

2500 Series Safety Relief Valve

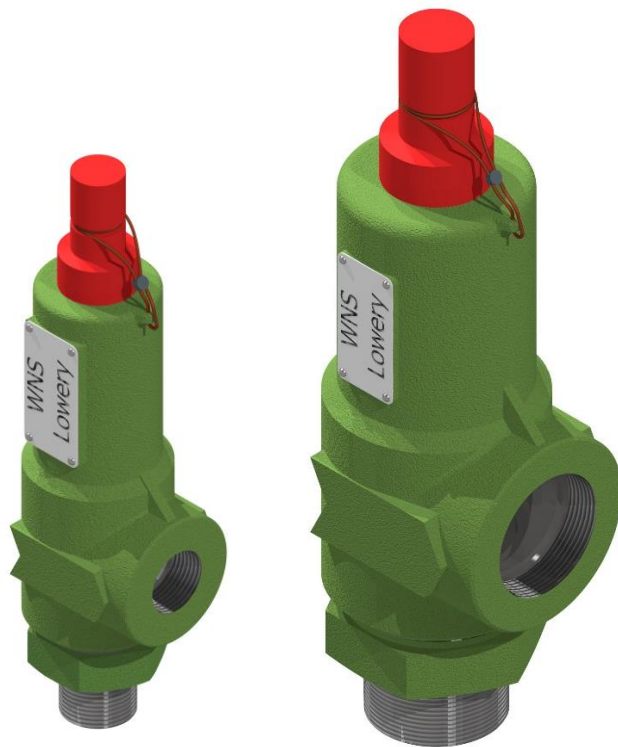
WNS Lowery's 2500 Series Safety Relief Valve (SRV) offers a top-of-the-line economical pressure relief valve. The 2500 SRV is engineered to operate in a variety of general-purpose gas and liquid applications. They are a critical safety device perfect for use on separators, pressure vessels, heater-treaters, compressors, and other oil and gas equipment to prevent the system from exceeding proper working pressures. The 2500 SRV is manufactured and tested in accordance with the ASME Boiler and Pressure Vessel Section VIII. Flow capacities are tested and independently certified by the National Board to ensure proper function and relief capacities. All certified valves are stamped with the symbols "UV" and "NB" to signify they were assembled and tested in accordance to ASME code requirements.

Features:

- Variety of Orifice Sizes
- ASME & NB Coded
- Soft seat trim
- High volume flow
- Low- and high-pressure applications
- Corrosive resistant stainless-steel internals

Applications:

- Pressure Vessels
- Heater-Treaters
- Separators
- Compressors
- Gathering and transmission lines
- Meter Runs



2500 Series Safety Relief Valves





WNS Lowery
 2221 SE 69th St
 Oklahoma City, OK 73149
 (405) 677-7222

Ordering Matrix

2500	↑	↑↑	↑↑	↑	↑	↑↑	↑↑↑↑	↑	↑	↑	Options
	A										Style
	L										Gas Service Only
											Liquid*
											Body Size, Inlet
		05									1/2" (1" Unit)
		75									3/4" (1" Unit)
		10									1" (1" Unit)
		12									1-1/4" (2" Unit)
		15									1-1/2" (2" Unit)
		20									2" (2" Unit)
											Body Size, Outlet
			10								1" (1" Unit)
			20								2" (2" Unit)
											End Connection, Inlet
											MNPT
											End Connection, Outlet
											FNPT
											Materials of Construction (Bonnet/Seat Frame)
											CS (4140) / CS (A105)
											Spring Size
							****				See Chart**
											Seal Material
								V			Viton
											Orifice Size
										C	C = .295" diameter (1" valve only)
										D	D = .400" diameter (1" valve only)
										E	E = .534" diameter (1" or 2" valve)
										F	F = .672" diameter (2" valve only)
										G	G = .857" diameter (2" valve only)
											Options
										0	No Options
										G	Gauge Port
										N	NACE
										3	Gauge Port & NACE

