GROTH CORPORATION®
a Continental Disc Company

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PRODUCT LIMITED WARRANTY

Groth's Product Limited Warranty terms applies only to purchase orders accepted by Groth Corporation.

A. Seller warrants that products which are manufactured by Seller, are manufactured in accordance with published specifications and free from defects in materials and/or workmanship for a period of (12) twelve months. Seller, at its option, will repair or replace any products returned intact to the factory, transportation charges prepaid, which Seller, upon inspection, shall determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Seller's warranty.

B. THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING PRODUCTS) UNLESS SPECIFIED IN THE SALES CONTRACT. THIS CONTRACT STATES THE ENTIRE OBLIGATION OF SELLER.

Seller makes no warranties, either express or implied, except as provided herein, including without limitation thereof, warranties as to marketability, merchantability, for a particular purpose or use, or against infringement of any patent of products. In no event shall Seller be liable for any direct, incidental or consequential damages of any nature, or losses or expenses resulting from any defective new product or the use of any such product, including any damages for loss of time, inconvenience, or loss of use of any such product.

C. The original Manufacturer shall be solely responsible for the design, development, supply, production, and performance of its products hereunder, and the protection of its trade name or names, if any. It assumes no responsibility, for products modified or changed in any way by its agent or customer. Any such modifications or changes to products sold by Seller hereunder shall make the product limited warranty null and void.

D. The Manufacturer shall be under no obligation to manufacture, sell, or supply or to continue to manufacture, sell or supply any of the Products.

GROTH® CORPORATION
a Continental Disc Company

CE
Pressure Equipment Directive

DNV Certification, Inc. USA
ANSI-RAB QMS ACCREDITED
DNV
DNV MSC The Netherlands Accredited by the RvA
ISO 9001 REGISTERED FIRM

GROTH is committed to the total quality improvement process

Groth Corporation
13650 N. Promenade Blvd.
Stafford, TX 77477

800-354-7684

www.grothcorp.com

CERTIFICATE

DET NORSKE VERITAS
MANAGEMENT SYSTEM CERTIFICATE

Certificate No. CERT-03385-2001-AQ-HOU-RvA/RAB Rev.1

This is to certify that the Quality System
of

GROTH CORPORATION

at

13650 N. Promenade, Stafford, TX 77477 USA

Has been found to conform to Quality Standard:

ISO 9001:1994

This Certificate is valid for the following products/service ranges:

THE DESIGN AND MANUFACTURE OF PRESSURE/VACUUM RELIEF VALVES, FLAME ARRESTERS, EMERGENCY RELIEF VALVES, WASTE GAS BURNERS, PRESSURE RELIEF REGULATORS, SEDIMENT TRAPS, FLAME TRAPS, CHECK VALVES, DRIP TRAPS, AND DETONATION ARRESTERS.

Place and date:

Houston, Texas; 25 March 2002

for the Accredited Unit:
Det Norske Veritas Certification, Inc.
Houston, Texas, USA
DNV Management System Certification
The Netherlands

(Rudy Frueboes)
Management Representative
Det Norske Veritas Certification, Inc.

ANSI-RAB QMS ACCREDITED

Accredited by
the RvA

This certificate is valid until:

15 December 2003

Initial Certification Date:

14 August 2001

(Roy Foster)
Lead Auditor

Lack of fulfillment of conditions as set out in the Appendix may render this certificate invalid.

DET NORSKE VERITAS CERTIFICATION. INC.. 16340 Park Ten Place. Suite 100. Houston. TX 77084 USA TEL: (281) 721-6600 FAX: (281) 721-6903

GROTH CORPORATION®
a Continental Disc Company

SECTION 1
PRESSURE / VACUUM RELIEF VALVES

1200A Presure / Vacuum Relief Valves •

1200A/7618 Pressure / Vacuum Relief Valves *w/ Flame Arrester* •

1220A Pressure / Vacuum Relief Valves *w/Pipe-Away Feature* •

1220A/7618 Pressure / Vacuum Relief Valve *w/Flame Arrester w/Pipe-Away Feature* •

Fiberglass Relief Valves •

Steam Jacketed Valves •

GROTH CORPORATION
a Continental Disc Company

PRESSURE / VACUUM RELIEF VALVE
Model 1200A

- **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, fiber-glass, and other materials**
- **Modular construction**

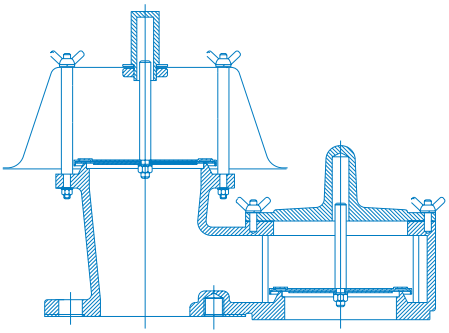
PRESSURE / VACUUM RELIEF VALVE

Model 1200A is designed to protect your tank from damage created by over-pressure 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.

MODEL 1200A

SPECIAL FEATURES

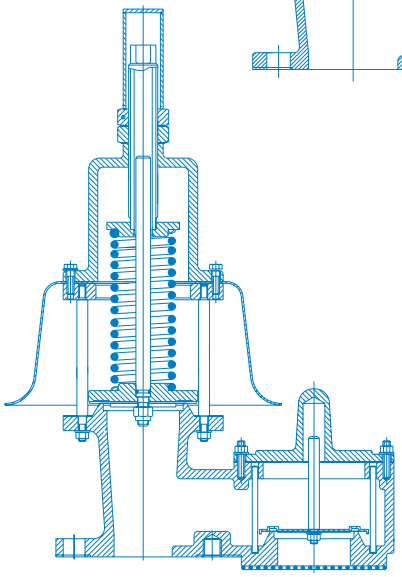
Model 1200A offers Groth’s special “cushioned air” seating. Superior performing Teflon® [1] seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1200A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids dangerous pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, Viton®, 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

GROTH, THE CAPABILITY COMPANY

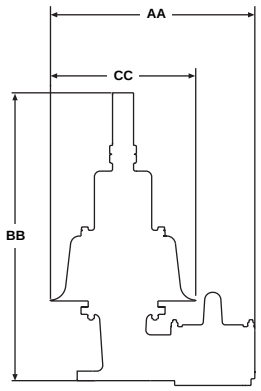
As with all Groth products, every model 1200A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

