12	28	2585
14	35	3926
16	35	3926
18	41	5927



No.	Part
1	Body
2	Cover
3	Disc
4	Seats

Hopkinsons Swing Check Valve is designed to effectively prevent reverse flow and is ideally suited for liquid, steam and other gases requiring assured performance, tight shutoff and low maintenance.



APPLICATION

- Condensate pump discharge
- Heater drains
- Liquid, steam and gas check valve

DESCRIPTION

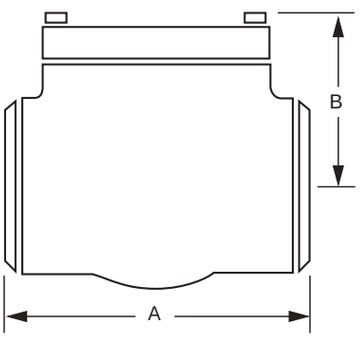
A unique one piece disc and disc arm that cannot spin or flutter. The valve is flow engineered to hold the disc in the full open position during a wider range of flows, and the swinging disc design prevents wedging or jamming. Wide, flat, permanently aligned seats that minimize leakage. Stainless steel seat facings and hardsurfacing alloy available.

Bolted bonnet on 150 through 600 class valves and pressure seal bonnet on 900 through 1500 class valves. An internal bracket on 2½ -18 inch valves, eliminates side body penetrations for the shaft, removing two potential leak paths.
For larger sizes, a conventional double bearing cover design is used.

SPECIFICATIONS

Size:	2½ - 48 inch
Pressure Ratings:	ASME Class 150-1500
Materials:	Carbon steel, Alloy steel or Stainless Steel, all with Stainless Steel trim.

CLASS 150 — Bolted Bonnet



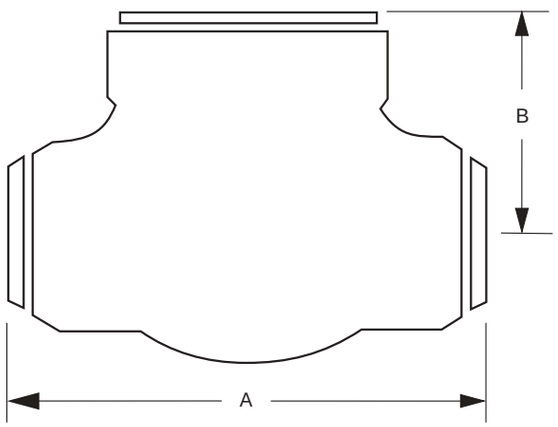
Nominal Size		A		B		Weight		Cv
mm	(in)	mm	(in)	mm	(in)	kg	(lb)	
65	(2.5)	305	(12)	133	(5.25)	43	(95)	198
75	(3)	305	(12)	133	(5.25)	43	(95)	208
100	(4)	330	(12)	137	(5.375)	50	(110)	370
150	(6)	368	(14.5)	165	(6.5)	64	(140)	868
200	(8)	432	(17)	216	(8.5)	107	(235)	1672
250	(10)	470	(18.5)	241	(9.5)	136	(300)	2688
300	(12)	521	(20.5)	273	(10.75)	204	(450)	3983
350	(14)	584	(23)	292	(11.5)	249	(550)	4892
400	(16)	635	(25)	330	(13)	299	(660)	6582
450	(18)	686	(27)	375	(14.75)	460	(1015)	8559
500	(20)	787	(31)	587	(23.125)	1113	(2474)	16400
600	(24)	940	(37)	603	(23.75)	1550	(3445)	21900
650	(26)	1118	(44)	686	(27)	1679	(3730)	27200
750	(30)	1270	(50)	651	(25.625)	2074	(4608)	36800

