GROTH CORPORATION
a Continental Disc Company

PRESSURE / VACUUM RELIEF VALVE

Model 1220A

with Pipe-Away Feature

- **Sizes 2” through 12”**
- **Pressure settings 0.5 oz/in² to 15 PSIG**
- **Vacuum settings 0.5 oz/in² to 12 PSIG**
- **Available in aluminum (type 356), carbon steel, stainless steel 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. Special pallets in the Model 1220A housing virtually eliminate the intake of air and the escape of vapors except during normal tank breathing, thus reducing the loss of product. These special pallets are engineered to allow only the intake or outlet relief necessary to maintain the proper working pressure, thereby protecting the tank from possible damage. Escaping vapors are piped away through a flanged outlet connection. This helps to provide increased fire protection and safety.

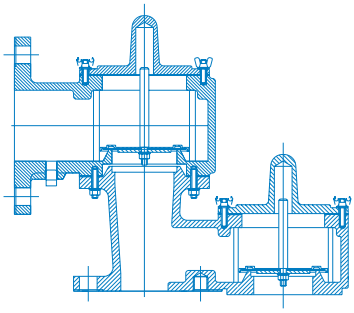
SPECIAL FEATURES

Model 1220A offers Groth’s special “cushioned air” seating. Superior performing Teflon®[1] 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, Viton® 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.

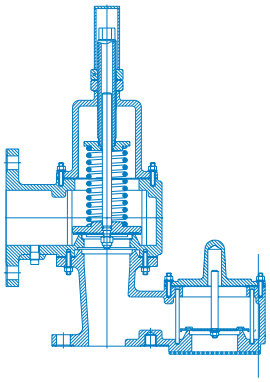
GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 1220A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

MODEL 1220A



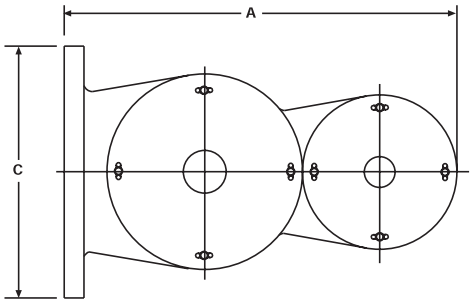
MODEL 1220A

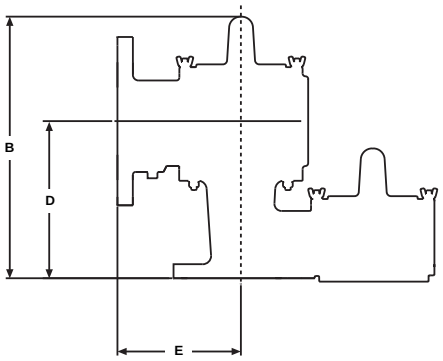


MODEL 1221B

[1] Teflon is a registered trademark of DuPont Corporation.