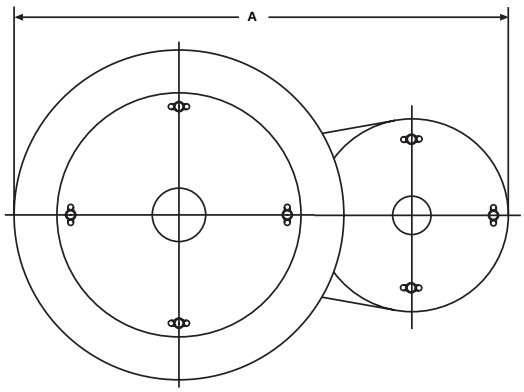


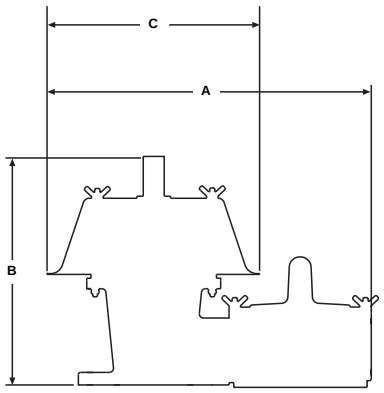
MODEL 1201B

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

SPECIFICATIONS







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

Inlet 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)	AA Length (mm)	BB Height (mm)	CC Width (mm)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	16 oz/in² (70.3 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		13 5/8" (346)	13" (330)	9 1/2" (241)	13 3/8" (340)	19 7/8" (505)	9 1/2" (241)	16 (7 kg)
3" (80 mm)		11 oz/in² (48.3 gm/cm²)					18" (457)	13 5/8" (346)	11 1/2" (292)	18 3/8" (467)	22 3/4" (578)	13" (330)	21 (9 kg)
4" (100 mm)		11 oz/in² (48.3 gm/cm²)	12 PSIG SPRING LOADED VACUUM (0.84 kg./cm²)				19 3/4" (501)	15 7/8" (403)	13" (330)	19 1/2" (495)	27 1/2" (699)	13" (330)	31 (14 kg)
6" (150 mm)		16 oz/in² (70.3 gm/cm²)					27 3/4" (704)	22 1/4" (565)	19" (482)	27 3/4" (705)	37 3/4" (959)	19 1/2" (495)	57 (26 kg)
8" (200 mm)		16 oz/in² (70.3 gm/cm²)					33 7/8" (860)	26 3/8" (669)	23 5/8" (600)	33 5/8" (854)	44 1/2" (1130)	23 1/2" (597)	75 (34 kg)
10" (250 mm)		16 oz/in² (70.3 gm/cm²)					40 7/8" (1038)	28 7/8" (733)	30 3/4" (781)	38" (965)	53" (1346)	25 1/2" (648)	116 (53 kg)
12" (300 mm)		16 oz/in² (70.3 gm/cm²)					46" (1168)	32 7/8" (835)	36" (914)	40 1/2" (1029)	55 5/8" (1413)	25 1/2" (648)	157 (71 kg)

† W.P. = Working Pressure. ‡ On spring loaded valves, change model number. 150# A.N.S.I. 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

1200A Weight Loaded
1201B Pressure Spring
1202B Vacuum Spring
1203A Pressure & Vacuum Springs

02" Thru 12"

Pallet Material
Seat Material
* Body Material

1 = Aluminum
3 = Carbon Steel
5 = 316 SS
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 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 0 0 A — 0 2 — 1 1 5 — T 0 0

Indicates a 2" Model 1200A 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 1200A
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	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 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 1200A
4 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 131,000 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 131,000 = 113,970 SCFH***

Model 1200A
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	0.22	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	8.40	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 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 1200A
100 mm WC Set Pressure [P_s]
175 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 3,670 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 3,670 = 3,193 NCMH***

Model 1200A
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 1200A
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 1200A
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 1200A
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 1201B
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 1201B
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 1201B
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 1201B
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 1202B
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 1202B
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 1202B
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 1202B
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 = 2,492 NCMH***

GROTH CORPORATION
a Continental Disc Company

PRESSURE / VACUUM RELIEF VALVE

Model 1200A/7618

with Flame Arrester

- **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**
- **Factory Mutual approved flame arresters**
- **Proven spiral wound, crimped ribbon, flame element**
- **Modular Construction**

PRESSURE / VACUUM RELIEF VALVE WITH FLAME ARRESTER

The Model 1200A/7618 Pressure/Vacuum Valve & Flame arrester combination units are designed to protect your tank from damage created by over-pressure or excessive vacuum, at the same time that they provide protection from externally caused sources of heat and ignition. The result is increased fire protection and safety.

SPECIAL FEATURES

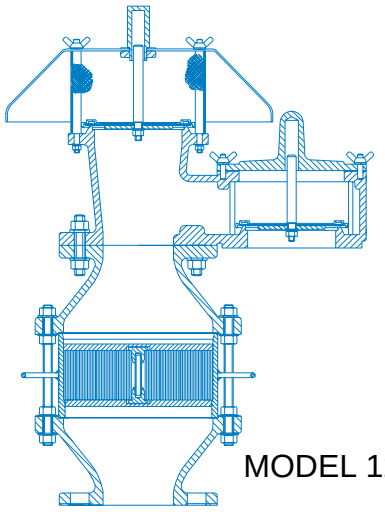
The Model 1200A Pressure/Vacuum relief valve offers Groth’s special “cushioned air” seating. Superior performing Teflon®[1] seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. Self draining housings and drip rings protect seating surfaces from condensate and freezing.

The wafer construction of the Model 7618 flame arrester affords easy accessibility to the flame bank for maintenance. All Groth flame arresters utilize spiral wound, crimped ribbon constructed flame elements. These proven, Factory Mutual approved elements, have been reported by NTIS of the Dept. of Commerce, to provide the best flame quenching performance for the least pressure drop. Groth flame arresters are pneumatic tested to 15 PSIG as standard.

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every model 1200A/7618 is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

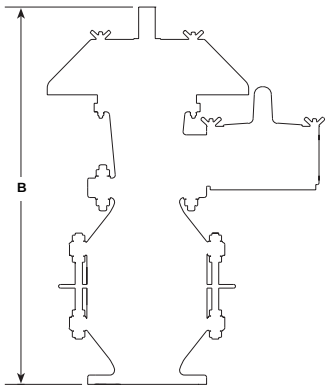
MODEL 1200A/7618

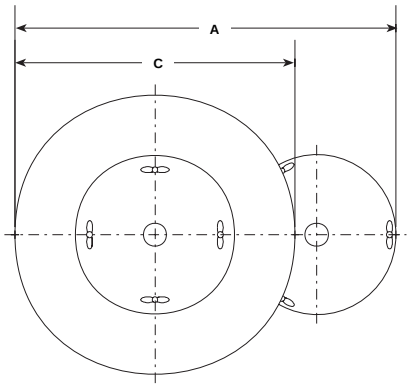


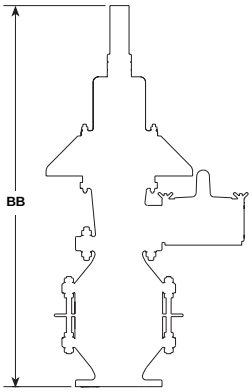
MODEL 1200A/7618

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

SPECIFICATIONS







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

Inlet 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)	BB Height (mm)	C Width (mm)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	16 oz/in² (70.3 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		13 5/8 " (346)	27" (685)	33 7/8 " (860)	9 1/2 " (241)	35 (16 kg)
3" (80 mm)		11 oz/in² (48.3 gm/cm²)					18" (457)	29 5/8 " (752)	38 3/4 " (984)	11 1/2 " (292)	45 (20 kg)
4" (100 mm)		11 oz/in² (48.3 gm/cm²)	12 PSIG SPRING LOADED VACUUM (0.84 kg. /cm²)				19 3/4 " (502)	34 5/8 " (879)	46 1/4 " (1175)	13" (330)	70 (32 kg)
6" (150 mm)		16 oz/in² (70.3 gm/cm²)					28 3/4 " (730)	43 1/4 " (1099)	58 3/4 " (1492)	19" (483)	125 (57 kg)
8" (200 mm)		16 oz/in² (70.3 gm/cm²)					36" (914)	51 3/8 " (1305)	69 1/2 " (1765)	23 5/8 " (600)	210 (95 kg)
10" (250 mm)		16 oz/in² (70.3 gm/cm²)					42" (1067)	58 7/8 " (1495)	83 (2108)	30 3/4 " (781)	350 (160 kg)
12" (300 mm)		16 oz/in² (70.3 gm/cm²)					48 1/2 " (1232)	65 3/8 " (1661)	88 1/8 " (2238)	35 3/4 " (908)	500 (227 kg)

† W.P. = Working Pressure. ‡ On spring loaded valves, change model number. 150# A.N.S.I. drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. 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

MODEL #:
- 1200A/7618 Weight Loaded
- 1201B/7618 Pressure Spring
- 1202B/7618 Vacuum Spring
- 1203A/7618 Pressure & Vacuum Springs

SIZE: 02" Thru 12"

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

1 = Aluminum
3 = Carbon Steel
5 = 316 SS
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 1200A/7618—02—1151—T00

Indicates a 2" Model 1200A/7618 with Aluminum Body and Seat, 316 SS Pallet, Teflon® [1] Seat Diaphragm, Aluminum Flame Element and no other options.

