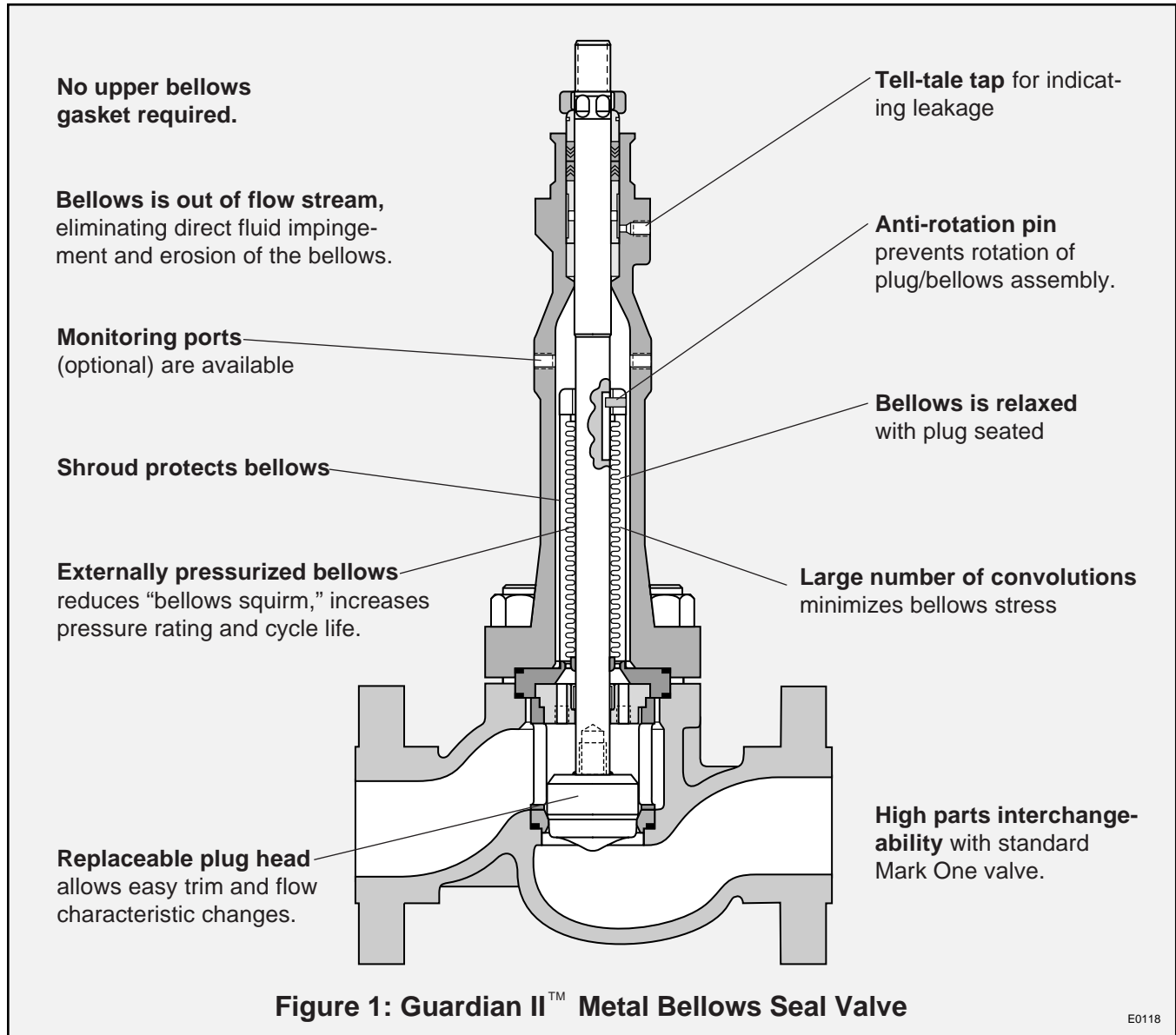




Valtek Guardian II
Metal Bellows Seal Control Valves

Guardian II Metal Bellows Seal Design Features



Wasted material, employee safety, environmental concerns and EPA regulations: all good reasons for today's plant operators to be concerned about fugitive emissions from hazardous processes. To stop packing leakage from control valves, Valtek® offers the Guardian II™ Metal Bellows Seal control valve.

