Forbes Marshall

Trusted Partners.
Innovative Solutions.

Safety Relief Valve
with Balanced Bellows VSE5 / VSR5

Energy Conservation | Environment | Process Efficiency

www.forbesmarshall.com

For over six decades, Forbes Marshall has been building steam engineering and control instrumentation solutions that work for process industry. Today we have evolved into a leader in process efficiency and energy conservation through technology tie-ups and focused investments in manufacturing and research. Our joint ventures with the world's leading names enable us to deliver quality solutions in 14 countries. Forbes Marshall is unique in having extensive expertise in both steam and control instrumentation. The dual expertise has allowed us to engineer industry specific systems that focus on energy efficiency and utilities management for sectors as diverse as textiles, food processing, paper, power and chemicals.

Our teams are peopled by some of the finest engineers in the land. These highly trained professionals have developed innovative solutions and saved millions of rupees in process costs for our clients. Our business practices and processes have combined into a singular philosophy of being trusted partners who provide innovative solutions. It's a philosophy we are proud to live up to.

We have long standing partnerships with some of the best names in the control instrumentation industry such as Arca, Codel, Krohne and Shinkawa, to develop, design and supply innovative solutions for measurement and monitoring of process parameters. With a combination of specialist knowledge and the latest technology, we provide products and solutions to achieve optimum efficiency. Our products are a unique combination of hardware and software that make them reliable and accurate.

VSE5 / VSR5

The Forbes Marshall's VSE 5/VSR 5 type Full Lift Safety Relief Valves with Balanced Bellows are specifically designed for high back pressures and also to protect the spindle and spring from the effects of corrosive gases, vapours and liquids. These valves are available in 12 sizes with API-526 orifice sizes (EA-RA) and ANSI flanges covering set pressure ranges from 1 Bar upto 315 Bar. A variety of materials are available to cover temperatures from (–) 196°C to 550°C.

Salient Features

- Inlet Full Nozzle made of forged materials to ensure safe operations at the highest pressure conditions.
- Body as well as inlet/outlet connections are deliberately oversized compared to the recommendations of API-526 to provide favourable flow characteristics and keep flow velocities and dynamic pressure losses low in the feed pipe.
- Stem is precisely guided by a piston which slides in the guide bush. The piston and guide bush provide a large guiding area which ensures concentric spindle loading and repeatability of opening and closing cycles.
- All internal parts made from corrosion resistant austenitic materials with balanced thermal expansion coefficients.
- Balanced bellows available in variety of materials like SS316, Hastelloy, Inconel 625 etc to take care of all corrosive media and effects of high temperatures.
- Optional provision of special seat with 'O' ring (SN 124) to achieve exceptional leak tightness on gas service.
- Precisely wound spring made from chrome vanadium steel specially designed to eliminate eccentric loading and provide full relieving capacity.
- All valves bodies provided with sturdy mounting brackets to absorb reaction forces.
- All valves precisely set on pneumatic test benches and tested for seat leakage as per API-527.

Material Specifications :

Closed Bonnet

Material	: Code 52	Code 53	Code 56	Code 57
Nozzle	: A105	A182F22	A182 F304/F316	A182 F316
Body	: A216WCB	A217WC6	A351 CF8/CF8M	A216 WCB
Temp. Range °C	: upto 425	425 to 550	-195 to 300	-60 to 400

Seat Code Letter		EA-HA	JA-KA	LA-NA	PA-RA	TA
Drain	in.	R 1/4	R 3/8	R 1/2	R 3/4	–
Suction	in.	R 1/4	R 3/8	R 3/8	R 1/2	R 1/2
Dimension "X"	mm	12	16	26	26	36

Smallest Flow Diameter (do) and Smallest Flow Area (Ao)

API-526 Orifice code Letters

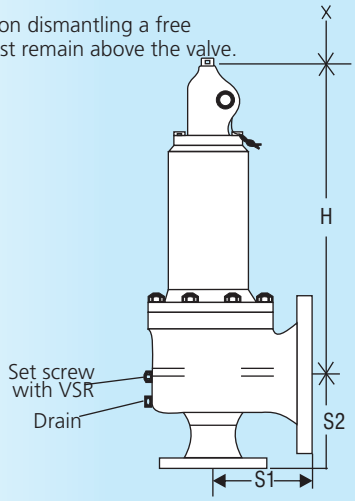
Orifice letters	do (mm)	Ao (mm^2)
EA	24.5	471
FA	24.5	471
GA	24.5	471
HA	26.4	547
EA IV	13.2	139
JA	33.3	897
KA	40.4	1282
LA	51	2043
MA	59	2734
NA	62	3019
PA	80	5027
QA	99	7699
RA	126	12467

