



# Safety Relief Valve

Ensuring the safety of pressure vessels

VSR1 - Steam, Non-Poisonous and Non-Flammable Gases and Vapours

VSR2 - Inflammable Gases, Vapours and Liquids

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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 probably the only company in the world to have 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.

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## Full Lift, Spring Loaded, Safety Relief Valve

Model VSR1 Open Bonnet Type Safety Relief Valves are designed for Steam Boiler Service to meet the requirements of the Indian Boiler Regulations. These valves are suitable for saturated and superheated steam; Non-poisonous and non inflammable Gases and Vapours.

Model VSR2 is a Closed Bonnet type Valve specially designed for poisonous and Inflammable gases, vapours and liquids.

These valves are available in 12 sizes as per API-526 Orifice sizes (EA-RA) and ANSI flanges covering set pressure ranging from 1.2 bar to 204 bar. A variety of materials are available to suit temperature ranges up to 550°C.

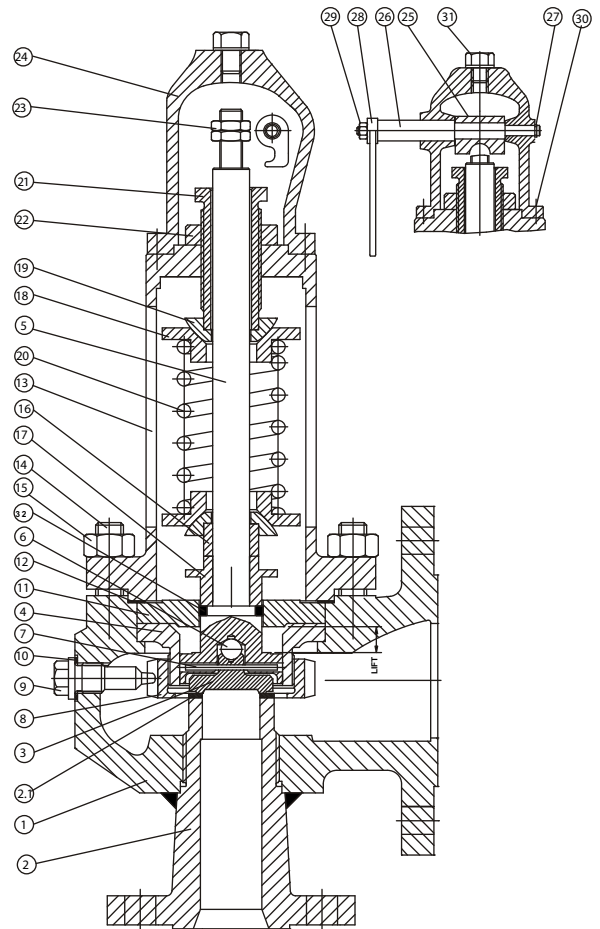
## Salient Features

- Valve nozzle and inlet flanges are integral and of forged material to ensure safe operation at the highest pressure conditions.
- The valve can therefore be offered in inlet flanged to DIN/BS/BS standards without any problem.
- Butt weld end connections at the valve inlet are possible.
- Inlet / Outlet and valve body are deliberately oversized compared to the recommendations of API 526 to provide favourable flow characteristics and to keep flow velocities and dynamic pressure losses low.
- The complete range of Safety Valves are type tested for capacity.
- Stem is precisely guided by a piston which slides in the Guide Bush.
- Piston and Guide Bush provide a large guiding area, which ensures concentric spindle loading and repeatability over extended period of time and numerous operations.
- Precisely wound spring made from chrome vanadium steel is specially designed to eliminate eccentric loading and to provide full relieving capacity.
- Atmospheric cooling of spring and self-compensating thermal design ensures consistent spring compression rate resulting in repeatability of operation at varying temperature conditions.
- All internal parts are made from corrosion resistant authentic materials with balanced thermal expansion coefficients.
- Provision of balanced piston design eliminates the effects of backpressure and achieves low reseal pressure differences (blowdown). This ensures minimal steam wastage.
- All valves are precisely set on pneumatic test bench and are tested for seat leakage as per API 527.

