

# VALVES

& TANK EQUIPMENT



SAFETY PRODUCTS THAT PROTECT EQUIPMENT, LIVES & THE ENVIRONMENT



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## ADDITIONAL GROTH PRODUCTS

Please see our other Groth Datasheets for additional product lines:



# MODEL 1200A

- Sizes // 2" through 12"
- Pressure settings // 0.5 oz/in<sup>2</sup> to 15 psig
- Vacuum settings // 0.5 oz/in<sup>2</sup> to 12 psig
- Available in aluminum, carbon steel, stainless steel, fiberglass and other materials
- Modular construction

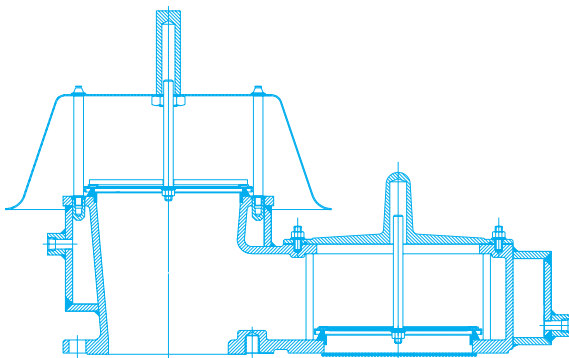


## PRESSURE/VACUUM RELIEF VALVE

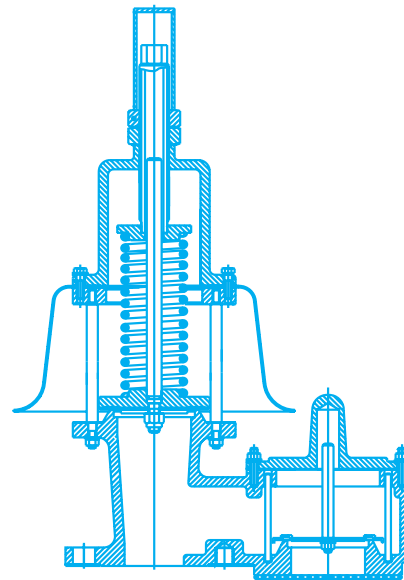
Model 1200A is designed to protect your tank from damage created by overpressure or excessive vacuum. Costly product evaporation losses due to normal tank “breathing” are greatly reduced. Because the Model 1200A retains toxic vapors, atmospheric contamination is minimized. This helps to provide increased fire protection and safety.

## SPECIAL FEATURES

Model 1200A offers Groth’s special “cushioned air” seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1200A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids dangerous pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, FKM and other seating diaphragms can be provided when required. To insure the proper alignment of seating surfaces, there is peripheral guiding and a center stabilizing system.

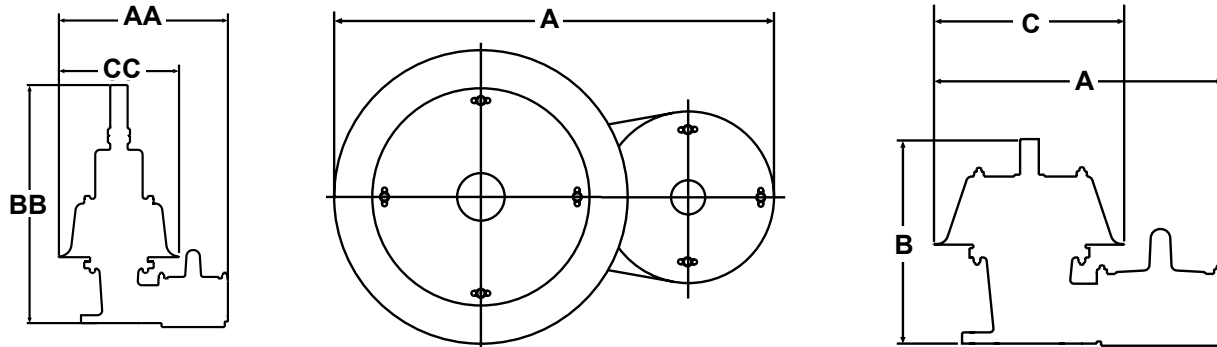


**MODEL 1200A**



**MODEL 1201B**

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

Inlet Flg <sup>o</sup> (Metric)	Max. Set Pressure Weight Loaded	Max. Set Vacuum Weight Loaded	Max. Setting Spring Loaded	Min. Setting Weight Loaded	Max. W.P. <sup>†</sup> for Min. Vacuum Setting	Min. Vac. Setting for Max. W.P. <sup>†</sup>	A Length (Metric)	B Height (Metric)	C Width (Metric)	AA Length (Metric)	BB Height (Metric)	CC Width (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)		12 oz/in <sup>2</sup> (52.7 gm/cm <sup>2</sup> )					13.63" (346 mm)	14" (355 mm)	9.50" (241 mm)	13.37" (340 mm)	19.87" (505 mm)	9.50" (241 mm)	16 (7 kg)
3" (80 mm)		11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )					18" (457 mm)	15" (381 mm)	11.50" (292 mm)	18.37" (467 mm)	22.75" (578 mm)	13" (330 mm)	21 (9 kg)
4" (100 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )	15 psig SPRING LOADED PRESSURE (1.05 kg/cm <sup>2</sup> ) 12 psig SPRING LOADED VACUUM (0.84 kg/cm <sup>2</sup> )	*0.5 oz/in <sup>2</sup> WEIGHT LOADED (2.20 gm/cm <sup>2</sup> )	See TPD for Vacuum Settings and MAWP		19.75" (502 mm)	17.50" (444 mm)	13" (330 mm)	19.50" (495 mm)	27.50" (699 mm)	13" (330 mm)	31 (14 kg)
6" (150 mm)		16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					27.75" (704 mm)	22.25" (565 mm)	19" (483 mm)	27.75" (705 mm)	37.75" (959 mm)	19.50" (495 mm)	57 (26 kg)
8" (200 mm)		16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					33.88" (860 mm)	27.50" (699 mm)	23.63" (600 mm)	33.62" (854 mm)	44.50" (1130 mm)	23.50" (597 mm)	75 (34 kg)
10" (250 mm)		16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					40.88" (1038 mm)	28.88" (733 mm)	30.75" (781 mm)	38" (965 mm)	53" (1346 mm)	25.50" (648 mm)	116 (53 kg)
12" (300 mm)		16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					46" (1168 mm)	32.88" (835 mm)	36" (914 mm)	40.50" (1029 mm)	55.62" (1413 mm)	25.50" (648 mm)	157 (71 kg)

<sup>†</sup> W.P. = Working Pressure. // <sup>o</sup> On spring loaded valves, change model number.

<sup>o</sup> 150# ANSI drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

Fiberglass dimensions on request. 16 oz/in<sup>2</sup> set with spacer. SS set weights-consult factory. \*Some sizes require non-ferrous components to achieve 0.5 oz/in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> </div>	02" Thru 12"	1 = Aluminum 3 = Carbon Steel 5 = Stainless Steel 6 = Vinyl Ester Resin 7 = Furan Z = Special	O = No Options Z = Special Options  O = No Jacket J = Steam Jacket S = Spacer H = Steam Jacket & Spacer  Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM Z = Special
1200A Weight Loaded 1201B Pressure Spring 1202B Vacuum Spring 1203A Pressure & Vacuum Springs		Pallet Material Seat Material Body Material	

**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 0 0 A — 0 2 — 1 1 5 — T O O

Indicates a 2" Model 1200A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

# MODEL 1200A/1202B // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)								
1000 Standard Cubic Feet per Hour at 60° F								
Set Pressure (P <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
0.87	0.50	7.65	16.2	28.9	61.9	108	174	217
1.00	0.58	8.22	17.4	31.1	66.5	116	187	233
1.73	1.00	10.8	22.8	40.8	87.2	152	246	305
2.00	1.16	11.6	24.5	43.8	93.7	164	264	328
2.60	1.50	13.2	27.8	49.8	106	186	300	373
3.00	1.73	14.1	29.9	53.4	114	200	322	400
3.46	2.00	15.2	32.0	57.3	123	214	345	429
4.00	2.31	16.3	34.4	61.5	131	230	371	460
6.00	3.47	19.8	41.8	74.7	160	279	450	560
8.00	4.62	22.7	47.9	85.7	183	320	516	641
10.0	5.78	25.1	53.1	95.1	203	355	573	712
12.0	6.93	27.3	57.8	103	221	386	623	774
15.0	8.66	30.2	63.9	114	244	427	689	856
20.0	11.6	34.3	72.5	130	277	485	781	971
25.0	14.4	37.7	79.6	142	305	532	859	1067
30.0	17.3	40.6	85.7	153	328	573	925	1149

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1200A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 131,000 SCFH  
 $\% \text{ OP} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 131,000 = 113,970 SCFH**

# MODEL 1200A/1202B // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)								
1000 Normal Cubic Meters per Hour at 0° C								
Set Pressure (P <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
22	2.16	0.22	0.46	0.82	1.74	3.05	4.91	6.11
50	4.90	0.32	0.68	1.22	2.62	4.58	7.38	9.17
75	7.35	0.40	0.83	1.49	3.19	5.58	9.00	11.2
100	9.80	0.45	0.96	1.72	3.67	6.42	10.4	12.9
125	12.3	0.51	1.07	1.91	4.09	7.15	11.5	14.3
150	14.7	0.55	1.17	2.09	4.47	7.81	12.6	15.6
175	17.2	0.59	1.26	2.25	4.81	8.4	13.5	16.8
200	19.6	0.63	1.34	2.39	5.12	8.95	14.4	17.9
225	22.1	0.67	1.41	2.53	5.41	9.46	15.3	18.9
250	24.5	0.70	1.49	2.66	5.68	9.93	16.0	19.9
275	27.0	0.73	1.55	2.78	5.94	10.4	16.7	20.8
300	29.4	0.76	1.62	2.89	6.18	10.8	17.4	21.6
375	36.8	0.85	1.79	3.20	6.84	12.0	19.3	23.9
500	49.0	0.96	2.03	3.63	7.76	13.6	21.9	27.2
625	61.3	1.05	2.23	3.99	8.52	14.9	24.0	29.9
750	73.5	1.14	2.40	4.29	9.18	16.1	25.9	32.2

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1200A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 3,670 NCMH  
 $\% \text{ OP} = [(175 - 100) / 100] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 3,670 = 3,193 NCMH**

# MODEL 1200A/1201B // 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 <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1200A
- 4 InWC Set Vacuum [P<sub>s</sub>]
- 7 InWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 74,000 SCFH  
 $\% \text{OV} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 74,000 = 64,380 SCFH**



# MODEL 1200A/1201B // 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 <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1200A
- 100 mmWC Set Vacuum [P<sub>s</sub>]
- 175 mmWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 2,080 \text{ NCMH}$$

$$\% \text{OV} = [(175 - 100) / 100] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 2,080 = 1,810 \text{ NCMH}$$



# MODEL 1201B/1203A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)							
1000 Standard Cubic Feet per Hour at 60° F							
Set Pressure (P <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1201B
- 4 psig Set Pressure [P<sub>s</sub>]
- 7 psig Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 448,000 SCFH  
 % OP = [(7 - 4)/4] x 100 = 75%  
 "C" = 0.83  
**Flow = 0.83 x 448,000 = 371,840 SCFH**

# MODEL 1201B/1203A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)							
1000 Normal Cubic Meters per Hour at 0° C							
Set Pressure (P <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1201B
- 0.4 barg Set Pressure [P<sub>s</sub>]
- 0.7 barg Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 16,200 \text{ NCMH}$$

$$\% \text{ OP} = [(0.7 - 0.4) / 0.4] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 16,200 = 13,446 \text{ NCMH}$$

# MODEL 1202B/1203A // 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 <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1202B
- 2 psig Set Vacuum [P<sub>s</sub>]
- 3.5 psig Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 166,000 \text{ SCFH}$$

$$\% \text{ OV} = [(3.50 - 2.0) / 2.0] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 166,000 = 137,780 \text{ SCFH}$$

# MODEL 1202B/1203A // 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 <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

6" Model 1202B

0.12 barg Set Vacuum [P<sub>s</sub>]

0.17 barg Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 4,530 NCMH

% OV = [(0.17 - 0.12) / 0.12] x 100 = 42%  
"C" = 0.55

Flow = 0.55 x 4,530 = 2,492 NCMH

- Sizes // 2" (DN 50) through 12" (DN 300) flange sizes
- Available in aluminum, carbon steel, stainless steel
- Stable full lift at 10% overpressure
- Modulating action
- Near zero blowdown (reseats near set pressure)
- Ability to achieve set pressure/vacuum very close to tank maximum allowable working pressure/vacuum



### FULL LIFT PRESSURE/VACUUM RELIEF VALVE

The most notable advantage of the Groth Full Lift Type Valve Compared to Standard Pressure/Vacuum Relief Valves is its' ability to open at 10% overpressure while standard Pressure/Vacuum Relief Valves achieve full open capacity at 100% overpressure. The use of a Full Lift Type Valve allows the user to select the valve set pressure (vacuum) within 10% of the tank Maximum Allowable Working Pressure (vacuum). This is important because operation near the tank design pressure greatly reduces the breathing losses of the product in the tank.

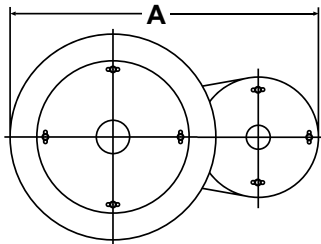
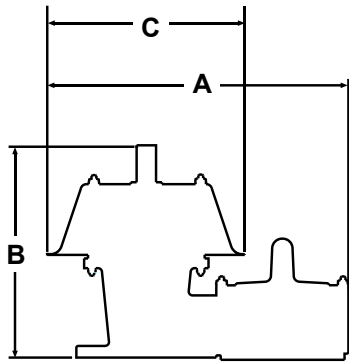
### WHAT IS A FULL LIFT TYPE VALVE?

A Full Lift Type Valve is a relief valve which attains full stable lift at only 10% overpressure. Like all Groth Pressure/Vacuum Relief Valves, the Full Lift Type Valve is a modulating valve which offers near zero blowdown, meaning it reseats near set pressure. These performance capabilities are possible due to the harmonization of the nozzle, seating, and pallet areas such that the valve will achieve stable lift at only 10% above the set pressure/vacuum.

### BENEFITS

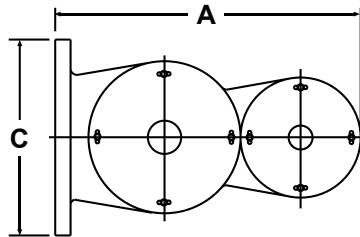
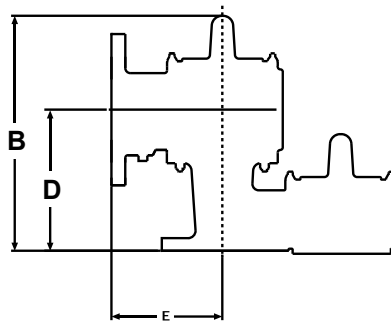
- Ability to operate process closer to Tank MAWP, increasing operating range of process
- Minimal seat leakage to prevent fugitive emission and conserve tank product
- Narrow valve operating range (from seal to full open) maximizes tank operating range and reduces total vapor emissions
- Stable lift ensures that the venting requirements of the process are reliably met
- Reduced seat leakage, low overpressure, and near zero blowdown characteristics to allow for process maintenance, minimal product loss and better tank corrosion maintenance

# MODEL 1800



Inlet Flg	A Length	B Height	C Width
2"	13.625"	13"	9.5"
50 mm	346 mm	330 mm	241 mm
3"	18"	13.625"	11.5"
30 mm	457 mm	346 mm	292 mm
4"	19.75"	15.875"	13"
100 mm	503 mm	403 mm	130 mm
6"	27.75"	22.25"	19"
150 mm	704 mm	565 mm	482 mm
8"	33.875"	26.375"	23.625"
200 mm	860 mm	669 mm	600 mm
10"	48.875"	28.875"	30.75"
250 mm	1038 mm	733 mm	781 mm
12"	46"	32.875"	36"
300 mm	1165 mm	835 mm	914 mm

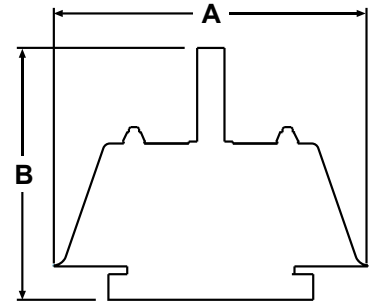
# MODEL 1820



Inlet Flg	A Length	B Height	C Width
2"	14.25"	12.625"	7.5"
50 mm	361 mm	320 mm	191 mm
3"	18"	15.125"	9"
30 mm	457 mm	384 mm	229 mm
4"	19.25"	18.25"	11"
100 mm	489 mm	463 mm	279 mm
6"	26.25"	23.75"	13.5"
150 mm	673 mm	603 mm	343 mm
8"	32.5"	28.5"	16"
200 mm	826 mm	723 mm	406 mm
10"	37.75"	34.25"	19"
250 mm	959 mm	876 mm	483 mm
12"	42.75"	39.125"	21"
300 mm	1086 mm	993 mm	533 mm

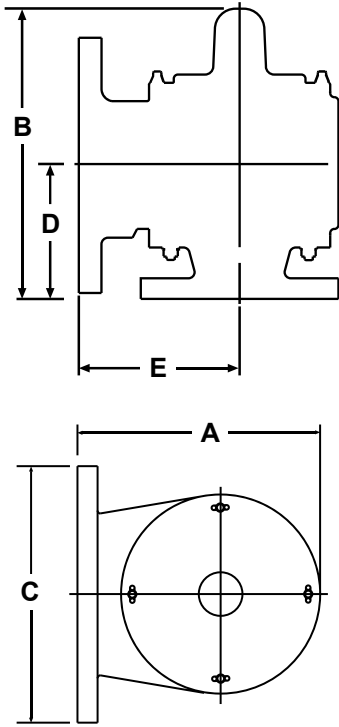
Inlet Flg	D	E
2"	7"	5.5"
50 mm	178 mm	140 mm
3"	8.125"	6"
30 mm	206 mm	152 mm
4"	9.5"	6.5"
100 mm	241 mm	165 mm
6"	12.75"	8.5"
150 mm	324 mm	216 mm
8"	15.25"	10.75"
200 mm	387 mm	273 mm
10"	18"	12.5"
250 mm	457 mm	318 mm
12"	20.625"	15"
300 mm	524 mm	381 mm

# MODEL 1830



Inlet Flg	A Diameter	B Height
2"	9.5"	6.625"
50 mm	241 mm	168 mm
3"	11.5"	8.625"
30 mm	292 mm	219 mm
4"	13"	10.5625"
100 mm	330 mm	268 mm
6"	19"	15"
150 mm	482 mm	381 mm
8"	23.625"	16.625"
200 mm	600 mm	422 mm
10"	30.75"	17"
250 mm	781 mm	431 mm
12"	36"	18"
300 mm	914 mm	457 mm

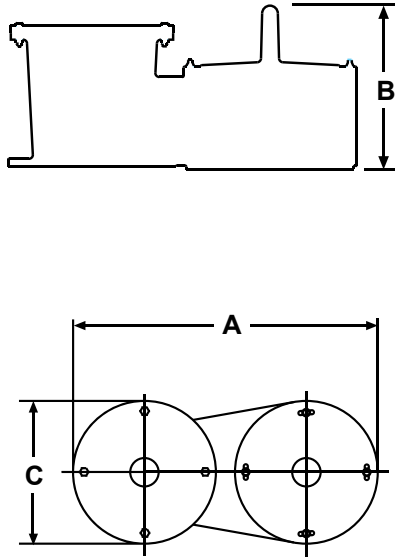
# MODEL 1860



Inlet Flg	A Length	B Height	C Width
2"	8.625"	9.375"	7.5"
50 mm	219 mm	238 mm	191 mm
3"	10"	11.125"	9"
30 mm	254 mm	282 mm	229 mm
4"	11"	13.875"	11"
100 mm	279 mm	352 mm	279 mm
6"	14.5"	17.375"	13.5"
150 mm	368 mm	441 mm	343 mm
8"	18"	21.25"	16"
200 mm	457 mm	539 mm	406 mm
10"	20.75"	23.625"	19"
250 mm	527 mm	600 mm	483 mm
12"	24.75"	26.625"	21"
300 mm	629 mm	676 mm	533 mm

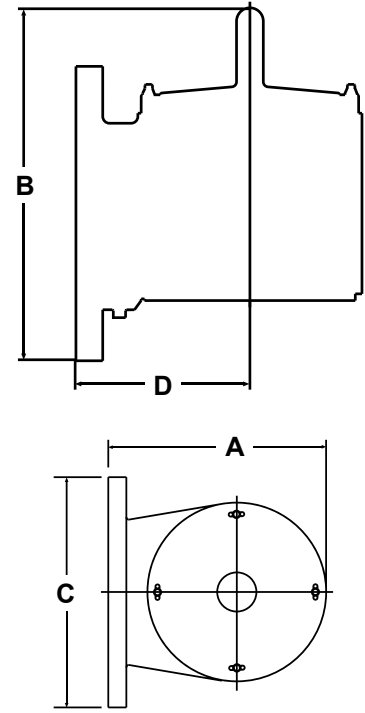
Inlet Flg	D	E
2"	4.125"	5.5"
50 mm	105 mm	140 mm
3"	5"	6"
30 mm	127 mm	152 mm
4"	6.5"	6.5"
100 mm	165 mm	165 mm
6"	8.5"	8.5"
150 mm	216 mm	216 mm
8"	9.75"	10.75"
200 mm	248 mm	273 mm
10"	10.25"	12.5"
250 mm	260 mm	318 mm
12"	11"	15"
300 mm	279 mm	381 mm

# MODEL 1810



Inlet Flg	A Length	B Height	C Width
2"	11.625"	6.875"	6"
50 mm	295 mm	174 mm	152 mm
3"	15.75"	7.75"	7.75"
30 mm	400 mm	196 mm	197 mm
4"	17.25"	9.625"	9"
100 mm	438 mm	244 mm	229 mm
6"	23.5"	11.875"	12"
150 mm	597 mm	301 mm	305 mm
8"	28.5"	15.5"	14.5"
200 mm	724 mm	393 mm	368 mm
10"	33.25"	18.625"	16.5"
250 mm	845 mm	473 mm	419 mm
12"	37.25"	21.625"	19"
300 mm	946 mm	549 mm	483 mm

# MODEL 1870



Size Flange	A Length	B Height
3"	8.625"	9.25"
80 mm	219 mm	235 mm
4"	10"	11.5"
100 mm	254 mm	292 mm
6"	11"	14.25"
150 mm	279 mm	362 mm
8"	14.5"	17.75"
200 mm	368 mm	451 mm
10"	18"	21.25"
250 mm	457 mm	539 mm
12"	20.75"	25.75"
300 mm	527 mm	654 mm
14"	24.75"	29.25"
350 mm	629 mm	742 mm

Size Flange	C Width	D
3"	7.5"	5.5"
80 mm	191 mm	140 mm
4"	9"	6"
100 mm	229 mm	152 mm
6"	11"	6.5"
150 mm	279 mm	165 mm
8"	13.5"	8.5"
200 mm	343 mm	216 mm
10"	16"	10.75"
250 mm	406 mm	273 mm
12"	19"	12.5"
300 mm	483 mm	318 mm
14"	21"	15"
350 mm	533 mm	381 mm