Example:
 1" E orifice Gas Safety Relief Valve set at 720 =
 2500A-1010MF-CC-1000VE0 Set @ 720

Notes:
 *Water 140°F max operating temperature
 **Use the upper end of the spring range, if its < 4 digits add zeros
 (for example, 2" F set @ 50 would be 0200). Always use the largest
 orifice size

Spring Chart:

Orifice	Service	Spring Range - Use higher end of spring range for Model Number					
1"	C Air/Gas	25-80	80-250	250-400	400-800	800-1600	1600-2500
	D Air/Gas & Liquid	25-80	80-250	250-400	400-800	800-1600	1600-2500
	E Air/Gas	-	50-150	150-400	400-700	700-1500	1500-2500
	Liquid	-	50-150	150-300	300-500	500-1000	1000-2500
2"	E Air/Gas & Liquid	15-75	75-250	250-500	500-1200	1200-2500	-
	F Air/Gas	15-40	40-200	200-400	400-800	800-1600	-
	G Air/Gas	-	75-100	100-200	200-600	600-1000	1000-1500
	F Liquid	15-70	70-200	200-400	400-530	530-800	800-1600
	G Liquid	-	75-125	125-250	250-600	600-1000	1000-1500



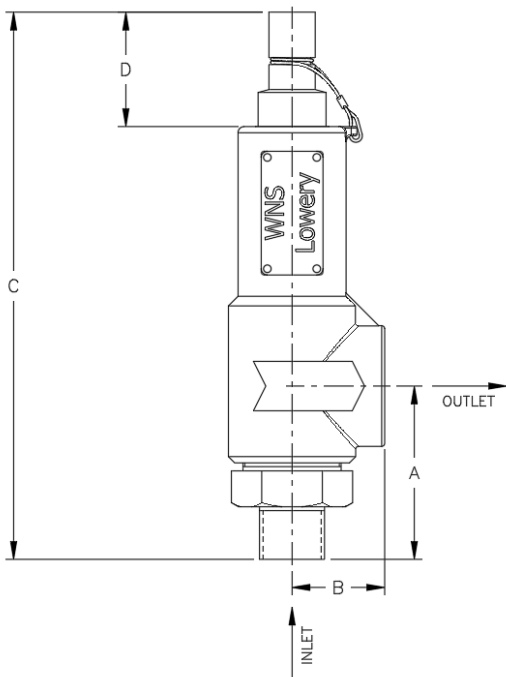
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Specifications

All valves are manufactured and tested in accordance to the ASME Boiler and Pressure Vessel Code Section XIII. The 2500 Series Safety Relief Valve has been independently tested and certified by the National Board. All valves are stamped with the symbols “UV” and “NB” on their nameplates. All valves are tested using calibrated equipment to ensure they will operate to within 3% of the indicated stamped set pressure.

	Orifice Size					
	C	D	E		F	G
Orifice Diameter	0.295 in	0.400 in	0.534 in		0.672 in	0.857 in
Orifice Area	0.068 in ²	0.126 in ²	0.224 in ²		0.355 in ²	0.577 in ²
Inlet Size Options (NPT)	½", ¾", 1"	½", ¾", 1"	½", ¾", 1"	1 ¼", 1 ½" 2"	1 ¼", 1 ½" 2"	1 ¼", 1 ½" 2"
Outlet Size Options (NPT)	1"	1"	1"	2"	2"	2"
Pressure Range	25-2500 PSI	25-2500 PSI	50-2500 PSI	15-2500 PSI	15-1600 PSI	75-1500 PSI
Gas Flow Coefficient (K)	0.850	0.850	0.850		0.850	0.850
Liquid Flow Coefficient (K)	-	0.591	0.591		0.591	0.591

Dimensions



	A	B	C	D	Weight
1" 2500	3.500"	1.875"	11.063"	2.313"	7.5 lb
2" 2500	4.660"	2.563"	13.469"	2.875"	18 lb