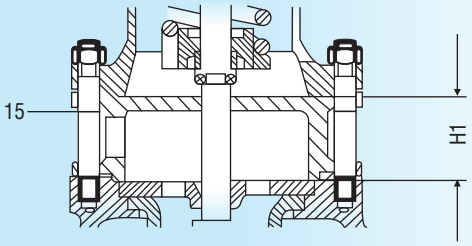
do-smallest flow diameter (mm)
Ao- Smallest Flow Area (mm^2)

Back Pressure Correction factor for Bellow

1) Max. pressure (bar) at 20°C	°C	100	150	200	250	300	350	400	450	500	550
2) Max. pressure (g) at 68°F	°F	212	302	392	482	572	662	752	842	932	1022
Reduction factor for higher temperatures		0,90	0,85	0,82	0,75	0,70	0,67	0,65	0,60	0,57	0,54

For inspection dismantling a free space X must remain above the valve.





Accessories SN 110
A Cooling Spacer is recommended between body and bonnet for temperatures greater than 400ºC
Height 'H' increases by 'H1'

API 526 - Seat Designation and ANSI Flange connections

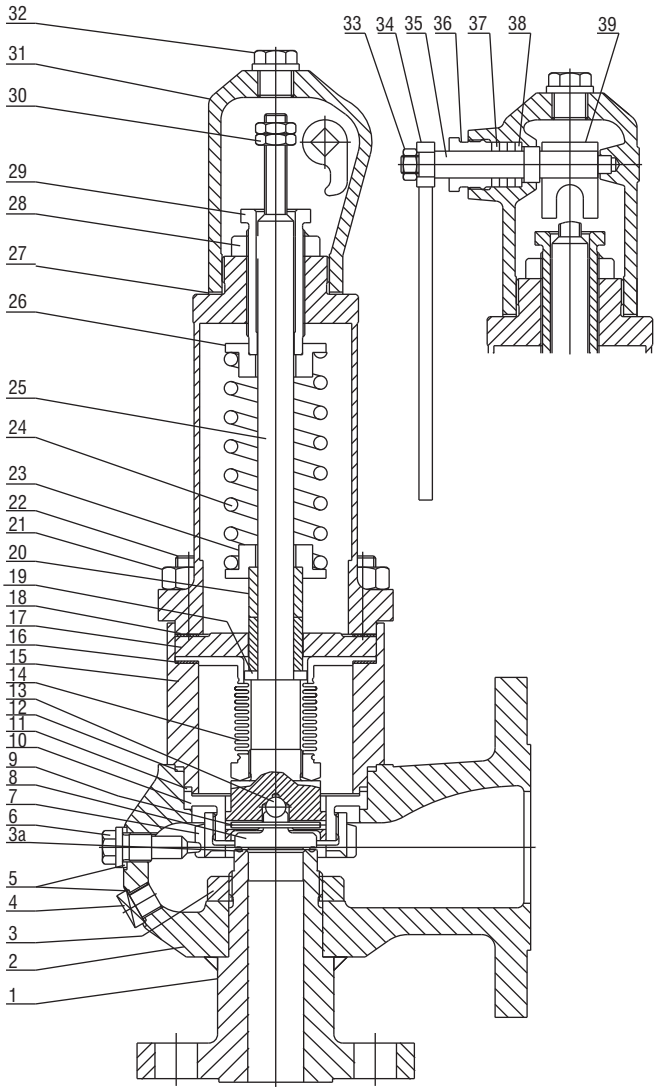
Inlet Inch DN	Seat Code	Outlet Inch DN	Pressure Group	Set Pressure Kg./cm²		Centre-to-face dimensions for class mm							Dimension H	Dimension H1	Weight
						S1 Outlet		S2 Outlet							
				Min	Max	150	300	150	300	600	900	1500		Min.	kgs
1	EA	2	I	1.2	46	114		105	105				305	50	10
		2	II	46	127	114			105	105			305	50	10
1 1/2	EA	2	II	46	127	114				105	105	105	305	50	10
		2	III	127	204		139					105	305	50	17
1 1/2	FA	2	I	1.2	20	121		124	124				355	50	10
		2	I	0.5	46	152			124	124			355	50	10
		2	II	46	127	152			124	124	124	124	355	50	10
		2	III	127	204	152	152				124	124	355	50	17
1 1/2	GA	2 1/2	I	1.2	20	121		124	124		124	124	381	50	17
		2 1/2	I	0.6	32	152			124	124			381	50	32
		2 1/2	II	32	91	152			124	124	124	124	381	50	32
		2 1/2	III	91	143	152	152			124	124	124	508	50	35
1 1/2	HA	3	I	1.2	20	124		130	130				355	50	32
2	HA	3	I	1.2	32	124			130				355	50	32
		3	II	32	92	124			130	130	130		406	50	53
		3	II	32	92	162				156	156		406	50	53
		3	III	92	143		162				156	156	508	50	72
2 1/2	JA	4	I	1.2	23	142		136	136				457	50	35
		4	II	23	64	142			136	136	136		457	50	35
		4	II	23	64	171				136	136		457	50	55
		4	III	64	102	171	181			136	136	136	533	50	80
3	KA	4	I	1.2	20	136		156	156				457	50	43
		4	II	20	57	136			156	156	156		457	50	60
		4	II	20	57	136				184	184		457	50	60
		4	III	57	92	181	216			190	184	184	584	50	82
4	LA	6	I	2	16	181		180	180				558	70	65
		6	II	16	41	181			180	180			711	70	89
		6	III	41	92	181				180	180	180	711	70	101
4	MA	6	I	1.3	12.7	184		178	178				584	70	98
		6	II	12.7	36.3	184		178	178	178			737	70	111
		6	II	12.7	36.3	203			178	178			737	70	111
		6	III	36.3	72.5	222				178	197	197	737	70	141
4	NA	6	I	1.3	12.7	209		197	197				584	70	98
		6	II	12.7	36.3	209		197	197	197			737	70	111
		6	II	12.7	36.3	209				197			737	70	111
		6	III	36.3	70.4	222				197	197		737	70	141
4	PA	6	I	1	9	228		181					991	110	157
		6	II	9	26	229		181	181				1067	110	167
		6	III	26	72	254			225	225	225		1067	110	196
6	QA	8	I	0.8	8	241		240	240				991	110	208
		8	II	8	20.4	241		240	240				1067	110	216
		8	III	20.4	42.2	241			240	240	240		1067	110	248
6	RA	8	I	0.7	6.4	241		240					1016	110	257
		8	II	6.4	16	241		240	240	240	240		1018	110	268