# MODEL 1800A // PRESSURE RELIEF CAPACITY



Flow Capacity at 10% Overpressure and 60°F [1000 SCFH]								
Set Pressure		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	3.29	7.25	12.5	28.3	49.1	77.3	111
1.0	0.6	3.54	7.79	13.4	30.5	52.7	83.1	119
2.0	1.2	5.00	11.0	19.0	43.1	74.6	118	169
3.0	1.7	6.13	13.5	23.2	52.7	91.3	144	206
4.0	2.3	7.07	15.6	26.8	60.9	105	166	238
6.0	3.5	8.66	19.1	32.9	74.6	129	204	292
8.0	4.6	10.0	22.0	37.9	86.1	149	235	337
10.0	5.8	11.2	24.6	42.4	96.2	167	263	377
12.0	6.9	12.2	27.0	46.4	105	182	288	413
13.9	8.0	13.1	29.0	49.9	113	196	309	443

Flow Capacity at 10% Overpressure and 0°C [1000 NCMH]								
Set Pressure		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.102	0.225	0.388	0.88	1.52	2.40	3.44
50	4.90	0.145	0.318	0.548	1.24	2.15	3.40	4.87
75	7.35	0.177	0.390	0.671	1.52	2.64	4.16	5.96
100	9.80	0.204	0.450	0.775	1.76	3.05	4.80	6.89
125	12.3	0.228	0.503	0.867	1.97	3.41	5.37	7.70
150	14.7	0.250	0.551	0.949	2.15	3.73	5.88	8.43
200	19.6	0.289	0.636	1.10	2.49	4.31	6.79	9.74
250	24.5	0.323	0.711	1.22	2.78	4.81	7.59	10.9
300	29.4	0.354	0.779	1.34	3.04	5.27	8.31	11.9
350	34.3	0.382	0.841	1.45	3.29	5.69	8.97	12.9

# MODEL 1800A // VACUUM RELIEF CAPACITY



Flow Capacity at 10% Over-Vacuum and 60°F [1000 SCFH]								
Set Vacuum		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	1.57	3.54	6.30	14.2	25.2	39.4	56.7
1.0	0.6	1.69	3.81	6.80	15.2	27.1	42.3	61.0
2.0	1.2	2.39	5.37	9.60	21.5	38.2	60.0	86.0
3.0	1.7	2.92	6.6	11.7	26.3	46.7	73.0	105
4.0	2.3	3.37	7.60	13.5	30.3	53.9	84.0	121
6.0	3.5	4.11	9.30	16.5	37.0	66.0	103	148
8.0	4.6	4.74	10.7	18.9	42.6	76.0	118	170
10.0	5.8	5.28	11.9	21.1	47.5	84.0	132	190
12.0	6.9	5.80	13.0	23.1	51.9	92.0	144	208
13.9	8.0	6.20	13.9	24.7	55.6	99.0	154	222

Flow Capacity at 10% Over-Vacuum and 0°C [1000 NCMH]								
Set Vacuum		Size						
mmWc	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.049	0.110	0.196	0.44	0.780	1.22	1.76
50	4.90	0.069	0.155	0.276	0.620	1.10	1.73	2.48
75	7.35	0.084	0.190	0.338	0.760	1.35	2.11	3.04
100	9.80	0.097	0.219	0.389	0.880	1.56	2.43	3.50
125	12.3	0.109	0.245	0.435	0.980	1.74	2.72	3.91
150	14.7	0.119	0.267	0.475	1.07	1.90	2.97	4.28
200	19.6	0.137	0.308	0.547	1.23	2.19	3.42	4.93
250	24.5	0.153	0.343	0.610	1.37	2.44	3.81	5.49
300	29.4	0.167	0.375	0.670	1.50	2.67	4.17	6.00
350	34.3	0.179	0.404	0.720	1.62	2.87	4.49	6.46

# MODEL 1820 // PRESSURE RELIEF CAPACITY



Flow Capacity at 10% Overpressure and 60°F [1000 SCFH]								
Set Pressure		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	2.52	5.55	9.50	21.7	37.5	59.1	85.0
1.0	0.6	2.71	5.96	10.3	23.3	40.3	63.6	91.0
2.0	1.2	3.83	8.40	14.5	32.9	57.0	90.0	129
3.0	1.7	4.68	10.3	17.8	40.3	69.8	110	158
4.0	2.3	5.41	11.9	20.5	46.6	81.0	127	182
6.0	3.5	6.62	14.6	25.1	57.0	99.0	156	223
8.0	4.6	7.60	16.8	29.0	65.8	114	180	258
10.0	5.8	8.50	18.8	32.4	73.6	127	201	288
12.0	6.9	9.40	20.6	35.5	81.0	140	220	316
13.9	8.0	10.1	22.2	38.1	87.0	150	236	339

Flow Capacity at 10% Overpressure and 0°C [1000 NCMH]								
Set Pressure		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.078	0.172	0.297	0.673	1.17	1.84	2.63
50	4.90	0.111	0.244	0.419	0.952	1.65	2.60	3.73
75	7.35	0.135	0.298	0.513	1.17	2.02	3.18	4.56
100	9.80	0.156	0.344	0.593	1.35	2.33	3.67	5.27
125	12.3	0.175	0.385	0.663	1.50	2.60	4.11	5.89
150	14.7	0.191	0.422	0.726	1.65	2.85	4.50	6.45
200	19.6	0.221	0.487	0.838	1.90	3.29	5.19	7.45
250	24.5	0.247	0.544	0.937	2.13	3.68	5.80	8.32
300	29.4	0.270	0.596	1.03	2.33	4.03	6.36	9.12
350	34.3	0.292	0.643	1.11	2.51	4.35	6.86	9.84

# MODEL 1820 // VACUUM RELIEF CAPACITY



Flow Capacity at 10% Over-Vacuum and 60°F [1000 SCFH]								
Set Vacuum		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	1.57	3.54	6.30	14.2	25.2	39.4	56.7
1.0	0.6	1.69	3.81	6.80	15.2	27.1	42.3	61.0
2.0	1.2	2.39	5.37	9.60	21.5	38.2	60.0	86.0
3.0	1.7	2.92	6.60	11.7	26.3	46.7	73.0	105
4.0	2.3	3.37	7.60	13.5	30.3	53.9	84.0	121
6.0	3.5	4.11	9.30	16.5	37.0	66.0	103	148
8.0	4.6	4.74	10.7	18.9	42.6	76.0	118	170
10.0	5.8	5.28	11.9	21.1	47.5	84.0	132	190
12.0	6.9	5.80	13.0	23.1	51.9	92.0	144	208
13.9	8.0	6.20	13.9	24.7	55.6	99.0	154	222

Flow Capacity at 10% Over-Vacuum and 0°C [1000 NCMH]								
Set Vacuum		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.049	0.110	0.196	0.440	0.78	1.22	1.76
50	4.90	0.069	0.155	0.276	0.620	1.10	1.73	2.48
75	7.35	0.084	0.190	0.338	0.760	1.35	2.11	3.04
100	9.80	0.097	0.219	0.389	0.880	1.56	2.43	3.50
125	12.3	0.109	0.245	0.435	0.980	1.74	2.72	3.91
150	14.7	0.119	0.267	0.475	1.07	1.90	2.97	4.28
200	19.6	0.137	0.308	0.547	1.23	2.19	3.42	4.93
250	24.5	0.153	0.343	0.610	1.37	2.44	3.81	5.49
300	29.4	0.167	0.375	0.670	1.50	2.67	4.17	6.00
350	34.3	0.179	0.404	0.720	1.62	2.87	4.49	6.46

# MODEL 1830 // PRESSURE RELIEF CAPACITY



Flow Capacity at 10% Overpressure and 60°F [1000 SCFH]								
Set Pressure		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	3.29	7.25	12.5	28.3	49.1	77.3	111
1.0	0.6	3.54	7.79	13.4	30.5	52.7	83.1	119
2.0	1.2	5.00	11.0	19.0	43.1	74.6	118	169
3.0	1.7	6.13	13.5	23.2	52.7	91.3	144	206
4.0	2.3	7.07	15.6	26.8	60.9	105	166	238
6.0	3.5	8.66	19.1	32.9	74.6	129	204	292
8.0	4.6	10.0	22.0	37.9	86.1	149	235	337
10.0	5.8	11.2	24.6	42.4	96.2	167	263	377
12.0	6.9	12.2	27.0	46.4	105	182	288	413
13.9	8.0	13.1	29.0	49.9	113	196	309	443

Flow Capacity at 10% Overpressure and 0°C [1000 NCMH]								
Set Pressure		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.102	0.225	0.388	0.880	1.52	2.40	3.44
50	4.90	0.145	0.318	0.548	1.24	2.15	3.40	4.87
75	7.35	0.177	0.390	0.671	1.52	2.64	4.16	5.96
100	9.80	0.204	0.450	0.775	1.76	3.05	4.80	6.89
125	12.3	0.228	0.503	0.867	1.97	3.41	5.37	7.70
150	14.7	0.250	0.551	0.949	2.15	3.73	5.88	8.43
200	19.6	0.289	0.636	1.10	2.49	4.31	6.79	9.74
250	24.5	0.323	0.711	1.22	2.78	4.81	7.59	10.9
300	29.4	0.354	0.779	1.34	3.04	5.27	8.31	11.9
350	34.3	0.382	0.841	1.45	3.29	5.69	8.97	12.9

# MODEL 1860 // PRESSURE RELIEF CAPACITY



Flow Capacity at 10% Overpressure and 60°F [1000 SCFH]								
Set Pressure		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	2.52	5.55	9.5	21.7	37.5	59.1	85.0
1.0	0.6	2.71	5.96	10.3	23.3	40.3	63.6	91.0
2.0	1.2	3.83	8.40	14.5	32.9	57.0	90.0	129
3.0	1.7	4.68	10.3	17.8	40.3	69.8	110	158
4.0	2.3	5.41	11.9	20.5	46.6	81.0	127	182
6.0	3.5	6.62	14.6	25.1	57.0	99.0	156	223
8.0	4.6	7.60	16.8	29.0	65.8	114	180	258
10.0	5.8	8.50	18.8	32.4	73.6	127	201	288
12.0	6.9	9.40	20.6	35.5	81.0	140	220	316
13.9	8.0	10.1	22.2	38.1	87.0	150	236	339

Flow Capacity at 10% Overpressure and 0°C [1000 NCMH]								
Set Pressure		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.078	0.172	0.297	0.673	1.17	1.84	2.63
50	4.90	0.111	0.244	0.419	0.952	1.65	2.60	3.73
75	7.35	0.135	0.298	0.513	1.17	2.02	3.18	4.56
100	9.80	0.156	0.344	0.593	1.35	2.33	3.67	5.27
125	12.3	0.175	0.385	0.663	1.50	2.60	4.11	5.89
150	14.7	0.191	0.422	0.726	1.65	2.85	4.50	6.45
200	19.6	0.221	0.487	0.838	1.90	3.29	5.19	7.45
250	24.5	0.247	0.544	0.937	2.13	3.68	5.80	8.32
300	29.4	0.270	0.596	1.03	2.33	4.03	6.36	9.12
350	34.3	0.292	0.643	1.11	2.51	4.35	6.86	9.84

# MODEL 1810 // VACUUM RELIEF CAPACITY



Flow Capacity at 10% Over-Vacuum and 60°F [1000 SCFH]								
Set Vacuum		Size						
InWC	OSI	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
0.9	0.5	1.57	3.54	6.30	14.2	25.2	39.4	56.7
1.0	0.6	1.69	3.81	6.80	15.2	27.1	42.3	61.0
2.0	1.2	2.39	5.37	9.60	21.5	38.2	60.0	86.0
3.0	1.7	2.92	6.60	11.7	26.3	46.7	73.0	105
4.0	2.3	3.37	7.60	13.5	30.3	53.9	84.0	121
6.0	3.5	4.11	9.30	16.5	37.0	66.0	103	148
8.0	4.6	4.74	10.7	18.9	42.6	76.0	118	170
10.0	5.8	5.28	11.9	21.1	47.5	84.0	132	190
12.0	6.9	5.80	13.0	23.1	51.9	92.0	144	208
13.9	8.0	6.20	13.9	24.7	55.6	99.0	154	222

Flow Capacity at 10% Over-Vacuum and 0°C [1000 NCMH]								
Set Vacuum		Size						
mmWC	mbar	2" (DN50)	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)
25	2.45	0.049	0.110	0.196	0.440	0.78	1.22	1.76
50	4.90	0.069	0.155	0.276	0.620	1.10	1.73	2.48
75	7.35	0.084	0.190	0.338	0.760	1.35	2.11	3.04
100	9.80	0.097	0.219	0.389	0.880	1.56	2.43	3.50
125	12.3	0.109	0.245	0.435	0.980	1.74	2.72	3.91
150	14.7	0.119	0.267	0.475	1.07	1.90	2.97	4.28
200	19.6	0.137	0.308	0.547	1.23	2.19	3.42	4.93
250	24.5	0.153	0.343	0.610	1.37	2.44	3.81	5.49
300	29.4	0.167	0.375	0.670	1.50	2.67	4.17	6.00
350	34.3	0.179	0.404	0.720	1.62	2.87	4.49	6.46



# MODEL 1870 // VACUUM RELIEF CAPACITY



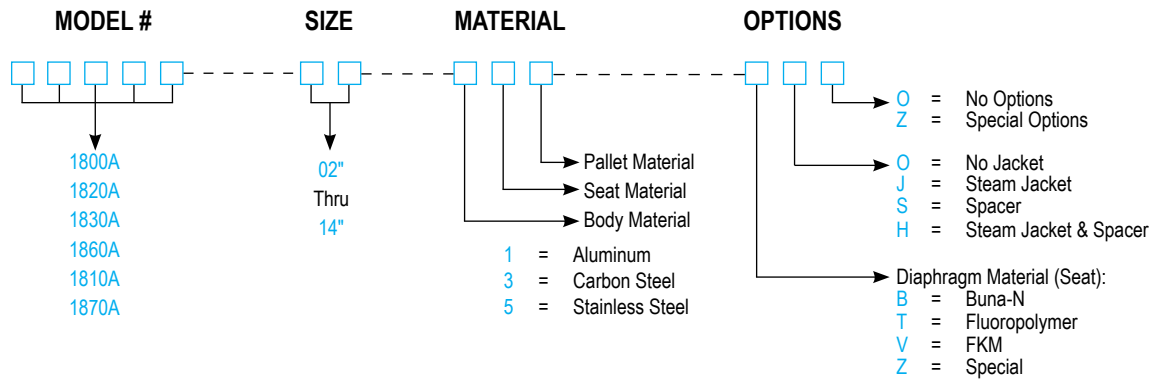
Flow Capacity at 10% Over-Vacuum and 60°F [1000 SCFH]								
Set Vacuum		Size						
InWC	OSI	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)	14" (DN350)
0.9	0.5	2.75	6.18	11.0	24.7	44.0	68.7	98.9
1.0	0.6	2.95	6.65	11.8	26.6	47.3	73.8	106
2.0	1.2	4.17	9.38	16.7	37.5	66.7	104	150
3.0	1.7	5.10	11.5	20.4	45.9	81.6	128	184
4.0	2.3	5.88	13.2	23.5	52.9	94.1	147	212
6.0	3.5	7.18	16.2	28.7	64.6	115	180	259
8.0	4.6	8.27	18.6	33.1	74.4	132	207	298
10.0	5.8	9.22	20.7	36.9	83.0	147	230	332
12.0	6.9	10.1	22.6	40.3	90.6	161	252	362
13.9	8.0	10.8	24.3	43.1	97.1	173	270	388

Flow Capacity at 10% Over-Vacuum and 0°C [1000 NCMH]								
Set Vacuum		Size						
mmWC	mbar	3" (DN75)	4" (DN100)	6" (DN150)	8" (DN200)	10" (DN250)	12" (DN300)	14" (DN350)
25	2.45	0.085	0.192	0.341	0.770	1.37	2.13	3.07
50	4.90	0.121	0.271	0.482	1.08	1.93	3.01	4.34
75	7.35	0.147	0.332	0.590	1.33	2.36	3.68	5.31
100	9.80	0.170	0.382	0.680	1.53	2.72	4.25	6.12
125	12.3	0.190	0.427	0.759	1.71	3.04	4.74	6.83
150	14.7	0.208	0.467	0.830	1.87	3.32	5.19	7.47
200	19.6	0.239	0.538	0.956	2.15	3.82	5.97	8.60
250	24.5	0.266	0.599	1.07	2.40	4.26	6.66	9.59
300	29.4	0.291	0.655	1.16	2.62	4.66	7.27	10.5
350	34.3	0.313	0.705	1.25	2.82	5.01	7.83	11.3

# SERIES 1800

## HOW TO ORDER

For easy ordering, select proper model numbers



**EXAMPLE** 1 8 0 0 A — 0 2 — 1 1 5 — T O O

Indicates a 2" Model 1800A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

# MODEL 1220A

- Sizes // 2" through 12"
- Pressure settings // 0.5 oz/in<sup>2</sup> to 15 psig
- Vacuum settings // 0.5 oz/in<sup>2</sup> to 12 psig
- Available in aluminum, carbon steel, stainless steel, fiberglass and other materials
- Modular construction

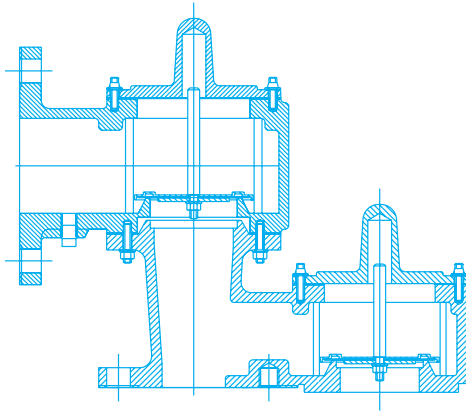


## PRESSURE / VACUUM RELIEF VALVE WITH PIPE-AWAY FEATURE

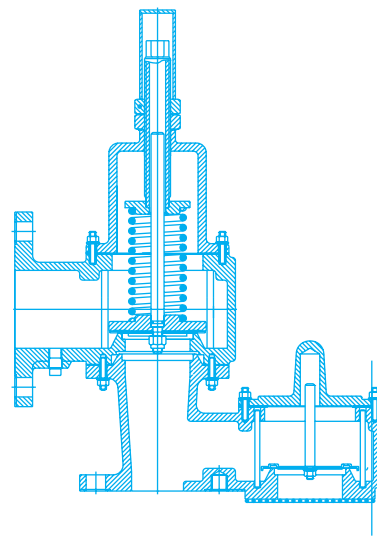
Model 1220A is used for pressure and vacuum relief where vapors must be piped away. Escaping vapors are piped away through a flanged outlet connection. This helps to provide increased fire protection and safety.

## SPECIAL FEATURES

Model 1220A offers Groth's special "cushioned air" seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1220A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, FKM, and other seating diaphragms can be provided when required. Model 1221B may be spring loaded when required for use on blanketed tanks or other type installation requiring higher settings. To insure the proper alignment of seating surfaces there is peripheral guiding and a center stabilizing stem.

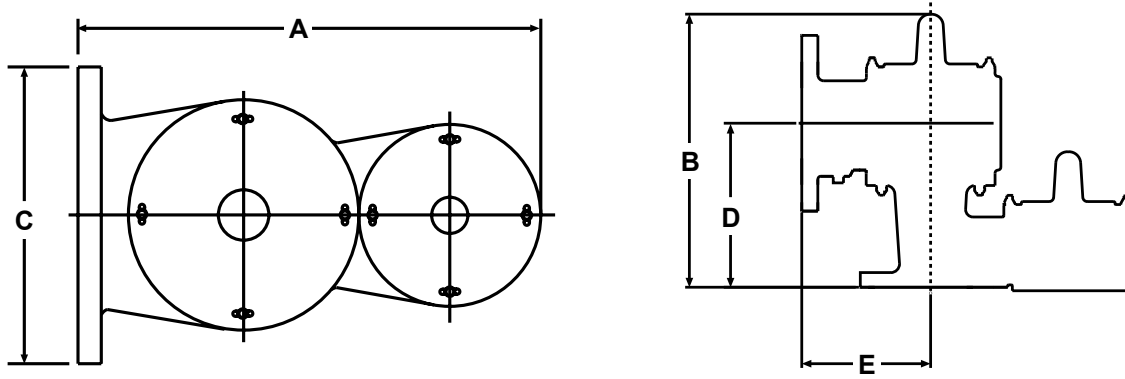


**MODEL 1220A**



**MODEL 1221B**

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

Inlet Flg <sup>o</sup> (Metric)	Outlet Flg <sup>o</sup> (Metric)	Max. Set Pressure Weight Loaded	Max. Set Vacuum Weight Loaded	Max. Setting Spring Loaded	Min. Setting Weight Loaded	Max. W.P. <sup>†</sup> for Min. Vacuum Setting	Min. Vac. Setting for Max. W.P. <sup>†</sup>	A Length (Metric)	B Height (Metric)	C Width (Metric)	D (Metric)	E (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	3" (76 mm)	11 oz/in <sup>2</sup> (48.2 gm/cm <sup>2</sup> )	12 oz/in <sup>2</sup> (52.7 gm/cm <sup>2</sup> )					14.25" (362 mm)	12.62" (321 mm)	7.50" (191 mm)	7" (178 mm)	5.50" (140 mm)	26 (12 kg)
3" (80 mm)	4" (102 mm)	13 oz/in <sup>2</sup> (57.0 gm/cm <sup>2</sup> )	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )					18" (457 mm)	15.12" (384 mm)	9" (229 mm)	8.12" (206 mm)	6" (152 mm)	34 (16 kg)
4" (100 mm)	6" (152 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )					19.25" (489 mm)	18.25" (464 mm)	11" (279 mm)	9.50" (241 mm)	6.50" (165 mm)	49 (22 kg)
6" (150 mm)	8" (203 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )				See TPD for Vacuum Settings and MAWP	26.50" (673 mm)	23.75" (603 mm)	13.50" (343 mm)	12.75" (324 mm)	8.50" (216 mm)	93 (42 kg)
8" (200 mm)	10" (254 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					32.50" (826 mm)	28.50" (724 mm)	16" (406 mm)	15.25" (387 mm)	10.75" (273 mm)	137 (62 kg)
10" (250 mm)	12" (305 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					37.75" (959 mm)	34.50" (876 mm)	19" (483 mm)	18" (457 mm)	12.50" (318 mm)	186 (85 kg)
12" (300 mm)	14" (356 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					42.75" (1086 mm)	39.12" (994 mm)	21" (533 mm)	20.62" (524 mm)	15" (381 mm)	260 (118 kg)

<sup>†</sup>W.P. = Working Pressure. <sup>o</sup>On spring loaded valves, change model number. <sup>o</sup>150# R.F. drilling compatibility F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Fiberglass dimensions on request. 16 oz/in<sup>2</sup> set with spacer. SS set weights-consult factory. \*Some sizes require non-ferrous components to achieve 0.5 oz/in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div>			
1220A Weight Loaded 1221B Pressure Spring 1222B Vacuum Spring 1223B Pressure & Vacuum Springs	02" Thru 12"	Pallet Material Seat Material Body Material	O = No Options Z = Special Options  O = No Jacket J = Steam Jacket S = Spacer H = Steam Jacket & Spacer  Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM Z = Special
<b>NOTES</b> <ul style="list-style-type: none"> <li>• Include model number and setting when ordering.</li> <li>• For special options, consult factory.</li> <li>• When ordering steam jacket, include steam pressure/temperature.</li> <li>* Stainless steel guides, stems are standard with aluminum and carbon steel bodies. Stainless steel seats standard with carbon steel bodies.</li> </ul>		1 = Aluminum 3 = Carbon Steel 5 = Stainless Steel 6 = Vinyl Ester Resin 7 = Furan Z = Special	

**EXAMPLE** 1 2 2 0 A — 0 2 — 1 1 5 — T O O

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

# 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 <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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 interpolation.

