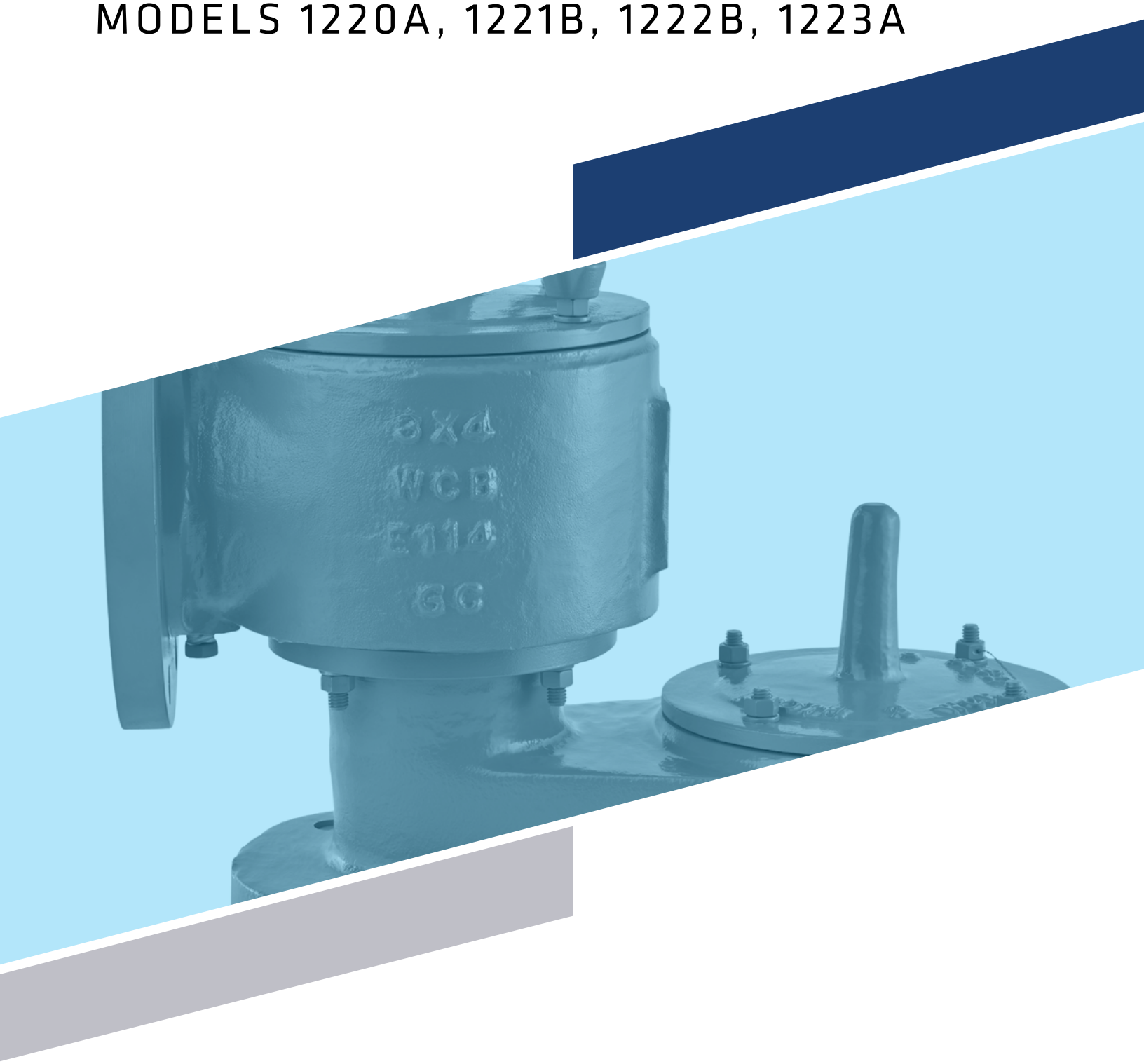
GROTH CORPORATION®

PRESSURE/VACUUM RELIEF VALVES

MODELS 1220A, 1221B, 1222B, 1223A



MODELS 1220A, 1221B, 1222B 1223A

The Groth Models 1220A, 1221B, 1222B, 1223A Pressure/Vacuum Relief Valves are designed to protect your tank from damage created by overpressure or excessive vacuum. Costly product evaporation losses due to normal tank "breathing" are greatly reduced. Because the 1200 Series products retain toxic vapors, atmospheric contamination is minimized which helps to provide increased fire protection and safety.