Example for Valve Codification

Example for valve specification: API-Orifice and ANSI connections

VSR5. 150 1 FA 2-I-52-110

- Standard Accessories
- Material specification
- Pressure group
- Outlet size DN
- Orifice code letter
- Inlet size DN
- Inlet nominal pressure PN
- Type of valve, abbr.



Ordering Information

Data to be specified with enquiry or order :
–Operating Medium
–Density / Sp. Gravity / Mol. Wt. of Medium
–State of fluid (gaseous or liquid)
–Set pressure and service pressure
–Service temperature
–Discharge capacity
–End connection
–Mounting brackets as per Mounting Instructions
–Back pressure

Material specification		52
Service temperature Range of application		(59-Nonferrous free) -10 up to + 400 (460)°C -14 up to + 752 (860)°F
Part No.	Part Name	Material
1	Nozzle	A105
2	Body	A216 WCB
3	Lock Nut	SS
3a	Seat Zone	X20CrM017/Delero
4	Drain Plug	C20/SS
5 ●	Gasket	Graphite
6	Nozzle Locking Screw	SS
7	Blowdown Adj.Ring	SS
8 ●	Disc	SS 431
9 ●	Pin	SS410
10	Guide Bush	A351CF8/8M
11 ●	Gasket	Graphite
12 ●	Gasket	Graphite
13 ●	Ball	C20/SS
14 +	Bellow	SS316/Inconel 625
15	Bellow Bonnet	SS304
16	Gasket	Graphite
17	Cover	SS 304
18	Gasket	Graphite
19	Stroke Limiter	SS 410
20	Spacer	SS
21	Hex.Nut	A194 2H
22	Stud	A193 B7
23	Spring Guide Bottom	CS/SS
24 +	Spring	50CrV4
25	Spindle	SS410
26	Spring Guide Top	CS/SS
27	Gasket	Graphite
28	Lock Nut	SS
29	Adjustment Bolt	Bronze/SS
30	Lock Nut	SS
31	Cap	CS/SS
32	Plug	SS 410
33	Hex.Nut	A194 2H
34	Lever	SG Iron
35	Shaft	SS
36	Adaptor	SS
37	Packing	Graphite
38	Bottom Ring	SS
39	Cam	MS

+ 2 years spare
● Wear parts in spare

www.forbesmarshall.com

Forbes Marshall Pvt. Ltd.
A-34/35, MIDC, Industrial Estate, 'H' Block, Pimpri, Pune - 411 018. India.
Tel.: 91(0)20 - 27442020
Fax: 91(0)20 - 27442040 E-mail: aganorkar@forbesmarshall.com

Domestic:
Ahmedabad, Alibag, Bangalore, Bhopal / Indore, Chandigarh, Chennai, Coimbatore, Delhi, Hyderabad, Jamshedpur, Kolkata, Mumbai, Nagpur, Navi Mumbai, Surat, Trichy, Vadodara, Visakhapatanam
International Operations: exp@forbesmarshall.com
Bangladesh, Canada, Egypt, Indonesia, Kenya, Malaysia, Nepal, Sri Lanka, Thailand, U.A.E. (Instrumentation) (Boilers & Boiler Accessories), USA

Forbes Marshall
Trusted Partners.
Innovative Solutions.