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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1220A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

- Read flow capacity at set pressure from table
- Calculate overpressure
- Read "C" factor from table
- Calculate flow capacity

$$\text{Flow} = 112,000 \text{ SCFH}$$

$$\% \text{ OP} = [(7 - 4) / 4] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 112,000 = 97,440 \text{ SCFH}$$

# 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 <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1220A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 3,140 NCMH  
 % OP = [(175 - 100)/100] x 100 = 75%  
 "C" = 0.87  
**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 <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1220A
- 4 InWC Set Vacuum [P<sub>s</sub>]
- 7 InWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 74,000 SCFH  
 $\% \text{OV} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**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 <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1220A
- 100 mmWC Set Vacuum [P<sub>s</sub>]
- 175 mmWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 2,080 \text{ NCMH}$$

$$\% \text{OV} = [(175 - 100) / 100] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 2,080 = 1,810 \text{ NCMH}$$

# 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 <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1221B
- 4 psig Set Pressure [P<sub>s</sub>]
- 7 psig Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 448,000 SCFH  
 % OP = [(7 - 4)/4] x 100 = 75%  
 "C" = 0.83  
**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 <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1221B
- 0.4 barg Set Pressure [P<sub>s</sub>]
- 0.7 barg Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 16,200 \text{ NCMH}$$

$$\% \text{ OP} = [(0.7 - 0.4) / 0.4] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 16,200 = 13,446 \text{ NCMH}$$

# 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 <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1222B
- 2 psig Set Vacuum [P<sub>s</sub>]
- 3.5 psig Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 166,000 \text{ SCFH}$$

$$\% \text{ OV} = [(3.50 - 2.0) / 2.0] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 166,000 = 137,780 \text{ SCFH}$$

# 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 <sub>s</sub> )	Size						
	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1222B
- 0.12 barg Set Vacuum [P<sub>s</sub>]
- 0.17 barg Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 4,530 \text{ NCMH}$$

$$\% \text{OV} = [(0.17 - 0.12) / 0.12] \times 100 = 42\%$$

$$"C" = 0.55$$

$$\text{Flow} = 0.55 \times 4,530 = 2,492 \text{ NCMH}$$

# MODEL 1720A/1760A

- Same size inlet and outlet connections
- “Cushioned air” seating
- Non-sticking design
- Center and peripheral pallet guiding
- Self-draining body
- Factory tested for compliance with API 2000
- ISO-Certified manufacturing facility
- Higher set pressures (in weight loaded configuration) than standard pipe-away valves



## VACUUM RELIEF VALVE WITH PIPE-AWAY FEATURE

Groth Series 1700 relief valves are designed with inlet and outlet flanges of the same size to reduce installation costs by having smaller downstream piping. Model 1720A valves are designed for systems requiring pressure and vacuum relief. Model 1760A valves are designed for systems requiring only pressure relief.

## SPECIAL FEATURES

Model 1700 offers Groth’s special “cushioned air” seating. Superior performing fluoropolymer seating diaphragms minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1700 has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, FKM, and other seating diaphragms can be provided when required. Available in 2”, 3” and 4” sizes and in carbon steel, stainless steel or fiberglass. Trim materials (seat and pallet components) are 316SS. Other materials available on request. Options include stainless steel weights.

## SETTING RANGES

White bars in oz/in<sup>2</sup>. Blue bars in mbar.

Model	Size (inches)	Standard Weights				Stainless Steel Weights			
		Pressure		Vacuum		Pressure		Vacuum	
		Min	Max	Min	Max	Min	Max	Min	Max
1720A	2 X 2	0.5	33	0.5	17.4	0.5	24	0.5	16.5
		2.2	142	2.1	74	2.2	103	2.2	71
	3 X 3	0.5	33	0.5	15.5	0.5	24	0.5	15.2
		2.2	142	2.1	66	2.2	103	2.2	65
	4 X 4	0.5	33	0.5	16.5	0.5	24	0.5	15.0
		2.2	142	2.1	71	2.2	103	2.2	64
1760A	2 X 2	0.5	33	–	–	0.5	24	–	–
		2.2	142	–	–	2.2	103	–	–
	3 X 3	0.5	33	–	–	0.5	24	–	–
		2.2	142	–	–	2.2	103	–	–
	4 X 4	0.5	33	–	–	0.5	24	–	–
		2.2	142	–	–	2.2	103	–	–

The 1700 Series relief valves are also available in spring loaded designs for pressure settings up to 15 psig. Other options include FRP (Furan or Derakane) construction, positive lift indicators and special coatings. Consult the factory for details.

# MODEL 1720/1760 // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60°F					Air Flow Capacity at 100% Overpressure (Double Set Pressure) Normal Cubic Meters per Hour at 0°C				
Set Pressure [P <sub>s</sub> ]		Size			Set Pressure [P <sub>s</sub> ]		Size		
InWC	oz/in <sup>2</sup>	2" x 2"	3" x 3"	4" x 4"	mmWC	mbar	2" x 2"	3" x 3"	4" x 4"
0.9	0.5	4.79	10.7	18.1					
1.0	0.6	5.15	11.5	19.5	25	2.45	149	332	563
2.0	1.2	7.29	16.3	27.6	50	4.90	211	470	797
3.0	1.7	8.94	20.0	33.8	75	7.35	258	577	976
4.0	2.3	10.3	23.1	39.0	100	9.80	299	667	1128
6.0	3.5	12.7	28.3	47.9	150	14.7	367	818	1383
8.0	4.6	14.7	32.8	55.4	200	19.6	424	946	1599
10.0	5.8	16.5	36.7	62.0	250	24.5	476	1060	1790
					300	29.4	522	1164	1963
					350	34.3	565	1259	2123
15.0	8.7	20.3	45.2	76.1					
					400	39.2	606	1349	2285
20.0	11.6	23.6	52.4	78.5	500	49.0	680	1514	2467
					600	58.8	749	1757	2627
25.0	14.4	26.5	58.9	84.7					
30.0	17.3	29.2	60.3	90.2					
					800	78.4	872	1877	2756
34.6	20.0	31.5	64.5	94.6					
					1000	98.0	984	2052	2959
41.6	24.0	34.8	70.5	102					
					1200	118	1086	2281	3243
51.9	30.0	39.3	78.3	111					
57.1	33.0	41.4	82.0	116					
					1500	147	1229	2388	3374

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 3" Model 1760A
- 4 InWC Set Pressure [P<sub>s</sub>]
- 7 InWC Flowing Pressure [P<sub>f</sub>]

- Read flow capacity at set pressure from table
- Calculate overpressure
- Read "C" factor from table
- Calculate flow capacity

Flow = 23,100 SCFH  
 $\% \text{ OP} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 23,100 = 20,097 SCFH**



# MODEL 1720 // VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60°F					Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum) Normal Cubic Meters per Hour at 0°C				
Set Vacuum [P <sub>s</sub> ]		Size			Set Vacuum [P <sub>s</sub> ]		Size		
InWC	oz/in <sup>2</sup>	2" x 2"	3" x 3"	4" x 4"	mmWC	mbar	2" x 2"	3" x 3"	4" x 4"
0.87	0.50	4.70	10.3	16.0	22	2.16	130	290	450
1.0	0.58	5.05	11.0	17.2	25	2.45	149	332	563
2.0	1.16	7.12	15.6	24.2	50	4.90	200	440	680
					75	7.35	240	530	830
4.0	2.31	10.0	21.9	34.1	100	9.80	280	620	960
					125	12.3	310	690	1070
6.0	3.47	12.2	26.7	41.5	150	14.7	340	750	1170
					175	17.2	370	810	1260
8.0	4.62	14.0	30.6	47.7	200	19.6	390	860	1340
					225	22.1	420	910	1420
10.0	5.78	15.6	34.0	53.0	250	24.5	440	960	1490
					275	27.0	460	1000	1560
12.0	6.93	17.0	37.1	57.8	300	29.4	480	1040	1620
15.0	8.66	18.8	41.1	64.0	375	36.8	530	1160	1800
20.0	11.6	21.4	46.8	72.9	500	49.0	600	1320	2050
25.0	14.4	23.6	51.5	80.3	625	61.3	660	1450	2260
27.7	16.0	24.6	53.8	83.8	800	78.4	872	1877	2756
					750	73.5	720	1570	2440

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1720A
- 4 InWC Set Vacuum [P<sub>s</sub>]
- 7 InWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 21,900 SCFH  
 $\% \text{OV} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 21,900 = 19,053 SCFH**

# SPECIFICATIONS



White bars in inches or pounds. Blue bars in millimeters or kilograms.

Size (inches)	Model 1720A						Model 1760A					
	A	B	C	D	E	Weight	AA	BB	C	DD	E	Weight
2 X 2	13.50	14.63	6.50	6.75	4.75	80	7.75	11.88	6.50	3.88	4.75	50
	343	372	165	171	121	36	197	302	165	99	121	23
3 X 3	18.00	17.38	8.00	8.00	6.00	105	10.00	14.13	8.00	4.75	6.00	70
	457	441	203	203	152	48	254	359	203	121	152	32
4 X 4	19.25	19.50	9.00	9.13	6.50	150	10.75	16.50	9.00	6.06	6.50	92
	489	495	229	232	165	68	273	419	229	154	165	42

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	BODY MATERIAL	SEAT MATERIAL	PALLET MATERIAL	DIAPHRAGM MATERIAL	JACKET	SPECIAL OPTIONS
1720A 1760A	02 03 04	3 = Carbon Steel 5 = Stainless 6 = Vinyl Ester 7 = Furan Z = Special	5 = 316SS 6 = Vinyl Ester 7 = Furan Z = Special (See note regarding seat material)	5 = 316SS 6 = Vinyl Ester 7 = Furan Z = Special	B = Buna N K = FFKM T = Fluoropolymer V = FKM Z = Special	O = No Jacket N = Steam Jacket S = Vacuum Port Spacer H = Vacuum Port Spacer and Steam Jacket	O = No Options Z = Special Options

**NOTES**

- Include model number and setting when ordering.
- For steam jacket, include steam pressure/temperature.
- For special options, consult factory.
- Stainless steel seats are standard with stainless steel and carbon steel bodies.

**EXAMPLE** 1 7 2 0 A — 0 3 — 3 5 5 — B O O

Indicates a 3" x 3" Model 1720 A with CS body, 316SS seat, 316SS pallet, Buna-N diaphragm, no steam jacket and no special options.

## MODEL 12-TH

- Size: 8" (200 mm)
- Bolting: API 12
- Available Pressure Settings:  
4, 6, 8, 12, 16, 24 & 32 osig
- Available Vacuum Settings:  
0.4, 0.9 & 3.5 osig
- Leak Rate:  
1 SCFH air @ 90% of set pressure
- Materials of Construction:  
Casting: Aluminum (Non-Sparking)  
Envelope Gasket: HNBR, FKM, or Fluorosilicone  
Vacuum Diaphragm: HNBR, FKM, Fluorosilicone, or Fluoropolymer
- Optional: Polyester/PTFE Coating
- Accessories: Flange (base) Gasket, Mounting Kit



### PRESSURE/VACUUM RELIEF VALVE

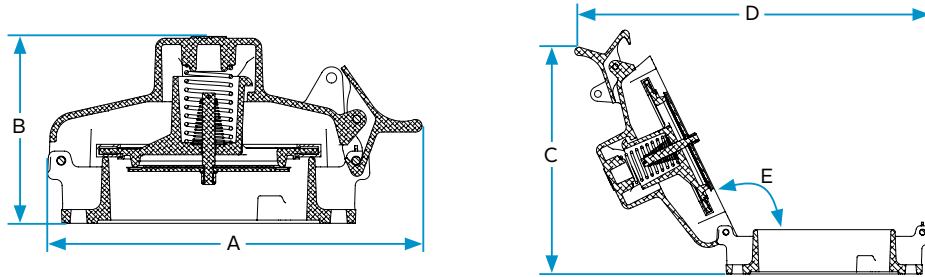
The Model 12-TH Thief Hatch was designed to out perform the competition, with industry leading high flow rates and precision tolerances to provide a superior sealing performance. The leakage is less than 1 SCFH of air @ 90% of the set pressure, keeping your tanks in compliance with industry standards.

The Model 12-TH Thief Hatch incorporates a spring loaded pressure/vacuum relief valve within the device. Thief Hatches are used on steel or fiberglass (FRP) low pressure oil tanks. Providing access for level gauging, sampling, and overpressure/vacuum protection for the tanks, all in one compact design.

### SPECIAL FEATURES

- Ultra-tight sealing reduces product leakage and fugitive emissions
- Higher flow capacity to protect from excessive pressure build up
- Designed for easy maintenance, thus reducing downtime and lower operational cost
- Corrosion resistance can be enhanced with FKM soft goods and coating
- Direct replacement for any standard round API 12 thief hatch
- Incorporates a mechanical lock system to be used with a pad lock or lock out bar

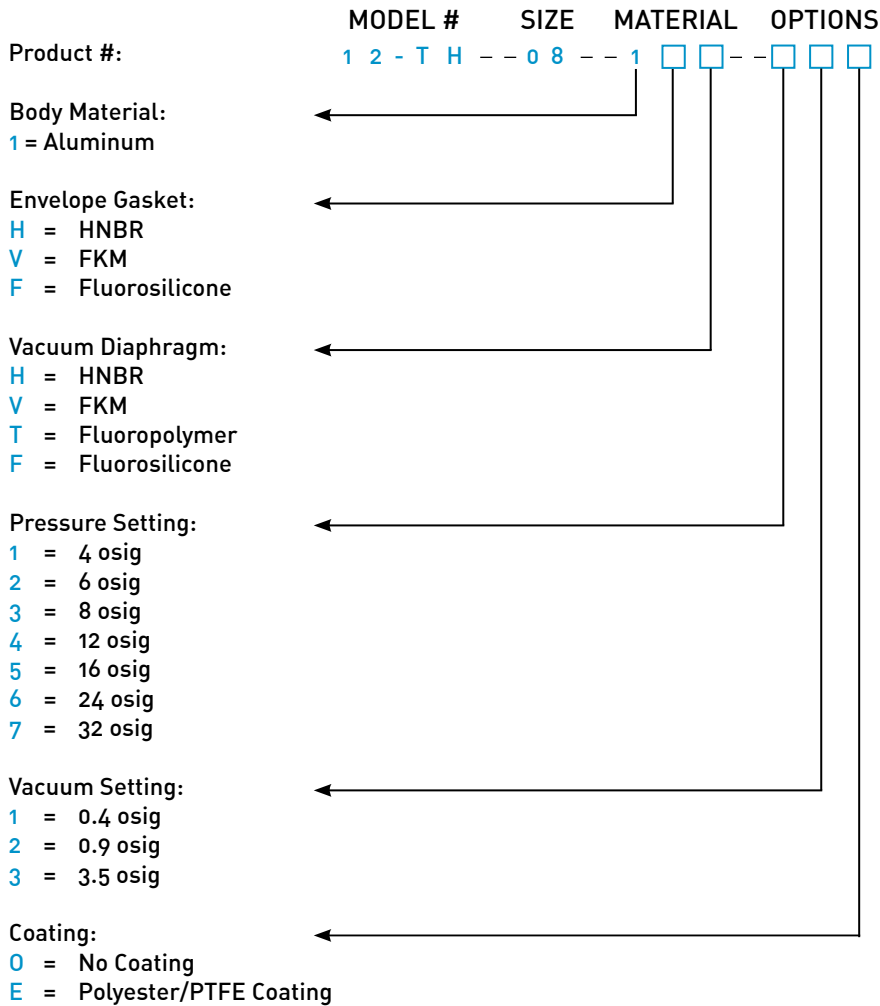
# SPECIFICATIONS



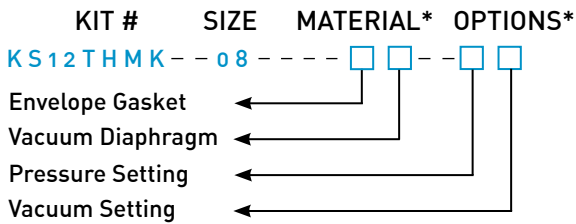
SIZE		WIDTH				HEIGHT				ANGLE	ASSEMBLY WEIGHT	
		Closed		Open		Closed		Open		Open		
		A		D		B		C		E		
in	mm	in	mm	in	mm	in	mm	in	mm	deg	lbs	kg
8	200	14.95	379	20.25	514	7.45	189	15.25	387	109.5	13.8	6.26



# HOW TO ORDER



Maintenance Repair Kit: (use the above chart for selecting material and options)



## OPTIONAL ACCESSORIES:

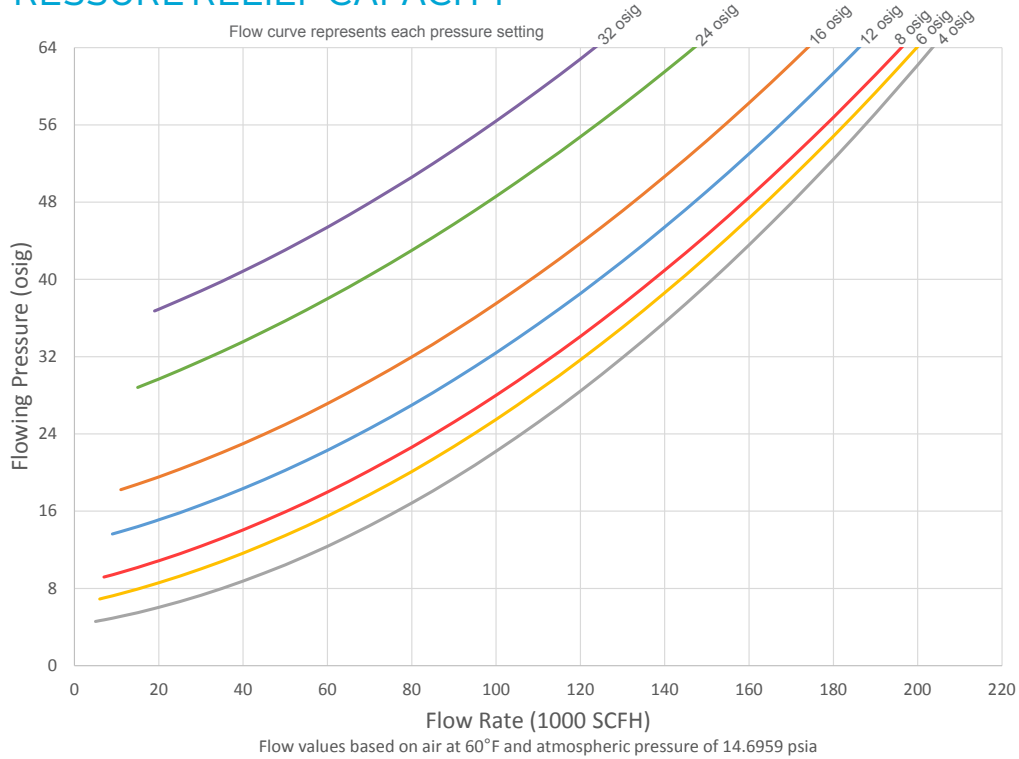
Base Gasket:

- GKT12TH08K302 = Non-Asbestos
- GKT12TH087602 = FKM
- GKT12TH087102 = PTFE
- GKT12TH084402 = Black Neoprene

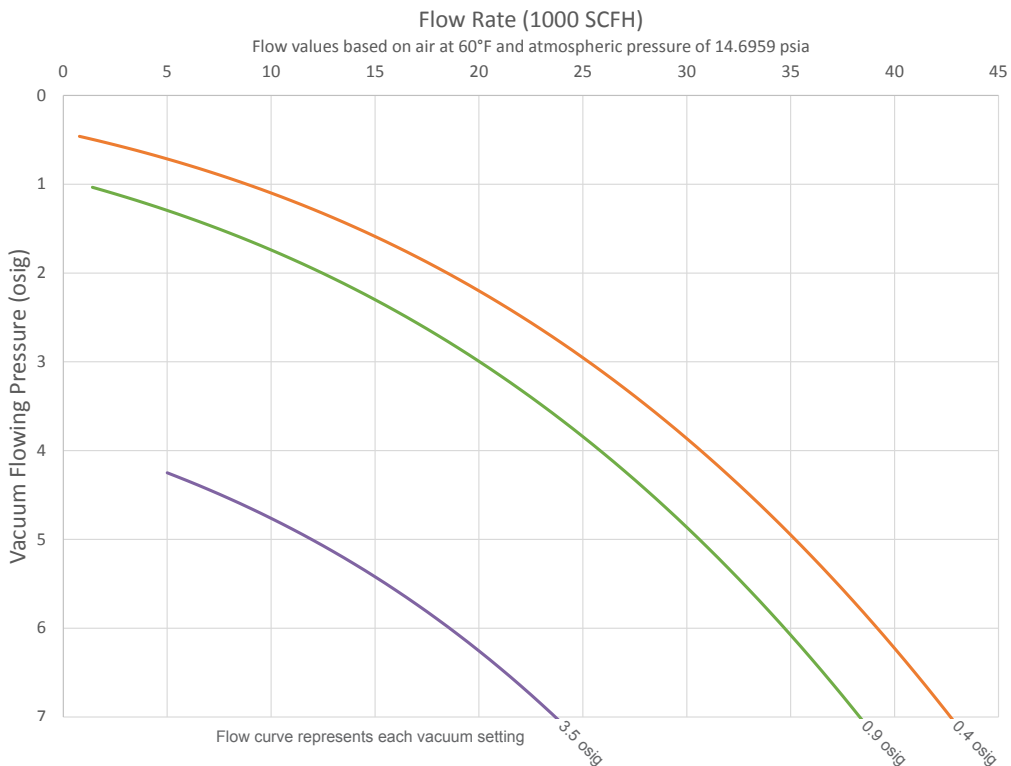
Mounting Kit:

- KS12THBS08P01 = Zinc Plated Steel (½-13 UNC Hex Nut & Bolt)

## PRESSURE RELIEF CAPACITY



## VACUUM RELIEF CAPACITY



# MODEL 1260A

- Sizes // 2" through 12"
- Pressure settings // 0.5 oz/in<sup>2</sup> to 15 psig
- Available in aluminum, carbon steel, stainless steel, fiberglass and other materials
- Modular construction

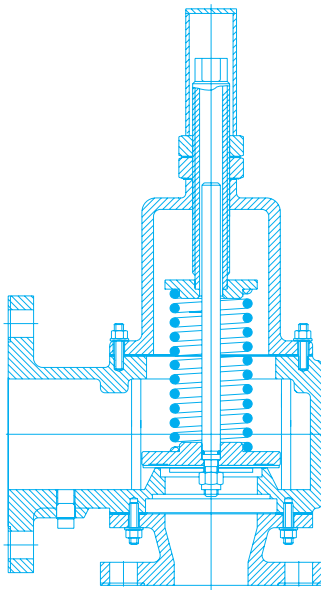


## PRESSURE RELIEF VALVE

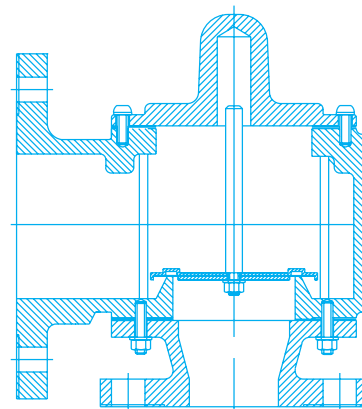
Pressure Relief Valve Model 1260A is for use where pressure relief is required and all relieving vapors must be piped away. Tank relief, to avoid tank damage, is controlled by a spring or weight loaded pallet in the valve housing. Pressure relief valves help provide increased fire protection and safety. The Model 1260A can also be used for in-line vacuum relief where flanged inlet connection is required. Back pressure in the system must be considered when using flow curves.

## SPECIAL FEATURES

Model 1260A offers Groth's special "cushioned air" seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1260A has a self-draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, FKM and other seating diaphragms can be provided when required.