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

Model 1200/7618
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	3.01	5.98	10.7	21.5	34.8	55.2	62.3
1.00	0.58	3.29	6.68	12.0	24.2	39.2	62.1	72.0
1.73	1.00	4.56	9.70	17.6	36.3	58.4	92.0	112
2.00	1.16	4.96	10.7	19.3	39.9	64.2	101	125
2.60	1.50	5.76	12.6	22.7	47.2	75.9	120	148
3.00	1.73	6.26	13.7	24.8	51.7	82.9	131	163
3.46	2.00	6.79	15.0	27.1	56.4	90.5	143	178
4.00	2.31	7.36	16.3	29.5	61.5	99.0	155	195
6.00	3.47	9.20	20.6	37.3	78.1	125	197	249
8.00	4.62	10.9	24.3	44.0	92.2	148	233	295
10.0	5.78	12.3	27.6	50.0	105	168	264	335
12.0	6.93	13.6	30.6	55.4	116	186	293	372
15.0	8.66	15.4	34.6	62.8	132	211	332	422
20.0	11.6	18.0	40.7	73.7	155	248	390	497
25.0	14.4	20.4	46.0	83.5	175	281	442	563
30.0	17.3	22.6	50.9	92.4	194	311	489	623

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.

Consult Factory for flow capacity with fiberglass valve.

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 20 30 40	Consult Factory									
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/7618
4 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 61,500 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 61,500 =53,505 SCFH***

Model 1200A/7618
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	2"	3"	4"	6"	8"	10"	12"
22.0	0.09	0.18	0.32	0.64	1.04	1.65	1.91
50.0	0.14	0.30	0.55	1.13	1.82	2.87	3.53
75.0	0.18	0.39	0.70	1.46	2.35	3.70	4.62
100	0.21	0.46	0.83	1.74	2.80	4.40	5.53
150	0.26	0.58	1.06	2.21	3.55	5.59	7.05
200	0.31	0.69	1.25	2.61	4.19	6.59	8.35
250	0.35	0.78	1.42	2.97	4.76	7.48	9.50
300	0.39	0.87	1.57	3.29	5.27	8.30	10.5
375	0.44	0.98	1.78	3.73	5.98	9.41	12.0
500	0.51	1.15	2.09	4.39	7.02	11.0	14.1
625	0.58	1.30	2.36	4.97	7.96	12.5	15.9
750	0.64	1.44	2.62	5.50	8.80	13.8	17.6

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-pressure.

Consult Factory for flow capacity with fiberglass valve.

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 **67%** Over-pressure at intersection of row **60** and column **7**
"C" factor at 67% OP = **0.82**

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10 20 30 40	Consult Factory									
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/7618
150 mm WC Set Pressure [P_s]
250 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 2,210 NCMH
2. Calculate over-pressure — % OP = [(250 - 150)/150] x 100 = 67%
3. Read "C" factor from table — "C" = 0.82
4. Calculate flow capacity — ***Flow = 0.82 x 2,210 = 1,812 NCMH***

Model 1200A/7618
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	2.55	5.19	8.80	17.9	28.6	44.3	53.6
1.00	0.58	2.77	5.73	9.70	19.8	31.6	48.9	60.4
1.73	1.00	3.78	8.15	13.6	28.3	45.1	69.4	89.8
2.00	1.16	4.10	8.90	14.9	31.0	49.3	75.8	99.0
2.60	1.50	4.74	10.4	17.4	36.2	57.7	88.6	117
3.00	1.73	5.14	11.3	18.9	39.5	62.9	96	128
3.46	2.00	5.56	12.3	20.5	42.9	68.4	105	139
4.00	2.31	6.03	13.4	22.3	46.7	74.4	114	152
6.00	3.47	7.54	16.9	28.1	58.9	93.8	144	193
8.00	4.62	8.84	19.9	33.0	69.4	110	169	227
10.0	5.78	10.0	22.5	37.4	78.6	125	192	258
12.0	6.93	11.1	24.9	41.5	87.1	139	212	286
15.0	8.66	12.5	28.2	46.9	98.6	157	240	324
20.0	11.6	14.7	33.1	55.1	116	184	282	381
25.0	14.4	16.6	37.5	62.3	131	209	319	432
30.0	17.3	18.3	41.5	68.9	145	231	353	478

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.

Consult Factory for flow capacity with fiberglass valve.

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 20 30 40	Consult Factory									
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/7618
4 In WC set vacuum [P_s]
7 In WC flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 46,700 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 46,700 = 40,629 SCFH***

Model 1200A/7618
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	2"	3"	4"	6"	8"	10"	12"
22.0	0.07	0.15	0.26	0.52	0.84	1.29	1.60
50.0	0.12	0.25	0.42	0.87	1.39	2.13	2.78
75.0	0.14	0.32	0.53	1.11	1.77	2.72	3.59
100	0.17	0.38	0.63	1.32	2.09	3.21	4.27
150	0.21	0.48	0.79	1.66	2.64	4.05	5.42
200	0.25	0.56	0.93	1.95	3.11	4.76	6.40
250	0.28	0.63	1.05	2.21	3.53	5.40	7.27
300	0.31	0.70	1.17	2.45	3.90	5.97	8.06
375	0.35	0.80	1.32	2.78	4.42	6.77	9.10
500	0.41	0.93	1.55	3.26	5.19	7.94	10.7
625	0.47	1.06	1.76	3.69	5.87	8.98	12.2
750	0.52	1.17	1.94	4.08	6.50	9.90	13.5

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.

Consult Factory for flow capacity with fiberglass valve.

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 **67%** Over-vacuum at intersection of row **60** and column **7**
"C" factor at 67% OV = **0.82**

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10 20 30 40	Consult Factory									
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/7618
150 mm WC Set Vacuum [P_s]
250 mm WC Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 1,660 NCMH
2. Calculate over-vacuum — % OV = [(250 - 150)/150] x 100 = 67%
3. Read "C" factor from table — "C" = 0.82
4. Calculate flow capacity — ***Flow = 0.82 x 1,660 = 1,361 NCMH***

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.

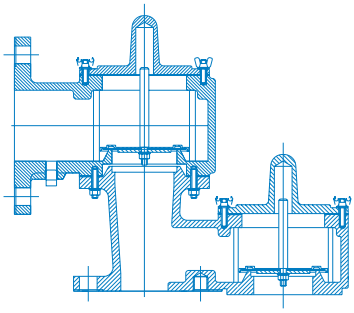
SPECIAL FEATURES

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.

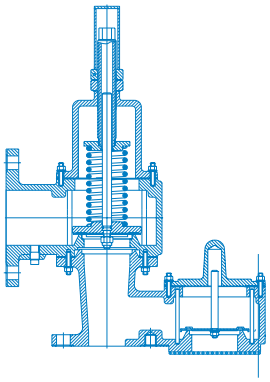
GROTH, THE CAPABILITY COMPANY

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



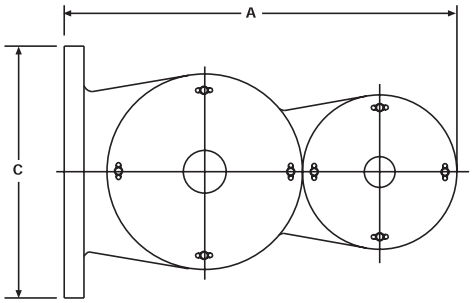
MODEL 1220A

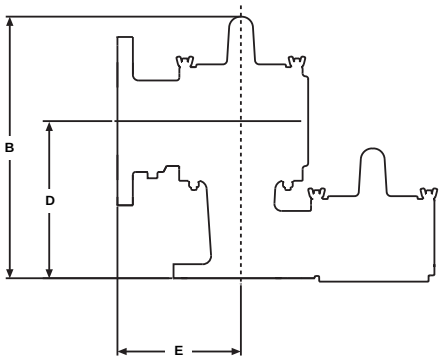


MODEL 1221B

[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***

GROTH CORPORATION
a Continental Disc Company

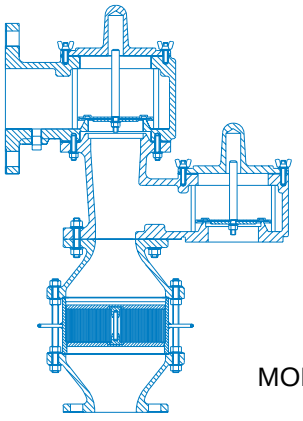
PRESSURE / VACUUM RELIEF VALVE

Model 1220A/7618

and Flame Arrester w/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.**
- **Factory Mutual approved flame arresters**
- **Proven spiral wound, crimped ribbon, flame element**
- **Modular construction**