## Dimensions and Weight of Safety Relief Valve

S. NO.	NAME	QTY.	MATERIAL SPEC. 12
1	Body	1	ASTM A 216 WCB
2	Nozzle	1	ASTM A 105
2.1	Seat Zone (Deposition)		Stellite
• 3	Disc	1	ASTM A 276 Gr. 431
4	Guide Bush	1	ASTM A 351 CF8
5	Spindle	1	ASTM A 276 Gr. 410
• 6	Ball	1	SS-304
• 7	Dowel Pin	1	SS-304
8	Blowdown Adj. Ring	1	ASTM A 276 Gr. 304
9	Locking Screw	1	ASTM A 276 Gr. 410
10	Gasket	1	Soft Iron
11	Cover	1	ASTM A 276 Gr. 410
12	Gasket	1	Graphite
13	Bonnet	1	C 22
14	Stud	6	ASTM 193 B7
15	Nut	6	ASTM A 194 2H
16	Spacer	1	ASTM A 276 Gr. 410
17	Protection Ring	1	ASTM A 276 Gr. 410
18	Spring Guide	2	ASTM A 276 Gr. 410
19	Spring Guide Bush	2	ASTM A 276 Gr. 410
• 20	Spring	1	50 CrV4
21	Adj. Bolt	1	ASTM A 276 Gr. 410
22	Lock Nut	1	ASTM A 276 Gr. 410
23	Lock Nut	2	Gr.10
24	Cap	1	S G Iron
25	Cam	1	S G Iron
26	Shaft	1	C 20
27	Circlip	1	SS 304
28	Lever	1	C 20
29	Hexnut	1	Gr.10
30	Allen Bolt	4	Gr.29
31	Plug	1	C 20
32	Carbon Ring	1	Carbon

• **Note: Spare for 2 years service indicated**



## Material Specifications :

### Open Bonnet

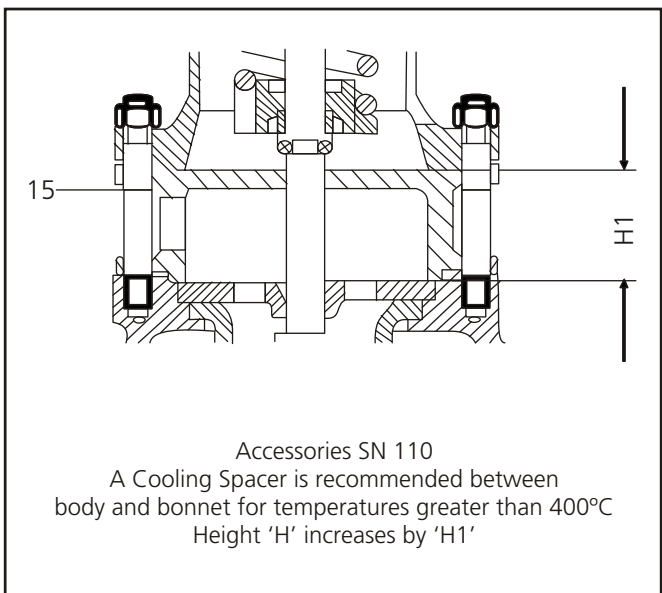
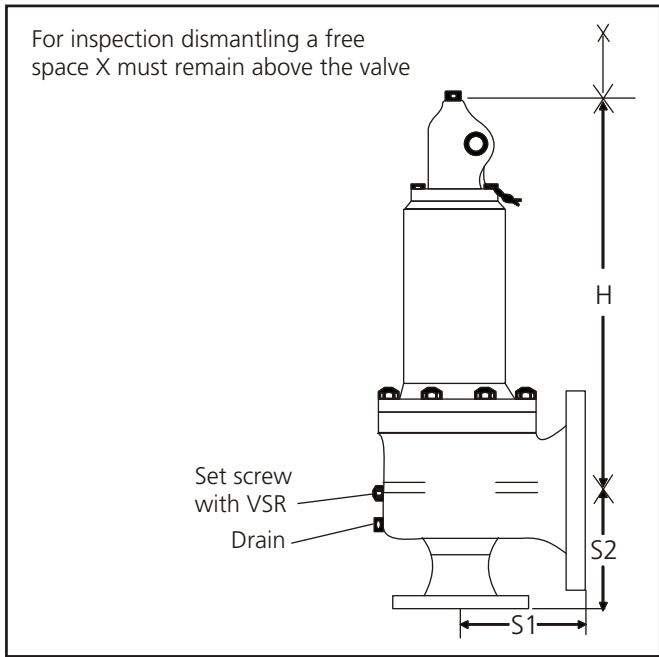
Materials for	Nozzle (*)	Body (*)	Temp. Range °C
Code 12	A105	A216WCB	upto 425
Code 13	A182F22	A217 WC6/ WC9	425 to 550
Code 16	A182 F304/316	A351 CF8	-195 to 300
Code 17	A182F 304/316	A216 WCB	-60 to 400