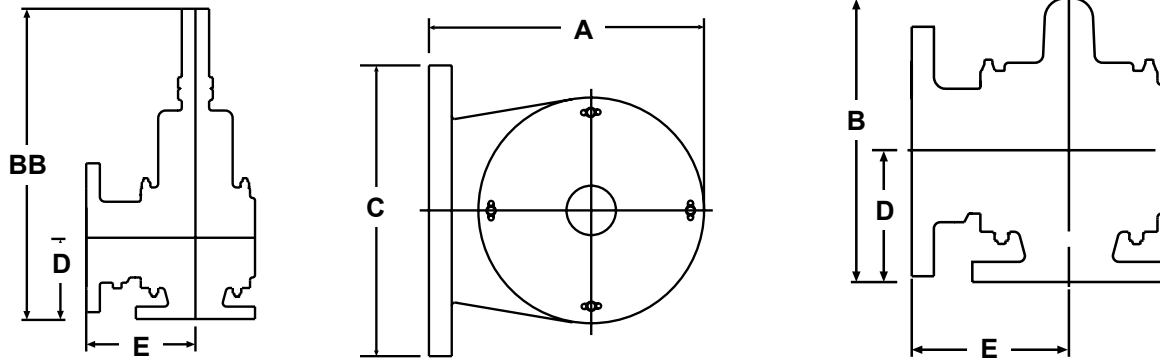


MODEL 1261A



MODEL 1260A

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

Inlet Fig <sup>o</sup> (Metric)	Outlet Fig <sup>o</sup> (Metric)	Max. Set Pressure Weight Loaded	Max. Set Pressure Spring Loaded	Min. Setting Weight Loaded	A Length (Metric)	B Height (Metric)	C Width (Metric)	D (Metric)	E (Metric)	BB (Metric)	Approximate Shipping Weight Lbs. (Aluminum)
2" (50 mm)	3" (80 mm)	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )	15 psig SPRING LOADED PRESSURE (1.05 kg/cm <sup>2</sup> )	*0.5 oz/in <sup>2</sup> WEIGHT LOADED (2.20 gm/cm <sup>2</sup> )	8.62" (219 mm)	9.37" (238 mm)	7.50" (191 mm)	4.12" (105 mm)	5.50" (140 mm)	16.62" (422 mm)	16 (7 kg)
3" (80 mm)	4" (100 mm)	13 oz/in <sup>2</sup> (57.1 gm/cm <sup>2</sup> )			10" (254 mm)	11.12" (282 mm)	9" (229 mm)	5" (127 mm)	6" (152 mm)	20.25" (514 mm)	22 (10 kg)
4" (100 mm)	6" (150 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )			11" (279 mm)	13.87" (352 mm)	11" (279 mm)	6.50" (165 mm)	6.50" (165 mm)	25.62" (651 mm)	29 (13 kg)
6" (150 mm)	8" (200 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )			14.50" (368 mm)	17.37" (441 mm)	13.50" (343 mm)	8.50" (216 mm)	8.50" (216 mm)	34.50" (876 mm)	55 (25 kg)
8" (200 mm)	10" (250 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )			18" (457 mm)	21.25" (540 mm)	16" (406 mm)	9.75" (248 mm)	10.75" (273 mm)	39.75" (1010 mm)	92 (42 kg)
10" (250 mm)	12" (300 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )			20.75" (527 mm)	23.62" (600 mm)	19" (483 mm)	10.25" (260 mm)	12.50" (318 mm)	46.37" (1178 mm)	105 (48 kg)
12" (300 mm)	14" (350 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )			24.75" (629 mm)	26.62" (676 mm)	21" (533 mm)	11" (279 mm)	15" (381 mm)	49.25" (1251 mm)	149 (68 kg)

<sup>o</sup> On spring loaded valves, change model number. <sup>o</sup> 150# R.F. drilling compatibility F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Fiberglass dimensions on request. 16 oz/in<sup>2</sup> set with spacer. SS set weights-consult factory. \*Some sizes require non-ferrous components to achieve 0.5 oz/in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> 1260A Weight Loaded 1261B Pressure Spring                 </div> <div style="text-align: center;"> <input type="checkbox"/> 02" Thru 12"                 </div> <div style="text-align: center;"> <input type="checkbox"/> Pallet Material  <input type="checkbox"/> Seat Material  <input type="checkbox"/> Body Material                 </div> <div style="text-align: center;"> <input type="checkbox"/> O = No Options Z = Special Options   <input type="checkbox"/> O = No Jacket J = Steam Jacket S = Spacer H = Steam Jacket &amp; Spacer   <input type="checkbox"/> Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM Z = Special                 </div> </div>			

**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.

1 = Aluminum  
 3 = Carbon Steel  
 5 = Stainless Steel  
 6 = Vinyl Ester Resin  
 7 = Furan  
 Z = Special

**EXAMPLE** 1 2 6 0 A — 0 2 — 1 1 5 — T O O

Indicates a 2" Model 1260A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.



# MODEL 1260A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)								
1000 Standard Cubic Feet per Hour at 60° F								
Set Pressure (P <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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 interpolation.

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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1260A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

- Read flow capacity at set pressure from table
- Calculate overpressure
- Read "C" factor from table
- Calculate flow capacity

Flow = 112,000 SCFH  
 % OP = [(7 - 4)/4] x 100 = 75%  
 "C" = 0.87  
**Flow = 0.87 x 112,000 = 97,440 SCFH**

# MODEL 1260A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)								
1000 Normal Cubic Meters per Hour at 0° C								
Set Pressure (P <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1260A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 3,140 NCMH

$$\% \text{OP} = [(175 - 100) / 100] \times 100 = 75\%$$

"C" = 0.87

$$\text{Flow} = 0.87 \times 3,140 = 2,732 \text{ NCMH}$$

# MODEL 1261A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)							
1000 Standard Cubic Feet per Hour at 60° F							
Set Pressure (P <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1261A
- 4 psig Set Pressure [P<sub>s</sub>]
- 7 psig Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 448,000 \text{ SCFH}$$

$$\% \text{ OP} = [(7 - 4) / 4] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 448,000 = 371,840 \text{ SCFH}$$

# MODEL 1261A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)							
1000 Normal Cubic Meters per Hour at 0° C							
Set Pressure (P <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1261A
- 0.4 barg Set Pressure [P<sub>s</sub>]
- 0.7 barg Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 16,200 NCMH  
 $\% \text{ OP} = [(0.7 - 0.4) / 0.4] \times 100 = 75\%$   
 "C" = 0.83  
**Flow = 0.83 x 16,200 = 13,446 NCMH**

# MODEL 2300A

- Sizes // 2" through 12"
- Pressure settings // 0.5 oz/in<sup>2</sup> to 15 psig
- Available in aluminum, carbon steel, stainless steel, and other materials

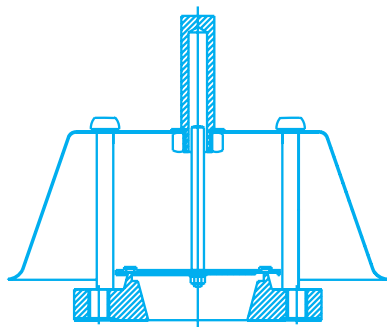


## EMERGENCY RELIEF VALVE

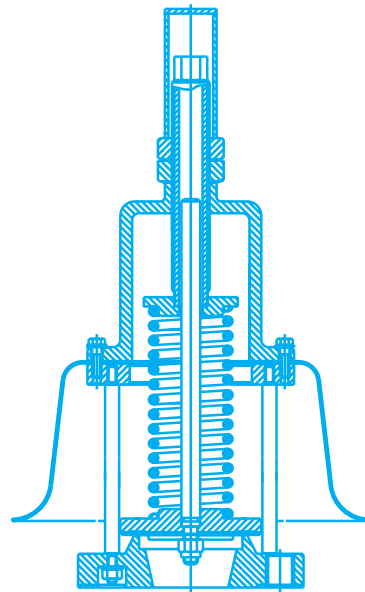
Model 2300A is designed for emergency relief capacity above that supplied by a standard operating valve used on tanks, piping, and low pressure vessels. Emergency relief valves provide relief from excessive internal pressures which may cause tank damage.

## SPECIAL FEATURES

Model 2300A is built of corrosion resistant material throughout. Groth's self-closing special fluoropolymer "cushioned air" pallet with center stabilizing stem and peripheral guiding provides uniform seating and alignment. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The guides support a spun weatherhood which covers and protects the entire valve structure. As added protection against the entry of foreign matter, a mesh screen encircles the valve under the weatherhood. Buna-N, FKM and other seating diaphragms can be provided when required.

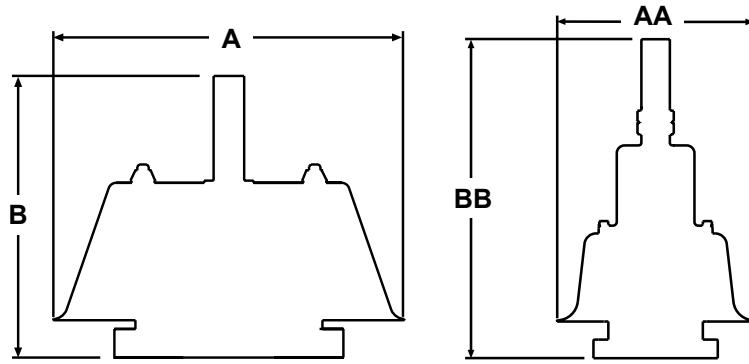


MODEL 2300A



MODEL 2301A

# SPECIFICATIONS



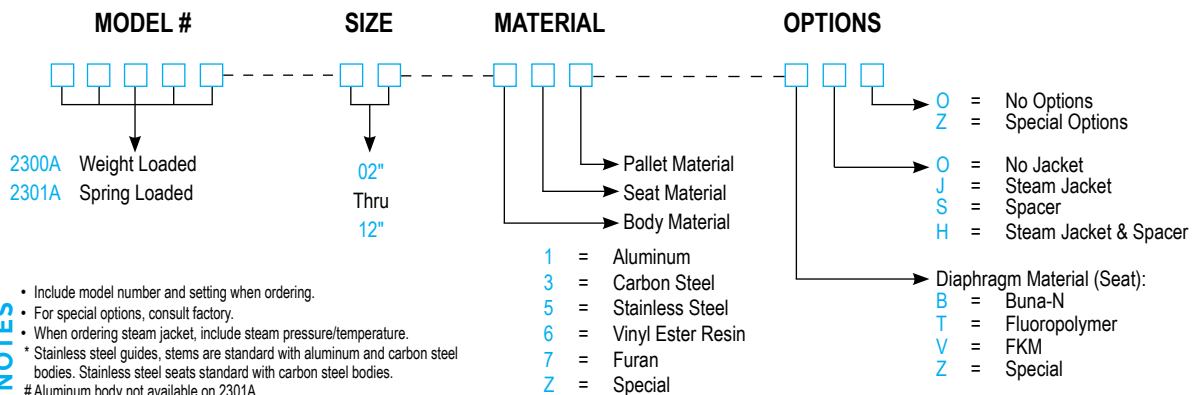
Specifications subject to change without notice. Certified dimensions available upon request.

Size* Flange (Metric)	Max. Set Pressure	Minimum Set Pressure	A Diameter (Metric)	AA Diameter (Metric)	B Height (Metric)	BB Height (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)			9.50" (241 mm)	9.50" (241 mm)	9.75" (248 mm)	16.50" (419 mm)	12 (5 kg)
3" (80 mm)			11.50" (292 mm)	13" (330 mm)	8.62" (219 mm)	22.00" (550 mm)	15 (7 kg)
4" (100 mm)			13" (330 mm)	13" (330 mm)	10.56" (268 mm)	22.50" (572 mm)	20 (9 kg)
6" (150 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> ) WEIGHT LOADED	15 psig (1.05 kg/cm <sup>2</sup> ) SPRING LOADED	19" (480 mm)	19.50" (495 mm)	15" (381 mm)	30.50" (784 mm)	30 (14 kg)
8" (200 mm)			23.62" (600 mm)	23.50" (597 mm)	16.62" (422 mm)	35.37" (899 mm)	45 (20 kg)
10" (250 mm)			30.75" (781 mm)	25.50" (648 mm)	17" (431 mm)	41.37" (1051 mm)	65 (30 kg)
12" (300 mm)			36" (914 mm)	25.50" (648 mm)	18" (457 mm)	42.37" (1076 mm)	100 (45 kg)

‡ On spring loaded valves, change to model 2301A. † Larger sizes available - consult factory. \* 150# ANSI. drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Fiberglass dimensions on request. \*\*Some sizes require non-ferrous components to achieve 0.5 oz/in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers



**EXAMPLE** 2 3 0 0 A — 0 2 — 1 1 5 — T O O

Indicates a 2" Model 2300A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

# MODEL 2300A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F								
Set Pressure (P <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
0.87	0.50	6.98	15.4	26.1	58.5	88.4	143	211
1.00	0.58	7.50	16.5	28.0	62.8	95.0	154	227
1.73	1.00	9.85	21.7	36.8	82.5	125	203	298
2.00	1.16	10.6	23.3	39.6	88.6	134	218	320
2.60	1.50	12.1	26.6	45.1	101	153	248	365
3.00	1.73	12.9	28.6	48.4	108	164	266	392
3.46	2.00	13.9	30.7	52.0	116	176	285	420
4.00	2.31	14.9	33.0	55.8	125	189	307	451
6.00	3.47	18.2	40.4	68.2	152	230	374	550
8.00	4.62	21.0	46.6	78.5	175	265	430	633
10.0	5.78	23.4	52.1	87.6	194	295	479	705
12.0	6.93	25.6	57.1	95.7	212	322	523	769
15.0	8.66	28.5	63.8	107	235	358	581	855
20.0	11.6	32.7	73.6	122	268	409	665	979
25.0	14.4	36.3	82.2	136	296	454	736	1084
30.0	17.3	39.5	89.9	148	321	492	799	1177

## 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 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 2300A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

- Read flow capacity at set pressure from table
- Calculate overpressure
- Read "C" factor from table
- Calculate flow capacity

$$\text{Flow} = 125,000 \text{ SCFH}$$

$$\% \text{ OP} = [(7 - 4) / 4] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 125,000 = 108,750 \text{ SCFH}$$

# MODEL 2300A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C								
Set Pressure (P <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
22	2.16	0.20	0.43	0.73	1.65	2.49	4.04	5.95
50	4.90	0.30	0.65	1.11	2.48	3.75	6.08	8.95
75	7.35	0.36	0.80	1.35	3.03	4.58	7.43	10.9
100	9.80	0.42	0.92	1.56	3.49	5.28	8.57	12.6
125	12.3	0.47	1.03	1.74	3.89	5.89	9.56	14.1
150	14.7	0.51	1.13	1.91	4.25	6.44	10.5	15.4
175	17.2	0.55	1.22	2.06	4.58	6.94	11.3	16.6
200	19.6	0.59	1.30	2.19	4.88	7.40	12.0	17.7
225	22.1	0.62	1.38	2.32	5.16	7.84	12.7	18.7
250	24.5	0.65	1.46	2.45	5.43	8.25	13.4	19.7
275	27.0	0.69	1.53	2.56	5.68	8.63	14.0	20.6
300	29.4	0.72	1.59	2.67	5.92	9.00	14.6	21.5
375	36.8	0.80	1.78	2.98	6.57	10.0	16.2	23.9
500	49.0	0.91	2.06	3.42	7.49	11.4	18.6	27.4
625	61.3	1.02	2.30	3.80	8.28	12.7	20.6	30.3
750	73.5	1.11	2.51	4.13	8.97	13.8	22.4	32.9

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 2300A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 3,490 NCMH  
 % OP = [(175 - 100)/100] x 100 = 75%  
 "C" = 0.87  
**Flow = 0.87 x 3,490 = 3,036 NCMH**



# MODEL 2301A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F							
Set Pressure (P <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
1.00	27.1	59.9	104	198	345	529	739
2.00	39.7	87.7	152	296	500	767	1070
3.00	50.1	111	192	379	625	960	1340
4.00	59.5	131	228	456	736	1130	1577
5.00	68.3	151	261	530	838	1286	1794
6.00	76.5	169	293	601	932	1431	1997
7.00	84.3	186	323	670	1022	1568	2188
8.00	91.9	203	352	737	1107	1699	2371
9.00	99.3	219	380	804	1189	1825	2546
10.0	107	235	407	869	1267	1945	2714
11.0	113	250	434	934	1343	2062	2877
12.0	120	265	460	998	1417	2175	3036
13.0	127	280	485	1061	1489	2286	3189
14.0	134	295	510	1124	1559	2393	3339
15.0	140	309	535	1186	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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 2301A
- 4 psig Set Pressure [P<sub>s</sub>]
- 7 psig Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 456,000 SCFH  
 % OP = [(7 - 4)/4] x 100 = 75%  
 "C" = 0.83  
**Flow = 0.83 x 456,000 = 378,480 SCFH**

# MODEL 2301A // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C							
Set Pressure (P <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
0.07	0.80	1.76	3.05	5.83	10.1	15.5	21.7
0.10	0.97	2.13	3.70	7.13	12.2	18.8	26.2
0.15	1.21	2.67	4.64	9.05	15.2	23.4	32.7
0.20	1.43	3.16	5.48	10.8	17.9	27.4	38.3
0.25	1.63	3.60	6.25	12.5	20.3	31.1	43.4
0.30	1.82	4.02	6.98	14.0	22.5	34.5	48.2
0.35	2.00	4.42	7.68	15.6	24.6	37.8	52.7
0.40	2.18	4.81	8.34	17.1	26.6	40.8	57.0
0.45	2.35	5.18	8.99	18.6	28.5	43.8	61.1
0.50	2.51	5.54	9.62	20.0	30.4	46.6	65.1
0.55	2.67	5.89	10.2	21.4	32.2	49.4	68.9
0.60	2.83	6.24	10.8	22.8	33.9	52.0	72.7
0.70	3.13	6.90	12.0	25.6	37.3	57.1	79.8
0.80	3.42	7.55	13.1	28.3	40.4	62.0	86.6
0.90	3.70	8.17	14.2	31.0	43.5	66.7	93.2
1.00	3.98	8.78	15.2	33.6	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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 2301A
- 0.4 barg Set Pressure [P<sub>s</sub>]
- 0.7 barg Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 17,100 NCMH  
 % OP = [(0.7 - 0.4)/0.4] x 100 = 75%  
 "C" = 0.83  
**Flow = 0.83 x 17,100 = 14,193 NCMH**

# MODEL 1300

- Sizes // 2" through 12"
- Vacuum settings // 0.5 oz/in<sup>2</sup> to 12 psig
- Available in aluminum, carbon steel, stainless steel, and other materials
- Modular construction

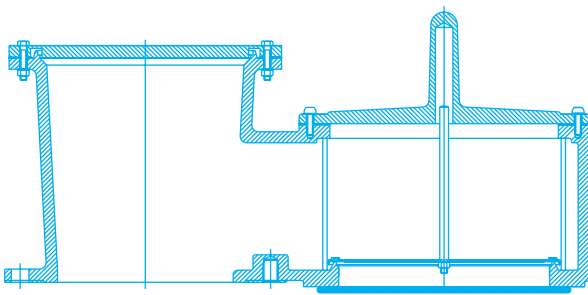


## VACUUM RELIEF VALVE

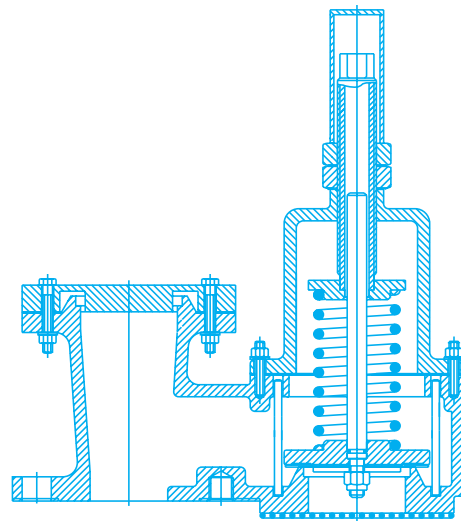
Model 1300A is used when vacuum relief is the only requirement. Intake relief necessary under working conditions is achieved by a spring or weight loaded pallet. This feature of the Model 1300A reduces the possibility of tank damage. The Model 1300A helps to provide increased fire protection and safety. Valve size must be selected to perform required vacuum relief under operating and thermal conditions. Flow curves for vacuum relief are provided.

## SPECIAL FEATURES

Model 1300A offers Groth's special "cushioned air" seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1300A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids vacuum buildup due to binding or clogging of the vent. Metal-to-metal, Buna-N, FKM and other seating diaphragms can be provided when required.

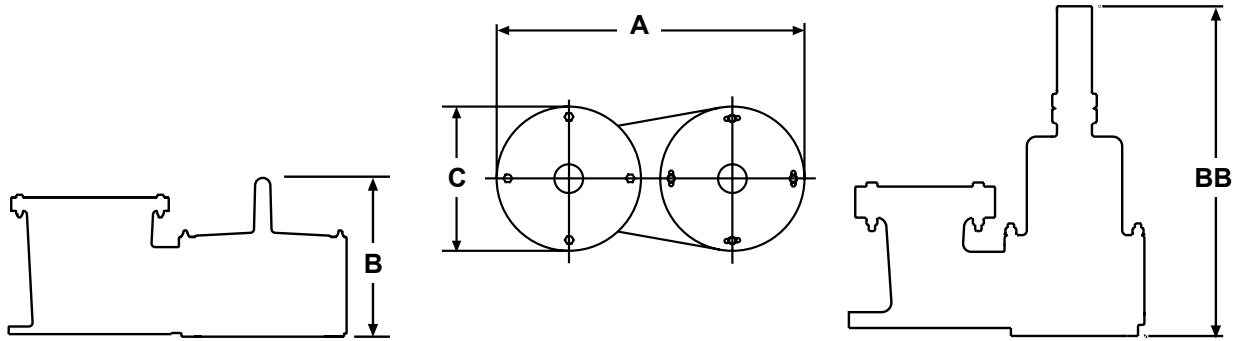


**MODEL 1300A**



**MODEL 1301A**

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

Size <sup>°</sup> (Metric)	Max. Set Vacuum Weight Loaded	Max. Set Vacuum Spring Loaded	Min. Set Vacuum Weight Loaded	Max. W.P. <sup>†</sup> for Min. Vacuum Setting	Min. Vac. Setting for Max. W.P. <sup>‡</sup>	A Length (Metric)	B Height (Metric)	BB Height (Metric)	C Width (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	12 oz/in <sup>2</sup> (52.7 gm/cm <sup>2</sup> )					11.62" (295 mm)	6.87" (174 mm)	14" (356 mm)	6" (152 mm)	15 (7 kg)
3" (80 mm)	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )	12 psig SPRING LOADED PRESSURE (0.84 kg/cm <sup>2</sup> )	*0.5 oz/in <sup>2</sup> WEIGHT LOADED (2.20 gm/cm <sup>2</sup> )	See TPD for Vacuum Settings and MAWP		15.75" (400 mm)	7.75" (196 mm)	16.25" (413 mm)	7.75" (197 mm)	21 (10 kg)
4" (100 mm)	11 oz/in <sup>2</sup> (48.3 gm/cm <sup>2</sup> )					17.25" (438 mm)	9.62" (244 mm)	19.87" (505 mm)	9" (229 mm)	32 (14 kg)
6" (150 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					23.50" (597 mm)	11.87" (301 mm)	27" (686 mm)	12" (305 mm)	61 (28 kg)
8" (200 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					28.50" (724 mm)	15.50" (394 mm)	31.87" (810 mm)	14.50" (368 mm)	81 (37 kg)
10" (250 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					33.25" (845 mm)	18.62" (473 mm)	37.87" (962 mm)	16.50" (419 mm)	121 (55 kg)
12" (300 mm)	16 oz/in <sup>2</sup> (70.3 gm/cm <sup>2</sup> )					37.25" (946 mm)	21.62" (549 mm)	42" (1067 mm)	19" (483 mm)	165 (75 kg)

<sup>†</sup> W.P. = Working Pressure. <sup>‡</sup> On spring loaded valves, change model number. <sup>°</sup> 150# ANSI. drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Fiberglass dimensions on request. 16 oz/in<sup>2</sup> set with spacer. SS set weights-consult factory. \*Some sizes require non-ferrous components to achieve 0.5 oz./in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> </div>	02" Thru 12"	1 = Aluminum 3 = Carbon Steel 5 = Stainless Steel 6 = Vinyl Ester Resin 7 = Furan Z = Special	O = No Options Z = Special Options  O = No Jacket J = Steam Jacket S = Spacer H = Steam Jacket & Spacer  Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM M = Metal-to-Metal Z = Special
1300A Weight Loaded 1301A Spring Loaded		Pallet Material Seat Material Body Material*	

**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 3 0 0 A — 0 2 — 1 1 5 — T O O

Indicates a 2" Model 1300A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

# MODEL 1300A // 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 <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1300A
- 4 InWC Set Vacuum [P<sub>s</sub>]
- 7 InWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 74,000 SCFH

% OV = [(7 - 4)/4] x 100 = 75%

"C" = 0.87

Flow = 0.87 x 74,000 = 64,380 SCFH

# MODEL 1300A // 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 <sub>s</sub> )		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

6" Model 1300A  
100 mmWC Set Vacuum [P<sub>s</sub>]  
175 mmWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 2,080 NCMH  
% OV = [(175 - 100)/100] x 100 = 75%  
"C" = 0.87  
**Flow = 0.87 x 2,080 = 1,810 NCMH**

# MODEL 1301A // 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 <sub>s</sub> )	Size						
psig	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1301A
- 2 psig Set Vacuum [P<sub>s</sub>]
- 3.5 psig Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 166,000 \text{ SCFH}$$

$$\% \text{ OV} = [(3.50 - 2.0) / 2.0] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 166,000 = 137,780 \text{ SCFH}$$

# MODEL 1301A // VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Over-Vacuum (Double Set Vacuum)							
1000 Normal Cubic Meters per Hour at 0° F							
Set Vacuum (P <sub>s</sub> )	Size						
barg	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1301A
- 0.12 barg Set Vacuum [P<sub>s</sub>]
- 0.17 barg Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 4,530 \text{ NCMH}$$

$$\% \text{OV} = [(0.17 - 0.12) / 0.12] \times 100 = 42\%$$

$$"C" = 0.55$$

$$\text{Flow} = 0.55 \times 4,530 = 2,492 \text{ NCMH}$$



# MODEL 1360A

- Sizes // 3" through 14"
- Vacuum settings // 0.5 oz/in<sup>2</sup> to 12 psig
- Available in aluminum, carbon steel, stainless steel, fiberglass and other materials



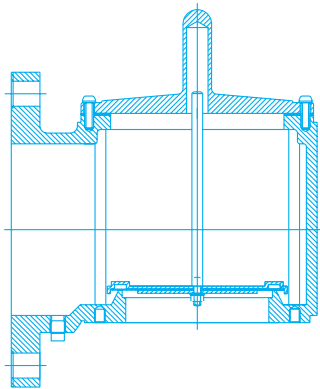
## VACUUM RELIEF VALVE

Model 1360A is used when vacuum relief is the only requirement. The Model 1360A may be side mounted on the tank body or piped in. Intake relief necessary under working conditions is achieved by a spring or weight loaded pallet in the valve housing. The Model 1360A reduces the possibility of tank damage.