CLASS 300 — Bolted Bonnet

Nominal Size		A		B		Weight		Cv
mm	(in)	mm	(in)	mm	(in)	kg	(lb)	
65	(2.5)	305	(12)	133	(5.25)	43	(95)	198
75	(3)	305	(12)	133	(5.25)	43	(95	204
100	(4)	330	(13)	152	(6)	50	(110)	370
150	(6)	394	(15.5)	191	(7.5)	91	(200)	868
200	(8)	445	(17.5)	235	(9.25)	141	(310)	1628
250	(10)	508	(20)	273	(10.75)	204	(450)	2651
300	(12)	546	(21.5)	305	(12)	299	(669)	3838
350	(14)	610	(24)	330	(13)	313	(698)	4892
400	(16)	635	(25)	356	(14)	374	(825)	6420
450	(18)	699	(27.5)	394	(15.5)	551	(1215)	8559
500	(20)	787	(31)	587	(23.125)	1113	(2474)	16400
600	(24)	940	(37)	638	(25.125)	1573	(3495)	21900
650	(26)	1118	(44)	727	(28.625)	1701	(3780)	27200
750	(30)	1270	(50)	651	(25.625)	2264	(5030)	36800

CLASS 600 — Bolted Bonnet

Nominal Size		A		B		Weight		Cv
mm	(in)	mm	(in)	mm	(in)	kg	(lb)	
65	(2.5)	318	(12.5)	159	(6.25)	57	(125)	187
75	(3)	318	(12.5)	159	(6.25)	57	(125)	193
100	(4)	343	(13.5)	178	(7)	68	(150)	370
150	(6)	394	(15.5)	235	(9.25)	113	(250)	868
200	(8)	445	(17.5)	267	(10.5)	170	(375)	1796
250	(10)	508	(20)	311	(12.25)	249	(550)	2651
300	(12)	546	(21.5)	330	(13)	354	(780)	3838
350	(14)	635	(25)	368	(14.5)	442	(975)	4833
400	(16)	686	(27)	394	(15.52)	596	(1315)	6295
450	(18)	787	(31)	445	(17.5)	885	(1950)	8290
500	(20)	1016	(40)	864	(34)	1800	(4000)	15300
600	(24)	1016	(40)	794	(31.25)	2372	(5270)	17500
650	(26)	1270	(50)	724	(28.5)	2565	(5700)	31650
750	(30)	1321	(52)	953	(37.5)	3735	(8300)	35700



CLASS 900 *Pressure Seal Bonnet*

Nominal Size		A		B		Weight		Cv
mm	(in)	mm	(in)	mm	(in)	kg	(lb)	
65	(2.5)	318	(12.5)	191	(7.5)	43	(95)	202
75	(3)	318	(12.5)	191	(7.5)	43	(95)	209
100	(4)	330	(13)	222	(8.75)	54	(120)	363
150	(6)	394	(15.5)	279	(11)	107	(235)	801
200	(8)	445	(17.5)	318	(12.5)	168	(370)	1517
250	(10)	572	(22.5)	483	(19)	363	(800)	2346
300	(12)	686	(27)	438	(17.25)	522	(1150)	3658
350	(14)	686	(27)	438	(17.25)	522	(1150)	4207
400	(16)	787	(31)	508	(20)	726	(1600)	5629
457	(18)	864	(34)	559	(22)	1043	(2300)	7558
500	(20)	1118	(44)	720	(28.37)	14036	(6380)	15235
600	(24)	1118	(44)	750	(29.5)	13200	(6000)	18878

CLASS 1500 *Pressure Seal Bonnet*

Nominal Size		A		B		Weight		Cv
mm	(in)	mm	(in)	mm	(in)	kg	(lb)	
65	(2.5)	318	(12.5)	203	(8)	64	(140)	202
75	(3)	318	(12.5)	203	(8)	64	(140)	209
100	(4)	356	(14)	222	(8.75)	152	(336)	345
150	(6)	419	(16.5)	343	(13.5)	363	(800)	801
200	(8)	495	(19.5)	394	(15.5)	544	(1200)	1517
250	(10)	635	(25)	495	(19.5)	726	(1600)	2346
300	(12)	762	(30)	584	(23)	984	(2170)	3658
350	(14)	762	(30)	584	(23)	984	(2170)	4207
400	(16)	876	(34.5)	686	(27)	1270	(2800)	5629
450	(18)	965	(38)	762	(30)	1588	(3500)	7558