Technical Details

- Sizes: 2" (DN 50) through 12" (DN 300)
- Pressure Settings: 0.5 oz/in2 to 15 psig (2.15 mbarg to 1.03 barg)
- Vacuum Settings: 0.5 oz/in2 to 12 psig (2.15 mbarg to 506 mbarg)
- Material: Aluminum, Carbon Steel, Stainless Steel, Fiberglass, special materials available upon request

Features

- Modular Construction
- Cushioned air seating
- Superior performing fluoropolymer diaphragms
- Self draining housing body and drip rings
- Peripheral Guiding and center stabilizing system for alignment
- PED and ATEX Certified

Options

- Buna-N, FKM
- Steam Jacket Valve

1220A

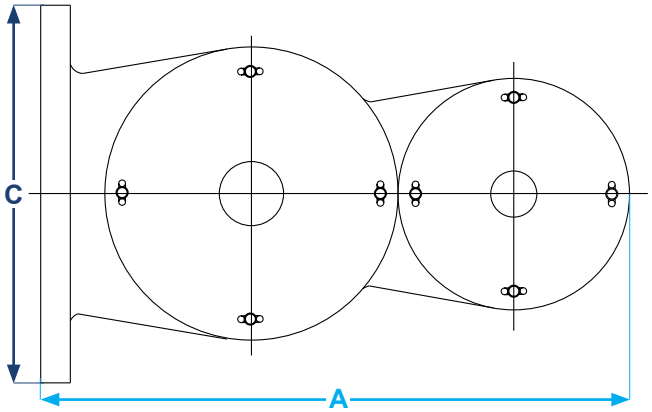
1221B

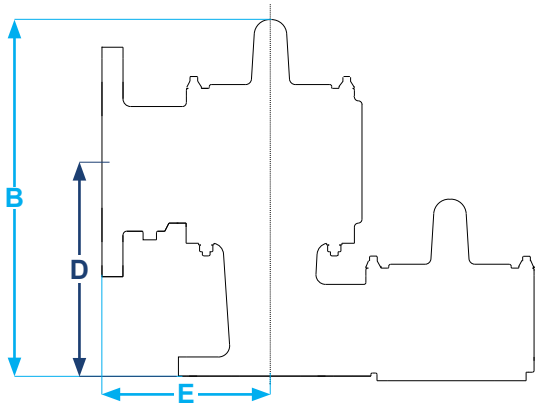
1222B

1223A

SPECIFICATIONS

Inlet Flg◊ In (mm)	Outlet Flg◊ In (mm)	Max. Set Pressure Weight Loaded oz/in² (gm/cm²)	Max. Set Vacuum. Weight Loaded oz/in² (gm/cm²)	Max. Setting Spring Loaded	Min. Setting Weight Loaded	A Length In (mm)	B Height In (mm)	C Width In (mm)	D In (mm)	E In (mm)	Approx. Ship Wt. for Al Lbs (kg)
2 (50)	3 (76)	11 (52.7)	12 (52.7)	15 psig Spring Loaded Pressure (1.05 kg/cm2) 12 psig Spring Loaded Vacuum (0.84 kg/cm2)	*0.5 oz/in2 Weight Loaded (2.20 gm/cm2)	114.25 (362)	12.62 (321)	7.50 (178)	7 (178)	5.50 (140)	16 (7)
3 (80)	4 (102)	12 (57.0)	11 (48.3)			18 (457)	15.12 (384)	9 (229)	8.12 (206)	6 (152)	34 (16)
4 (100)	6 (152)	16 (70.3)	11 (48.3)			19.25 (489)	18.25 (464)	11 (279)	9.50 (241)	6.50 (165)	49 (22)
6 (150)	8 (203)	16 (70.3)	16 (70.3)			26.50 (673)	23.75 (603)	13.5 (343)	12.75 (324)	8.50 (216)	93 (42)
8 (200)	10 (254)	16 (70.3)	16 (70.3)			32.50 (826)	28.50 (724)	16 (406)	15.25 (387)	10.75 (273)	137 (62)
10 (250)	12 (305)	16 (70.3)	16 (70.3)			37.75 (959)	34.50 (876)	19 (483)	18 (457)	12.50 (318)	186 (85)
12 (300)	14 (356)	16 (70.3)	16 (70.3)			42.75 (1086)	39.12 (994)	21 (533)	20.62 (524)	15 (381)	260 (118)





