



Multiport Relief Valve

Advanced Technology for Proven Performance

The use of a Multiport Relief Valve dampens the pressure swings within deaerators, steam lines and associated components. The Multiport Relief Valve dash pot vapor action provides smooth relief of excess steam to the atmosphere. By limiting operating pressure variances within the deaerator, it eliminates the need to restack trays, and provides protection to the trays, boiler feed pumps and other equipment.



Design Advantages

- Controlled steam atmosphere
- Easy set pressure adjustment
- Alloy Steel springs for high temperature and Chrome Vanadium Steel springs for medium and low temperatures
- Body is cast iron for applications to 500 °F and cast steel for 600 °F applications
- Discs are vapor cushion gradual lift non-pop type with replaceable resilient seating surfaces
- Built for long service life, many **COCHRANE**® by **newterra** valves have been in service for fifty years and some for as long as eighty years



COCHRANE
by **newterra**

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Why is the Multiport Relief Valve Better Than a Standard Pop Safety Relief Valve?

As the deaerator operating pressure increases, the deaerated water is heated to a higher temperature. When the deaerator operating pressure returns to normal, there will be flashing taking place in the storage tank and the boiler feed pump suction piping. When this pressure reduction is sudden, the flashed steam carries large quantities of water with it to the deaerator section causing tray upsets (this is the only deaerator operating condition that will upset trays). Further, the flashing that is taking place in the boiler feed pump suction piping causes the pumps to cavitate.

If you are using pop type valves to protect your deaerator from over pressure, you may have satisfied the ASME Code requirements from a safety standpoint, but you have not been able to handle the operational problems involved.

The Multiport Relief Valve is a natural for this type of operation and will go a long way in protecting your trays and boiler feed pumps. *The pop safety valves are usually set at the deaerator vessel design pressure, which translates into two considerations:*

- 1] No pressure control available until vessel design pressure of the unit is reached, which is usually 30 to 50 PSIG, then the valve blows at the relief valve set pressure.
- 2] Allowing the pressure to climb this high will heat the water to a temperature far exceeding the normal boiler feed pump design of 250 °F. Double trouble!

Proven Safety

COCHRANE® by newterra Multiport Relief Valve springs cannot be compressed solid nor can the valve be locked closed by external adjustment. When springs are compressed to a maximum point by handwheel adjustment, the valve discs will open upon overpressure. Operating components are internal to the valve, which precludes tampering.

COCHRANE® by newterra Multiport Relief Valves are designed for maximum safety. The valve and springs are designed for the maximum initial relief pressure indicated on the nameplate. This pressure cannot be exceeded by external adjustment even though the valve is fully adjustable to all pressures within the zero to maximum pressure.

***COCHRANE® by newterra** Multiport Relief Valves are designed for maximum safety. The valve and springs are designed for the maximum initial relief pressure indicated on the nameplate.*

A **COCHRANE® by newterra** Multiport Relief Valve should be installed following every pressure reducing station on all low pressure exhaust steam systems using supplementary reduced live steam. This will provide absolute protection should the reducing valve fail in the open position.

COCHRANE® by newterra Multiport Relief Valves are provided with multiple resilient surfaced vapor cushion discs (*on standard brass trim valves*) which are non-popping, cushion lift, cushion closed and tight reseating. The seating surface, an extremely resilient high temperature thermoplastic material, allows movement yet helps provide a reliable “soft seal” that prevents leaking. Since this piston seat and disc assembly seats without leaking and reseats faster than other types of assemblies, useful steam is never wasted. The net result is a reduction of operating costs by saving steam.