REHEATER ISOLATING DEVICE

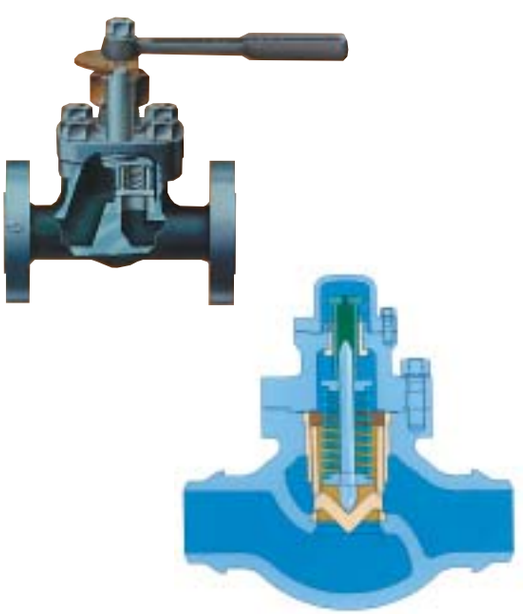
Isolating devices to facilitate the hydraulic testing of sections of power plant such as reheaters following repair.
During normal boiler operation the body of the device acts as a smooth flow component of the pipeline. If required for isolation duty during boiler shutdown, a disc set is inserted in the device to blank-off the flow passage.

Isolating Devices

Ratings:	Up to ASME Class 4500 Higher on request.
Sizes:	Up to 1500 mm Up to 60 in
Body Materials:	Carbon Steel, Alloy Steel, Stainless Steel.

UNIFLOW SLIDE VALVES

Uniflow Slide Valves	
Ratings:	ASME Class 150 to 3100
Sizes:	10 to 50 mm ⅜ to 2 in
Materials:	Carbon Steel, Alloy Steel.
End Connections:	Flanged, butt weld/ socket weld ends.



SPRING LOADED FEEDHEATER BYPASS VALVE

The valve automatically opens to maintain feed flow if the feedheater has to be isolated during fault conditions.
Available in carbon steel, sizes to suit pipeline.

GLOBE VALVES

Hopkinsons range of globe valves offers a choice of configuration for stop/regulating, check, and combined stop and check duties.

APPLICATIONS

- General purpose, isolating and blowdown
- Main steam stop and non-return valves (shell boilers)
- Check feed version (shell boilers)
- General drain duties
- Double isolation drain duty as 'Martyr' valve
- With parabolic valve head for precise flow control
- Continuous blowdown (micrometer valve)

Globe Valves

Ratings:	ASME Class 150 to 4500
Sizes:	15 to 300 mm ½ to 12 in
Materials:	Carbon Steel, Alloy Steel, Stainless Steel, Bronze.

PRODUCT PORTFOLIO

The following list identifies the full range of Hopkinsons Products. For further information please contact our factory in Huddersfield.

Parallel Slide Gate valves
Safety valves (All international standards)
Lift and Swing Check valves
Extraction Steam Check valves
Blowdown and Drain valves
Feed Pump Leak-off equipment
Spring Load Bypass valves
Globe valves
Uniflow valves
Feedcheck valves
Liquid level gauges
Pressure Reducing valves
Bronze valves
Wedge Gate valves - Nuclear
Vent Silencers
Expansion Chambers
Special valves
Reheat Isolation valves
Full spares support programme