Minimum Vacuum Settings versus Maximum Tank Working Pressure

	Spun Pallet		Stamped Pallet		Machined Pallet	
Size In (mm)	Minimum* Vacuum Setting [oz/in²]	Maximum Tank Pressure [psig]	Minimum Vacuum Setting [oz/in²]	Maximum Tank Pressure [psig]	Minimum Vacuum Setting [oz/in²]	Maximum Tank Pressure [psig]◊
2 (50)	0.50	15	1.2	25	1.9	30
3 (80)	0.50	15	1.2	25	1.8	30
4 (100)	0.50	12	1.0	20	1.5	30
6 (150)	0.50	12	1.3	20	2.4	30
8 (200)	0.50	5	1.3	15	2.2	30
10 (250)	0.50	5	1.2	15	3.2	30
12 (300)	0.50	5	1.1	15	3.1	30

MODEL 1220A/1222B PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F								
Set Pressure (P_s)		Size In (mm)						
InWC	oz/in^2	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
0.87	0.50	6.87	13.3	25.2	52.7	82.6	135	175
1.00	0.58	7.39	14.3	27.1	56.6	88.8	145	188
1.73	1.00	9.71	18.8	35.6	74.3	117	190	247
2.00	1.16	10.4	20.2	38.2	79.8	125	205	265
2.60	1.50	11.9	23.0	43.5	90.8	143	233	302
3.00	1.73	12.8	24.7	46.8	97.5	153	250	324
3.46	2.00	13.7	26.6	50.2	105	164	268	348
4.00	2.31	14.7	28.6	53.9	112	177	288	374
6.00	3.47	18.0	35.0	65.9	137	215	351	456
8.00	4.62	20.7	40.4	75.8	157	248	404	525
10.0	5.78	23.1	45.1	84.6	175	276	450	584
12.0	6.93	25.2	49.4	92.4	191	301	491	638
15.0	8.66	28.1	55.2	103	211	335	546	709
20.0	11.6	32.2	63.7	118	241	383	625	811
25.0	14.4	35.8	71.2	131	267	424	692	898
30.0	17.3	39.0	77.9	143	289	460	751	975

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% overpressure. Read the flow capacity at 100% overpressure directly from the table above. Use linear sted. If the allowable overpressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable overpressure is more than 100%, consult your Groth Representative.

Calculate the percentage overpressure by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OP = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% overpressure according to the following example.

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.48	0.49	0.50
20	0.51	0.52	0.52	0.53	0.54	0.55	0.56	0.56	0.57	0.58
30	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.64	0.64	0.65
40	0.66	0.66	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% overpressure at intersection of row 70 and column 5

"C" factor at 75% OP = 0.87

Example Flow Capacity Calculation

6" Model 1220A	1.Read flow capacity at set pressure from table	Flow = 112,000 SCFH
4 InWC set pressure [P_s]	2.Calculate overpressure	% OP = [(7 - 4)/4] x 100 = 75%
7 InWC flowing pressure [P_f]	3.Read "C" factor from table	"C" = 0.87
	4.Calculate flow capacity	Flow = 0.87 x 112,000 = 97,440 SCFH