Construction and Specifications

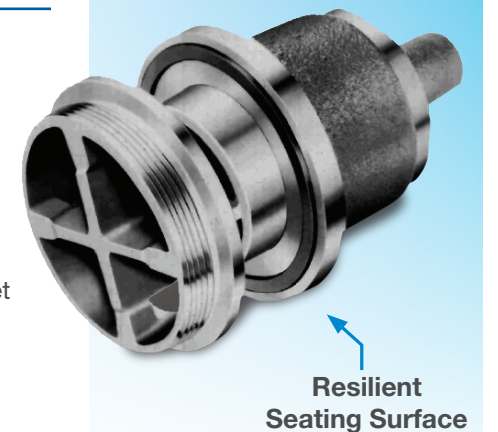
	0-25 PSIG Set Pressure				0-60 PSIG Set Pressure		
Max. Design Temp.	300 °F	350 °F	500 °F	600 °F	350 °F	500 °F	600 °F
Body	Cast Iron	Cast Iron	Cast Iron	Cast Steel	Cast Iron	Cast Iron	Cast Steel
Valve Disc & Piston-Seat Assembly	Bronze	Bronze	St. Steel	St. Steel	Bronze	St. Steel	St. Steel
Main Spindle & Nut Assembly	Bronze	Bronze	St. Steel	St. Steel	St. Steel	St. Steel	St. Steel
Gear Assembly	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Springs	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel
Set Pressure Adjustment Range of Springs Fitted in Valve	0 to 1 PSIG max.				0 to 30 PSIG max.		
	or 0 to 3 1/2 PSIG max.				or 0 to 35 PSIG max.		
	or 0 to 6 PSIG max.				or 0 to 40 PSIG max.		
	or 0 to 10 PSIG max.				or 0 to 45 PSIG max.		
	or 0 to 15 PSIG max.				or 0 to 50 PSIG max.		
	or 0 to 20 PSIG max.				or 0 to 55 PSIG max.		
	or 0 to 25 PSIG max.				or 0 to 60 PSIG max.		

Typical Specification

“One size 12” (vertical upflow, handwheel adjustable) **COCHRANE® by newterra** Multiport Relief Valve. Valve to be of 0-25 PSIG, 350 °F. max. construction. Body to be cast iron with 125# flanges with bronze trim and chrome vanadium steel springs. The springs are designed for 0-15 PSIG pressure range adjustment. When set for initial relief at 15 PSIG, the valve is to be capable of relieving saturated steam to the atmosphere at rates up to 40,000 lbs/hr., with accompanying pressure rise above set pressure up to 4.55 psi max. Normal line operating pressures will be 10 to 15 PSIG, and normal line operating temperatures will be 240 °F. to 250 °F.

Steam Savings & Fast ROI

Based on the volume of steam they save, **COCHRANE® by newterra** Multiport Relief Valves offer an excellent return on investment. Only the excess steam that would cause overpressure is relieved to the atmosphere. Additionally, since the piston and disc assembly both seat without leaking, and reseal faster than other types of assemblies, useful steam is never wasted. It is preserved in the system for maximum efficiency and savings.



Configurations of the Vertical Series Multiport Relief Valves



Figure 1000
0-25 PSIG/350 °F
Handwheel Adjustable



Figure 1002
0-25 PSIG/350 °F
Chainwheel Adjustable

Figure 1000 and 1002 are also available in 0-60 PSIG design, 500 °F and 600 °F designs and combinations of both.