SPECIFICATIONS





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

Inlet Flg.	Outlet Flg.	Max. Set Pressure Weight Loaded	Max. Set Vacuum Weight Loaded	Max. Setting Spring Loaded	Min. Setting Weight Loaded	Max. W.P.† for Min. Vacuum Setting	Min. Vac. Setting for Max. W.P.†	A Length (mm)	B Height (mm)	C Width (mm)	D (mm)	E (mm)	BB (mm)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	3" (80 mm)	11 oz/in² (48.2 gm/cm²)	12 oz/in² (52.7 gm/cm²)	15 PSIG SPRING LOADED PRESSURE (1.05 kg. /cm²)	*0.5 oz/in² WEIGHT LOADED (2.20 gm. /cm²)	See TPD2 for Vacuum Settings and MAWP		14 1/4 " (361)	12 5/8 " (320)	7 1/2 " (191)	7" (178)	5 1/2 " (140)	19 5/8 " (499)	26 (12 kg)
3" (80 mm)	4" (100 mm)	13 oz/in² (57.0 gm/cm²)	11 oz/in² (48.3 gm/cm²)					18" (457)	15 1/8 " (384)	9" (229)	8 1/8 " (206)	6" (152)	23 3/8 " (594)	34 (16 kg)
4" (100 mm)	6" (150 mm)	16 oz/in² (70.3 gm/cm²)	11 oz/in² (48.3 gm/cm²)	12 PSIG SPRING LOADED VACUUM (0.84 kg. /cm²)				19 1/4 " (489)	18 1/4 " (463)	11" (279)	9 1/2 " (241)	6 1/2 " (165)	28 5/8 " (727)	49 (22 kg)
6" (150 mm)	8" (200 mm)	16 oz/in² (70.3 gm/cm²)	16 oz/in² (70.3 gm/cm²)					26 1/2 " (673)	23 3/4 " (603)	13 1/2 " (343)	12 3/4 " (324)	8 1/2 " (216)	38 3/8 " (984)	93 (42 kg)
8" (200 mm)	10" (250 mm)	16 oz/in² (70.3 gm/cm²)	16 oz/in² (70.3 gm/cm²)					32 1/2 " (826)	28 1/2 " (723)	16" (406)	15 1/4 " (387)	10 3/4 " (273)	45 1/4 " (1149)	137 (62 kg)
10" (250 mm)	12" (300 mm)	16 oz/in² (70.3 gm/cm²)	16 oz/in² (70.3 gm/cm²)					37 3/4 " (959)	34 1/2 " (876)	19" (483)	18" (457)	12 1/2 " (318)	54 1/8 " (1375)	186 (85 kg)
12" (300 mm)	14" (350 mm)	16 oz/in² (70.3 gm/cm²)	16 oz/in² (70.3 gm/cm²)					42 3/4 " (1086)	39 1/8 " (993)	21" (533)	20 5/8 " (524)	15" (381)	58 7/8 " (1496)	260 (118 kg)

† W.P. = Working Pressure. ‡ On spring loaded valves, change model number. 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/in² set with spacer. S.S. set weights-Consult Factory. *Some sizes require non-ferrous components to achieve 0.5 oz./sq. in. setting.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # □□□□□ ---------- SIZE □□ -------- MATERIAL □□□ ---------- OPTIONS □□□

- 1220A Weight Loaded
- 1221B Pressure Spring
- 1222B Vacuum Spring
- 1223A Pressure & Vacuum Springs

SIZE: 02" Thru 12"

MATERIAL:
- Pallet Material
- Seat Material
- * Body Material

1 = Aluminum
3 = Carbon Steel
5 = 316 SS
6 = Vinyl Ester Resin
7 = Furan
Z = Special

OPTIONS:
- O = No Options
- Z = Special Options
- O = No Jacket
- J = Steam Jacket
- S = Spacer
- H = Steam Jacket and Spacer
- Diaphragm Material (Seat):
  - B = Buna-N
  - T = Teflon®[1]
  - V = Viton®
  - 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 aluminum and carbon steel bodies. Stainless steel seats standard with carbon steel bodies.

EXAMPLE

1 2 2 0 A — 0 2 — 1 1 5 — T 0 0

Indicates a 2" Model 1220A with Aluminum Body and Seat, 316 SS Pallet, Teflon®[1] Seat Diaphragm and no other options.

[1] Teflon is a registered trademark of DuPont Corporation.

Model 1220A
Pressure Relief Capacity

Set Pressure (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-pressure.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-pressure directly from the table above. Use linear interpolation if the set pressure is not listed. (Ref: Page TPD1)

If the allowable over-pressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-pressure is more than 100%, consult page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% OP = $[(P_f - P_s)/P_s] \times 100$

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

Example—To find "C" factor from table:
Read "C" factor for **75%** Over-pressure 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 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 112,000 SCFH
2. Calculate over-pressure — % OP = [(7 - 4)/4] x 100 = 75%
3. Read "C" factor from table — "C" = 0.87
4. Calculate flow capacity — ***Flow = 0.87 x 112,000 = 97,440 SCFH***

Model 1220A
Pressure Relief Capacity

Set Pressure (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C						
mm WC	mb	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-pressure.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-pressure directly from the table above. Use linear interpolation if the set pressure is not listed. (Ref: Page TPD1)

If the allowable over-pressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-pressure is more than 100%, consult page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% OP = $[(P_f - P_s)/P_s] \times 100$

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

Example—To find "C" factor from table:
Read "C" factor for **75%** Over-pressure 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 mm WC Set Pressure [P_s]
175 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 3,140 NCMH
2. Calculate over-pressure — % OP = [(175 - 100)/100] x 100 = 75%
3. Read "C" factor from table — "C" = 0.87
4. Calculate flow capacity — ***Flow = 0.87 x 3,140 = 2,732 NCMH***