### Closed Bonnet

Materials for	Nozzle (*)	Body (*)	Temp. Range °C
Code 22	A105	A216WCB	upto 425
Code 23	A182F22	A217WC6/WC9	425 to 550
Code 26	A182 F304/316	A351 CF8/CF8M	-195 to 300
Code 27	A182 F304/316	A216 WCB	-60 to 400

## API 256 Orifice Code Letters, Smallest Flow Diameter (do) & (Ao)

Designation	EA	FA	GA	HA	JA	KA	LA	MA	NA	PA	QA	RA
do (mm)	24.5	24.5	24.5	26.4	33.8	40.4	51.0	59.0	62.0	80.0	99.0	126.0
Ao (mm <sup>2</sup> )	471	471	471	547	897	1282	2043	2734	3019	5027	7699	12467



API 526 - Seat designation and ANSI Flange connections

Inlet (DN) Inch	Orifice Designation	Outlet (DN) Inch	Spring Pressure Group	Set Pressure Kg/cm <sup>2</sup>		S1 Outlet Dimension (mm)		S2 Inlet Dimension (mm)					Dimension H (Approx)	Dimension H1 (Approx)	Weight Kgs (Approx)
				Min	Max	150	300	150	300	600	900	1500			
1	EA	2	I	1.2	46	114		105	105				305	50	10
1		2	II	46	127	114			105	105			305	50	10
1 1/2		2	II	46	127	114				105	105	105	305	50	10
1 1/2		2	III	127	204		114					105	305	50	17
1 1/2	FA	2	I	1.2	46	121		124	124				355	50	10
1 1/2		2	II	46	127	152			124	124	124		355	50	10
1 1/2		2	III	127	204		152					124	355	50	17
1 1/2	GA	2 1/2	I	1.2	32	121		124	124				381	50	17
1 1/2		2 1/2	II	32	91	152			124	124			381	50	30
1 1/2		2 1/2	III	91	143		152			124	124	124	381	50	30
1 1/2	HA	3	I	1.2	32	124		130	130				355	50	30
1 1/2		3	II	32	91	124			130	130			406	50	50
1 1/2		3	III	91	143		162			130	130	130	508	50	72
2		3	I	1.2	32	124		130	130				355	50	30
2	JA	3	II	32	91	124			130	130			406	50	50
2		3	III	91	143		162			130	130	130	508	50	72
2		4	I	1.2	23	142		136	136				457	50	35
2		4	II	23	64	142/171			136	136			457	50	55
2	KA	4	III	64	102	171	181			136	136	136	533	50	80
2 1/2		4	I	1.2	23	142		136	136				457	50	35
2 1/2		4	II	23	64	142/171			136	136			457	50	55
2 1/2	LA	4	III	64	102	171	181			136	136	136	533	50	80