Using a formed metal bellows design with minimal welded joints, the Guardian II has a full-cycle life of up to 5 million cycles. This ensures years of safe and reliable operation in hazardous processes ranging from -320° to 1000° F (-196° to 538° C) and pressures to 1100 psi (75.8 Bar).

A metal shroud envelopes the bellows acting as a pressure boundary in service, allowing use of a single, pressurized gasket seal and preventing fluid contact with the bellows housing during normal operation. External pressurization of the bellows increases cycle life and the maximum allowable pressure, while eliminating "bellows squirm." The replaceable plug head allows trim changes without changing the bellows assembly.

The Guardian II can be retrofitted to a standard Mark One valve by changing the plug and bolting, adding a bellows assembly, bellows housing and lower guide assembly.

Guardian II Metal Bellows Seal Advantages and Features

Advantage	Feature
Eliminates fugitive emissions	Zero-leakage stem seal
Broad range of fluid compatibilities	Available with Inconel or Hastelloy C bellows
No bellows tension	Bellows is in a relaxed state at valve's closed position
Protected from external damage	Shroud envelopes the bellows, protecting it during handling, installation and operation
No bellows erosion/fluid impingement	Bellows is out of flow stream
Minimal bellows stress	Large number of convolutions minimizes the amount of bellows movement
Reduced failure potential	Anti-rotation pin prevents accidental rotation of plug and bellows, a major cause of bellows failure
Easy trim/flow characteristic changes	Replaceable plug head
Fast detection of bellows failure	A tell-tale tap located in bellows housing may be monitored visually, electronically or by pressure
Minimum seals to monitor	One-gasket design reduces potential leak paths
No special packing requirements	Uses standard Valtek packing materials
Multiple temperature applications	Temperature range from -320° to 1000° F (-196° to 538° C)
Tolerates particle-entrained fluids	Bellows has large convolutions
Long cycle life	Formed bellows has low mechanical stress and minimal welds
Assured integrity	Bellows assembly is helium leak tested
High parts interchangeability	Most Guardian II parts are interchangeable with standard Mark One valve parts
Conservative size	A Guardian II valve with pneumatic actuator is shorter than a comparable diaphragm actuated valve

Table I: Guardian II Cycle Life*

Valve Size (inches)	ANSI Pressure Class	Full Stroke Cycles at 70° F (21° C)			
		150 psi (10.3 Bar)		600 psi (41.4 Bar)	
		Minimum	Average	Minimum	Average
1½, 3¼, 1	150, 300	2,000,000	5,000,000+	125,000	780,000
1½, 2	150, 300	2,000,000	5,000,000+	90,000	500,000
3	150, 300	520,000	2,000,000	40,000	250,000
4	150	500,000	2,500,000	—	—
4	300	275,000	1,400,000	33,000	160,000
6	150	200,000	1,300,000	—	—
6	300	100,000	550,000	17,000	90,000
8	150	375,000	1,350,000	—	—
8	300	56,000	350,000	21,000	110,000

*Bellows life is affected by unequal loads applied to the bellows, called "bellows squirm." With the Guardian II design, the outside of the bellows is pressurized, providing a stable pressure load on the bellows and reducing bellows squirm. External pressurization also increases the maximum allowable pressure rating of the bellows.