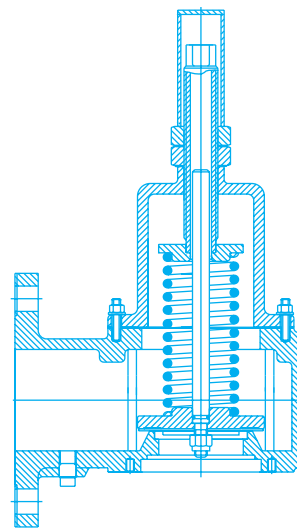
Valve size must be selected to meet required vacuum relief under operating and thermal conditions. Flow curves for vacuum relief are provided.

## SPECIAL FEATURES

Model 1300A offers Groth's special "cushioned Model 1360A offers Groth's special "cushioned air" seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1360A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids vacuum buildup due to binding or clogging of the vent. Metal-to-metal, Buna-N, FKM and other seating diaphragms can be provided when required.

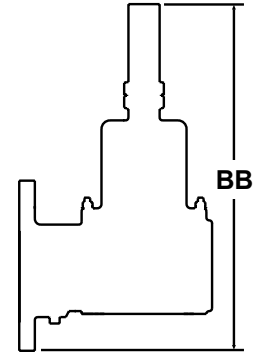
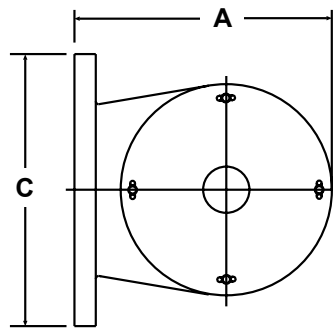
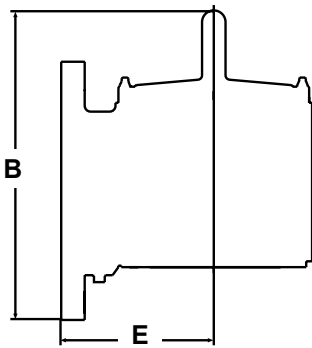


**MODEL 1360A**



**MODEL 1361A**

# SPECIFICATIONS



Size <sup>o</sup> Flange (Metric)	Max. Set Vacuum Weight Loaded	Max. Set Vacuum Spring Loaded	Min. Set Vacuum Weight Loaded	Max. W.P. <sup>†</sup> for Min. Vacuum Setting	Min. Vac. Setting vs. Max. W.P. <sup>†</sup>	A Length (Metric)	B Height (Metric)	C Width (Metric)	E (Metric)	BB Height (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
3" (80 mm)	11 oz/in2 (48.2 gm/cm2)					8.62" (219 mm)	9.25" (235 mm)	7.50" (191 mm)	5.50" (140 mm)	16.25" (413 mm)	12 (6 kg)
4" (100 mm)	13 oz/in2 (57.0 gm/cm2)	12 psig SPRING LOADED VACUUM (0.84 kg/cm <sup>2</sup> )	*0.5 oz/in <sup>2</sup> WEIGHT LOADED (2.20 gm/cm <sup>2</sup> )	See TPD for Vacuum Settings and MAWP		10" (254 mm)	11.50" (292 mm)	9" (229 mm)	6" (152 mm)	19.75" (502 mm)	17 (8 kg)
6" (150 mm)	16 oz/in2 (70.3 gm/cm2)					11" (279 mm)	14.25" (362 mm)	11" (279 mm)	6.50" (165 mm)	24.62" (625 mm)	23 (10 kg)
8" (200 mm)	16 oz/in2 (70.3 gm/cm2)					14.50" (368 mm)	17.75" (451 mm)	13.50" (343 mm)	8.50" (216 mm)	32.75" (832 mm)	42 (19 kg)
10" (250 mm)	16 oz/in2 (70.3 gm/cm2)					18" (457 mm)	21.25" (540 mm)	16" (406 mm)	10.75" (273 mm)	38" (965 mm)	71 (32 kg)
12" (300 mm)	16 oz/in2 (70.3 gm/cm2)					20.75" (527 mm)	25.75" (654 mm)	19" (483 mm)	12.50" (318 mm)	45.37" (1152 mm)	83 (38 kg)
14" (350 mm)	16 oz/in2 (70.3 gm/cm2)					24.75" (629 mm)	29.25" (743 mm)	21" (533 mm)	15" (381 mm)	48.75" (1238 mm)	118 (54 kg)

<sup>†</sup> W.P. = Working Pressure. <sup>‡</sup> On spring loaded valves, change model number. <sup>o</sup> 150# R.F. drilling compatibility F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Fiberglass dimensions on request. 16 oz/in<sup>2</sup> set with spacer. SS set weights-consult factory. \*Some sizes require non-ferrous components to achieve 0.5 oz./in<sup>2</sup> setting.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div> <p>1360A Weight Loaded 1361A Spring Loaded</p> <p>03" Thru 14"</p> <p>1 = Aluminum 3 = Carbon Steel 5 = Stainless Steel 6 = Vinyl Ester Resin 7 = Furan Z = Special</p> <p> <input type="checkbox"/> = No Options  <input type="checkbox"/> = Special Options  <input type="checkbox"/> = No Jacket  <input type="checkbox"/> = Steam Jacket  <input type="checkbox"/> = Spacer  <input type="checkbox"/> = Steam Jacket &amp; Spacer  <input type="checkbox"/> = Diaphragm Material (Seat):  <input type="checkbox"/> = Buna-N  <input type="checkbox"/> = Fluoropolymer  <input type="checkbox"/> = FKM  <input type="checkbox"/> = Special                 </p>			

**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.

**EXAMPLE** 1 3 6 0 A — 0 3 — 1 1 5 — T O O

Indicates a 3" Model 1360A with Aluminum Body and Seat, Stainless Steel Pallet, Fluoropolymer Seat Diaphragm, and no other options.

# MODEL 1360A // 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 <sub>s</sub> )		Size						
InWC	oz/in <sup>2</sup>	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)	14" (350 mm)
0.87	0.50	8.01	14.8	27.8	57.4	99.4	136	182
1.00	0.58	8.61	15.9	29.9	61.6	107	146	195
1.73	1.00	11.3	20.8	39.3	80.9	140	192	257
2.00	1.16	12.1	22.4	42.2	86.9	151	207	276
2.60	1.50	13.8	25.5	48.0	98.9	171	235	314
3.00	1.73	14.8	27.3	51.5	106	184	252	337
3.46	2.00	15.9	29.3	55.3	114	197	271	361
4.00	2.31	17.1	31.5	59.3	122	212	291	388
6.00	3.47	20.8	38.4	72.3	149	258	354	472
8.00	4.62	23.9	44.0	83.0	171	297	407	542
10.0	5.78	26.6	49.0	92.3	190	330	452	603
12.0	6.93	28.9	53.4	101	207	359	492	657
15.0	8.66	32.1	59.1	111	230	398	546	728
20.0	11.6	36.5	67.3	127	261	453	621	829
25.0	14.4	40.2	74.1	140	288	499	684	913
30.0	17.3	43.4	80.0	151	311	538	738	985

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1360A
- 4 InWC Set Vacuum [P<sub>s</sub>]
- 7 InWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 59,300 SCFH  
 $\% \text{ OV} = [(7 - 4) / 4] \times 100 = 75\%$   
 "C" = 0.87  
**Flow = 0.87 x 59,300 = 51,591 SCFH**

# MODEL 1360A // 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 <sub>s</sub> )		Size						
mmWC	mb	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)	14" (350 mm)
22	2.16	0.23	0.42	0.78	1.62	2.80	3.84	5.12
50	4.90	0.34	0.63	1.18	2.43	4.21	5.77	7.70
75	7.35	0.41	0.76	1.44	2.97	5.14	7.05	9.41
100	9.80	0.48	0.88	1.66	3.42	5.92	8.12	10.8
125	12.3	0.53	0.98	1.85	3.81	6.61	9.06	12.1
150	14.7	0.58	1.07	2.02	4.16	7.22	9.89	13.2
175	17.2	0.63	1.16	2.18	4.49	7.78	10.7	14.2
200	19.6	0.67	1.23	2.32	4.78	8.29	11.4	15.2
225	22.1	0.71	1.30	2.45	5.06	8.77	12.0	16.0
250	24.5	0.74	1.37	2.58	5.32	9.22	12.6	16.9
275	27.0	0.78	1.43	2.70	5.56	9.64	13.2	17.6
300	29.4	0.81	1.49	2.81	5.79	10.0	13.8	18.4
375	36.8	0.90	1.65	3.12	6.42	11.1	15.3	20.4
500	49.0	1.02	1.88	3.55	7.31	12.7	17.4	23.2
625	61.3	1.13	2.08	3.91	8.06	14.0	19.1	25.5
750	73.5	1.21	2.24	4.22	8.70	15.1	20.7	27.6

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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**

"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—Flow Capacity Calculation

- 6" Model 1360A
- 100 mmWC Set Vacuum [P<sub>s</sub>]
- 175 mmWC Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 1,660 \text{ NCMH}$$

$$\% \text{OV} = [(175 - 100) / 100] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 1,660 = 1,444 \text{ NCMH}$$

# MODEL 1361A // 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 <sub>s</sub> )	Size						
psig	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)	14" (350 mm)
1.00	22.6	49.8	86.4	196	322	494	689
1.10	23.6	52.0	90.2	204	336	516	720
1.20	24.5	54.0	93.8	213	349	536	748
1.30	25.4	56.0	97.2	220	362	556	775
1.40	26.2	57.8	100	227	374	574	801
1.50	27.0	59.6	103	234	385	591	825
1.75	28.8	63.5	110	250	411	631	880
2.00	30.4	67.0	116	264	433	665	928
2.25	31.8	70.1	122	276	453	696	971
2.50	33.1	72.8	126	287	471	723	1009
2.75	34.1	75.2	131	296	486	747	1042
3.00	35.1	77.3	134	304	500	767	1070
3.25	35.9	79.0	137	311	511	785	1095
3.50	36.5	80.5	140	317	520	799	1115
>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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1361A
- 2 psig Set Vacuum [P<sub>s</sub>]
- 3.5 psig Flowing Vacuum [P<sub>f</sub>]

- Read flow capacity at set vacuum from table
- Calculate over-vacuum
- Read "C" factor from table
- Calculate flow capacity

$$\text{Flow} = 116,000 \text{ SCFH}$$

$$\% \text{ OV} = [(3.50 - 2.0) / 2.0] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 116,000 = 96,280 \text{ SCFH}$$

# MODEL 1361A // 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 <sub>s</sub> )	Size						
barg	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)	14" (350 mm)
0.07	0.66	1.46	2.53	5.74	9.39	14.4	20.2
0.10	0.77	1.71	2.96	6.72	11.0	16.9	23.7
0.11	0.81	1.78	3.09	7.00	11.5	17.6	24.7
0.12	0.84	1.85	3.20	7.26	11.9	18.3	25.6
0.13	0.86	1.91	3.31	7.50	12.3	18.9	26.4
0.14	0.89	1.96	3.41	7.72	12.6	19.4	27.2
0.15	0.91	2.02	3.50	7.93	13.0	19.9	27.9
0.16	0.94	2.07	3.58	8.12	13.3	20.4	28.6
0.17	0.96	2.11	3.66	8.30	13.6	20.9	29.3
0.18	0.98	2.15	3.73	8.47	13.9	21.3	29.8
0.19	0.99	2.19	3.80	8.62	14.1	21.7	30.4
0.20	1.01	2.23	3.86	8.76	14.3	22.0	30.9
0.22	1.04	2.29	3.97	9.01	14.7	22.7	31.7
0.24	1.06	2.34	4.06	9.21	15.1	23.2	32.4
>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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{OV} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 6" Model 1361A
- 0.12 barg Set Vacuum [P<sub>s</sub>]
- 0.17 barg Flowing Vacuum [P<sub>f</sub>]

1. Read flow capacity at set vacuum from table
2. Calculate over-vacuum
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 3,200 NCMH  
 $\% \text{OV} = [(0.17 - 0.12) / 0.12] \times 100 = 42\%$   
 "C" = 0.55  
**Flow = 0.55 x 3,200 = 1,760 NCMH**

# MODEL 5000

- Sizes // 2" through 12"
- Available in carbon steel, stainless steel, and other materials
- High flow capacity



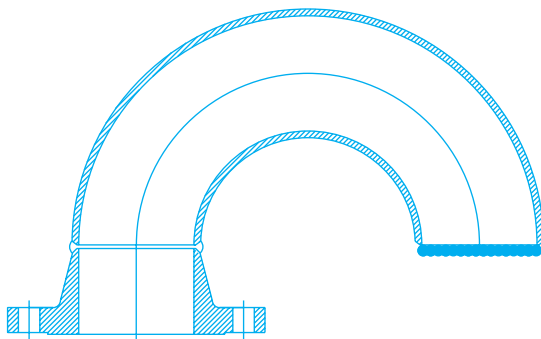
**MODEL 5100**

## FREE VENTS

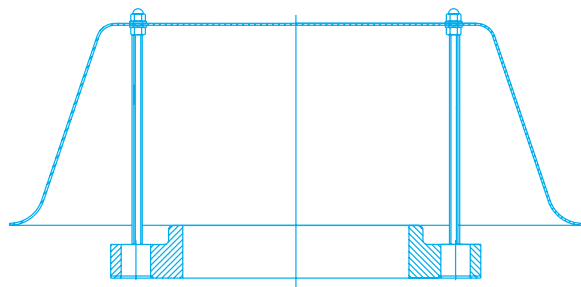
Model 5100 Series are designed to be used on tanks containing non-volatile liquids and on vent pipe extremities. Groth Free Vents offer efficient flow capacity for the protection of the tank.

## SPECIAL FEATURES

Model 5100 Series are built of corrosion resistant materials throughout. A wire mesh screen prevents foreign matter from entering the tank or pipe opening. Weather hoods are easily removable for inspection of vent and wire mesh screen.



**MODEL 5000**



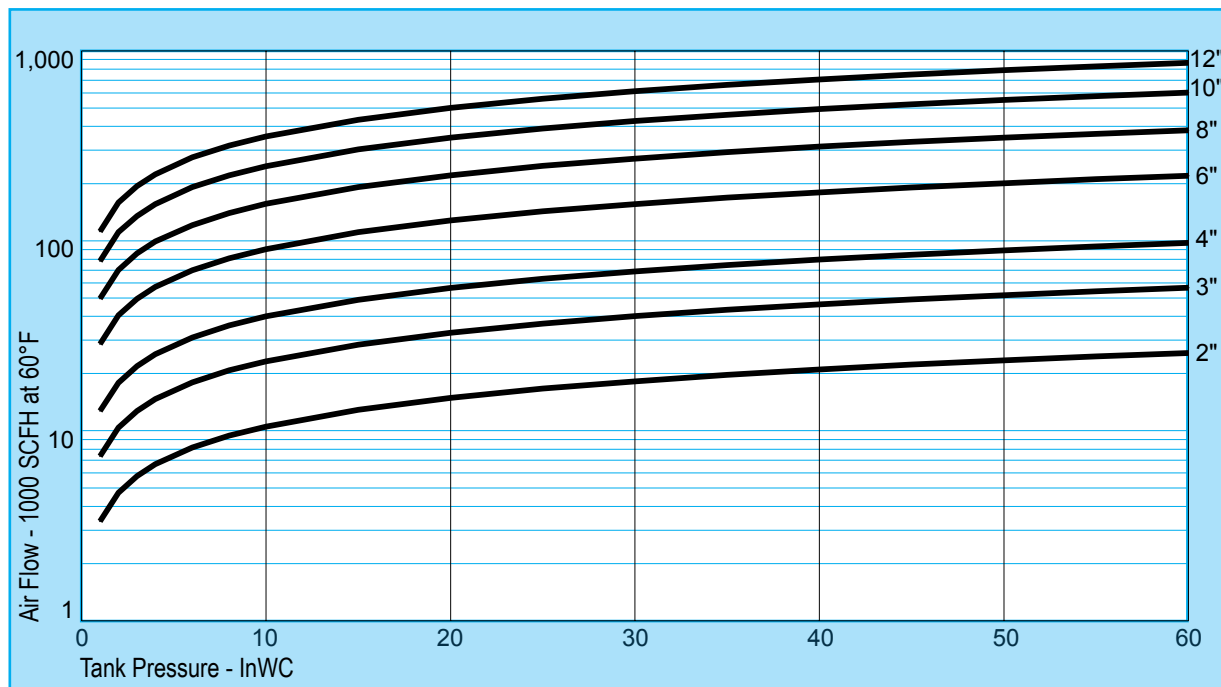
**MODEL 5100**





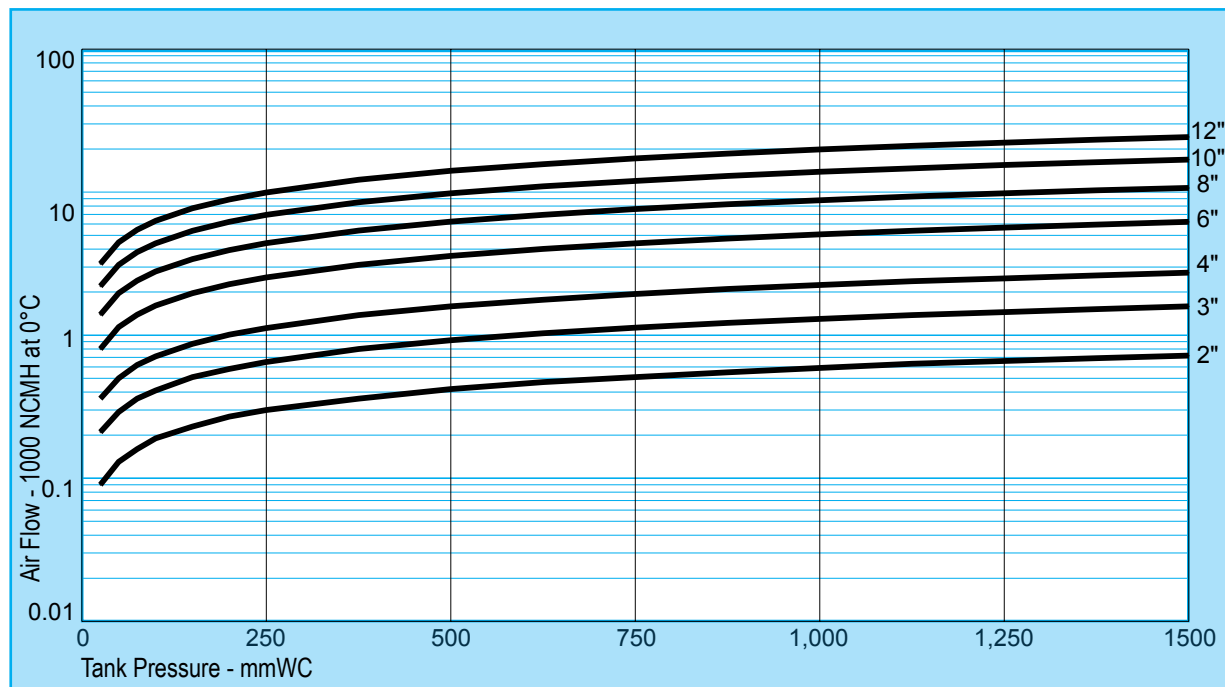
# MODEL 5000 // FLOW CAPACITY

Air Flow - 1000 Standard Cubic Feet per Hour at 60°F								
Tank Pressure		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
1	0.58	3.34	7.34	12.7	28.6	49.6	78.2	112
2	1.16	4.72	10.4	17.9	40.5	70.2	111	159
3	1.73	5.78	12.7	21.9	49.5	85.9	135	194
4	2.31	6.67	14.7	25.3	57.2	99.2	156	224
6	3.47	8.17	18.0	31.0	70.0	121	192	275
8	4.62	9.44	20.8	35.8	80.9	140	221	317
10	5.78	10.5	23.2	40.0	90.4	157	247	354
15	8.66	12.9	28.4	48.9	111	192	303	434
20	11.6	14.9	32.8	56.5	128	221	349	501
25	14.4	16.7	36.6	63.1	143	248	390	560
30	17.3	18.2	40.1	69.1	156	271	427	613
35	20.2	19.7	43.3	74.6	169	293	461	662
40	23.1	21.0	46.3	79.7	180	313	493	707
45	26.0	22.3	49.1	84.5	191	332	523	750
50	28.9	23.5	51.7	89.1	201	349	551	790
55	31.8	24.6	54.2	93.4	211	366	577	828
60	34.7	25.7	56.6	97.5	220	382	603	864