Table 1: For 0-25 PSIG Design Multiport Relief Valves

DISCHARGE CAPACITIES (lbs./hr. saturated steam) of 4" to 16" SIZE VALVES (across from a particular capacity find the max. pressure rise for that capacity.)							Corresponding PRESSURE RISES (psi) above valve max. set pressure of:							DISCHARGE CAPACITIES (lbs./hr. saturated steam) of 18" to 24" SIZE VALVES (across from a particular capacity find the max. pressure rise for that capacity.)		
4"	6"	8"	10"	12"	14"	16"	1 PSIG	3.5 PSIG	5 PSIG	10 PSIG	15 PSIG	20 PSIG	25 PSIG	18"	20"	24"
1,000	1,500	2,500	4,000	5,500	6,500	8,000	.17	.22	.25	.30	.35	.37	.40	9,000	11,000	18,000
1,500	2,500	4,000	6,500	9,000	11,000	12,100	.35	.45	.50	.60	.70	.75	.80	15,000	18,500	30,000
2,000	3,500	6,100	9,000	12,100	16,000	18,000	.52	.67	.75	.90	1.05	1.12	1.20	22,000	26,000	42,000
2,500	4,500	8,000	12,000	16,000	20,500	23,000	.70	.90	1.00	1.20	1.40	1.50	1.60	27,000	34,000	52,000
3,000	5,000	9,500	14,500	19,000	24,000	27,500	.87	1.12	1.25	1.50	1.75	1.87	2.00	33,000	40,000	62,500
3,500	6,000	11,000	17,000	22,000	28,000	32,500	1.05	1.35	1.50	1.80	2.10	2.25	2.40	38,000	47,000	72,000
4,000	7,000	12,500	19,500	25,500	32,000	36,500	1.22	1.57	1.75	2.10	2.45	2.62	2.80	44,000	53,000	80,500
4,400	7,500	14,000	21,000	28,000	35,500	40,000	1.40	1.80	2.00	2.40	2.80	3.00	3.20	49,000	59,500	90,000
4,750	8,000	15,500	23,000	30,500	38,500	45,500	1.57	2.02	2.25	2.70	3.15	3.37	3.60	53,000	65,000	99,000
5,100	8,500	16,750	25,500	33,000	42,000	48,500	1.75	2.25	2.50	3.00	3.50	3.75	4.00	58,000	72,000	109,000
5,400	9,000	18,000	27,000	36,000	45,000	52,000	1.92	2.47	2.75	3.30	3.85	4.12	4.40	62,500	78,000	117,500
5,700	9,500	19,000	28,500	38,500	48,000	56,000	2.10	2.70	3.00	3.60	4.20	4.50	4.80	67,000	84,000	126,000
6,000	10,000	20,000	30,000	40,000	50,500	59,000	2.27	2.92	3.25	3.90	4.55	4.87	5.20	71,000	89,000	134,000
6,250	10,500	21,000	32,000	42,500	53,000	62,500	2.45	3.15	3.50	4.20	4.90	5.25	5.60	75,500	95,000	143,000
6,475	11,000	22,000	33,500	44,500	56,000	66,000	2.62	3.37	3.75	4.50	5.25	5.62	6.00	80,000	100,000	151,000
6,675	11,500	23,000	34,500	46,000	58,500	69,000	2.80	3.60	4.00	4.80	5.60	6.00	6.40	84,000	105,000	159,500
6,800	12,000	23,750	36,000	48,000	61,500	72,500	2.97	3.82	4.25	5.10	5.95	6.37	6.80	88,000	111,000	168,000
6,900	12,500	24,500	37,500	50,000	64,000	75,500	3.15	4.05	4.50	5.40	6.30	6.75	7.20	92,500	116,000	176,500
6,950	13,000	25,250	39,000	51,500	66,000	78,500	3.32	4.27	4.75	5.70	6.65	7.12	7.60	96,500	121,000	184,000
6,975	13,400	26,000	40,000	53,500	69,000	81,500	3.50	4.50	5.00	6.00	7.00	7.50	8.00	101,000	126,500	192,000
7,000	13,700	26,500	41,000	55,000	71,000	84,500	3.67	4.72	5.25	6.30	7.35	7.87	8.40	104,500	131,000	200,000
7,020	14,000	27,000	42,000	57,000	74,000	87,500	3.85	4.95	5.50	6.60	7.70	8.25	8.80	108,500	136,000	210,000
7,035	14,250	27,500	43,000	58,500	75,500	90,500	4.02	5.17	5.75	6.90	8.05	8.62	9.20	112,000	141,000	223,000
7,045	14,500	28,000	44,000	60,000	77,000	93,500	4.20	5.40	6.00	7.20	8.40	9.00	9.60	116,000	146,000	230,000