MODEL 1220A/7618



MODEL 1220A/7618

PRESSURE / VACUUM RELIEF VALVE WITH FLAME ARRESTER (PIPE-AWAY)

The Model 1220A/7618 combination units are used for pressure and vacuum relief where vapors must be piped away. They are designed to protect your tank from damage created by over-pressure or excessive vacuum, at the same time that they provide protection from externally caused sources of heat and ignition. The result is reduced emissions level and increased fire protection and safety.

SPECIAL FEATURES

The Model 1220A Pressure/Vacuum relief valve with flanged pipe-away outlet 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. Self draining housings and drip rings protect seating surfaces from condensate and freezing.

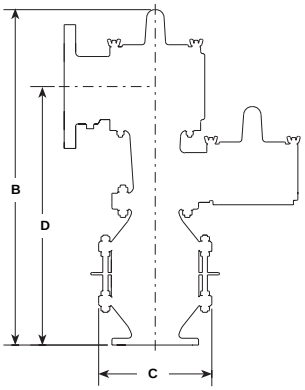
The wafer construction of the Model 7618 flame arrester affords easy accessibility to the flame bank for maintenance. All Groth flame arresters utilize spiral wound, crimped ribbon constructed flame elements. These proven, Factory Mutual approved elements, have been reported by NTIS of the Dept. of Commerce, to provide the best flame quenching performance for the least pressure drop. Groth flame arresters are pneumatic tested to 15 PSIG as standard.

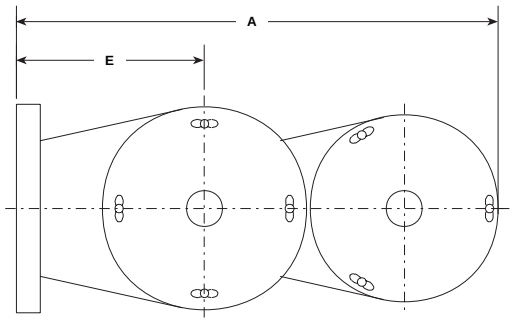
GROTH, THE CAPABILITY COMPANY

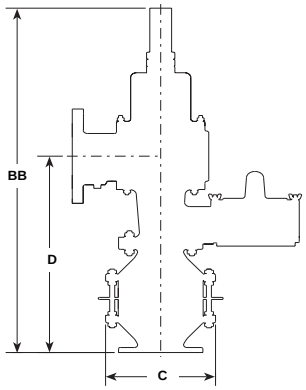
As with all Groth products, every Model 1220A/7618 is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

[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)	BB Height (mm)	C Width (mm)	D (mm)	E (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) 12 PSIG SPRING LOADED VACUUM (0.84 kg./cm²)	*0.5 oz/in² WEIGHT LOADED (2.20 gm./cm²)	See TPD2 for Vacuum Settings and MAWP		14 1/4" (361)	26 5/8" (676)	33 5/8" (854)	8 3/4" (221)	20 1/4" (514)	5 1/2" (140)	45 (20 kg)
3" (80 mm)	4" (100 mm)	13 oz/in² (57.0 gm/cm²)	11 oz/in² (48.3 gm/cm²)					18" (457)	31 1/8" (790)	39 3/8" (1000)	9 1/2" (241)	23 1/8" (588)	6" (152)	60 (27 kg)
4" (100 mm)	6" (150 mm)	16 oz/in² (70.3 gm/cm²)	11 oz/in² (48.3 gm/cm²)					19 1/4" (489)	37" (940)	47 3/8" (1203)	11 1/2" (292)	26 3/4" (679)	6 1/2" (165)	90 (41 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)	44 3/4" (1136)	59 3/4" (1518)	16 1/2" (419)	31 1/2" (800)	8 1/2" (216)	160 (73 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)	53 1/2" (1358)	70 1/4" (1784)	21" (533)	37 3/8" (949)	10 3/4" (273)	270 (123 kg)
10" (250 mm)	12" (300 mm)	16 oz/in² (70.3 gm/cm²)	16 oz/in² (70.3 gm/cm²)					37 1/4" (959)	64 1/2" (1638)	84 1/8" (2137)	24 3/4" (629)	45 1/4" (1149)	12 1/2" (318)	420 (190 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)	71 5/8" (1819)	91 3/8" (2321)	28 5/8" (727)	50 1/8" (1273)	15" (381)	600 (273 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. 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 ☐☐☐

MODEL #:
- 1220A/7618 Weight Loaded
- 1221B/7618 Pressure Spring
- 1222B/7618 Vacuum Spring
- 1223A/7618 Pressure & Vacuum Springs

SIZE: 02" Thru 12"

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

1 = Aluminum
3 = Carbon Steel
5 = 316 SS
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 / 7 6 1 8 — 0 2 — 1 1 5 1 — T 0 0

Indicates a 2" Model 1220A/7618 with Aluminum Body and Seat, 316 SS Pallet, Teflon®[1] Seat Diaphragm Aluminum Flame Element and no other options.

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

Model 1220A/7618
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	2.92	5.68	10.3	20.7	32.3	51.5	59.1
1.00	0.58	3.19	6.34	11.5	23.3	36.2	57.6	67.8
1.73	1.00	4.45	9.23	16.8	34.4	53.0	84.4	105
2.00	1.16	4.84	10.1	18.5	37.8	58.2	92.6	116
2.60	1.50	5.64	11.9	21.7	44.6	68.5	109	138
3.00	1.73	6.12	13.0	23.7	48.8	74.8	119	151
3.46	2.00	6.65	14.1	25.9	53.2	81.6	130	165
4.00	2.31	7.21	15.4	28.2	58.0	88.9	141	180
6.00	3.47	9.07	19.5	35.7	73.6	113	179	230
8.00	4.62	10.7	23.0	42.1	86.8	133	211	272
10.0	5.78	12.1	26.1	47.7	98.6	151	240	309
12.0	6.93	13.3	28.9	52.9	109	167	266	343
15.0	8.66	15.1	32.7	60.0	124	189	301	389
20.0	11.6	17.7	38.4	70.4	146	222	354	457
25.0	14.4	20.0	43.5	79.7	165	252	400	518
30.0	17.3	22.2	48.1	88.2	182	278	443	574

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.

Consult Factory for flow capacity with fiberglass valve.

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 20 30 40	Consult Factory									
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	0.91	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/7618
4 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 58,000 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 58,000 = 50,460 SCFH***

Model 1220A/7618
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	2"	3"	4"	6"	8"	10"	12"
22.0	0.08	0.17	0.31	0.62	0.96	1.53	1.80
50.0	0.14	0.29	0.52	1.07	1.65	2.62	3.28
75.0	0.17	0.37	0.67	1.38	2.12	3.37	4.27
100	0.20	0.44	0.80	1.64	2.52	4.01	5.11
150	0.26	0.55	1.01	2.08	3.19	5.07	6.51
200	0.30	0.65	1.19	2.46	3.76	5.98	7.70
250	0.34	0.74	1.35	2.79	4.27	6.79	8.75
300	0.38	0.82	1.50	3.10	4.73	7.52	9.70
375	0.43	0.93	1.70	3.51	5.36	8.53	11.0
500	0.50	1.09	2.00	4.12	6.29	10.0	13.0
625	0.57	1.23	2.26	4.67	7.13	11.3	14.7
750	0.63	1.36	2.50	5.17	7.89	12.5	16.3

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.