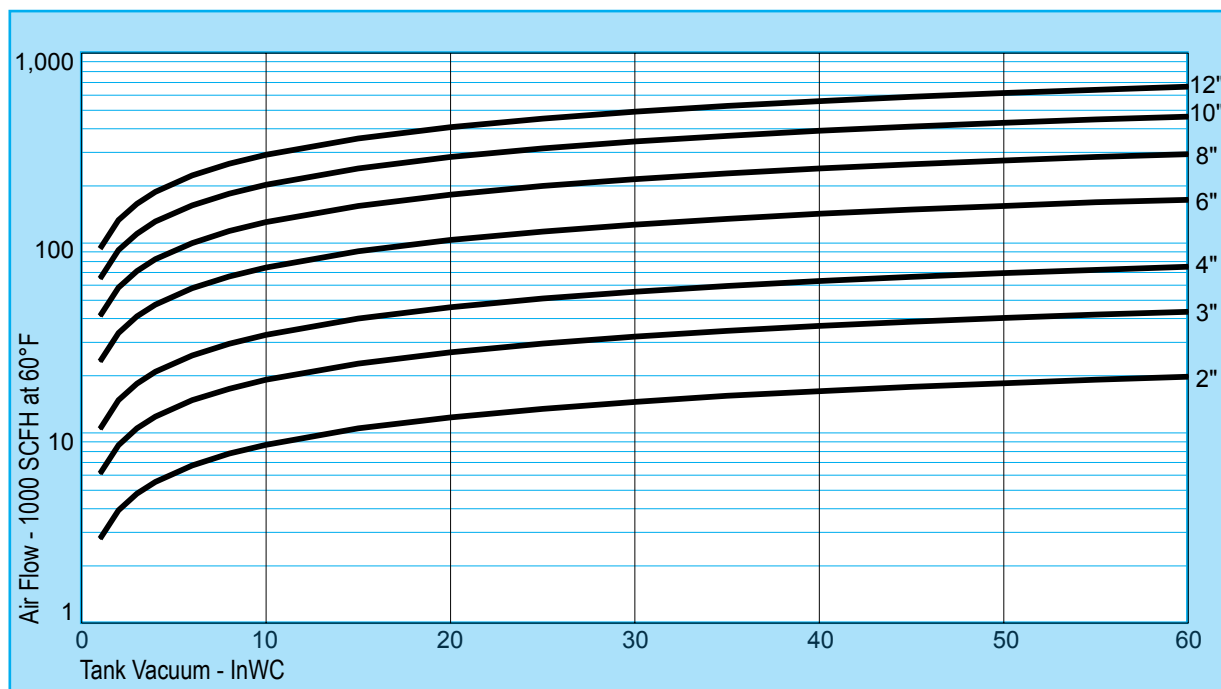
# MODEL 5000 // FLOW CAPACITY

Air Flow - 1000 Normal Cubic Meters per Hour at 0°C								
Tank Pressure		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
25	2.45	0.09	0.21	0.36	0.80	1.39	2.20	3.15
50	4.90	0.13	0.29	0.50	1.14	1.97	3.11	4.46
75	7.35	0.16	0.36	0.62	1.39	2.41	3.81	5.46
100	9.80	0.19	0.41	0.71	1.61	2.79	4.40	6.30
150	14.7	0.23	0.51	0.87	1.97	3.41	5.38	7.72
200	19.6	0.27	0.58	1.01	2.27	3.94	6.21	8.91
250	24.5	0.30	0.65	1.12	2.54	4.41	6.95	9.96
375	36.8	0.36	0.80	1.38	3.11	5.39	8.50	12.2
500	49.0	0.42	0.92	1.59	3.59	6.23	9.81	14.1
625	61.3	0.47	1.03	1.77	4.01	6.96	11.0	15.7
750	73.5	0.51	1.13	1.94	4.39	7.62	12.0	17.2
875	85.8	0.55	1.22	2.10	4.74	8.22	13.0	18.6
1000	98.0	0.59	1.30	2.24	5.07	8.79	13.9	19.9
1125	110	0.63	1.38	2.38	5.37	9.32	14.7	21.1
1250	123	0.66	1.45	2.50	5.66	9.82	15.5	22.2
1375	135	0.69	1.52	2.62	5.94	10.3	16.2	23.3
1500	147	0.72	1.59	2.74	6.20	10.7	16.9	24.3



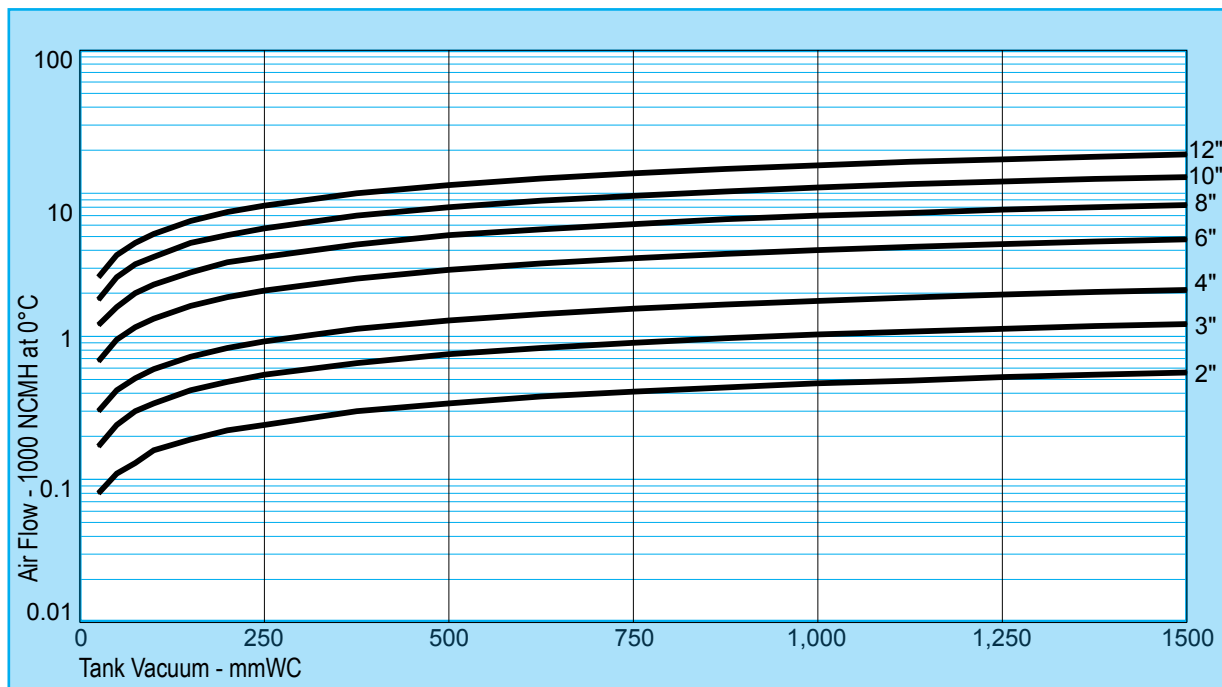
# MODEL 5000 // FLOW CAPACITY

Air Flow - 1000 Standard Cubic Feet per Hour at 60°F								
Tank Vacuum		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
1	0.58	2.78	6.11	10.5	23.8	41.3	65.1	93.4
2	1.16	3.92	8.63	14.9	33.6	58.3	91.9	132
3	1.73	4.80	10.6	18.2	41.1	71.3	112	161
4	2.31	5.53	12.2	21.0	47.4	82.3	130	186
6	3.47	6.76	14.9	25.6	57.9	100	158	227
8	4.62	7.79	17.1	29.5	66.7	116	182	262
10	5.78	8.68	19.1	32.9	74.4	129	203	292
15	8.66	10.6	23.2	40.0	90.5	157	247	355
20	11.6	12.1	26.6	45.9	104	180	284	407
25	14.4	13.4	29.6	51.0	115	200	315	452
30	17.3	14.6	32.2	55.4	125	217	343	491
35	20.2	15.7	34.5	59.4	134	233	367	527
40	23.1	16.6	36.6	63.1	143	247	390	559
45	26.0	17.5	38.5	66.4	150	260	411	589
50	28.9	18.3	40.3	69.5	157	272	430	616
55	31.8	19.1	42.0	72.3	164	284	447	641
60	34.7	19.8	43.5	75.0	169	294	463	665



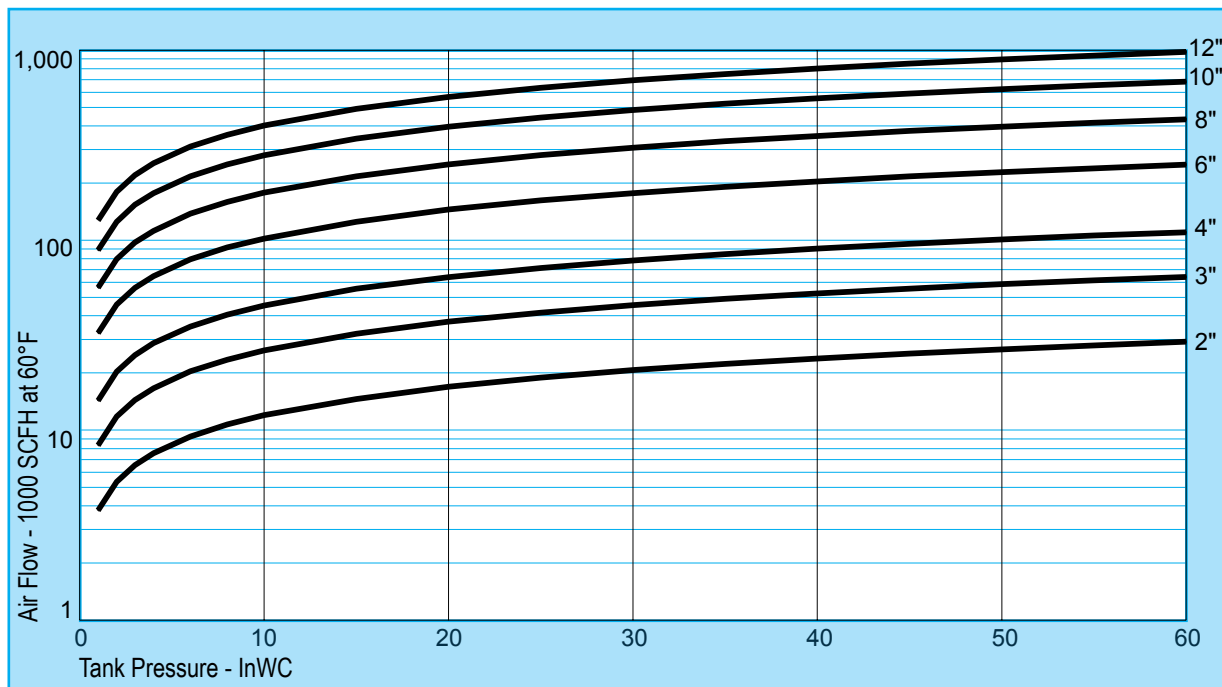
# MODEL 5000 // FLOW CAPACITY

Air Flow - 1000 Normal Cubic Meters per Hour at 0°C								
Tank Vacuum		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
25	2.5	0.08	0.17	0.30	0.67	1.2	1.8	2.6
50	4.9	0.11	0.24	0.42	0.95	1.6	2.6	3.7
75	7.4	0.13	0.30	0.51	1.16	2.0	3.2	4.5
100	9.8	0.16	0.34	0.59	1.33	2.3	3.6	5.2
150	14.7	0.19	0.42	0.72	1.63	2.8	4.5	6.4
200	19.6	0.22	0.48	0.83	1.88	3.3	5.1	7.4
250	24.5	0.24	0.54	0.92	2.09	3.6	5.7	8.2
375	36.8	0.30	0.65	1.13	2.54	4.4	7.0	10.0
500	49.0	0.34	0.75	1.29	2.92	5.1	8.0	11.4
625	61.3	0.38	0.83	1.43	3.24	5.6	8.9	12.7
750	73.5	0.41	0.90	1.56	3.52	6.1	9.6	13.8
875	85.8	0.44	0.97	1.67	3.78	6.6	10.3	14.8
1000	98.0	0.47	1.03	1.77	4.01	7.0	11.0	15.7
1125	110	0.49	1.08	1.87	4.23	7.3	11.6	16.6
1250	123	0.52	1.13	1.96	4.42	7.7	12.1	17.3
1375	135	0.54	1.18	2.04	4.60	8.0	12.6	18.0
1500	147	0.56	1.22	2.11	4.77	8.3	13.0	18.7



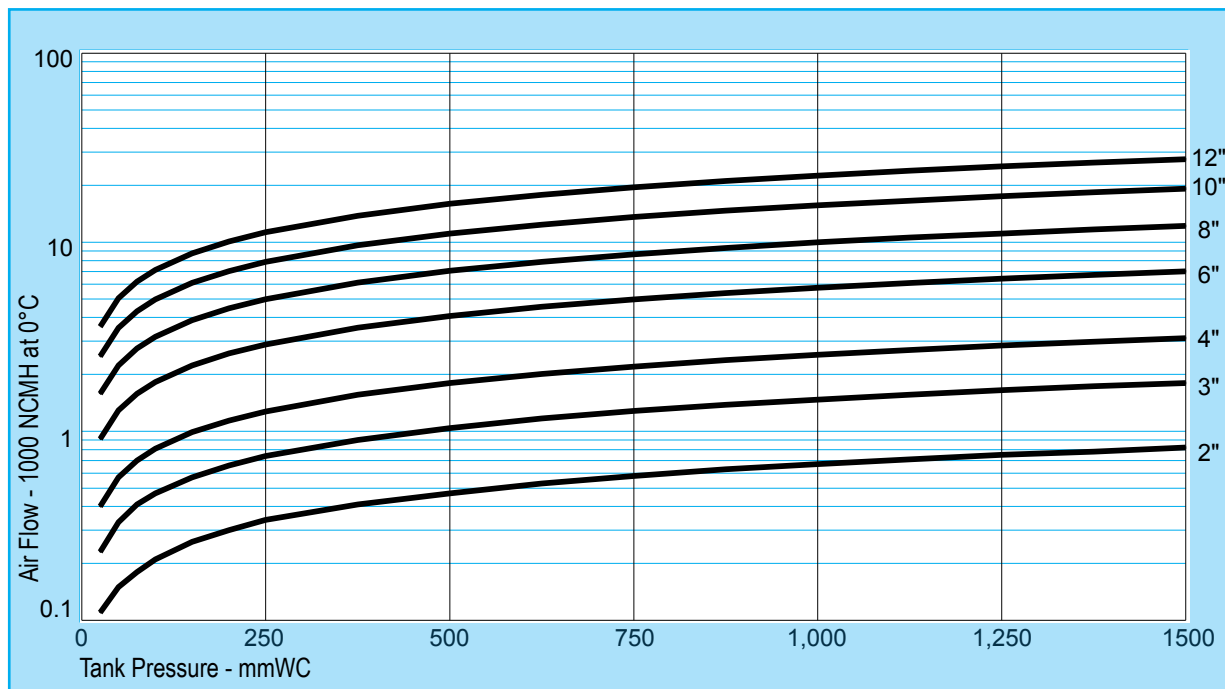
# MODEL 5100 // FLOW CAPACITY

Air Flow - 1000 Standard Cubic Feet per Hour at 60°F								
Tank Pressure		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
1	0.58	3.78	8.32	14.3	32.4	56.2	88.6	127
2	1.16	5.35	11.8	20.3	45.8	79.5	125	180
3	1.73	6.55	14.4	24.8	56.1	97.4	154	220
4	2.31	7.56	16.6	28.7	64.8	112	177	254
6	3.47	9.26	20.4	35.1	79.4	138	217	311
8	4.62	10.7	23.5	40.5	91.7	159	251	359
10	5.78	12.0	26.3	45.3	102	178	280	402
15	8.66	14.6	32.2	55.5	125	217	343	492
20	11.6	16.9	37.2	64.0	145	251	396	568
25	14.4	18.9	41.5	71.5	162	281	442	634
30	17.3	20.7	45.5	78.3	177	307	484	695
35	20.2	22.3	49.1	84.6	191	332	523	750
40	23.1	23.8	52.4	90.4	204	354	559	801
45	26.0	25.3	55.6	95.8	217	376	592	850
50	28.9	26.6	58.6	101	228	396	624	895
55	31.8	27.9	61.4	106	239	415	654	938
60	34.7	29.2	64.1	110	250	433	683	980



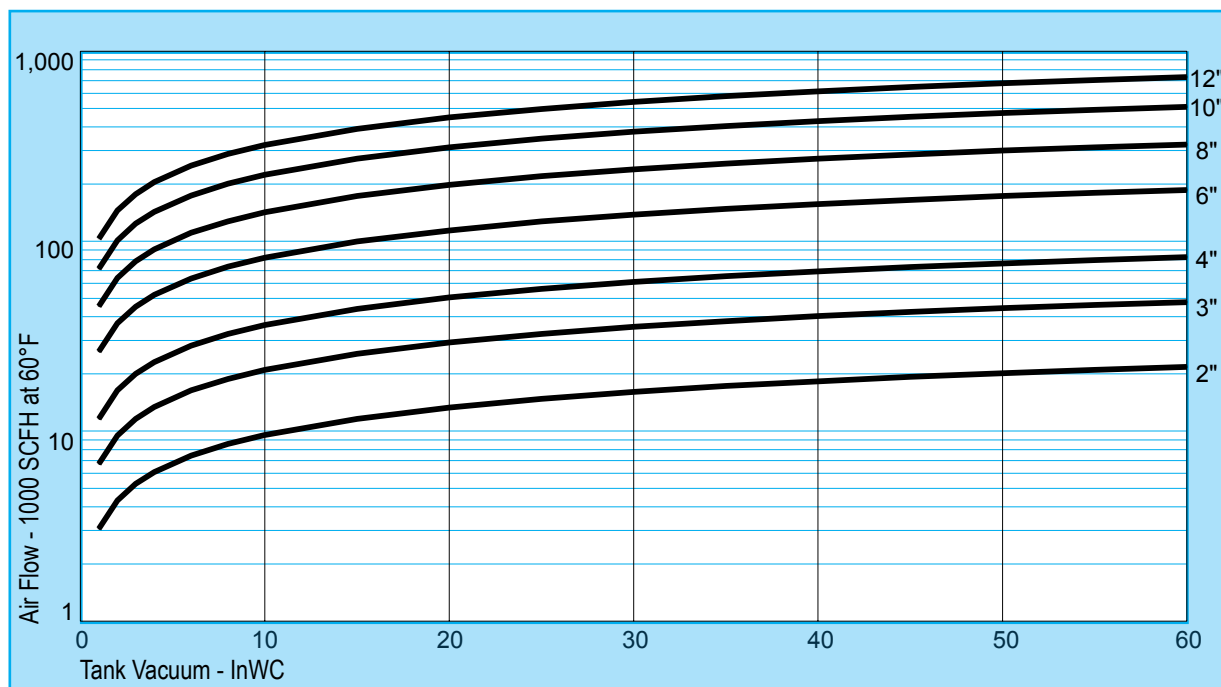
# MODEL 5100 // FLOW CAPACITY

Air Flow - 1000 Normal Cubic Meters per Hour at 0°C								
Tank Pressure		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
25	2.45	0.11	0.23	0.40	0.91	1.58	2.49	3.57
50	4.90	0.15	0.33	0.57	1.29	2.23	3.52	5.05
75	7.35	0.18	0.41	0.70	1.58	2.74	4.31	6.19
100	9.80	0.21	0.47	0.81	1.82	3.16	4.98	7.14
150	14.7	0.26	0.57	0.99	2.23	3.87	6.10	8.75
200	19.6	0.30	0.66	1.14	2.58	4.47	7.04	10.1
250	24.5	0.34	0.74	1.27	2.88	4.99	7.87	11.3
375	36.8	0.41	0.90	1.56	3.53	6.11	9.64	13.8
500	49.0	0.47	1.04	1.80	4.07	7.06	11.1	16.0
625	61.3	0.53	1.17	2.01	4.55	7.88	12.4	17.8
750	73.5	0.58	1.28	2.20	4.98	8.63	13.6	19.5
875	85.8	0.63	1.38	2.38	5.38	9.32	14.7	21.1
1000	98.0	0.67	1.47	2.54	5.74	10.0	15.7	22.5
1125	110	0.71	1.56	2.69	6.09	10.6	16.6	23.9
1250	123	0.75	1.65	2.84	6.42	11.1	17.5	25.2
1375	135	0.78	1.73	2.97	6.73	11.7	18.4	26.4
1500	147	0.82	1.80	3.11	7.02	12.2	19.2	27.5



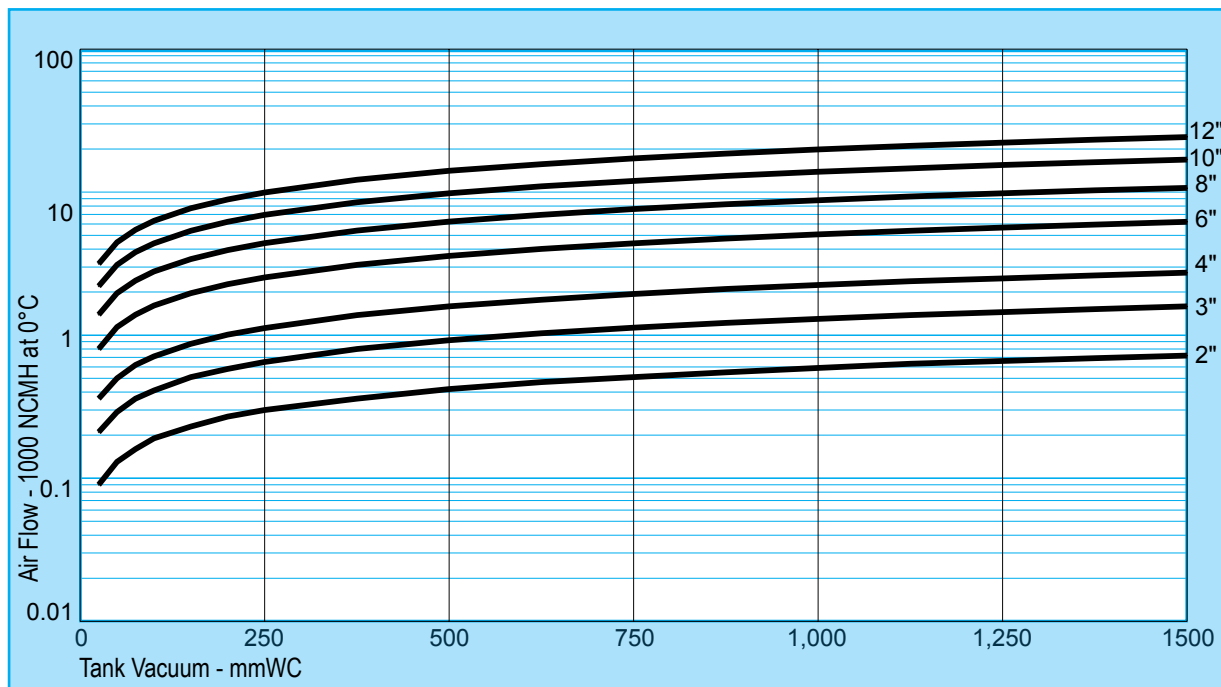
# MODEL 5100 // FLOW CAPACITY

Air Flow - 1000 Standard Cubic Feet per Hour at 60°F								
Tank Vacuum		Size						
InWC	oz/in <sup>2</sup>	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
1	0.58	3.06	6.72	11.6	26.2	45.4	71.6	103
2	1.16	4.32	9.49	16.4	37.0	64.1	101	145
3	1.73	5.28	11.6	20.0	45.2	78.5	124	177
4	2.31	6.09	13.4	23.1	52.2	90.5	143	205
6	3.47	7.44	16.4	28.2	63.7	111	174	250
8	4.62	8.56	18.8	32.5	73.4	127	201	288
10	5.78	9.55	21.0	36.2	81.8	142	224	321
15	8.66	11.6	25.5	44.0	99.6	173	272	390
20	11.6	13.3	29.3	50.5	114	198	312	448
25	14.4	14.8	32.5	56.1	127	220	347	497
30	17.3	16.1	35.4	61.0	138	239	377	541
35	20.2	17.3	37.9	65.4	148	256	404	580
40	23.1	18.3	40.3	69.4	157	272	429	615
45	26.0	19.3	42.4	73.1	165	286	452	648
50	28.9	20.2	44.4	76.4	173	300	473	678
55	31.8	21.0	46.2	79.6	180	312	492	705
60	34.7	21.8	47.8	82.5	186	323	510	731