MODEL 1220A/1222B PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C								
Set Pressure (P_s)		Size In (mm)						
mmWC	mb	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
22	2.16	0.19	0.37	0.71	1.48	2.33	3.80	4.93
50	4.90	0.29	0.56	1.07	2.23	3.50	5.72	7.42
75	7.35	0.36	0.69	1.31	2.72	4.28	6.99	9.10
100	9.80	0.41	0.80	1.51	3.14	4.93	8.05	10.4
125	12.3	0.46	0.89	1.68	3.50	5.51	8.99	11.7
150	14.7	0.50	0.98	1.84	3.82	6.02	9.80	12.7
175	17.2	0.54	1.06	1.99	4.12	6.49	10.6	13.7
200	19.6	0.58	1.13	2.12	4.39	6.92	11.3	14.7
225	22.1	0.61	1.20	2.25	4.65	7.33	12.0	15.5
250	24.5	0.65	1.26	2.36	4.89	7.71	12.6	16.3
275	27.0	0.68	1.32	2.48	5.11	8.07	13.2	17.1
300	29.4	0.70	1.38	2.58	5.33	8.42	13.7	17.8
375	36.8	0.78	1.54	2.88	5.91	9.40	15.3	19.8
500	49.0	0.90	1.78	3.30	6.75	10.7	17.5	22.7
625	61.3	1.00	1.99	3.67	7.46	11.9	19.4	25.1
750	73.5	1.09	2.18	3.99	8.07	12.9	21.0	27.3

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% overpressure. Read the flow capacity at 100% overpressure directly from the table above. Use linear interpolation if the set pressure is not listed. If the allowable overpressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable overpressure is more than 100%, consult your Groth Representative.

Calculate the percentage overpressure by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OP = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% overpressure according to the following example.

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.48	0.49	0.50
20	0.51	0.52	0.52	0.53	0.54	0.55	0.56	0.56	0.57	0.58
30	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.64	0.64	0.65
40	0.66	0.66	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% overpressure at intersection of row 70 and column 5

"C" factor at 75% OP = 0.87

Example Flow Capacity Calculation

6" Model 1220A	1.Read flow capacity at set pressure from table	Flow = 3,140 NCMH
100 mmWC Set Pressure [P_s]	2.Calculate overpressure	% OP = [(175 - 100)/100] x 100 = 75%
175 mmWC Flowing Pressure [P_f]	3.Read "C" factor from table	"C" = 0.87
	4.Calculate flow capacity	Flow = 0.87 x 3,140 = 2,732 NCMH

MODEL 1220A/1221B VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60° F								
Set Vacuum (P_s)		Size In (mm)						
InWC	oz/in^2	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
0.87	0.50	4.70	10.3	16.0	34.7	60.5	91.1	129
1.00	0.58	5.05	11.0	17.2	37.3	65.0	97.9	138
1.73	1.00	6.63	14.5	22.6	49.0	85.3	129	182
2.00	1.16	7.12	15.6	24.2	52.6	91.6	138	195
2.60	1.50	8.10	17.7	27.6	59.8	104	157	222
3.00	1.73	8.70	19.0	29.6	64.2	112	169	238
3.46	2.00	9.33	20.4	31.8	68.9	120	181	256
4.00	2.31	10.0	21.9	34.1	74.0	129	194	274
6.00	3.47	12.2	26.7	41.5	90.1	157	237	334
8.00	4.62	14.0	30.6	47.7	103	180	272	384
10.0	5.78	15.6	34.0	53.0	115	200	302	427
12.0	6.93	17.0	37.1	57.8	125	218	329	465
15.0	8.66	18.8	41.1	64.0	139	242	365	516
20.0	11.6	21.4	46.8	72.9	158	276	415	587
25.0	14.4	23.6	51.5	80.3	174	304	457	646
30.0	17.3	25.4	55.6	86.6	188	327	493	697

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% over-vacuum. Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. If the allowable over-vacuum is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-vacuum is more than 100%, consult your Groth Representative.

Calculate the percentage over-vacuum by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OV = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% over-vacuum according to the following example.

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.48	0.49	0.50
20	0.51	0.52	0.52	0.53	0.54	0.55	0.56	0.56	0.57	0.58
30	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.64	0.64	0.65
40	0.66	0.66	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% over-vacuum at intersection of row 70 and column 5

"C" factor at 75% OV = 0.87

Example Flow Capacity Calculation

6" Model 1220A	1.Read flow capacity at set vacuum from table	Flow = 74,000 SCFH
4 InWC Set Vacuum [P_s]	2.Calculate over-vacuum	% OV = [(7 - 4)/4] x 100 = 75%
7 InWC Flowing Vacuum [P_f]	3.Read "C" factor from table	"C" = 0.87
	4.Calculate flow capacity	Flow = 0.87 x 74,000 = 64,380 SCFH