Table 2: For 0-60 PSIG Design Multiport Relief Valves

DISCHARGE CAPACITIES (lbs./hr. saturated steam) of 18" to 24" SIZE VALVES (across from a particular capacity find the max. pressure rise for that capacity.)							Corresponding PRESSURE RISES (psi) above valve max. set pressure of:				DISCHARGE CAPACITIES (lbs./hr. saturated steam) of 18" to 24" SIZE VALVES (across from a particular capacity find the max. pressure rise for that capacity.)		
4"	6"	8"	10"	12"	14"	16"	30 or 35 PSIG	40 or 45 PSIG	50 or 55 PSIG	60 PSIG	18"	20"	24"
2,000	4,000	6,000	12,000	16,000	20,000	24,000	1	1	1	1	32,000	36,000	53,000
3,000	6,000	12,000	19,000	25,000	31,500	39,000	2	2	2	2	48,000	56,000	84,000
4,500	8,500	17,000	27,000	34,000	42,800	53,000	3	3	3	3	66,000	78,000	112,000
6,000	11,250	19,500	32,000	42,000	54,000	66,000	4	4	4	4	81,000	96,000	141,000
7,000	13,000	24,500	38,300	50,000	63,500	77,500	5	5	5	5	96,000	114,000	168,000
8,000	14,750	28,000	44,500	57,500	73,000	88,000	6	6	6	6	110,000	130,000	192,000
9,000	16,500	31,000	49,300	65,000	81,500	98,000	7	7	7	7	123,500	146,000	216,000
10,000	18,500	34,000	54,000	71,000	90,000	108,000	8	8	8	8	136,000	160,000	237,000
11,000	20,000	37,000	58,300	77,000	98,000	117,500	9	9	9	9	149,000	175,500	258,000
12,000	21,500	40,000	62,500	82,000	106,000	127,000	10	10	10	10	160,000	189,000	279,000
12,750	23,250	42,750	66,000	88,000	113,000	136,000	11	11	11	11	172,000	204,000	297,000
13,500	25,000	45,000	69,500	94,000	120,000	145,000	12	12	12	12	184,000	219,000	316,000
14,250	26,250	47,000	72,800	99,500	126,300	154,000	13	13	13	13	194,000	232,000	335,000
14,900	27,500	49,000	76,000	104,500	132,500	161,000	14	14	14	14	204,000	244,000	353,000
15,500	28,750	50,750	79,000	109,750	138,300	169,000	15	15	15	15	214,000	258,000	370,000
16,000	30,000	53,500	82,000	114,000	144,000	177,000	16	16	16	16	224,000	269,000	388,000
16,400	31,250	55,800	84,800	118,300	150,000	184,500	17	17	17	17	233,500	280,000	407,000
16,800	32,500	58,000	87,500	122,500	156,000	192,000	18	18	18	18	243,000	291,000	424,000
17,150	33,800	60,000	90,300	126,300	162,000	199,000	19	19	19	19	251,500	302,000	442,000
17,450	34,800	61,900	93,000	130,000	164,000	206,000	20	20	20	20	260,000	313,000	459,000
17,725	36,000	63,500	95,600	134,600	170,000	213,000	21	21	21	21	268,000	324,000	474,000
18,000	37,200	65,000	98,000	139,000	176,000	220,000	22	22	22	22	276,000	333,000	492,000
18,400	38,208	66,500	100,000	143,000	181,500	227,000	23	23	23	23	284,000	342,000	506,000
18,740	39,250	68,000	102,000	147,000	187,000	234,000	24	24	24	24	292,000	352,000	522,000
19,040	40,250	69,500	104,000	150,500	192,000	240,500	25	25	25	25	300,000	361,000	537,000
19,280	41,100	71,000	106,000	154,000	197,000	247,000	26	26	26	26	308,000	369,000	552,000
19,480	42,000	72,500	108,000	157,500	201,500	253,500	27	27	27	27	315,500	378,000	565,000
19,640	42,850	74,000	110,000	161,000	206,000	260,000	28	28	28	28	323,000	387,000	580,000
19,760	43,700	75,500	112,000	164,500	211,000	267,000	29	29	29	29	331,000	396,000	594,000
19,860	44,500	77,000	114,000	168,000	216,000	274,000	30	30	30	30	339,000	404,000	608,000
19,940	45,300	78,500	115,800	171,000	220,300	280,000	31	31	31	31	346,000	413,000	624,000
20,000	46,000	80,000	117,500	174,000	224,500	286,000	32	32	32	32	353,000	421,000	636,000

Sizing Example

Determine the design range of the springs, i.e. the maximum set pressure of the springs required, before entering Table 1 or Table 2.

Assume Requirements Indicate:
 Max. discharge capacity 49,000 lbs/hr. saturated steam
 Valve max. set pressure 10 PSIG
 Actual set pressure 10 PSIG
 Max. set pressure rise 5 PSIG

- Arbitrarily try 12" size valve per Table 1. Interpret Table 1 as follows: when discharging saturated steam to atmosphere, a 12" valve has a maximum discharge capacity of:
- 5,500 lbs./hr. with .30 psi max. pressure rise above 10 PSIG actual set pressure. (Line pressure upstream of valve will be 10.30 psi while relieving this capacity.)
- 9,000 lbs./hr. with .60 psi max. pressure rise above 10 PSIG actual set pressure. (Line pressure upstream of valve will be 10.60 psi while relieving this capacity.)

Following the chart for higher capacities:

- 47,334 lbs./hr. with 5.0 psi max pressure rise above 10 PSIG actual set pressure. (Line pressure upstream of valve will be 15 psi while relieving this capacity.)
- 49,000 lbs./hr. with 5.25 psi max. pressure rise above 10 PSIG actual set pressure. (Line pressure upstream of valve will be 15.25 psi while relieving this capacity.)

Note: The last two examples above (47,334 and 49,000 lbs./hr.) show discharge capacities and pressure rises that are obtained by interpolation. Interpolation in this manner is permissible throughout the tables.