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Gas Relieving Capacity

Full open (10% Overpressure) at 60°F

Set Pressure (PSI)	Relief Capacity (SCFM)				
	Orifice Size				
	C 0.295 in	D 0.400 in	E 0.534 in	F 0.672 in	G 0.857 in
15	-	-	-	172	-
20	-	-	-	203	-
25	45	83	-	233	-
30	51	93	-	264	-
40	63	115	-	324	-
50	74	136	243	385	-
60	86	158	282	446	-
70	98	180	320	507	-
75	104	190	339	537	874
80	109	201	358	568	923
90	121	223	397	628	1022
100	133	244	435	689	1121
125	162	298	531	841	1368
150	191	352	627	993	1615
175	221	406	723	1145	1862
200	250	460	819	1297	2109
250	309	567	1011	1601	2604
275	338	621	1107	1753	2851
300	367	675	1203	1905	3098
350	426	783	1395	2209	3592
400	484	890	1587	2513	4087
450	543	998	1779	2817	4581
500	601	1106	1971	3121	5075
550	660	1213	2162	3425	5570
600	719	1321	2354	3729	6064
650	777	1429	2546	4032	6558
700	836	1536	2738	4336	7053
720	859	1579	2815	4458	7250
750	894	1644	2930	4640	7547
800	953	1752	3122	4944	8041
850	1011	1859	3314	5248	8536
900	1070	1967	3506	5552	9030
950	1129	2075	3698	5856	9524

Set Pressure (PSI)	Relief Capacity (SCFM)				
	Orifice Size				
	C 0.295 in	D 0.400 in	E 0.534 in	F 0.672 in	G 0.857 in
1000	1187	2183	3890	6160	10019
1050	1246	2290	4082	6464	10513
1100	1304	2398	4274	6768	11007
1150	1363	2506	4466	7072	11502
1200	1421	2613	4658	7376	11996
1250	1480	2721	4849	7680	12490
1300	1539	2829	5041	7984	12985
1350	1597	2936	5233	8288	13479
1400	1656	3044	5425	8592	13973
1440	1703	3130	5579	8835	14369
1450	1714	3152	5617	8895	14467
1500	1773	3259	5809	9199	14962
1550	1831	3367	6001	9503	-
1600	1890	3475	6193	9807	-
1650	1949	3583	6385	-	-
1700	2007	3690	6577	-	-
1750	2066	3798	6769	-	-
1800	2124	3906	6961	-	-
1850	2183	4013	7153	-	-
1900	2241	4121	7344	-	-
1950	2300	4229	7536	-	-
2000	2359	4336	7728	-	-
2050	2417	4444	7920	-	-
2100	2476	4552	8112	-	-
2150	2534	4659	8304	-	-
2160	2546	4681	8342	-	-
2200	2593	4767	8496	-	-
2250	2651	4875	8688	-	-
2300	2710	4982	8880	-	-
2350	2769	5090	9072	-	-
2400	2827	5198	9264	-	-
2450	2886	5306	9456	-	-
2500	2944	5413	9648	-	-

Sizing:

ASME Boiler and Pressure Vessel Code Appendix 11, Section XIII provides a variety of formulas that calculates the relieving capacity of the Safety Relief Valve in a wide range of applications.

Relieving Capacity Formula Coefficient Method

$$Q = \frac{CKAP}{\rho \times 60} \sqrt{\frac{M}{T}}$$

- A = Discharge Area of Orifice (in²) (d²*3.14/4)
- C = Gas Constant
- K = Flow Coefficient (.850)
- M = Molecular Weight
- P = Flow pressure (psia) (Set Pressure x 1.1 + 14.7 psia)
- Q = Relieving Flow Rate (SCFM)
- T = Absolute Temperature at inlet (R) (°F+460)
- ρ = Density of gas (lb/ft³) (Air = .0764 @ 14.7 psia)