# MODEL 5100 // FLOW CAPACITY

Air Flow - 1000 Normal Cubic Meters per Hour at 0°C								
Tank Vacuum		Size						
mmWC	mb	2" (50 mm)	3" (80 mm)	4" (100 mm)	6" (150 mm)	8" (200 mm)	10" (250 mm)	12" (300 mm)
25	2.45	0.09	0.19	0.33	0.74	1.28	2.01	2.89
50	4.90	0.12	0.27	0.46	1.04	1.80	2.84	4.08
75	7.35	0.15	0.33	0.56	1.27	2.21	3.48	4.99
100	9.80	0.17	0.38	0.65	1.47	2.54	4.01	5.75
150	14.7	0.21	0.46	0.79	1.79	3.11	4.90	7.02
200	19.6	0.24	0.53	0.91	2.06	3.58	5.64	8.09
250	24.5	0.27	0.59	1.02	2.30	3.99	6.29	9.02
375	36.8	0.33	0.72	1.24	2.80	4.85	7.65	11.0
500	49.0	0.37	0.82	1.42	3.21	5.57	8.78	12.6
625	61.3	0.42	0.91	1.58	3.56	6.18	9.74	14.0
750	73.5	0.45	1.00	1.71	3.88	6.72	10.6	15.2
875	85.8	0.49	1.07	1.84	4.16	7.21	11.4	16.3
1000	98.0	0.52	1.13	1.95	4.41	7.65	12.1	17.3
1125	110	0.54	1.19	2.06	4.65	8.06	12.7	18.2
1250	123	0.57	1.25	2.15	4.86	8.43	13.3	19.1
1375	135	0.59	1.30	2.24	5.06	8.78	13.8	19.9
1500	147	0.61	1.35	2.32	5.25	9.10	14.3	20.6





# MODEL 6000

- Sizes // 4" through 10"
- Available in aluminum, carbon steel, stainless steel, and other materials
- Available in free lift or lockdown cover
- Designed to assure uniform seating

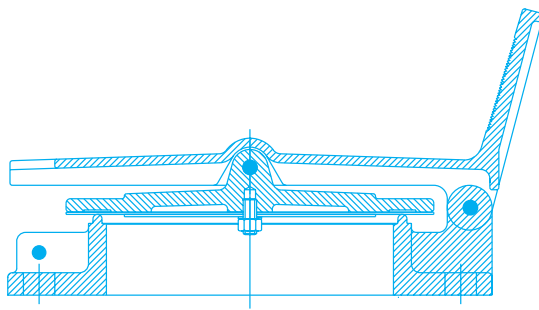


## GAUGE HATCH

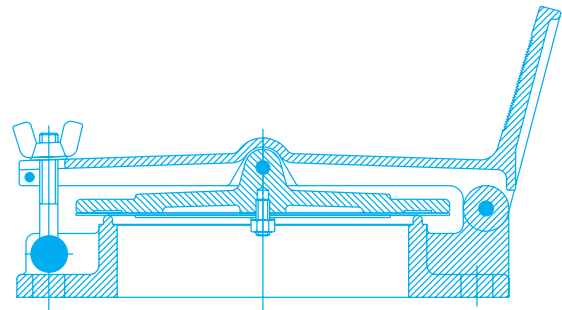
Model 6000 Series provide access for gauging or obtaining product samples from storage tanks. The Model 6000 also provides pressure relief as emergency venting. The Model 6100 incorporates a positive cover hold down which assures a premium tight seal on tanks with internal pressures up to 3 psig. Gasketed covers are recommended on tanks with high pressure settings. Model 6100 offers lockdown capability.

## SPECIAL FEATURES

Model 6000 Series is designed with a serrated foot lever surface to avoid foot slippage when opening. This model permits the use of both hands during gauging or sampling. Gravity will close the cover upon removal of pressure on the foot treadle. Groth's special "cushioned-air" seating or metal-to-metal seatings available.

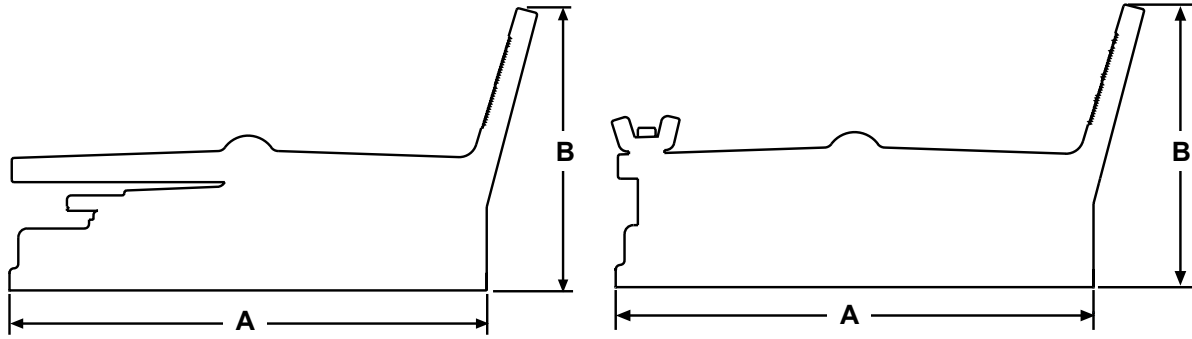


**MODEL 6000**



**MODEL 6100**

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

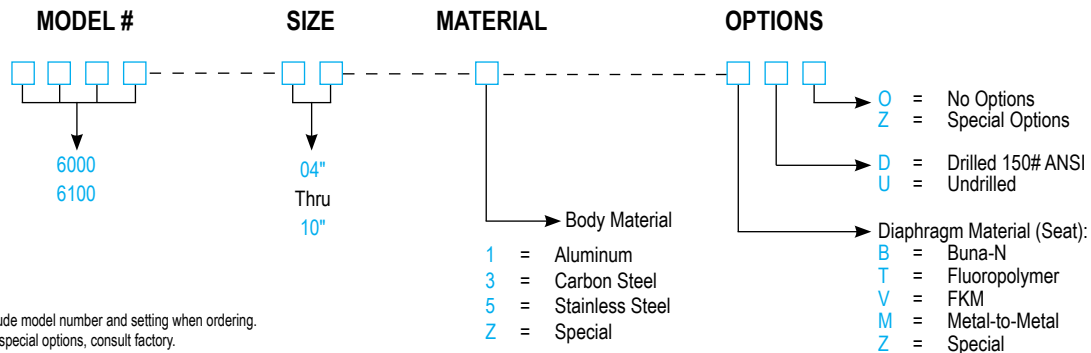
Size (Metric)	A Width (Metric)	B Height (Metric)	Approx. Ship Wt. Lbs. Aluminum
4" (100 mm)	10" (250 mm)	6" (152 mm)	7 (3 kg)
6" (150 mm)	12.50" (318 mm)	8" (203 mm)	10 (5 kg)
8" (200 mm)	15" (381 mm)	8" (203 mm)	13 (6 kg)
10" (250 mm)	17.75" (451 mm)	9" (229 mm)	17 (8 kg)

‡ When gauge hatch includes the lockdown feature, change model number to 6100.

† 150 # ANSI. drilling compatibility, F.F. on aluminum, carbon steel, and stainless steel alloys.

## HOW TO ORDER

For easy ordering, select proper model numbers



### NOTES

- Include model number and setting when ordering.
- For special options, consult factory.

**EXAMPLE**    6 0 0 0 — 0 4 — 1 — T D O

Indicates a 4" Model 6000 with Aluminum Body, Fluoropolymer Seat Diaphragm, Drilled Flange and no other options.

# MODEL 2000A

- Sizes // 16", 20" and 24"
- Pressure settings // 1.5 - 16 oz/in<sup>2</sup>
- Vacuum settings // 0.5 - 4 oz/in<sup>2</sup>
- Available in carbon steel, stainless steel, fiberglass and other materials
- Easy access manway combined with emergency relief

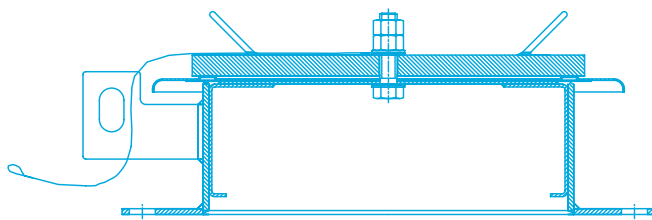


## EMERGENCY PRESSURE RELIEF VALVE

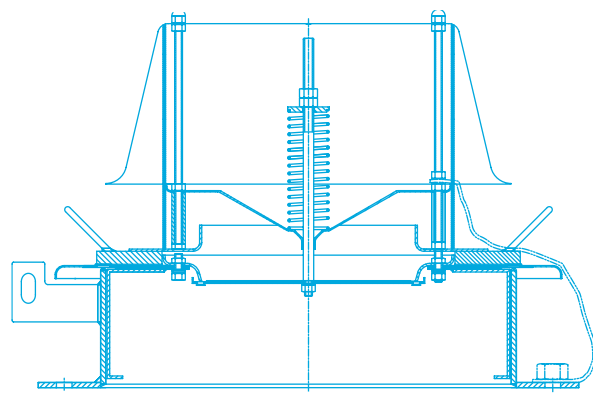
Model 2000A is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure relief valve on the tank. The valve protects the tank against rupture or explosion that could result from excessive internal pressures caused by fire, etc. As excessive pressure builds up, the Groth Model 2000A relieves excess pressure, then reseats when pressure has been dissipated. Removable stops can be provided which restrict the lift of the cover.

## SPECIAL FEATURES

Model 2000A is built of corrosion resistant materials throughout. A grounding cable connects the head and flange. Groth's special fluoropolymer "cushioned air" pallet and peripheral guiding insures proper alignment and integrity of seating. Model 2050A incorporates a vacuum breaker for added vacuum relief capability.

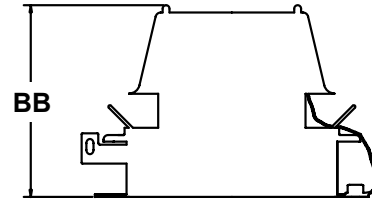
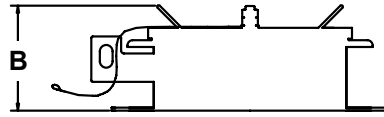
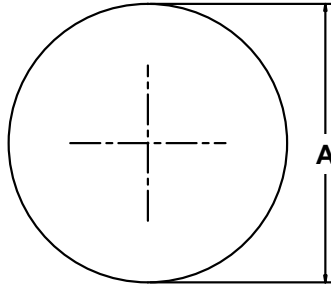


MODEL 2000A



MODEL 2050A

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

MODEL 2000A					
Size* (Metric)	Minimum Pressure Setting Weight Loaded	Maximum Pressure Setting Weight Loaded	A Width (Metric)	B Height† (Metric)	Approx. Ship Wt. Lbs. at min. setting
16" (406 mm)	1.50 oz/in <sup>2</sup> (6.5 mbar)	16 oz/in <sup>2</sup> (69 mbar)	23.50" (597 mm)	11" (279 mm)	62 (28 kg)
20" (508 mm)	1.50 oz/in <sup>2</sup> (6.5 mbar)	16 oz/in <sup>2</sup> (69 mbar)	27.50" (699 mm)	11" (279 mm)	88 (40 kg)
24" (610 mm)	1.50 oz/in <sup>2</sup> (6.5 mbar)	16 oz/in <sup>2</sup> (69 mbar)	32" (813 mm)	11" (279 mm)	114 (52 kg)

MODEL 2050A						
Size* (Metric)	Minimum Setting		Maximum Settings	A Width (Metric)	BB Height Closed (Metric)	Approx. Ship Wt. Lbs. at min. setting
	Pressure Weight Loaded	Vacuum Spring Loaded	Pressure <sup>s</sup> <sup>o</sup> Weight Loaded			
16" (406 mm)	2.6 oz/in <sup>2</sup> (11.2 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	23.50" (597 mm)	17.75" (451 mm)	69 (31 kg)
20" (508 mm)	2.1 oz/in <sup>2</sup> (9.1 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	27.50" (699 mm)	17.75" (451 mm)	95 (43 kg)
24" (610 mm)	1.9 oz/in <sup>2</sup> (8.2 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	32" (813 mm)	17.75" (451 mm)	120 (55 kg)

\* 150# ANSI. or API 650 drilling compatibility. "Caution" — See IOM when mounting to API 650 flange. <sup>s</sup> Maximum pressure setting on 16" size = 4 oz/in<sup>2</sup>  
<sup>o</sup> Max. vacuum setting is 4 oz./in<sup>2</sup>      † Fiberglass dimensions on request.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> </div>	<div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div>	<div style="text-align: center;"> <input type="checkbox"/> </div>	<div style="text-align: center;"> <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div>
2000A Pressure Only 2050A Pressure/Vacuum	16" 20" 24"	Body Material* 3 = Carbon Steel 5 = Stainless Steel 6 = Vinyl Ester Resin 7 = Furan Z = Special	O = No Options Z = Special Options O = No Jacket J = Steam Jacket 1 = ANSI 150# drilled 2 = A.P.I. 650 drilled Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM Z = Special

**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 carbon steel bodies.

**EXAMPLE**    2 0 0 0 A — 2 0 — 5 — T 1 J O

Indicates a 20" Model 2000A with Stainless Steel Body, Fluoropolymer Seat Diaphragm, ANSI 150# drilled, Steam Jacket and no other options.

Air Flow Capacity at 100% Overpressure (Double Set Pressure/Vacuum)						
1000 Standard Cubic Feet per Hour at 60° F						
Set Pressure / Vacuum (P <sub>s</sub> )		Size				
InWC	oz/in <sup>2</sup>	16" Pressure	20" Pressure	24" Pressure	All Vacuum*	2050 Only
0.87	0.50*				65	For Vacuum Flow, Use the "C1" Factor Table Located with Model 2100
1.73	1.00*				91	
2.60	1.50	422	668	970		
3.00	1.73	454	718	1043		
3.46	2.00*	487	771	1120	129	
4.00	2.31	524	829	1204		
4.33	2.50	545	862	1252		
5.00	2.89	585	926	1345		
5.19	3.00*	597	944	1371	157	
6.93	4.00*	689	1090	1583	180	
10.4	6.00	843	1334	1937		
13.9	8.00	973	1539	2236		
17.3	10.00	1087	1720	2498		
20.8	12.00	1190	1883	2735		
24.2	14.00	1284	2033	2952		
27.7	16.00	1372	2172	3154		

\* Standard vacuum settings, consult factory for other settings.

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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 = 0.95

"C4" Factor Table - Pressure Only										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.70	0.71	0.71	0.72	0.72	0.73	0.73	0.74	0.74	0.75
20	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.79	0.79	0.80
30	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85
40	0.85	0.86	0.86	0.87	0.87	0.88	0.88	0.89	0.89	0.90
50	0.90	0.90	0.90	0.91	0.91	0.91	0.91	0.91	0.92	0.92
60	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.94	0.94
70	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.96	0.96
80	0.96	0.96	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.98
90	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00

### Example—Flow Capacity Calculation

- 20" Model 2000A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

- Read flow capacity at set pressure from table
- Calculate overpressure
- Read "C" factor from table
- Calculate flow capacity

Flow = 829,000 SCFH  
 % OP = [(7 - 4) / 4] x 100 = 75%  
 "C" = 0.95  
**Flow = 0.95 x 829,000 = 787,550 SCFH**

Air Flow Capacity at 100% Overpressure (Double Set Pressure/Vacuum)						
1000 Normal Cubic Meters per Hour at 0° C						
Set Pressure / Vacuum (P <sub>s</sub> )		Size				
mmWC	mb	16" Pressure	20" Pressure	24" Pressure	All Vacuum*	2050 Only
22	2.16*				1.83	For Vacuum Flow, Use the "C1" Factor Table Located with Model 2100
44	4.31*				2.58	
88	8.63*	13.8	21.9	31.7	3.63	
100	9.80	14.7	23.3	33.8		
132	12.9*	16.9	26.8	38.9	4.42	
176	17.3*	19.5	30.9	44.9	5.08	
200	19.6	20.8	32.9	47.8		
250	24.5	23.2	36.8	53.4		
300	29.4	25.5	40.3	58.5		
350	34.3	27.5	43.5	63.2		
400	39.2	29.4	46.5	67.5		
500	49.0	32.8	51.9	75.4		
600	58.8	35.9	56.9	82.6		
700	68.6	38.8	61.4	89.1		

\* Standard vacuum settings, consult factory for other settings.

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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 = 0.95

"C4" Factor Table - Pressure Only										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.70	0.71	0.71	0.72	0.72	0.73	0.73	0.74	0.74	0.75
20	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.79	0.79	0.80
30	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85
40	0.85	0.86	0.86	0.87	0.87	0.88	0.88	0.89	0.89	0.90
50	0.90	0.90	0.90	0.91	0.91	0.91	0.91	0.91	0.92	0.92
60	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.94	0.94
70	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.96	0.96
80	0.96	0.96	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.98
90	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00

### Example—Flow Capacity Calculation

- 20" Model 2000A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 23,300 NCMH  
 $\% \text{ OP} = [(175 - 100) / 100] \times 100 = 75\%$   
 "C" = 0.95  
**Flow = 0.95 x 23,300 = 22,135 NCMH**

# MODEL 2100

- Sizes // 16", 20" and 24"
- Pressure settings // 1 - 15 psig
- Available in carbon steel, stainless steel and other materials
- Unique design // spring loaded cover

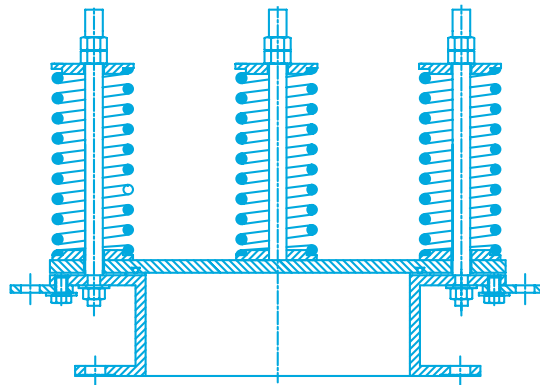


## EMERGENCY PRESSURE RELIEF VALVE

Model 2100 is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure relief valve on the tank. The valve protects the tank against rupture or explosion that could result from excessive internal pressures caused by fire, etc. As excessive pressure builds up, Model 2100 relieves, then reseats when the overpressure has been dissipated.

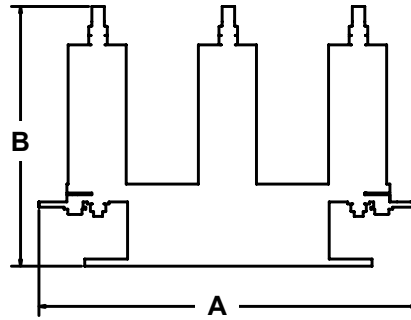
## SPECIAL FEATURES

Model 2100 is built of corrosion resistant materials throughout. It is designed with independently adjustable springs which load the cover and keep the valve tightly sealed until set pressure is reached. The Model 2100 features a FKM seating to ensure a tight seal.



MODEL 2100

# SPECIFICATIONS



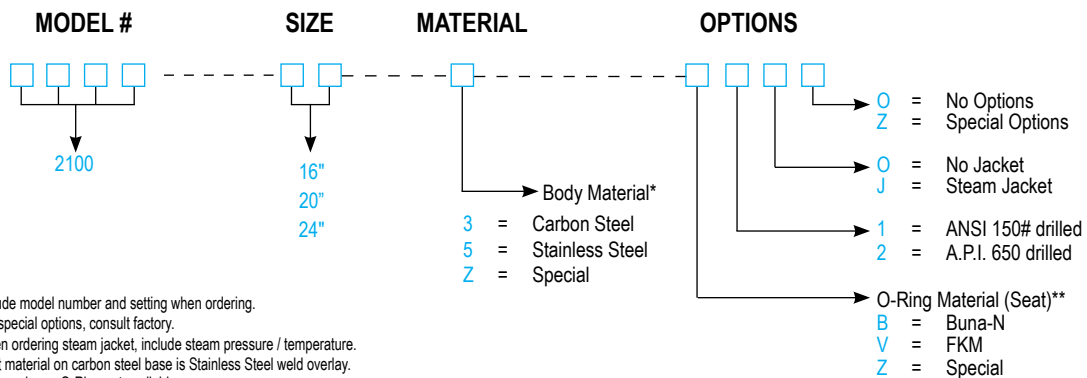
Specifications subject to change without notice. Certified dimensions available upon request.

Size Flange (Metric)	Minimum Setting Pressure Spring Loaded	Maximum Setting Pressure Spring Loaded	A Width (Metric)	B Height† (Metric)	Approx. Ship Wt. Lbs.	
					(At min. set.)	(At max. set.)
16" (406 mm)	1 psig (69 mbar)	15 psig (1.03 bar)	36.75" (933 mm)	23" (584 mm)	310 (141 kg)	490 (223 kg)
20" (508 mm)	1 psig (69 mbar)	15 psig (1.03 bar)	36.75" (933 mm)	23" (584 mm)	335 (152 kg)	500 (227 kg)
24" (610 mm)	1 psig (69 mbar)	15 psig (1.03 bar)	40.75" (1035 mm)	27" (686 mm)	420 (190 kg)	670 (304 kg)

\* 150# ANSI, drilling compatibility, or API 650 drilled flange option

## 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.
  - \* Seat material on carbon steel base is Stainless Steel weld overlay.
  - \*\* Fluoropolymer O-Ring not available

**EXAMPLE**    2 1 0 0 — 2 0 — 5 — V 1 J O

Indicates a 20" Model 2000A with Stainless Steel Body, FKM Seat O-Ring, ANSI 150# drilled, Steam Jacket and no other options.