Consult Factory for flow capacity with fiberglass valve.

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 **67%** Over-pressure at intersection of row **60** and column **7**
"C" factor at 67% OP = **0.82**

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10 20 30 40	Consult Factory									
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	0.91	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/7618
150 mm WC Set Pressure [P_s]
250 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 2,080 NCMH
2. Calculate over-pressure — % OP = [(250 - 150)/150] x 100 = 67%
3. Read "C" factor from table — "C" = 0.82
4. Calculate flow capacity — ***Flow = 0.82 x 2,080 = 1,706 NCMH***

Model 1220A/7618
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	2.55	5.19	8.80	17.9	28.6	44.3	53.6
1.00	0.58	2.77	5.73	9.70	19.8	31.6	48.9	60.4
1.73	1.00	3.78	8.15	13.6	28.3	45.1	69.4	89.8
2.00	1.16	4.10	8.90	14.9	31.0	49.3	75.8	99.0
2.60	1.50	4.74	10.4	17.4	36.2	57.7	88.6	117
3.00	1.73	5.14	11.3	18.9	39.5	62.9	96.0	128
3.46	2.00	5.56	12.3	20.5	42.9	68.4	105	139
4.00	2.31	6.03	13.4	22.3	46.7	74.4	114	152
6.00	3.47	7.54	16.9	28.1	58.9	93.8	144	193
8.00	4.62	8.84	19.9	33.0	69.4	110	169	227
10.0	5.78	10.0	22.5	37.4	78.6	125	192	258
12.0	6.93	11.1	24.9	41.5	87.1	139	212	286
15.0	8.66	12.5	28.2	46.9	98.6	157	240	324
20.0	11.6	14.7	33.1	55.1	116	184	282	381
25.0	14.4	16.6	37.5	62.3	131	209	319	432
30.0	17.3	18.3	41.5	68.9	145	231	353	478

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.

Consult Factory for flow capacity with fiberglass valve.

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 20 30 40	Consult Factory									
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	0.91	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/7618
4 In WC set vacuum [P_s]
7 In WC flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 46,700 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 46,700 = 40,629 SCFH***

Model 1220A/7618
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	2"	3"	4"	6"	8"	10"	12"
22.0	0.07	0.15	0.26	0.52	0.84	1.29	1.60
50.0	0.12	0.25	0.42	0.87	1.39	2.13	2.78
75.0	0.14	0.32	0.53	1.11	1.77	2.72	3.59
100	0.17	0.38	0.63	1.32	2.09	3.21	4.27
150	0.21	0.48	0.79	1.66	2.64	4.05	5.42
200	0.25	0.56	0.93	1.95	3.11	4.76	6.40
250	0.28	0.63	1.05	2.21	3.53	5.40	7.27
300	0.31	0.70	1.17	2.45	3.90	5.97	8.06
375	0.35	0.80	1.32	2.78	4.42	6.77	9.10
500	0.41	0.93	1.55	3.26	5.19	7.94	10.7
625	0.47	1.06	1.76	3.69	5.87	8.98	12.2
750	0.52	1.17	1.94	4.08	6.50	9.90	13.5

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.

Consult Factory for flow capacity with fiberglass valve.

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 **67%** Over-vacuum at intersection of row **60** and column **7**
"C" factor at 67% OV = **0.82**

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10 20 30 40	Consult Factory									
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	0.91	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/7618
150 mm WC Set Vacuum [P_s]
250 mm WC Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 1,660 NCMH
2. Calculate over-vacuum — % OV = [(250 - 150)/150] x 100 = 67%
3. Read "C" factor from table — "C" = 0.82
4. Calculate flow capacity — ***Flow = 0.82 x 1,660 = 1,361 NCMH***

Fiberglass

Relief Valves

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

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

Fiberglass valves are used the same as their counter parts manufactured in metal, primarily on above ground 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.

MODEL 2050

SPECIAL FEATURES

Fiberglass valves offer Groth's special "cushioned air" seating. Superior performing Teflon®[1] 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.

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every valve is factory inspected and tested to meet your critical requirements and special needs.

MODEL 1220A

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

CORROSION RESISTANCE

FIBERGLASS WITH VINYL ESTER RESIN #411

RESISTANT

ACIDS:
Acetic
Acrylic
Boric
Chromic (20%)
Formic
Hydrochloric
Hydrofluoric *
Nitric (All Conc.)
Perchloric
Phosphoric
Sulfuric (75%)

SALTS:
Alum
Ammonium Chloride
Calcium Chloride
Ferric Chloride
Magnesium Sulfate
Sodium Chloride
Sodium Chromate

BLEACHING AGENTS:
Calcium Chlorate
Calcium Hypochlorite
Chlorine Dioxide
Chlorine Water
Hydrogen Peroxide
Potassium Permanganate
Sodium Chlorate
Sodium Hypochlorite

BASES:
Potassium Hydroxide
Sodium Hydroxide *
Ammonium Hydroxide *
Ammonium Carbonate
Potassium Carbonate *
Sodium Carbonate *

WATER:
Demineralized
Distilled

OTHERS:
Alcohols
Alum Chlorohydroxide
Glycerin
Sulfonated Detergents
Urea-Ammonium Nitrate
Fertilizers

NON RESISTANT

Solvents
Oleum
Phenol
Bromine
Furfural

* Synthetic Veil should be used in inner layer.

FIBERGLASS WITH FURAN RESIN

RESISTANT

ACIDS:
Acetic
Acrylic
Chlorophenol
Hydrochloric
Nitric (5%)
Phosphoric
Sulfonic
Sulfuric (25%, 50%)

BASES:
Aniline
Diethylamine
Potassium Carbonate
Sodium Carbonate
Sodium Hydroxide (5%, 50%)

SALTS:
Alum
Ammonium Bromide
Calcium Chloride
Ferric Chloride
Magnesium Sulfate
Sodium Chromate

WATER:
Demineralized
Distilled

SOLVENTS:
Acetone
Benzene
Carbon Disulfide
Carbon Tetrachloride
Chlorobenzene
Ethanol
Ethyl Acetate
Ethylene Dichloride
Methanol
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Perchloroethylene
Toluene
Trichloroethylene
Xylene

OTHERS:
Acrylonitrile
Benzyl Chloride
Cyclohexanone
Formalin
Pulp Mill Liquors
Styrene
Toluene Diisocyanate

NON RESISTANT

Bleaching Agents
Free Halogens
Peroxides

Dimensional drawings on request.

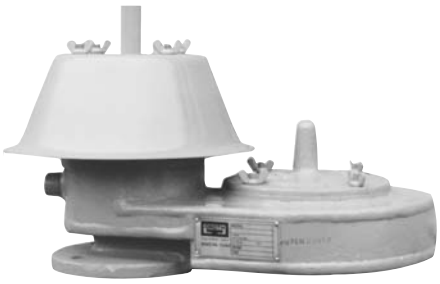
Chemical resistance information provided by Dow Chemical (Vinyl Ester Resin) and Qua Corr (Furan).

For Flow Data see corresponding Model Brochure.

Consult a chemical resistance guide or handbook for additional material compatability information.