CENTIGRADE TO FAHRENHEIT – FAHRENHEIT TO CENTIGRADE

–459.4° to 0°			1° to 60°			61° to 290°			300° to 890°			900° to 3000°		
C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F
–273	–459.4		–17.2	1	33.8	16.1	61	141.8	149	300	572	482	900	1652
–268	–450		–16.7	2	35.6	16.7	62	143.6	154	310	590	488	910	1670
–262	–440		–16.1	3	37.4	17.2	63	145.4	160	320	608	493	920	1688
–257	–430		–15.6	4	39.2	17.8	64	147.2	166	330	626	499	930	1706
–251	–420		–15.0	5	41.0	18.3	65	149.0	171	340	644	504	940	1724
–246	–410		–14.4	6	42.8	18.9	66	150.8	177	350	662	510	950	1742
–240	–400		–13.9	7	44.6	19.4	67	152.6	182	360	680	516	960	1760
–234	–390		–13.3	8	46.4	20.0	68	154.4	188	370	698	521	970	1778
–229	–380		–12.8	9	48.2	20.6	69	156.2	193	380	716	527	980	1796
–223	–370		–12.2	10	50.0	21.1	70	158.0	199	390	734	532	990	1814
–218	–360		–11.7	11	51.8	21.7	71	159.8	204	400	752	538	1000	1832
–212	–350		–11.1	12	53.6	22.2	72	161.6	210	410	770	549	1020	1868
–207	–340		–10.6	13	55.4	22.8	73	163.4	215	420	788	560	1040	1904
–201	–330		–10.0	14	57.2	23.3	74	165.2	221	430	806	571	1060	1940
–196	–320		– 9.4	15	59.0	23.9	75	167.0	227	440	824	582	1080	1976
–190	–310		– 8.9	16	60.8	24.4	76	168.8	232	450	842	593	1100	2012
–184	–300		– 8.3	17	62.6	25.0	77	170.6	238	460	860	604	1120	2048
–179	–290		– 7.8	18	64.4	25.6	78	172.4	243	470	878	616	1140	2084
–173	–280		– 7.2	19	66.2	26.1	79	174.2	249	480	896	627	1160	2120
–169	–273	–459.4	– 6.7	20	68.0	26.7	80	176.0	254	490	914	638	1180	2156
–168	–270	–454	– 6.1	21	69.8	27.2	81	177.8	260	500	932	649	1200	2192
–162	–260	–436	– 5.6	22	71.6	27.8	82	179.6	266	510	950	660	1220	2228
–157	–250	–418	– 5.0	23	73.4	28.3	83	181.4	271	520	968	671	1240	2264
–151	–240	–400	– 4.4	24	75.2	28.9	84	183.2	277	530	986	682	1260	2300
–146	–230	–382	– 3.9	25	77.0	29.4	85	185.0	282	540	1004	693	1280	2336
–140	–220	–364	– 3.3	26	78.8	30.0	86	186.8	288	550	1022	704	1300	2372
–134	–210	–346	– 2.8	27	80.6	30.6	87	188.6	293	560	1040	732	1350	2462
–129	–200	–328	– 2.2	28	82.4	31.1	88	190.4	299	570	1058	760	1400	2552
–123	–190	–310	– 1.7	29	84.2	31.7	89	192.2	304	580	1076	788	1450	2642
–118	–180	–292	– 1.1	30	86.0	32.2	90	194.0	310	590	1094	816	1500	2732
–112	–170	–274	– 0.6	31	87.8	32.8	91	195.8	316	600	1112	843	1550	2822
–107	–160	–256	0.0	32	89.6	33.3	92	197.6	321	610	1130	871	1600	2912
–101	–150	–238	0.6	33	91.4	33.9	93	199.4	327	620	1148	899	1650	3002
– 96	–140	–220	1.1	34	93.2	34.4	94	210.2	332	630	1166	927	1700	3092
– 90	–130	–202	1.7	35	95.0	35.0	95	203.0	338	640	1184	954	1750	3182
– 84	–120	–184	2.2	36	96.8	35.6	96	204.8	343	650	1202	982	1800	3272
– 79	–110	–166	2.8	37	98.6	36.1	97	206.6	349	660	1220	1010	1850	3362
– 73	–100	–148	3.3	38	100.4	36.7	98	208.4	354	670	1238	1038	1900	3452
– 68	– 90	–130	3.9	39	102.2	37.2	99	210.2	360	680	1256	1066	1950	3442
– 62	– 80	–112	4.4	40	104.0	37.8	100	212.0	366	690	1274	1093	2000	3632
– 57	– 70	– 94	5.0	41	105.8	43	110	230	371	700	1292	1121	2050	3722
– 51	– 60	– 76	5.6	42	107.6	49	120	248	377	710	1310	1149	2100	3812
– 46	– 50	– 58	6.1	43	109.4	54	130	266	382	720	1328	1177	2150	3902
– 40	– 40	– 40	6.7	44	111.2	60	140	284	388	730	1346	1204	2200	3992
– 34	– 30	– 22	7.2	45	113.0	66	150	302	392	740	1364	1232	2250	4082
– 29	– 20	– 4	7.8	46	114.8	71	160	320	399	750	1382	1260	2300	4172
– 23	– 10	14	8.3	47	116.6	77	170	338	404	760	1400	1288	2350	4262
–17.8	0	32	8.9	48	118.4	82	180	356	410	770	1418	1316	2400	4352