Common Molecular Weight and Gas Constants

Gas	M - Molecular Weight	C - Gas Constant
Air	28.97	356
Acetylene	26.04	345
Ammonia	17.03	351
Butane	58.12	324
Carbon Dioxide	44.01	345
Chlorine	70.91	352
Ethane	30.07	339
Ethylene	28.05	337
Freon 22	86.48	355
Hydrogen	2.02	356
Hydrogen Sulfide	34.08	348
Methane	16.04	346
Methyl Chloride	50.48	337
Natural Gas (0.6)	17.4	344
Nitrogen	28.02	356
Oxygen	32	356
Propane	44.09	331
Sulfur Dioxide	64.06	342



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Liquid Relieving Capacity

Full open (10% Overpressure)

Set Pressure (PSI)	Relief Capacity (GPM)			
	Orifice Size			
	D 0.400 in	E 0.534 in	F 0.672 in	G 0.857 in
15	11	20	32	53
20	13	24	37	61
25	15	26	42	68
30	16	29	46	74
40	19	33	53	86
50	21	37	59	96
60	23	41	65	105
70	25	44	70	114
75	26	46	72	118
80	26	47	75	122
90	28	50	79	129
100	30	53	84	136
125	33	59	93	152
150	36	65	102	166
175	39	70	111	180
200	42	75	118	192
250	47	83	132	215
275	49	87	139	225
300	51	91	145	235
350	55	99	156	254
400	59	106	167	272
450	63	112	177	288
500	66	118	187	304
550	69	124	196	319
600	73	129	205	333
650	75	134	213	346
700	78	140	221	359
720	79	142	224	365
750	81	144	229	372
800	84	149	236	384
850	86	154	244	396
900	89	158	251	408
950	91	163	257	419

Set Pressure (PSI)	Relief Capacity (GPM)			
	Orifice Size			
	D 0.400 in	E 0.534 in	F 0.672 in	G 0.857 in
1000	94	167	264	430
1050	96	171	271	440
1100	98	175	277	451
1150	100	179	283	461
1200	103	183	289	471
1250	105	187	295	480
1300	107	190	301	490
1350	109	194	307	499
1400	111	197	313	508
1440	112	200	317	516
1450	113	201	318	517
1500	115	204	324	-
1550	117	208	329	-
1600	118	211	334	-
1650	120	214	-	-
1700	122	218	-	-
1750	124	221	-	-
1800	126	224	-	-
1850	127	227	-	-
1900	129	230	-	-
1950	131	233	-	-
2000	132	236	-	-
2050	134	239	-	-
2100	136	242	-	-
2150	137	245	-	-
2160	138	245	-	-
2200	139	247	-	-
2250	140	250	-	-
2300	142	253	-	-
2350	143	256	-	-
2400	145	258	-	-
2450	147	261	-	-
2500	148	264	-	-

Sizing:

ASME Boiler and Pressure Vessel Code Appendix 11, Section XIII provides a variety of formulas that calculates the relieving capacity of the Safety Relief Valve in a wide range of applications.

Relieving Capacity Formula Coefficient Method

$$Q = 38KA \sqrt{\frac{P - P_d}{G}}$$

A = Discharge Area of Orifice (in²) (d²*3.14/4)

K = Flow Coefficient (.591)

G = Specific Gravity of Liquid

P = Flow pressure (psia) (Set Pressure x 1.1 + 14.7 psia)

P_d = Down Stream Pressure (psia) (14.7 psia to atmosphere)

Q = Relieving Flow Rate (GPM)

Common Specific Gravities

Liquid	G – Specific Gravity
Ammonia	0.606
Benzene	0.883
Butane	0.558
Carbon Dioxide	0.683
Engine Oil	0.887
Ethanol	0.786
Gasoline	0.752
Glycerin	1.265
Kerosene	0.818
Methanol	0.789
N-Octane	0.695
Propane	0.511
R-12	1.315
R-22	1.195
R-134A	1.211
Water	1.000



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Warning!