Steam Jacketed Valves

- **Prevents freezing and product buildup**
- **Designed for easy maintenance**
- **Available for most models (consult factory)**

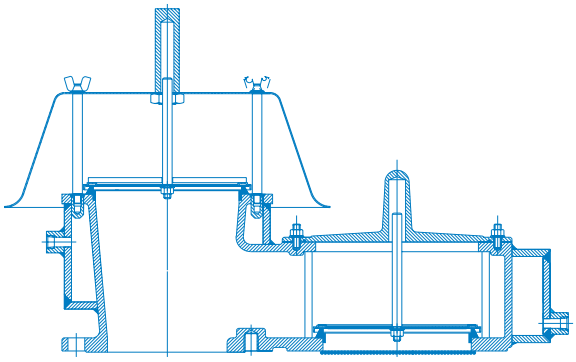


STEAM JACKETED VALVES

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.

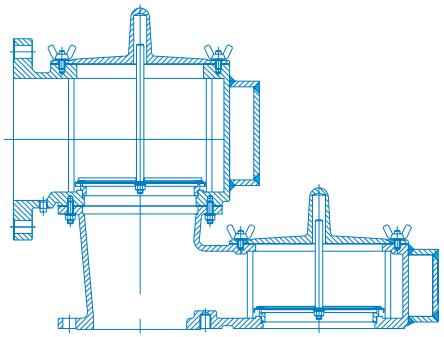
SPECIAL FEATURES

Steam Jacketed Valves are built of corrosion resistant materials throughout. Valve covers can be easily removed for convenient inspection and maintenance. Steam heated valves are suitable for steam circulation up to 100 PSIG saturated.



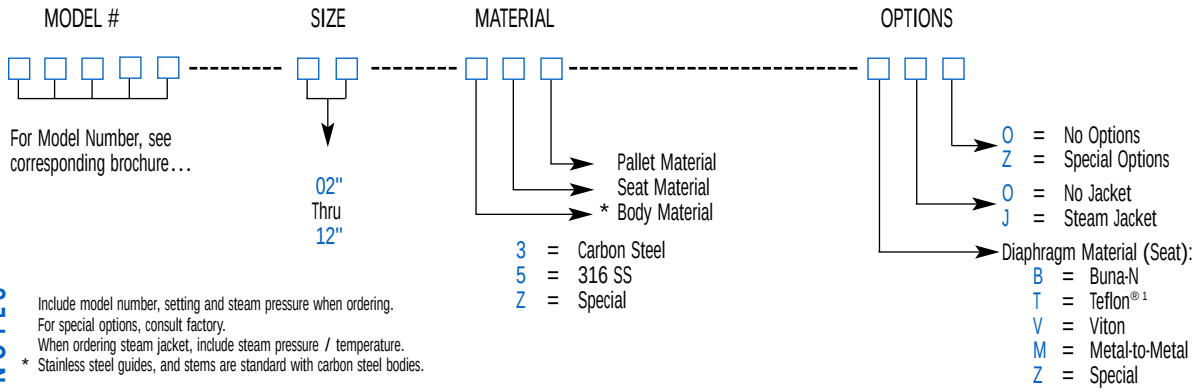
GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Steam Jacketed Valve is factory inspected and tested to meet your critical requirements and special needs.



HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

Include model number, setting and steam pressure when ordering.
For special options, consult factory.
When ordering steam jacket, include steam pressure / temperature.
* Stainless steel guides, and stems are standard with carbon steel bodies.

EXAMPLE

1 2 0 0 A — 0 2 — 5 5 5 — T J 0

Indicates a 2" Model 1200 with 316 SS Body, Seat and Pallet, Teflon® [1] Seat Diaphragm, Steam Jacketed and no other options.

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

GROTH CORPORATION®
a Continental Disc Company

SECTION 2
FLAME ARRESTERS

7618, 7628 Flame Arrester •

7622 Flame Check •

Steam Jacketed Flame Arresters •

7658A Detonation Arrester •

8400A Pressure Relief and Flame Trap Assembly •

Flame Trap Assembly •

Back Pressure Check Valve •

GROTH CORPORATION
a Continental Disc Company

FLAME ARRESTERS

Models 7618 / 7628

- Sizes 2” through 60”
- Available in, carbon steel, stainless steel aluminum (type 356) and other materials
- Wafer design for quick and easy maintenance
- Unique recessed seating for superior protection
- Factory Mutual approval for most sizes and materials
- Proven spiral wound, crimped ribbon, flame element

MODEL 7618 (VERTICAL)

MODEL 7628 (HORIZONTAL)

FLAME ARRESTER

Both models are designed to inhibit flame propagation in gas piping systems and to protect low pressure tanks containing flammable liquids. Arresters protect low flash point liquids from externally caused sources of heat and ignition. This provides increased fire protection and safety.

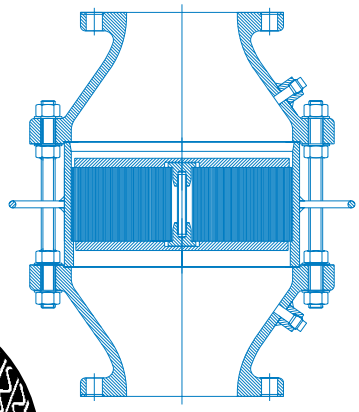
SPECIAL FEATURES

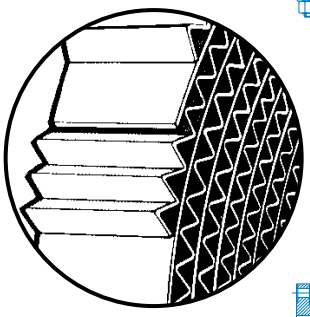
Both models are built of corrosion resistant materials throughout. Wafer design construction affords easy accessibility to the flame bank. Additionally, jack screws aid in the removal from the shell assembly. All Groth flame arrester flame banks utilize spiral wound, crimped ribbon constructed flame elements. These proven, Factory Mutual approved elements have been reported, by NTIS of the Dept. of Commerce, to provide the best flame quenching performance for the least pressure drop. Groth’s special recessed flame bank seating construction uniquely provides an extra measure of protection against leakage and possible flame propagation.

GROTH, THE CAPABILITY COMPANY

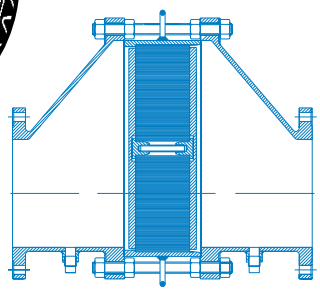
As with all Groth products, every Flame Arrester is factory inspected and tested to meet all critical requirements and special needs. Inventory is maintained to insure rapid delivery.

MODEL 7618



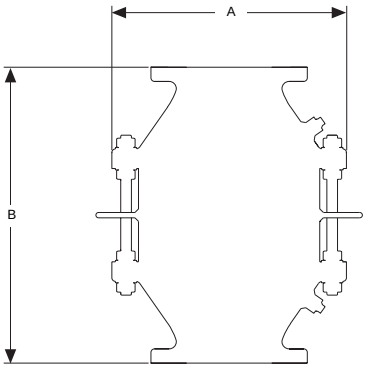


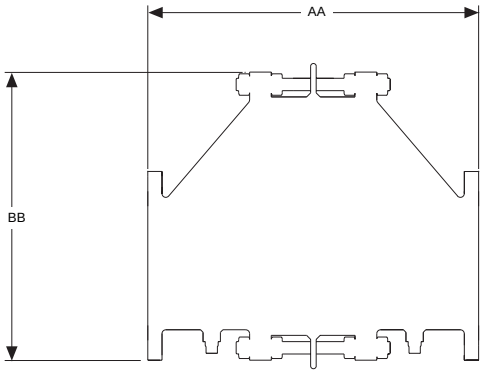
MODEL 7628



Note:
All Groth Flame Arresters are Bi-directional. Factory Mutual regulates that Flame arresters be installed less than 10 pipe diameters from the source of ignition.