3		4	I	1.2	20	136		156	156				457	50	43
3		4	II	20	57	136			156	156			457	50	60
3	MA	4	III	57	92	181	216			156	156	156	584	50	82
3		6	I	2	16	181		180	180				558	70	65
3		6	II	16	41	181		180	180	180	180	180	711	70	89
3		6	III	41	92	181			180	180	180	180	711	70	101
4	NA	6	I	2	16	181		180	180				588	70	65
4		6	II	16	41	181		180	180	180			711	70	89
4		6	III	41	92	181			180	180	180	180	711	70	101
4	PA	6	I	1.3	12.7	184		178	178				584	70	98
4		6	II	12.7	36.3	184/203		178	178	178			737	70	111
4		6	III	36.3	72.5	222			178	178	197	197	737	70	141
4	QA	6	I	1.3	12.7	209		197	197				584	70	98
4		6	II	12.7	36.3	209		197	197	197			737	70	111
4		6	III	36.3	70.4	222			197	197	197	197	737	70	141
4	RA	6	I	1.1	9	228		181	181				991	110	157
4		6	II	9	26	229		181	181	181			1067	110	167
4		6	III	26	72	254			255	255	255	255	1067	110	195
6	QA	8	I	0.8	8	241		240	240				991	110	208
6		8	II	8	20.4	241		240	240	240			1067	110	216
6		8	III	20.4	42.2	241			240	240	240	240	1067	110	248
6	RA	8	I	0.7	6.4	241		240	240				1016	110	257
6		8	II	6.4	16	241		240	240	240	240		1018	110	268

# Accessories

## Balanced Piston SN 144

The Forbes Marshall Safety Relief Valve VSR1 / VSR2 can be fitted with a Balanced Piston, SN 144, which makes the valve independent of back pressure. Valves with Balanced Piston work in the same way as those with Bellows. The outer diameter of the Balanced Piston corresponds to the average seat diameter of the valve. The gap between the outer diameter of the Piston and the inner diameter of the related bore in the cover is sealed by a gasket which seals effect of atmospheric backpressure. Closing pressure differences of 5% can be obtained with SN 144 accessory.

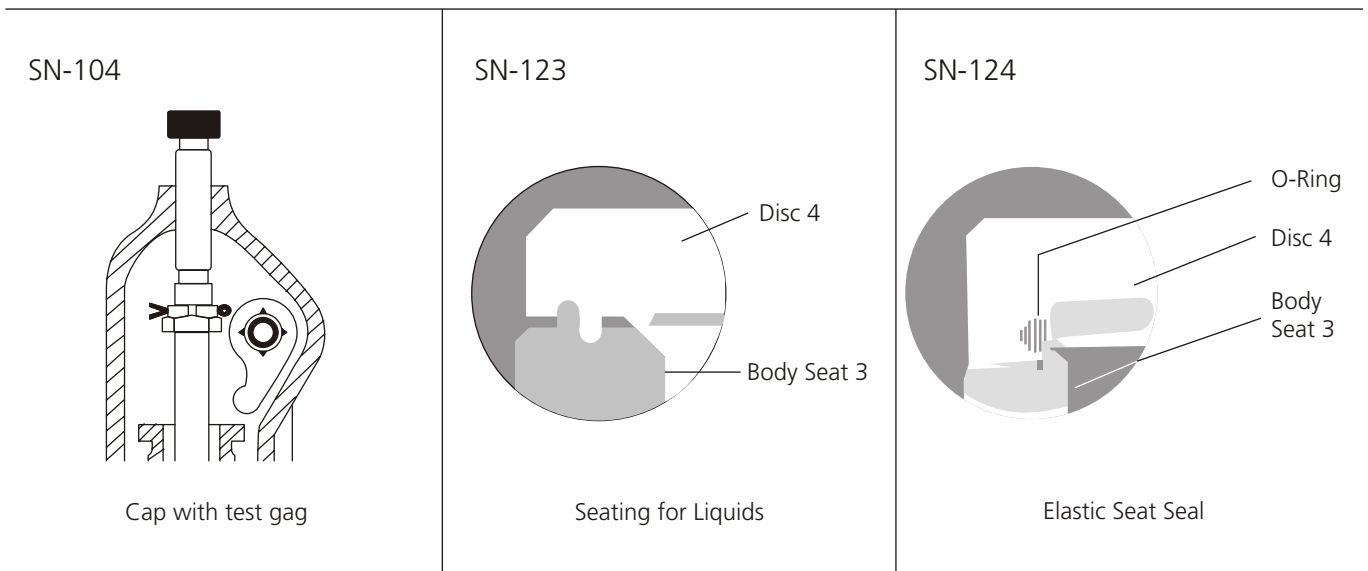
Model VSR series valves can be provided with the following accessories:

- 1) SN 123 – Special Seat for Liquids service – Ideal for use on Liquids services as it helps reduce rapid opening and closing of Disc – also known as chattering.
- 2) SN 124 – Elastic Seat Seal (Used only upto 150° C.) - Ideal for improved leak tightness between valve seat & disc .
- 3) SN 102 – Test Gag – Offered only on request.

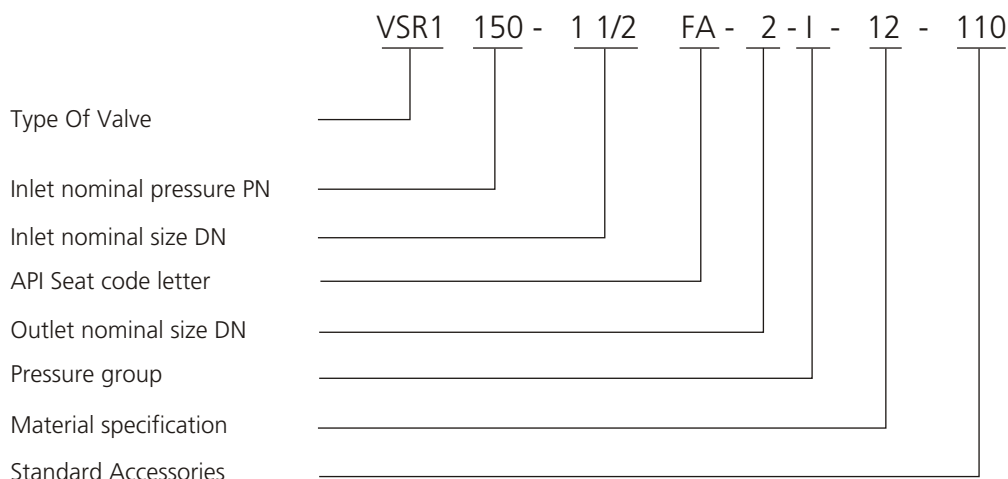
Valves are also available with Test Gag (SN104) as an optional accessory.

Valves can be offered with inlet flange connections as per DIN, JIS, BS standard and with Butt Weld End Connection.

Steam jacketing and Silencers also offered on request.



## Example for Valve Codification



DOC#IG/1209/28/V1.R0

## Ordering Information

- Operating Medium and State of Medium (gaseous or liquid)
- Molecular Weight (gas) / Density (liquid)
- Set, Design and Operating Pressure (Kg/cm<sup>2</sup>, bar)
- Operating Temperature; °C
- Capacity; Kg/hr.
- Material specifications
- Inlet / Outlet Size (Applicable for replacement requirements)
- Applicable accessories

Specifications subject to changes without prior notice



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