(Table continues on next page)

CENTIGRADE TO FAHRENHEIT – FAHRENHEIT TO CENTIGRADE CONTINUED

–459.4° to 0°			1° to 60°			61° to 290°			300° to 890°			900° to 3000°		
C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F	C	Cent. or Fah.	F
			9.4	49	120.2	88	190	374	416	780	1436	1343	2450	4442
			10.0	50	122.0	93	200	392	421	790	1454	1371	2500	4532
			10.6	51	123.8	99	210	410	427	800	1472	1399	2550	4622
			11.1	52	125.6	100	212	413.6	432	810	1490	1427	2600	4712
			11.7	53	127.4	104	220	428	438	820	1508	1454	2650	4802
			12.2	54	129.2	110	230	446	443	830	1526	1482	2700	4892
			12.8	55	131.0	116	240	464	449	840	1544	1510	2750	4982
			13.3	56	132.8	121	250	482	454	850	1562	1538	2800	5072
			13.9	57	134.6	127	260	500	460	860	1580	1566	2850	5162
			14.4	58	136.4	132	270	518	466	870	1598	1593	2900	5252
			15.0	59	138.2	138	280	536	471	880	1616	1621	2950	5342
			15.6	60	140.0	143	290	554	477	890	1634	1649	3000	5432

Locate temperature in middle column. If in degrees Centigrade, read Fahrenheit equivalent in right hand column; if in degrees Fahrenheit, read Centigrade equivalent in left hand column.

CONVERSION FORMULAS

$C = \frac{5}{9}(F–32)$, $F = \frac{9}{5}C + 32$
$C + 273.15 = K$ Kelvin
$F + 459.67 = R$ Rankin

BARS – bar

x 100	= Kilopascals (kPa)
x 14.504	= Pounds-force per square inch (psi)
x 33.52	= Feet of water (ftH_20) at 68°F
x 29.53	= Inches of mercury (inHg) at 0°C
x 1.0197	= Kilograms-force per square centimeter (kg/cm^2)
x 0.98692	= Atmospheres (atm) sea-level standard
x 1.0443	= Tons-force per square foot ($tonf/ft^2$)
x 750.06	= Torr (torr) (-mmHg at 0°C.)

KILOPASCALS – kPa

x 10^3	= Pascals (Pa) or newtons per square meter (N/m^2)
x 0.1450	= Pounds-force per square inch (psi)
x 0.010197	= Kilograms-force per square centimeter (kg/cm^2)
x 0.2953	= Inches of mercury (inHg) at 32°F
x 0.3351	= Feet of water (ftH_20) at 68°F
x 4.021	= Inches of water (inH_20) at 68°F

POUNDS-FORCE PER SQUARE INCH – psi

x 6.896	= Kilopascals (kPa)
x 0.06805	= Standard atmospheres
x 2.311	= Feet of water (ftH_20) at 68°F
x 27.73	= Inches of water (inH_20) at 68°F
x 2.036	= Inches of mercury (inHg) at 0°C
x 0.07031	= Kilograms-force per square centimeter (kg/cm^2)