SPECIFICATIONS





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

Size*†	A Width (mm)	B Height (mm)	AA Length (mm)	BB Height (mm)	MAWP 7618 Aluminum (mm)	MAWP 7618 Carbon or SS (mm)	MAWP 7628 Aluminum (mm)	MAWP 7628 Carbon or SS (mm)	Approx. Ship. Wt. Lbs. (Aluminum)
2" (51 mm)	8 3/4 " (221)	14" (356)	13 3/4 " (349)	9 1/2 " (241)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	150 PSIG (1035 kPa)	350 PSIG (2415 kPa)	18 (8kg)
3" (76 mm)	9 1/2 " (241)	16" (406)	15 3/4 " (400)	11" (279)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	25 (11 kg)
4" (102 mm)	11 1/2 " (292)	18 1/4 " (464)	18" (457)	12 1/2 " (318)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	40 (18 kg)
6" (152 mm)	16 1/2 " (419)	21" (533)	21" (533)	16 1/2 " (419)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	70 (32 kg)
8" (203 mm)	21" (533)	25" (635)	25" (635)	20 1/2 " (521)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	90 PSIG (621 kPa)	200 PSIG (1380 kPa)	135 (61 kg)
10" (254 mm)	24 3/4 " (629)	30" (762)	30" (762)	24 1/2 " (622)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	75 PSIG (517 kPa)	150 PSIG (1035 kPa)	235 (107 kg)
12" (305 mm)	28 5/8 " (727)	32 1/2 " (826)	32 1/2 " (826)	28 1/2 " (724)	50 PSIG (345 kPa)	100 PSIG (690 kPa)	75 PSIG (517 kPa)	150 PSIG (1035 kPa)	345 (156 kg)

* Larger sizes available on special application. †150# A.N.S.I. drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys. Pneumatic tested to 15 PSI as standard.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

7618 Vertical
7628 Horizontal

02" Thru 60"

Flame element winding

Body Material

1 = Aluminum
3 = Carbon Steel
5 = 316 SS
Z = Special

O = No Options
Z = Special Options

O = No Jacket
J = Steam Jacket

F = Flanged outlet (in-line design)
W = Weatherhood (replaces flanged outlet)

NOTES

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

EXAMPLE

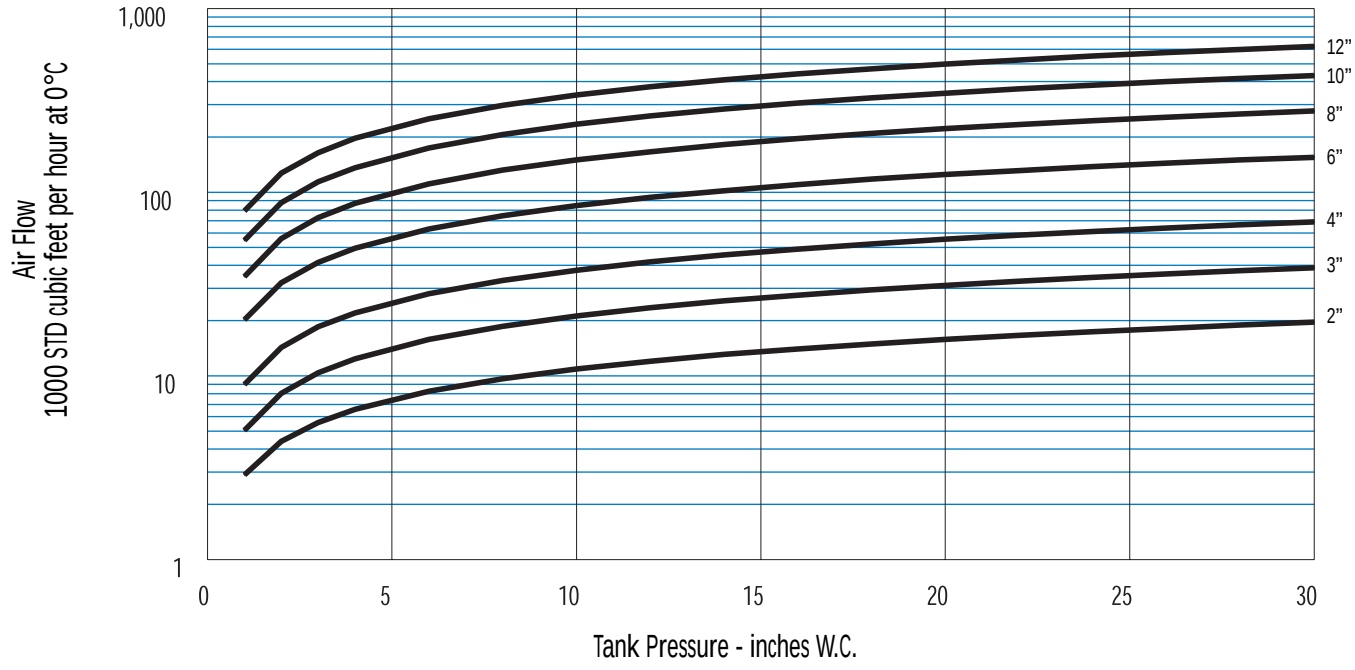
7 6 2 8 — 0 2 — 1 5 — F 0 0

Indicates a 2" Model 7628 with Aluminum Body, 316 SS Flame Element Winding, Flanged Outlet and no other options.

Model 7618 / 7628
Flow Capacity
End of Line

Tank Pressure		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	oz / sq in	2”	3”	4”	6”	8”	10”	12”
1	0.6	2.89	5.05	8.98	20.2	34.7	54.7	79.1
2	1.2	4.40	8.03	14.3	32.1	55.9	87.8	127
3	1.7	5.58	10.4	18.5	41.5	72.7	114	164
4	2.3	6.57	12.4	22.0	49.5	87.0	136	197
6	3.5	8.25	15.8	28.0	63.1	111	174	251
8	4.6	9.66	18.6	33.1	74.5	132	206	297
10	5.8	10.9	21.2	37.6	84.7	150	235	338
12	6.9	12.0	23.5	41.7	93.8	166	260	375
14	8.1	13.1	25.6	45.5	102	182	284	409
16	9.2	14.0	27.5	49.0	110	196	306	441
18	10.4	14.9	29.4	52.2	118	209	327	470
20	11.6	15.8	31.1	55.4	125	222	346	499
22	12.7	16.6	32.8	58.3	131	234	365	525
24	13.9	17.4	34.4	61.1	138	245	383	551
26	15.0	18.1	35.9	63.9	144	256	400	576
28	16.2	18.9	37.4	66.5	150	267	416	599
30	17.3	19.6	38.8	69.0	155	277	432	622