WNS Lowery 2500 Series Safety Relief Valves are manufactured and tested for specific applications. All valves should only be used in applications that are appropriate based on the information stamped on the tag. Installation of relief valves outside of the scope of the manufactured specifications can result in personal injury or death, equipment damage, leaking gas or liquid, and/or catastrophic failure.

Installation Instructions

The 2500 SRV should always be installed in the vertical position with the outlet in the horizontal orientation. It is recommended that the system the valve is installed on be cleaned prior to installation to ensure no debris blocks the valve or prevents the unit from reseating.

The Safety Relief Valve should be installed onto the system using the flats on the Seat Frame to tighten the unit in place. Using any other part of the valve to tighten or loosen the Safety Relief Valve can cause the valve to lose its set pressure or malfunction. The 2500 should be installed using proper pipe techniques and follow the guidelines published by the ASME Boiler and Pressure Vessel Code Section VIII paragraph UG-135:

UG-135 Installation

(a) Pressure relief devices intended for relief of compressible fluids shall be connected to the vessel in the vapor space above any contained liquid or to piping connected to the vapor space in the vessel which is to be protected. Pressure relief devices intended for relief of liquids shall be connected below the liquid level. Alternative connection locations are permitted, depending on the potential vessel overpressure scenarios and the type of relief device selected, provided the requirements of UG-125(a)(3) and UG-125(c) are met.

(b) see below

(1) The opening through all pipe, fittings, and nonreclosing pressure relief devices (if installed) between a pressure vessel and its pressure relief valve shall have at least the area of the pressure relief valve inlet. The characteristics of this upstream system shall be such that the pressure drop will not reduce the relieving capacity below that required or adversely affect the proper operation of the pressure relief valve.

(2) The opening in the vessel wall shall be designed to provide unobstructed flow between the vessel and its pressure relief device (see Nonmandatory Appendix M).

(c) When two or more required pressure relief devices are placed on one connection, the inlet internal cross-sectional area of this connection shall be either sized to avoid restricting flow to the pressure relief device or made at least equal to the combined inlet areas of the safety devices connected to it. The flow characteristics of the upstream system shall satisfy the requirements of (b) above. (See Nonmandatory Appendix M).

(d) There shall be no intervening stop valves between the vessel and its pressure relief device or devices, or between the pressure relief devices or devices and the point of discharge, except:

(1) when these stop valves are so constructed or positively controlled that the closing of the maximum number of block valves possible at one time will not reduce the pressure-relieving capacity provided by the unaffected pressure relief devices below the required relieving capacity; or

(2) under conditions set forth in Nonmandatory Appendix M.



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(e) The pressure relief devices on all vessels shall be so installed that their proper functioning will not be hindered by the nature of the vessel's contents.

(f) Discharge lines from pressure relief devices shall be designed to facilitate drainage or shall be fitted with drains to prevent liquid from lodging in the discharge side of the pressure relief device, and such lines shall lead to a safe place of discharge. The size of the discharge lines shall be such that any pressure that may exist or develop will not reduce the relieving capacity of the pressure relief devices below that required to properly protect the vessel or adversely affect the proper operation of the pressure relief devices. [see UG-136(a)(8) and Nonmandatory Appendix M].

Inlet Requirements

Safety Relief Valves should be installed directly onto the vessel or pipeline. If not possible, a minimal amount of piping can be used between the vessel or pipeline and the relief valve. All piping used must be equal to or larger than the inlet pipe size of the relief valve to ensure proper discharge and function of the valve. Reduction in discharge area can result in catastrophic failure.

Outlet Requirements

All outlet piping must be equal to or larger than the relief valve outlet size. Piping that is smaller than the outlet will decrease the relief capacity and can result in catastrophic failure. The 2500 Series valves are designed to relieve to atmospheric pressure only and should never be used in a closed system.

Warning!

All outlet piping should have caps or drains to prevent liquid from collecting in the valve or piping. Excessive liquid or ice blockages can result in a decrease relieving capacity. Care should be taken to ensure that any caps installed do not induce any back pressure on the safety relief valve.