MODEL 1220A/1221B VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) 1000 Normal Cubic Meters per Hour at 0° C								
Set Vacuum (P_s)		Size In (mm)						
mmWC	mb	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
22	2.16	0.13	0.29	0.45	0.98	1.71	2.58	3.65
50	4.90	0.20	0.44	0.68	1.48	2.58	3.88	5.48
75	7.35	0.24	0.53	0.83	1.81	3.15	4.74	6.70
100	9.80	0.28	0.62	0.96	2.08	3.62	5.46	7.72
125	12.3	0.31	0.69	1.07	2.32	4.04	6.09	8.60
150	14.7	0.34	0.75	1.17	2.53	4.41	6.65	9.40
175	17.2	0.37	0.81	1.26	2.73	4.75	7.16	10.1
200	19.6	0.39	0.86	1.34	2.91	5.07	7.64	10.8
225	22.1	0.42	0.91	1.42	3.08	5.36	8.08	11.4
250	24.5	0.44	0.96	1.49	3.23	5.64	8.49	12.0
275	27.0	0.46	1.00	1.56	3.38	5.90	8.88	12.6
300	29.4	0.48	1.04	1.62	3.52	6.14	9.25	13.1
375	36.8	0.53	1.16	1.80	3.91	6.81	10.3	14.5
500	49.0	0.60	1.32	2.05	4.45	7.75	11.7	16.5
625	61.3	0.66	1.45	2.26	4.90	8.54	12.9	18.2
750	73.5	0.72	1.57	2.44	5.29	9.22	13.9	19.6

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% over-vacuum. Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. If the allowable over-vacuum is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-vacuum is more than 100%, consult your Groth Representative.

Calculate the percentage over-vacuum by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OV = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% over-vacuum according to the following example.

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.48	0.49	0.50
20	0.51	0.52	0.52	0.53	0.54	0.55	0.56	0.56	0.57	0.58
30	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.64	0.64	0.65
40	0.66	0.66	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% over-vacuum at intersection of row 70 and column 5

"C" factor at 75% OV = 0.87

Example Flow Capacity Calculation

6" Model 1220A	1.Read flow capacity at set vacuum from table	Flow = 2,080 NCMH
100 mmWC Set Vacuum [P_s]	2.Calculate over-vacuum	% OV = [(175 - 100)/100] x 100 = 75%
175 mmWC Flowing Vacuum [P_f]	3.Read "C" factor from table	"C" = 0.87
	4.Calculate flow capacity	Flow = 0.87 x 2,080 = 1,810 NCMH

MODEL 1221B/1223B PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F							
Set Pressure (P_s)	Size In (mm)						
psig	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
1.00	28.0	53.4	92.5	210	345	529	739
2.00	40.3	77.4	134	304	500	767	1070
3.00	50.2	96.9	168	381	625	960	1340
4.00	58.8	114	198	448	736	1130	1577
5.00	66.5	130	225	510	838	1286	1794
6.00	73.7	144	250	568	932	1431	1997
7.00	80.4	158	274	622	1022	1568	2188
8.00	86.7	171	297	674	1107	1699	2371
9.00	92.8	184	319	724	1189	1825	2546
10.0	98.6	196	340	772	1267	1945	2714
11.0	104	208	360	818	1343	2062	2877
12.0	110	219	380	863	1417	2176	3036
13.0	115	231	400	907	1489	2286	3189
14.0	120	241	418	949	1559	2393	3339
15.0	125	252	437	991	1627	2498	3486

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% overpressure. Read the flow capacity at 100% overpressure directly from the table above. Use linear interpolation if the set pressure is not listed. If the allowable overpressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable overpressure is more than 100%, consult your Groth Representative.

Calculate the percentage overpressure by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OP = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% overpressure according to the following example.