Model 1220A
Vacuum Relief Capacity

Set Vacuum (P_s)		Air Flow Capacity at 100% Over-vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-vacuum.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. (Ref: Page TPD1)

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 page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% 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 In WC set vacuum [P_s]
7 In WC flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 74,000 SCFH
2. Calculate over-vacuum — % OV = [(7 - 4)/4] x 100 = 75%
3. Read "C" factor from table — "C" = 0.87
4. Calculate flow capacity — ***Flow = 0.87 x 74,000 = 64,380 SCFH***

Model 1220A
Vacuum Relief Capacity

Set Vacuum (P_s)		Air Flow Capacity at 100% Over-vacuum (Double Set Vacuum) 1000 Normal Cubic Meters per Hour at 0° C						
mm WC	mb	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-vacuum.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. (Ref: Page TPD1)

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 page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% 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 mm WC Set Vacuum [P_s]
175 mm WC Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 2,080 NCMH
2. Calculate over-vacuum — % OV = [(175 - 100)/100] x 100 = 75%
3. Read "C" factor from table — "C" = 0.87
4. Calculate flow capacity — ***Flow = 0.87 x 2,080 = 1,810 NCMH***

Model 1221B
Pressure Relief Capacity

Set Pressure (P_s)	Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F						
PSIG	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-pressure.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-pressure directly from the table above. Use linear interpolation if the set pressure is not listed. (Ref: Page TPD1)

If the allowable over-pressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-pressure is more than 100%, consult page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% OP = $[(P_f - P_s)/P_s] \times 100$

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

Example—To find "C" factor from table:
Read "C" factor for **75%** Over-pressure 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_s]
7 PSIG flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 448,000 SCFH
2. Calculate over-pressure — % OP = [(7 - 4)/4] x 100 = 75%
3. Read "C" factor from table — "C" = 0.83
4. Calculate flow capacity — ***Flow = 0.83 x 448,000 = 371,840 SCFH***

Model 1221B
Pressure Relief Capacity

Set Pressure (P_s)	Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Normal Cubic Meters per Hour at 0° C						
BarG	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-pressure.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-pressure directly from the table above. Use linear interpolation if the set pressure is not listed. (Ref: Page TPD1)

If the allowable over-pressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-pressure is more than 100%, consult page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% OP = $[(P_f - P_s)/P_s] \times 100$

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

Example—To find "C" factor from table:
Read "C" factor for **75%** Over-pressure 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_s]
0.7 BarG Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 16,200 NCMH
2. Calculate over-pressure — % OP = [(0.7 - 0.4)/0.4] x 100 = 75%
3. Read "C" factor from table — "C" = 0.83
4. Calculate flow capacity — ***Flow = 0.83 x 16,200 = 13,446 NCMH***

Model 1222B
Vacuum Relief Capacity

Set Vacuum (P_s)	Air Flow Capacity at 100% Over-vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60° F						
PSIG	2"	3"	4"	6"	8"	10"	12"
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 PSI						

Flow capacity is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-vacuum.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. (Ref: Page TPD1)

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 page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% 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_s]
3.5 PSIG flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 166,000 SCFH
2. Calculate over-vacuum — % OV = [(3.50 - 2.0)/2.0] x 100 = 75%
3. Read "C" factor from table — "C" = 0.83
4. Calculate flow capacity — ***Flow = 0.83 x 166,000 = 137,780 SCFH***

Model 1222B
Vacuum Relief Capacity

Set Vacuum (P_s)	Air Flow Capacity at 100% Over-vacuum (Double Set Vacuum) 1000 Normal Cubic Meters per Hour at 0° C						
BarG	2"	3"	4"	6"	8"	10"	12"
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 is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-vacuum.

For an equivalent size fiberglass valve, reduce tabulated capacities by 32%.

Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. (Ref: Page TPD1)

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 page TPD1 or your Groth Representative.

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

P_f = Flowing pressure
P_s = Set pressure
% 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 **42%** 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 1222B
0.12 BarG Set Vacuum [P_s]
0.17 BarG Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 4,530 NCMH
2. Calculate over-vacuum — % OV = [(0.17 - 0.12)/0.12] x 100 = 42%
3. Read "C" factor from table — "C" = 0.55
4. Calculate flow capacity — ***Flow = 0.55 x 4,530 = 2,491 NCMH***