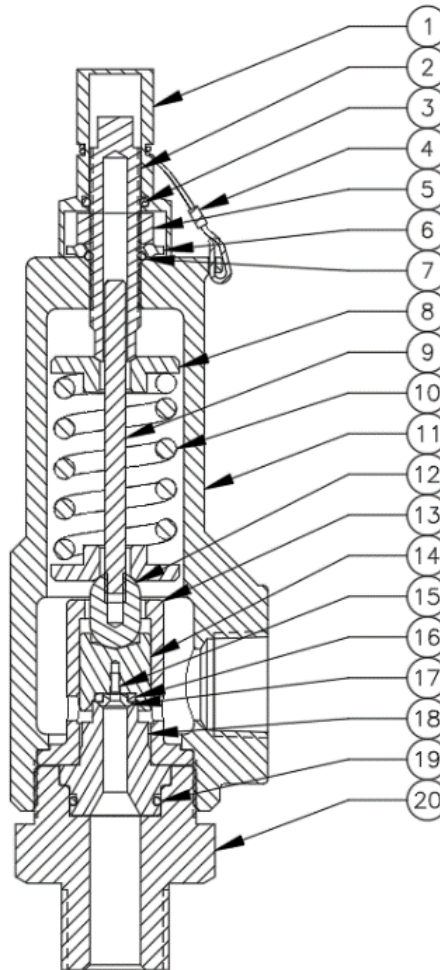
Maintenance

It is recommended that any maintenance work be performed by an approved "VR" commercial valve repair shop. All valves should be inspected annually to ensure the valve is in proper working condition. Any replacement parts must be WNS Lowery supplied parts. After any repairs are made, the valves set pressure must be reset by no more than 10% of the original set pressure as stamped on the nameplate. If the set pressure is changed, it must be indicated on the valve by a new nameplate from the valve repair company.

Parts List

1" Parts List

Item	Description	Part Number
1	Cap	20102
2	Adjustment Screw	21121
3	Cap O-ring	22005
4	Seal Wire	22604
5	Jam Nut	22400
6	Seal Washer	22300
7	Adjustment Screw O-Ring	22004
8	Spring Plate	21120 (x2)
9	Spring Guide Stem	21123
10	Spring	22101
		22102
		22103
		22104
		22105
		22106
11	Bonnet	20030
12	Guide	21122
13	Plug Guide	C&D 20100
		E 20101
14	Plug	C&D 21117
		E 21116
15	Plug Screw	C&D 22501
		E 22502
16	Orifice O-Ring	C&D 22002
		E 22001
17	O-Ring Holder	C&D 21119
		E 21118
18	Seat	C 21115
		D 21114
		E 21113
19	Seat O-Ring	22003
20	Seat Frame	½" 21112
		¾" 21111
		1" 21110
21*	Nameplate	22600
22*	Drive Screw	22602 (x4)



2" Parts List

Item	Description	Part Number
1	Cap	20203
2	Adjustment Screw	21233
3	Cap O-ring	22010
4	Seal Wire	22604
5	Jam Nut	22401
6	Seal Washer	22301
7	Adjustment Screw O-Ring	22009
8	Spring Plate	21232 (x2)
9	Spring Guide Stem	21235
10	Spring	22201
		22202
		22203
		22204
		22205
		22206
11	Bonnet	20040
12	Guide	21122
13	Plug Guide	E 20200
		F 20201
		G 20202
14	Plug	E 21228
		F 21227
		G 21226
15	Plug Screw	E 22502
		F&G 22503
16	Orifice O-Ring	E 22001
		F 22006
		G 22007
17	O-Ring Holder	E 21231
		F 21230
		G 21229
18	Seat	E 21225
		F 21224
		G 21223
19	Seat O-Ring	22008
20	Seat Frame	1 ½" 21222
		1 ½" 21221
		2" 21220
21*	Nameplate	22600
22*	Drive Screw	22602 (x4)

*Not Shown
 Consult Factory for full list of parts

*Not Shown
 Consult Factory for full list of parts