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	••• Consult Factory•••									
20	0.27	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.39	0.40
30	0.42	0.43	0.44	0.45	0.47	0.48	0.49	0.50	0.51	0.52
40	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.62
50	0.63	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70	0.71
60	0.72	0.72	0.73	0.74	0.75	0.76	0.76	0.77	0.78	0.79
70	0.80	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.85	0.86
80	0.87	0.87	0.88	0.89	0.90	0.90	0.91	0.92	0.92	0.93
90	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.98	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% overpressure at intersection of row 70 and column 5

"C" factor at 75% OP = 0.83

Example Flow Capacity Calculation

6" Model 1221B	1.Read flow capacity at set pressure from table	Flow = 448,000 SCFH
4 psig Set Pressure [P_s]	2.Calculate overpressure	% OP = [(7 - 4)/4] x 100 = 75%
7 psig Flowing Pressure [P_f]	3.Read "C" factor from table	"C" = 0.83
	4.Calculate flow capacity	Flow = 0.83 x 448,000= 371,840 SCFH

MODEL 1221B/1223B PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C							
Set Pressure (P_s)	Size In (mm)						
barg	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
0.07	0.82	1.57	2.72	6.16	10.1	15.5	21.7
0.10	0.99	1.89	3.28	7.45	12.2	18.8	26.2
0.15	1.23	2.36	4.09	9.28	15.2	23.4	32.6
0.20	1.43	2.76	4.80	10.9	17.9	27.4	38.3
0.25	1.62	3.14	5.44	12.3	20.3	31.1	43.4
0.30	1.79	3.48	6.04	13.7	22.5	34.5	48.2
0.35	1.95	3.81	6.61	15.0	24.6	37.8	52.7
0.40	2.10	4.12	7.14	16.2	26.6	40.9	57.0
0.45	2.25	4.41	7.66	17.4	28.5	43.8	61.1
0.50	2.39	4.70	8.16	18.5	30.4	46.6	65.1
0.55	2.52	4.98	8.64	19.6	32.2	49.4	68.9
0.60	2.65	5.25	9.10	20.6	33.9	52.1	72.6
0.70	2.89	5.76	10.0	22.7	37.2	57.2	79.7
0.80	3.13	6.25	10.8	24.6	40.4	62.1	86.5
0.90	3.35	6.72	11.7	26.5	43.5	66.7	93.1
1.00	3.56	7.18	12.5	28.3	46.4	71.2	99.4

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% overpressure. Read the flow capacity at 100% overpressure directly from the table above. Use linear interpolation if the set pressure is not listed. If the allowable overpressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable overpressure is more than 100%, consult your Groth Representative.

Calculate the percentage overpressure by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OP = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% overpressure according to the following example.

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	••• Consult Factory•••									
20	0.27	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.39	0.40
30	0.42	0.43	0.44	0.45	0.47	0.48	0.49	0.50	0.51	0.52
40	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.62
50	0.63	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70	0.71
60	0.72	0.72	0.73	0.74	0.75	0.76	0.76	0.77	0.78	0.79
70	0.80	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.85	0.86
80	0.87	0.87	0.88	0.89	0.90	0.90	0.91	0.92	0.92	0.93
90	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.98	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% overpressure at intersection of row 70 and column 5

"C" factor at 75% OP = 0.83

Example Flow Capacity Calculation

6" Model 1221B	1.Read flow capacity at set pressure from table	Flow = 16,200 NCMH
0.4 barg Set Pressure [P_s]	2.Calculate overpressure	% OP = [(0.7 - 0.4)/0.4] x 100 = 75%
0.7 barg Flowing Pressure [P_f]	3.Read "C" factor from table	"C" = 0.83
	4.Calculate flow capacity	Flow = 0.83 x 16,200 = 13,446 NCMH

MODEL 1222B/1223B VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60° F							
Set Vacuum (P_s)	Size In (mm)						
psig	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
1.00	13.8	30.5	52.9	120	197	302	422
1.10	14.5	31.9	55.4	126	206	316	442
1.20	15.1	33.2	57.7	131	215	330	460
1.30	15.7	34.5	59.9	136	223	342	478
1.40	16.2	35.7	62.0	141	231	355	495
1.50	16.8	36.9	64.0	145	239	366	511
1.75	18.0	39.6	68.7	156	256	393	548
2.00	19.1	42.0	73.0	166	272	417	582
2.25	20.1	44.3	76.9	174	286	439	613
2.50	21.0	46.3	80.4	183	300	460	641
2.75	21.9	48.2	83.7	190	312	478	667
3.00	22.7	49.9	86.6	197	323	495	691
3.25	23.4	51.4	89.3	203	333	511	713
3.50	24.0	52.8	91.8	208	342	525	732
>3.50	CONSULT FACTORY FOR VACUUM SETTINGS GREATER THAN 3.5 PSIG						

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% over-vacuum. Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set pressure is not listed. If the allowable over-vacuum is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-vacuum is more than 100%, consult your Groth Representative.