# MODEL 2100 // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure)			
1000 Standard Cubic Feet per Hour at 60° F			
Set Pressure (P <sub>s</sub> )	Size		
	16" (406 mm)	20" (508 mm)	24" (610 mm)
psig			
1.00	609	952	1371
2.00	857	1340	1930
3.00	1045	1633	2352
4.00	1201	1877	2704
5.00	1337	2089	3009
6.00	1458	2278	3282
7.00	1568	2450	3529
8.00	1669	2608	3757
9.00	1763	2755	3969
10.0	1851	2893	4167
11.0	1934	3022	4353
12.0	2012	3145	4530
13.0	2087	3261	4697
14.0	2158	3372	4857
15.0	2226	3478	5010

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 20" Model 2100
- 4 psig Set Pressure [P<sub>s</sub>]
- 7 psig Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 1,877,000 SCFH  
 % OP = [(7 - 4)/4] x 100 = 75%  
 "C" = 0.83  
**Flow = 0.83 x 1,877,000 = 1,557,910 SCFH**

# MODEL 2100 // PRESSURE RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0°C			
Set Pressure (P <sub>s</sub> )	Size		
	16" (406 mm)	20" (508 mm)	24" (610 mm)
barg			
0.07	17.8	27.8	39.9
0.10	21.2	33.1	47.6
0.15	25.8	40.4	58.1
0.20	29.7	46.5	66.8
0.25	33.1	51.8	74.5
0.30	36.2	56.6	81.3
0.35	38.9	60.9	87.5
0.40	41.5	64.9	93.3
0.45	43.9	68.6	98.6
0.50	46.1	72.1	104
0.55	48.2	75.4	108
0.60	50.2	78.5	113
0.70	53.9	84.3	121
0.80	57.3	89.6	129
0.90	60.5	94.6	136
1.00	63.4	99.2	143

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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

"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—Flow Capacity Calculation

- 20" Model 2100
- 0.4 barg Set Pressure [P<sub>s</sub>]
- 0.7 barg Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 64,900 \text{ NCMH}$$

$$\% \text{ OP} = [(0.7 - 0.4) / 0.4] \times 100 = 75\%$$

$$"C" = 0.83$$

$$\text{Flow} = 0.83 \times 64,900 = 53,867 \text{ NCMH}$$

# MODEL 2400A//2450A

- Sizes // 16", 20" and 24"
- Pressure settings // 1.5 - 8 oz/in<sup>2</sup>
- Vacuum settings // 0.5 - 4 oz/in<sup>2</sup>
- Hinged with lift stop for positive reseating
- Available in carbon steel, stainless steel, and other materials
- Easy access manway combined with emergency relief

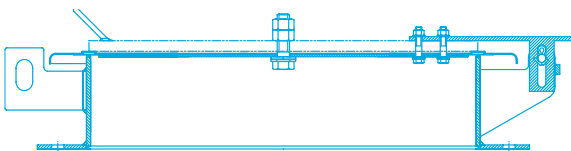


## EMERGENCY PRESSURE RELIEF VALVE

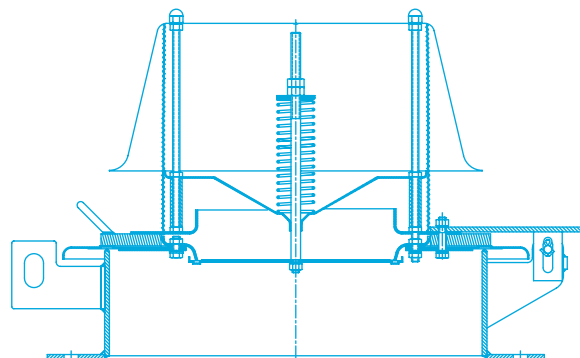
Series 2400A is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure/vacuum relief valve on the tank. The valve protects the tank against rupture or internal pressures caused by fire exposure. Series 2400A is designed to be self-closing. As excessive pressure builds up, Series 2400A relieves, then reseats when overpressure has been dissipated. Counter weights are available for lower settings.

## SPECIAL FEATURES

Model 2000A is built of corrosion resistant materials throughout. Groth's special fluoropolymer "cushioned air" pallet and peripheral guiding insures proper alignment and integrity of seating. Model 2450A incorporates a vacuum breaker for added vacuum relief capability.

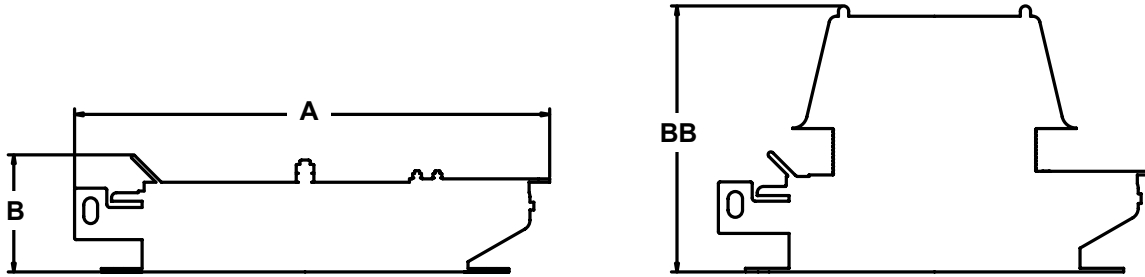


MODEL 2400A



MODEL 2450A

# SPECIFICATIONS



Specifications subject to change without notice. Certified dimensions available upon request.

## MODEL 2400A

Size <sup>†</sup> (Metric)	Standard Setting Pressure Weight Loaded	Maximum Setting Pressure Weight Loaded	A Width (Metric)	B Height (At max. setting)		Approx. Ship Wt. Lbs. at min. setting
				Closed (Metric)	Open (Metric)	
16" (406 mm)	1.5 oz/in <sup>2</sup> (6.5 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	23.50" (597 mm)	11" (279 mm)	20.50" (521 mm)	72 (33 kg)
20" (508 mm)	1.5 oz/in <sup>2</sup> (6.5 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	28.75" (730 mm)	11" (279 mm)	22.50" (572 mm)	98 (45 kg)
24" (610 mm)	1.5 oz/in <sup>2</sup> (6.5 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	33.25" (845 mm)	11" (279 mm)	24.50" (622 mm)	124 (56 kg)

## MODEL 2450A

Size <sup>†</sup> (Metric)	Standard Setting		Maximum Setting	A Width (Metric)	B Height		Approx. Ship Wt. Lbs. at min. setting
	Pressure Weight Loaded <sup>†</sup>	Vacuum Spring Loaded	Pressure Weight Loaded <sup>§</sup>		Closed (Metric)	Open (Metric)	
16" (406 mm)	2.7 oz/in <sup>2</sup> (11.6 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	23.50" (597 mm)	18.50" (470 mm)	24.50" (622 mm)	79 (36 kg)
20" (508 mm)	2.3 oz/in <sup>2</sup> (9.9 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	28.75" (730 mm)	18.50" (470 mm)	26" (660 mm)	105 (48 kg)
24" (610 mm)	2.0 oz/in <sup>2</sup> (8.6 mbar)	0.5 oz/in <sup>2</sup> (2.2 mbar)	8 oz/in <sup>2</sup> (34.5 mbar)	33.25" (845 mm)	18.50" (470 mm)	27.50" (699 mm)	130 (59 kg)

\* 150# ANSI. or API 650 drilling compatibility. † Minimum pressure setting 1.0 oz/in<sup>2</sup> on special application.

§ Maximum pressure setting on 16" size = 4 oz/in<sup>2</sup>. Fiberglass dimensions on request.

"Caution" — See IOM when mounting to API 650 flange. ° Max. vacuum setting is 4 oz./in<sup>2</sup>. \*\*Minimum pressure setting 1.5 oz/in<sup>2</sup> on special application.

## HOW TO ORDER

For easy ordering, select proper model numbers

MODEL #	SIZE	MATERIAL	OPTIONS
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> </div> <div style="text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div>			
2400A Pressure Only 2450A Pressure/Vacuum	16" 20" 24"	Body Material* 3 = Carbon Steel 5 = Stainless Steel Z = Special	O = No Options Z = Special Options O = No Jacket J = Steam Jacket 1 = ANSI 150# drilled 2 = A.P.I. 650 drilled Diaphragm Material (Seat): B = Buna-N T = Fluoropolymer V = FKM Z = Special

**NOTES**

- Include model number and setting when ordering.
- For special options, consult factory.
- When ordering steam jacket, include steam pressure / temperature.
- \* Seat material on carbon steel base is Stainless Steel weld overlay.

**EXAMPLE** 2400A—20—5—T1JO

Indicates a 20" Model 2400A with Stainless Steel Body, Fluoropolymer Seat Diaphragm, ANSI 150# drilled, Steam Jacket and no other options.

Air Flow Capacity at 100% Overpressure (Double Set Pressure/Vacuum)						
1000 Standard Cubic Feet per Hour at 60° F						
Set Pressure/Vacuum (P <sub>s</sub> )		Size				
InWC	oz/in <sup>2</sup>	16" Pressure	20" Pressure	24" Pressure	All Vacuum*	2050 Only
0.87	0.50*				65	For Vacuum Flow, Use the "C1" Factor Table Located with Model 2100
1.73	1.00*				91	
2.60	1.50	422	668	970		
3.00	1.73	454	718	1043		
3.46	2.00*	487	771	1120	129	
4.00	2.31	524	829	1204		
4.33	2.50	545	862	1252		
5.00	2.89	585	926	1345		
5.19	3.00*	597	944	1371	157	
6.93	4.00*	689	1090	1583	180	
10.4	6.00	843	1334	1937		
13.9	8.00	973	1539	2236		

\* Standard vacuum settings, consult factory for other settings.

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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 = 0.95

"C4" Factor Table - Pressure Only										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.70	0.71	0.71	0.72	0.72	0.73	0.73	0.74	0.74	0.75
20	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.79	0.79	0.80
30	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85
40	0.85	0.86	0.86	0.87	0.87	0.88	0.88	0.89	0.89	0.90
50	0.90	0.90	0.90	0.91	0.91	0.91	0.91	0.91	0.92	0.92
60	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.94	0.94
70	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.96	0.96
80	0.96	0.96	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.98
90	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00

### Example—Flow Capacity Calculation

- 20" Model 2400A
- 4 InWC set pressure [P<sub>s</sub>]
- 7 InWC flowing pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 829,000 SCFH

% OP = [(7 - 4)/4] x 100 = 75%

"C" = 0.95

Flow = 0.95 x 829,000 = 787,550 SCFH

# 2400A/2450A // PRESSURE/ VACUUM RELIEF CAPACITY

Air Flow Capacity at 100% Overpressure (Double Set Pressure/Vacuum)						
1000 Normal Cubic Meters per Hour at 0° C						
Set Pressure/Vacuum (P <sub>s</sub> )		Size				
mmWC	mb	16" Pressure	20" Pressure	24" Pressure	All Vacuum*	2050 Only
22	2.16*				1.83	For Vacuum Flow, Use the "C1" Factor Table Located with Model 2100
44	4.31*				2.58	
88	8.63*	13.8	21.9	31.7	3.63	
100	9.80	14.7	23.3	33.8		
132	12.9*	16.9	26.8	38.9	4.42	
176	17.3*	19.5	30.9	44.9	5.08	
200	19.6	20.8	32.9	47.8		
250	24.5	23.2	36.8	53.4		
300	29.4	25.5	40.3	58.5		
350	34.3	27.5	43.5	63.2		

\* Standard vacuum settings, consult factory for other settings.

## 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.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\% \text{ OP} = [(P_f - P_s) / P_s] \times 100$$

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

### 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 = 0.95

"C4" Factor Table - Pressure Only										
%OP	0	1	2	3	4	5	6	7	8	9
10	0.70	0.71	0.71	0.72	0.72	0.73	0.73	0.74	0.74	0.75
20	0.75	0.76	0.76	0.77	0.77	0.78	0.78	0.79	0.79	0.80
30	0.80	0.81	0.81	0.82	0.82	0.83	0.83	0.84	0.84	0.85
40	0.85	0.86	0.86	0.87	0.87	0.88	0.88	0.89	0.89	0.90
50	0.90	0.90	0.90	0.91	0.91	0.91	0.91	0.91	0.92	0.92
60	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.94	0.94
70	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.96	0.96
80	0.96	0.96	0.96	0.97	0.97	0.97	0.97	0.97	0.98	0.98
90	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00

### Example—Flow Capacity Calculation

- 20" Model 2400A
- 100 mmWC Set Pressure [P<sub>s</sub>]
- 175 mmWC Flowing Pressure [P<sub>f</sub>]

1. Read flow capacity at set pressure from table
2. Calculate overpressure
3. Read "C" factor from table
4. Calculate flow capacity

$$\text{Flow} = 23,300 \text{ NCMH}$$

$$\% \text{ OP} = [(175 - 100) / 100] \times 100 = 75\%$$

$$"C" = 0.95$$

$$\text{Flow} = 0.95 \times 23,300 = 22,135 \text{ NCMH}$$

# FIBERGLASS RELIEF VALVES

- Groth provides fiberglass products for corrosive service
- Available Available in Series 1200A, 1300A, 2000A and others



## FIBERGLASS SERIES 1200A, 1300A, 2000A AND OTHERS

Fiberglass valves are used the same as their counterparts manufactured in metal, primarily on aboveground storage tank installations. Fiberglass construction can be used where highly corrosive and toxic liquids are being stored. The fiberglass series design will protect the tank from damage created by overpressuring or excessive vacuum. Costly product evaporation losses due to normal tank “breathing” are greatly reduced. Retention of product vapors reduces the possibility of atmospheric contamination.

## SPECIAL FEATURES

Fiberglass valves offer Groth’s special “cushioned air” seating. Superior performing fluoropolymer seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. These valves have a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valves. These fiberglass valves may be spring loaded when required for use on blanketed tank or other type installations requiring higher settings. To insure the proper alignment of seating surfaces there is peripheral guiding and a center stabilizing stem.

# FIBERGLASS RELIEF VALVES

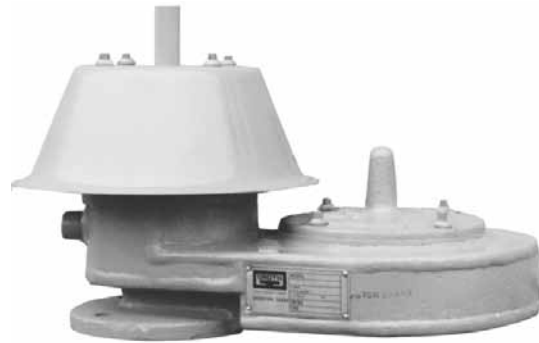
FIBERGLASS WITH VINYL ESTER RESIN #411		FIBERGLASS WITH FURAN RESIN	
RESISTANT		RESISTANT	
<p><b>ACIDS:</b> Acetic Acrylic Boric Chromic (20%) Formic Hydrochloric Hydrofluoric * Nitric (&lt;40%) Perchloric Phosphoric Sulfuric (75%)</p> <p><b>SALTS:</b> Alum Ammonium Chloride Calcium Chloride Ferric Chloride Magnesium Sulfate Sodium Chloride Sodium Chromate</p> <p><b>BLEACHING AGENTS:</b> Calcium Chlorate Calcium Hypochlorite Chlorine Dioxide Chlorine Water Hydrogen Peroxide Potassium Permanganate Sodium Chlorate Sodium Hypochlorite</p>	<p><b>BASES:</b> Potassium Hydroxide Sodium Hydroxide * Ammonium Hydroxide * Ammonium Carbonate Potassium Carbonate * Sodium Carbonate *</p> <p><b>WATER:</b> Deminerlized Distilled</p> <p><b>OTHERS:</b> Alcohols Alum Chlorohydroxide Glycerin Sulfonated Detergents Urea-Ammonium Nitrate Fertilizers</p>	<p><b>ACIDS:</b> Acetic Acrylic Chlorophenol Hydrochloric  <b>BASES:</b> Aniline Diethylamine Potassium Carbonate  <b>SALTS:</b> Alum Ammonium Bromide Calcium Chloride  <b>WATER:</b> Deminerlized  <b>SOLVENTS:</b> Acetone Benzene Carbon Disulfide Carbon Tetrachloride Chlorobenzene Ethanol Ethyl Acetate Ethylene Dichloride  <b>OTHERS:</b> Acrylonitrile Benzyl Chloride Cyclohexanone Formalin</p>	<p>Nitric (5%) Phosphoric Sulfonic Sulfuric (25%, 50%)  Sodium Carbonate Sodium Hydroxide (5%, 50%)  Ferric Chloride Magnesium Sulfate Sodium Chromate  Distilled  Methanol Methyl Ethyl Ketone Methyl Isobutyl Ketone Perchloroethylene Toluene Trichloroethylene Xylene  Pulp Mill Liquors Styrene Toluene Diisocyanate</p>
NON RESISTANT		NON RESISTANT	
Solvents Oleum	Phenol Bromine Furfural	Bleaching Agents Free Halogens	Peroxides
* Synthetic Veil should be used in inner layer.			

- Dimensional drawings on request.
- Chemical resistance information provided by Dow Chemical (Vinyl Ester Resin) and Qua Corr (Furan).
- End user to make final determination on suitability of chemical resistance
- Consult a chemical resistance guide or handbook for additional material compatibility information.
- For Flow Data see corresponding model literature.



# STEAM JACKETED VALVES

- Prevents freezing and product buildup
- Designed for easy maintenance
- Available in Series 1200A, 1300A, 2000A and others

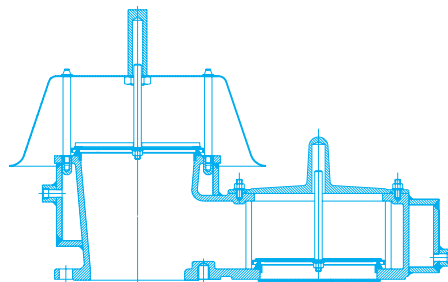


## STEAM JACKETED VALVES

Steam jacketed valves are designed for use on tanks containing liquids whose vapors may crystallize at normal temperature. They afford protection against valve clogging. Uniform heating of the housing and valves assures the valve will remain in operating condition. Available on model numbers 1200A, 1220A, 1260A, 1300A, 1360A, 2000A, 2300A and 2400A.

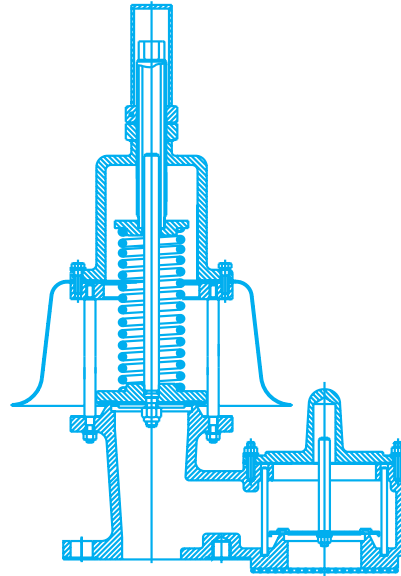
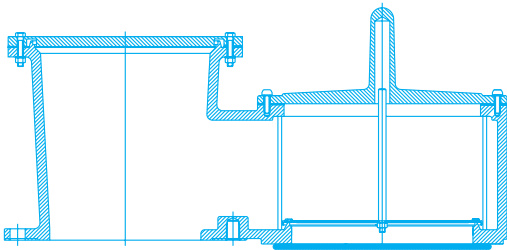
## SPECIAL FEATURES

Valve covers can be easily removed for convenient inspection and maintenance. Steam heated valves are suitable for steam circulation up to 100 psig saturated.



## STANDARD SETTINGS AND MAXIMUM TANK WORKING PRESSURE

### 1200A Series Valves



Due to the modular construction of Groth pressure/vacuum relief valves, internal components can be utilized which permit settings as low as 0.5 oz/in<sup>2</sup> and as high as 15 psig. Similarly, vacuum relief valves may withstand tank working pressures as high as 100 psig (special construction required).

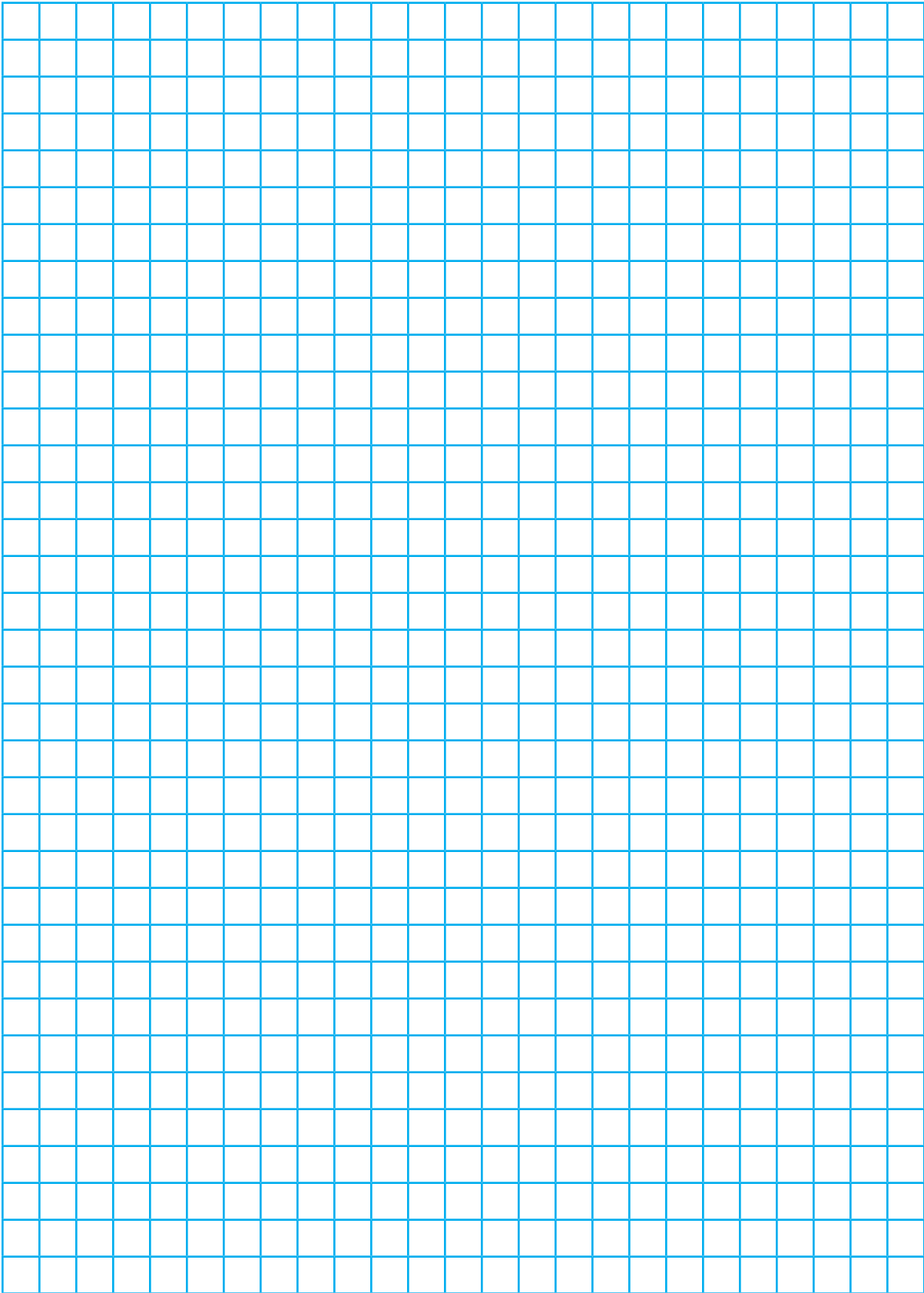
However, the light weight formed pallets required for low vacuum settings may not withstand the high working pressures, and the heavier machined plate pallets required for high working pressures may not permit low vacuum settings.

The following table defines the minimum vacuum setting as a function of the maximum tank working pressures for Models 1201B, 1221B, 1300A and 1360A valves based on the dead weight of each pallet assembly.

Minimum Vacuum Settings versus Maximum Tank Working Pressure						
Size (inches)	Spun Pallet		Stamped Pallet		Machined Pallet	
	Minimum* Vacuum Setting [oz/in <sup>2</sup> ]	Maximum Tank Pressure [psig]	Minimum Vacuum Setting [oz/in <sup>2</sup> ]	Maximum Tank Pressure [psig]	Minimum Vacuum Setting [oz/in <sup>2</sup> ]	Maximum Tank Pressure [psig] <sup>o</sup>
2"	0.50	15	1.2	25	1.9	30
3"	0.50	15	1.2	25	1.8	30
4"	0.50	12	1.0	20	1.5	30
6"	0.50	12	1.3	20	2.4	30
8"	0.50	5	1.3	15	2.2	30
10"	0.50	5	1.2	15	3.2	30
12"	0.50	5	1.1	15	3.1	30

\*Some sizes require non-ferrous components to achieve 0.5 oz/in<sup>2</sup> setting. <sup>o</sup>Consult factory for MAWP >30 psig.

# NOTES





SMART RELIEF...SAFE SOLUTIONS<sup>SM</sup>



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