Guardian II Metal Bellows Seal Specifications

Table II: C_v Data (= % Trim, Flow Over)

Valve Size (inches)	Trim Number	Stroke (inches)	Full C _v
1/2	.50	.50	4.2
	.31	.50	2.3
3/4	.72	.50	7.5
	.50	.50	5.4
1	.31	.50	2.6
	.81	.50	11.0
1 1/2	.50	.50	5.7
	.31	.50	2.6
	1.25	1.00	30
2	1.00	.75	22
	.81	.75	18
	1.62	1.00	44
	1.25	1.00	33
3	1.00	.75	23
	.81	.75	19
	2.62	1.50	107
4	1.62	1.50	49
	3.50	2.00	206
6	2.25	2.00	113
	5.00	2.50	405
8	3.50	2.50	236
	6.25	3.00	698
	5.00	3.00	474

Table III: Bellows Effective Area and Maximum Pressure*

Valve Size (inches)	Bellows Rating Class	Effective Area (sq. in.)	Maximum Pressure					
			psig at -320° to 100°F Barg at -196° to 38°C	psig at 500° F Barg at 260° C	psig at 1000° F Barg at 538° C			
1/2, 3/4, 1	150, 300	0.75	1100	75.8	858	59.2	825	56.9
1 1/2, 2, 3	150, 300	1.35	770	53.1	601	41.4	578	39.9
4, 6	150	2.38	425	29.3	332	22.9	319	22.0
4, 6	300	2.18	770	53.1	601	41.4	578	39.9
8	150	4.53	350	24.1	273	18.8	263	18.1
8	300	4.75	1050	72.4	819	56.5	788	54.3

* Maximum bellows pressure maybe more than valve body capability. Consult ANSI B16.34 for maximum body pressure capabilities.

Table IV: Body Specifications

Sizes	1/2, 3/4, 1, 1 1/2, 2, 3, 4, 6, 8
Forms	Globe, angle, expanded outlet
Characteristics	Equal percentage, linear, quick-open
Bellows Material	Inconel 625 (std.), Hastelloy C-22, other materials
Bonnet	One-piece including bellows housing
Packing	Double set
Packing Material	Teflon V-ring, glass-filled Teflon, asbestos-free packing w/Inconel wire, Grafoil, others as required
Gasket Types	Flat: Teflon, Kel-F Spiral wound: stainless steel / Grafoil
Guides	Glass-loaded Teflon, Grafoil, bronze, Stellite

Table V: Actuator Specifications

Actuators	Spring cylinder: Sizes 25, 50, 100, 200, 300, 400, 500, 600 sq. in. Manual handwheel: sizes 9, 12, 18, 24-inch diameters Hydraulic: as required
Positioner Signals	Pneumatic: 3-15, 6-30 psi (0-1, 0.4-2.1 Bar) Electro-pneumatic: 4-20, 10-50 mA

Ordering Information

The following information must be taken into consideration when ordering a Guardian II metal bellows seal valve:

1. Valve body type: globe, angle, or expanded outlet
2. Valve's operating conditions: inlet and outlet pressure, temperature, flow rate, fluid's specific gravity, and throttling or on/off application (If service conditions exceed Guardian II's limit, contact factory.)
3. Maximum operating temperature and pressure
4. Flange rating
5. Materials required: body, bellows, bellows housing assembly, trim, packing and guides
6. Actuator required: type (cylinder, hydraulic, manual), failure action and size
7. Positioner signal requirements
8. Accessories requirements

Guardian II Metal Bellows Seal Dimensions

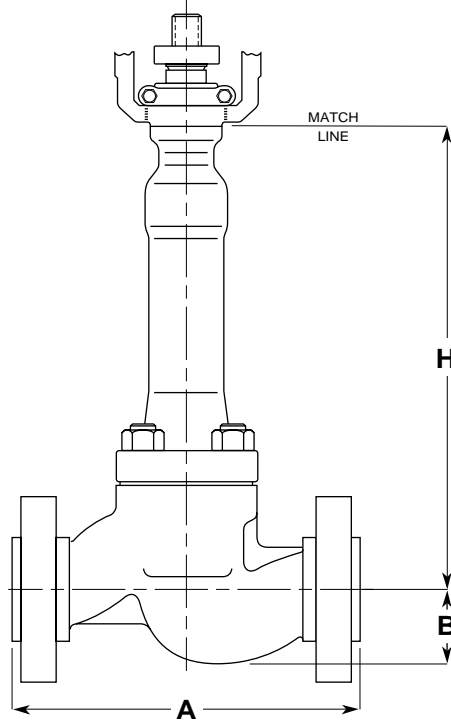


Table VI: Dimensions (inches / mm)