Decide to use a 12" valve having 47,334 lbs./hr. max. discharge capacity with 5.00 psi pressure rise or 49,000 lbs./hr. discharge capacity with 5.25 psi pressure rise. Or, decide to use a 14" valve having 49,000 lbs./hr. discharge capacity with 3.72 psi pressure rise. Try various size valves in the same manner until you decide on the most suitable valve for your application. When your steam is superheated, multiply the pressure rises only (not the capacities) by the applicable factor shown in Table 3.

Table 3: For Superheated Steam Multiplier

Deg. Superheat	25	50	75	100	150	200	250	300	350	400
Factor	1.025	1.05	1.055	1.07	1.11	1.14	1.17	1.20	1.20	1.265

When the actual valve set pressure will be less than valve maximum set pressure, multiply the pressures only (not the capacities) by the applicable factor shown in Table 4. (When actual valve set pressure will be less than valve maximum set pressure and steam is superheated, multiply pressure rises only by both this factor and the superheat factor.)

Table 4: Set Point Multiplier

Springs Design	25 PSIG	20 PSIG	15 PSIG	10 PSIG	6 PSIG	3.5 PSIG	1 PSIG
Actual Set Pressure (PSIG)							
25	1.00						
24	1.01						
23	1.03						
22	1.04						
21	1.05						
20	1.07	1.00					
19	1.08	1.03					
18	1.09	1.03					
17	1.11	1.05					
16	1.13	1.06					
15	1.14	1.07	1.00				
14	1.16	1.09	1.02				
13	1.18	1.11	1.04				
12	1.20	1.13	1.06				
11	1.22	1.15	1.08				
10	1.25	1.18	1.10	1.00			
9	1.27	1.20	1.12	1.02			
8	1.30	1.22	1.14	1.04			
7	1.33	1.25	1.16	1.06			
6	1.36	1.28					



Multiport Relief Valve by COCHRANE®

Variable Pressure Adjustment

Every **COCHRANE® by newterra** Multiport Relief Valve has springs that enable you to set pressure over the range of 1 psi to whatever the standard “maximum set pressure” you specify (within 10%). In other words, a valve fitted with 0-25 PSIG spring sets can be set to relieve at any pressure between 1 and approx. 22.5 PSIG. **COCHRANE® by newterra** offers 0-30 PSIG springs for our 0-25 PSIG design valves, for applications that require pressure settings up to approximately 27 PSIG without needing to upgrade to a 0-60 PSIG design valve.

Turning the valve handwheel clockwise lowers the pressure plate and compresses the springs, raising the initial relief pressure. Turning the handwheel counterclockwise reverses the action, lowering the initial relief pressure. A feature of the Multiport Relief Valve is that any desired set pressure is possible over the range of 1 psi to whatever the standard “maximum set pressure” you specify (within 10%).

All sizing data is based on steam relief to atmosphere.



Table 5: COCHRANE® by newterra Multiport Relief Valve Pertinent Data

Deg. Superheat			Multiport Valve Discs			
Dia. (in.)	Area (sq. in.)	No.	Dia. Ea. (in.)	Total Area	Ratio to Pipe Area	Total Periphery
4	12.57	3	2 5/8	16.20	1.28	24.75
6	28.27	3	3 3/4	33.12	1.17	35.34
8	50.57	4	4 3/16	55.08	1.09	52.64
10	78.54	6	4 3/16	82.62	1.05	78.96
12	113.10	5	5 7/8	135.50	1.19	92.30
14	153.94	6	5 7/8	162.60	1.18	110.76
16	201.06	5	7 3/8	213.50	1.17	115.85
18	254.47	6	7 3/8	256.20	1.10	139.02
20	314.16	6	8 1/4	320.76	1.10	155.52
24	452.39	9	8 1/4	481.50	1.13	233.28

Note: Since a disc rise of one-quarter the diameter gives full discharge area, i.e. and outlet opening equal to the disc circle, the comparatively small, light discs in a **COCHRANE® by newterra** Multiport Relief Valve do not rise nearly as high as the large diameter, heavier single disc in an ordinary relief valve. They come to seat with far less velocity impact - not considering the effective vapor cushioning of the Multiport valve and the non-vapor cushioning of an ordinary relief valve. When effective vapor cushioning is taken into consideration the velocity impact margin between the two types of valves widens tremendously. This reflects a tremendous difference in wear and tear of moving parts, especially since velocity impact is distributed over a much greater length of valve seat (total periphery) in the **COCHRANE® by newterra** Multiport Relief Valve.