Calculate the percentage over-vacuum by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OV = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% over-vacuum according to the following example.

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10	••• Consult Factory•••									
20	0.27	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.39	0.40
30	0.42	0.43	0.44	0.45	0.47	0.48	0.49	0.50	0.51	0.52
40	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.62
50	0.63	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70	0.71
60	0.72	0.72	0.73	0.74	0.75	0.76	0.76	0.77	0.78	0.79
70	0.80	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.85	0.86
80	0.87	0.87	0.88	0.89	0.90	0.90	0.91	0.92	0.92	0.93
90	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.98	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 75% over-vacuum at intersection of row 70 and column 5

"C" factor at 75% OV = 0.83

Example Flow Capacity Calculation

6" Model 1222B	1.Read flow capacity at set vacuum from table	Flow = 166,000 SCFH
2 psig Set Vacuum [P_s]	2.Calculate over-vacuum	% OV = [(3.50 - 2.0)/2.0] x 100 = 75%
3.5 psig Flowing Vacuum [P_f]	3.Read "C" factor from table	"C" = 0.83
	4.Calculate flow capacity	Flow = 0.83 x 166,000 = 137,780 SCFH

MODEL 1222B/1223B VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) 1000 Normal Cubic Meters per Hour at 0° C							
Set Vacuum (P_s)	Size In (mm)						
barg	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)
0.07	0.41	0.90	1.55	3.52	5.77	8.87	12.4
0.10	0.48	1.06	1.83	4.16	6.83	10.5	14.6
0.11	0.51	1.11	1.92	4.35	7.14	11.0	15.3
0.12	0.53	1.15	1.99	4.53	7.43	11.4	15.9
0.13	0.55	1.20	2.07	4.69	7.70	11.8	16.5
0.14	0.56	1.24	2.14	4.85	7.96	12.2	17.1
0.15	0.58	1.27	2.20	5.00	8.21	12.6	17.6
0.16	0.60	1.31	2.27	5.14	8.44	13.0	18.1
0.17	0.61	1.35	2.33	5.28	8.66	13.3	18.6
0.18	0.63	1.38	2.38	5.41	8.88	13.6	19.0
0.19	0.64	1.41	2.44	5.53	9.08	13.9	19.4
0.20	0.66	1.44	2.49	5.65	9.27	14.2	19.8
0.22	0.68	1.49	2.58	5.86	9.62	14.8	20.6
0.24	0.70	1.54	2.67	6.05	9.93	15.2	21.3
>0.24	CONSULT FACTORY FOR VACUUM SETTINGS GREATER THAN 0.24 BARG						

Flow Capacity Calculation
Flow capacity values listed above are based on full open valves at 100% over-vacuum. Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set pressure is not listed. If the allowable over-vacuum is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-vacuum is more than 100%, consult your Groth Representative.

Calculate the percentage over-vacuum by the following formula. Note that all pressures are gauge pressure expressed in the same units of measure.

Pf = Flowing pressure
Ps = Set pressure
% OV = [(Pf - Ps)/Ps] x 100

Calculate flow capacity at less than 100% over-vacuum according to the following example.

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	••• Consult Factory •••									
20	0.27	0.29	0.30	0.32	0.33	0.35	0.36	0.38	0.39	0.40
30	0.42	0.43	0.44	0.45	0.47	0.48	0.49	0.50	0.51	0.52
40	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60	0.61	0.62
50	0.63	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70	0.71
60	0.72	0.72	0.73	0.74	0.75	0.76	0.76	0.77	0.78	0.79
70	0.80	0.80	0.81	0.82	0.82	0.83	0.84	0.85	0.85	0.86
80	0.87	0.87	0.88	0.89	0.90	0.90	0.91	0.92	0.92	0.93
90	0.94	0.94	0.95	0.96	0.96	0.97	0.97	0.98	0.99	1.00

Example to find "C" factor from table:
Read "C" factor for 72% over-vacuum at intersection of row 40 and column 2