Valve Body Size (inches)	A								B		H		Clearance Height for Disassembly	
	ANSI		ANSI/ISA											
	Class 150, 300, 600	Class 150	Class 300	Class 600										
1 ¹ / ₂ , 3 ¹ / ₄	8.5	216	7.3	184	7.6	194	8.1	206	1.5	38	12.1	307	3.3	83
1	8.5	216	7.3	184	7.8	197	8.3	210	1.8	44	12.1	307	3.3	83
1 ¹ / ₂	9.5	241	8.8	222	9.3	235	9.9	251	2.3	59	16.5	420	5.0	127
2	11.5	292	10.0	254	10.5	267	11.3	286	2.3	57	16.5	420	5.5	140
3	14.0	356	11.8	298	12.5	318	13.3	337	3.4	86	19.0	483	7.0	178
4	17.0	432	13.9	353	14.5	368	15.5	394	5.2	133	27.2**	691**	9.3	235
6			17.8	451					5.5	139	29.1**	738**	11.5	292
6					18.6	473	20.0	508	5.8	146	29.1	738	11.5	292
8			21.4	543					7.1	180	35.3	896	12.0	305
8					22.4	568	24.0	610	7.5	190	35.3	896	12.8	324

** For 2.88 inch spud diameter subtract 0.6 inch (16 mm).

Guardian II Metal Bellows Seal

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Valtek International is represented by factory-trained manufacturer representatives throughout the world.

Valtek International Headquarters – Springville, UT
Phone 801 489 8611 Fax 801 489 3719
Web www.valtek.com

Valtek Baton Rouge – Baton Rouge, LA
Phone 504 751 9880 Fax 504 755 0728

Valtek Beaumont – Beaumont, TX
Phone 409 842 0087 Fax 409 842 4444

Valtek Corpus Christi – Corpus Christi, TX
Phone 512 883 8700 Fax 512 883 6700

Valtek Houston – Deer Park, TX
Phone 281 479 9500 Fax 281 479 8511

Valtek Business Development Group – Houston, TX
Phone 713 690 4447 Fax 713 895 7774

Valtek Philadelphia – Boothwyn, PA
Phone 610 497 8600 Fax 610 497 6680

Valtek Controls Ltd. – Edmonton, Alberta
Phone 403 449 4850 Fax 403 449 4851

Valtek Australia Pty. Ltd. – Scoresby, Victoria
Phone 3 9764 8522 Fax 3 9764 0013

Valtek Engineering Ltd. – Pershore, England
Phone 1386 554 551 Fax 1386 554 968

Kämmer Valves Inc. – Pittsburgh, PA
Phone 412 787 8803 Fax 412 787 1944

Kämmer Ventile GmbH – Essen, Germany
Phone 201 29407 0 Fax 201 29407 62

Valtek-Sereg Vannes S.A. – Paris, France
Phone 33 1 60 92 32 51 Fax 33 1 60 92 32 99

Valtek Sulamericana Ltda. – Sao Paulo, Brazil
Phone 11 745 1011 Fax 11 745 2477

Valtek India Ltd. – Ahmedabad, India
Phone 272 813319 Fax 272 812430

Durco Valtek Pte. Ltd. – Singapore
Phone 862 3332 Fax 862 2800

Yokogawa•Kitz•Valtek – Tokyo, Japan
Phone 03 5434 5963 Fax 03 5434 5930

Valtek Nederland BV – Capelle A/D IJssel, Holland
Phone 10 458 6388 Fax 10 442 1255