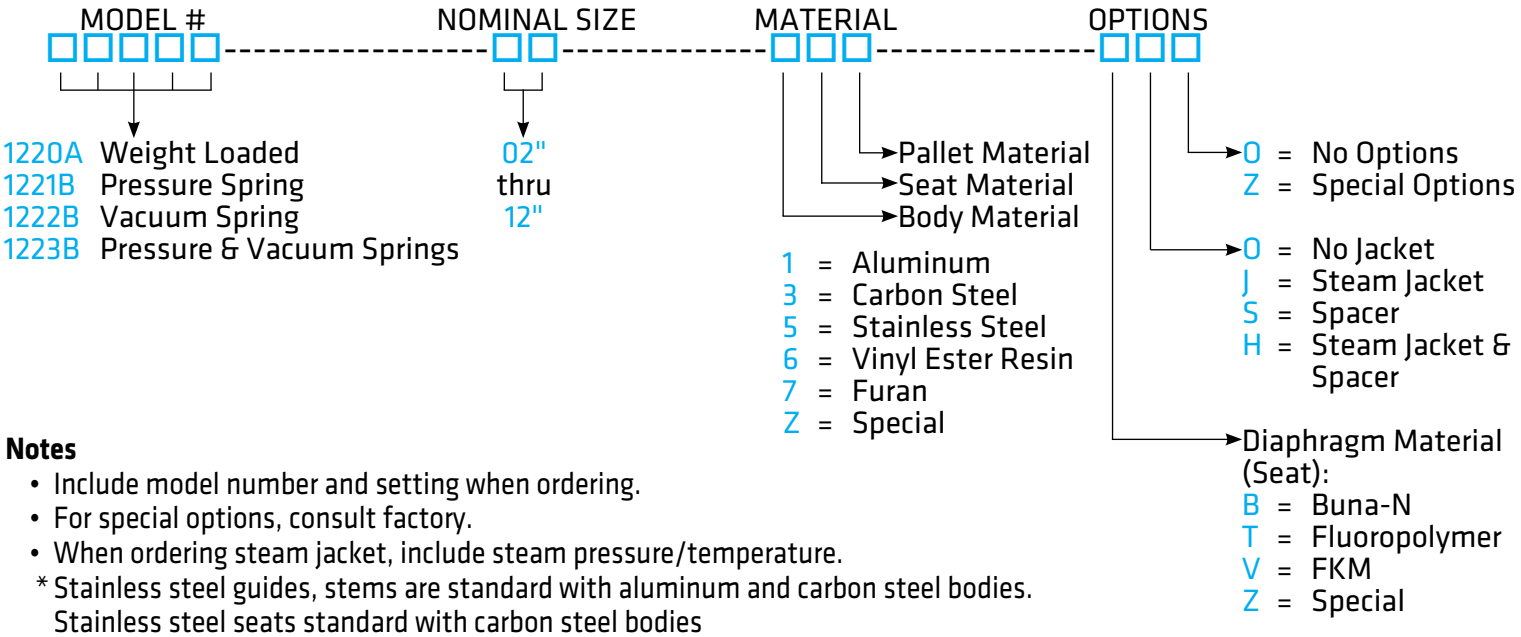
"C" factor at 42% OV = 0.55

Example Flow Capacity Calculation

6" Model 1222B	1.Read flow capacity at set vacuum from table	Flow = 4,530 NCMH
0.12 barg Set Vacuum [P_s]	2.Calculate over-vacuum	% OV = [(0.17 - 0.12)/0.12] x 100 = 42%
0.17 barg Flowing Vacuum [P_f]	3.Read "C" factor from table	"C" = 0.55
	4.Calculate flow capacity	Flow = 0.55 x 4,530 = 2,491 NCMH

HOW TO ORDER

For easy ordering, select proper model numbers



Notes

- Include model number and setting when ordering.
- For special options, consult factory.
- When ordering steam jacket, include steam pressure/temperature.

* Stainless steel guides, stems are standard with aluminum and carbon steel bodies. Stainless steel seats standard with carbon steel bodies

Example

1	2	2	0	A	–	0	2	–	1	1	5	–	T	0	0

Indicates a 2" Model 1220A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

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