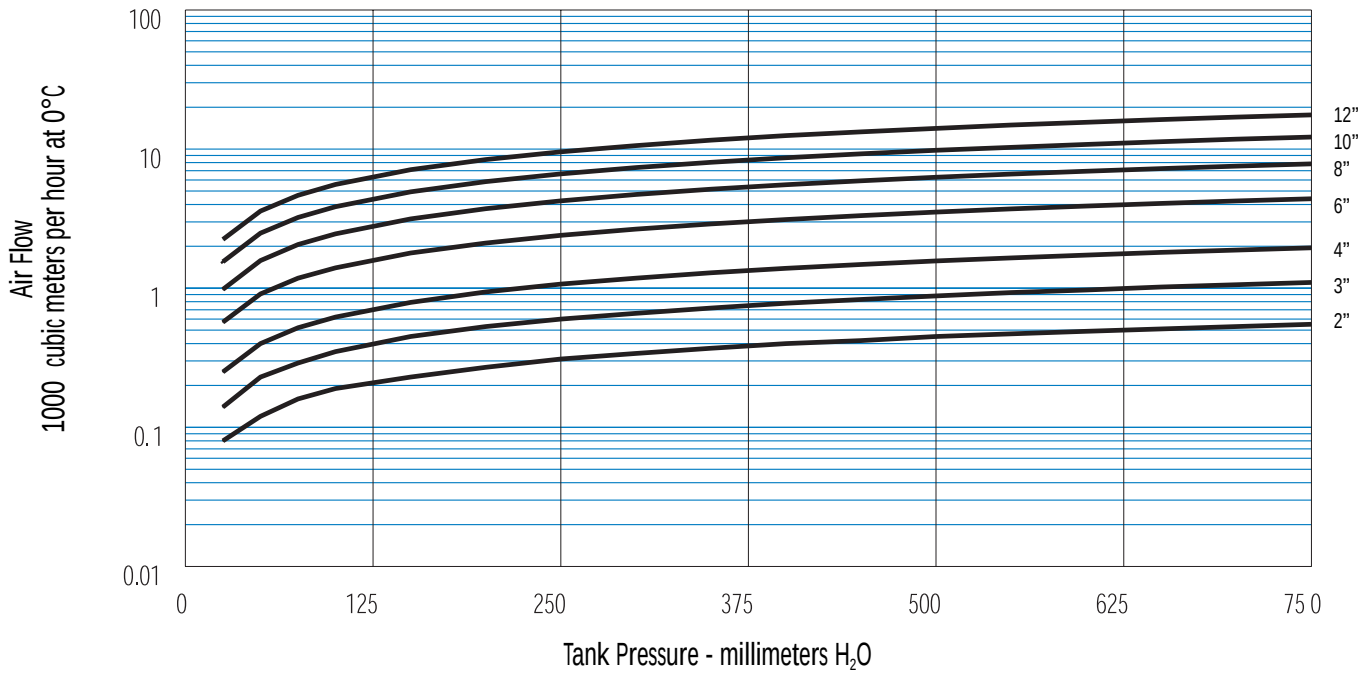
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.
4. Flow data are for tank mounting or end of line and includes flame arrester entrance loss, exit loss, and internal losses.



Model 7618 / 7628
Flow Capacity
End of Line

Tank Pressure		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
25	2.45	0.08	0.14	0.25	0.57	0.98	1.55	2.24
50	4.90	0.12	0.23	0.40	0.91	1.58	2.49	3.59
75	7.35	0.16	0.29	0.52	1.18	2.06	3.23	4.66
100	9.80	0.19	0.35	0.62	1.40	2.46	3.86	5.57
150	14.7	0.23	0.45	0.79	1.79	3.15	4.93	7.11
200	19.6	0.27	0.53	0.94	2.11	3.73	5.84	8.42
250	24.5	0.31	0.60	1.07	2.40	4.25	6.64	9.57
300	29.4	0.34	0.66	1.18	2.66	4.72	7.37	10.6
350	34.3	0.37	0.72	1.29	2.90	5.15	8.04	11.6
400	39.2	0.40	0.78	1.39	3.12	5.55	8.67	12.5
450	44.1	0.42	0.83	1.48	3.33	5.92	9.25	13.3
500	49.0	0.45	0.88	1.57	3.53	6.28	9.81	14.1
550	53.9	0.47	0.93	1.65	3.72	6.62	10.3	14.9
600	59	0.49	0.97	1.73	3.90	6.94	10.8	15.6
650	64	0.51	1.02	1.81	4.07	7.25	11.3	16.3
700	69	0.53	1.06	1.88	4.24	7.55	11.8	17.0
750	74	0.55	1.10	1.95	4.40	7.84	12.2	17.6

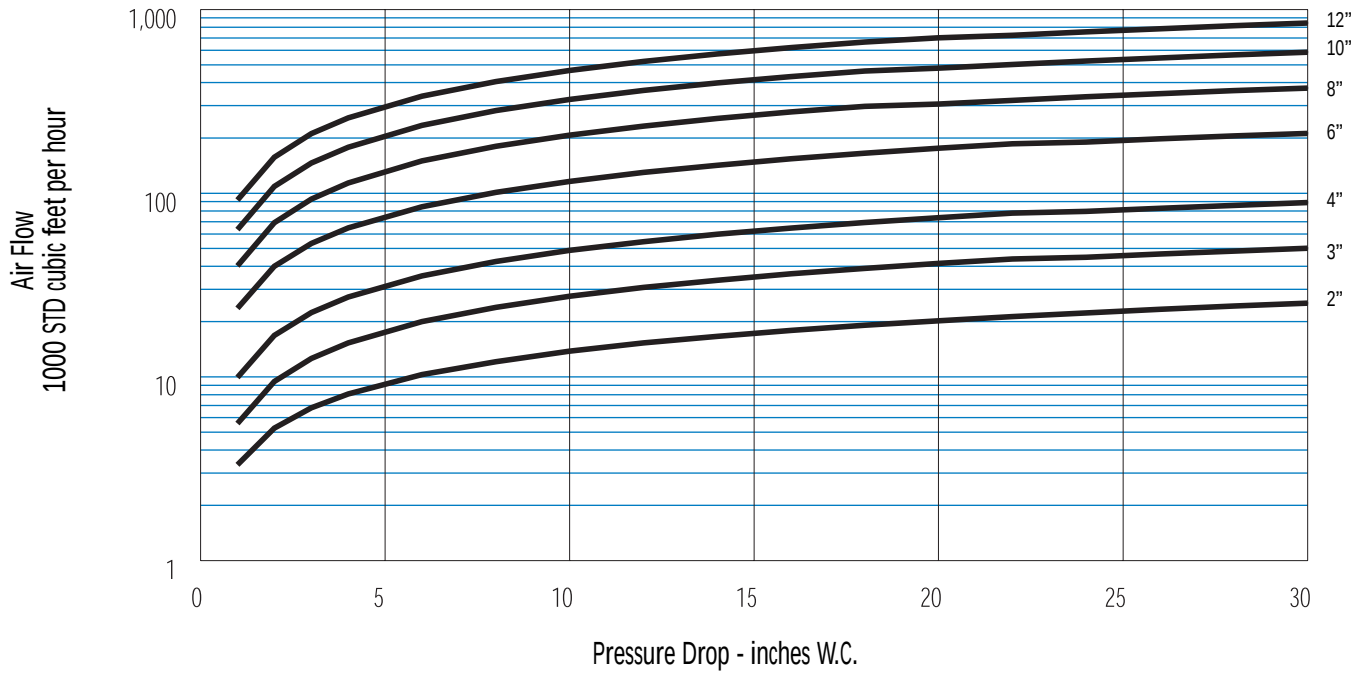
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.
4. Flow data are for tank mounting or end of line and includes flame arrester entrance loss, exit loss, and internal losses.



Model 7628 / 7618
Flow Capacity
In-Line

Pressure Drop		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	oz / sq in	2”	3”	4”	6”	8”	10”	12”
1	0.6	3.32	5.58	9.92	23.6	40.2	63.4	91.8
2	1.2	5.27	9.44	16.8	40.0	69.1	109	157
3	1.7	6.79	12.6	22.4	53.3	93.0	146	211
4	2.3	8.08	15.3	27.2	64.8	113.8	178	257
6	3.5	10.3	20.0	35.5	84.5	150	234	337
8	4.6	12.1	23.9	42.5	101	180	282	405
10	5.8	13.8	27.5	48.8	116	207	324	466
12	6.9	15.3	30.7	54.5	130	232	363	522
14	8.1	16.6	33.6	59.8	142	255	398	573
16	9.2	17.9	36.4	64.7	154	277	431	620
18	10.4	19.1	39.0	69.3	165	297	463	665
20	11.6	20.2	41.5	73.7	176	306	480	701
22	12.7	21.3	43.8	77.9	186	320	502	723
24	13.9	22.3	44.8	79.7	190	335	524	756
26	15.0	23.3	46.6	82.9	198	348	545	786
28	16.2	24.3	48.4	86.0	205	362	566	816
30	17.3	25.2	50.1	89.1	212	374	586	845

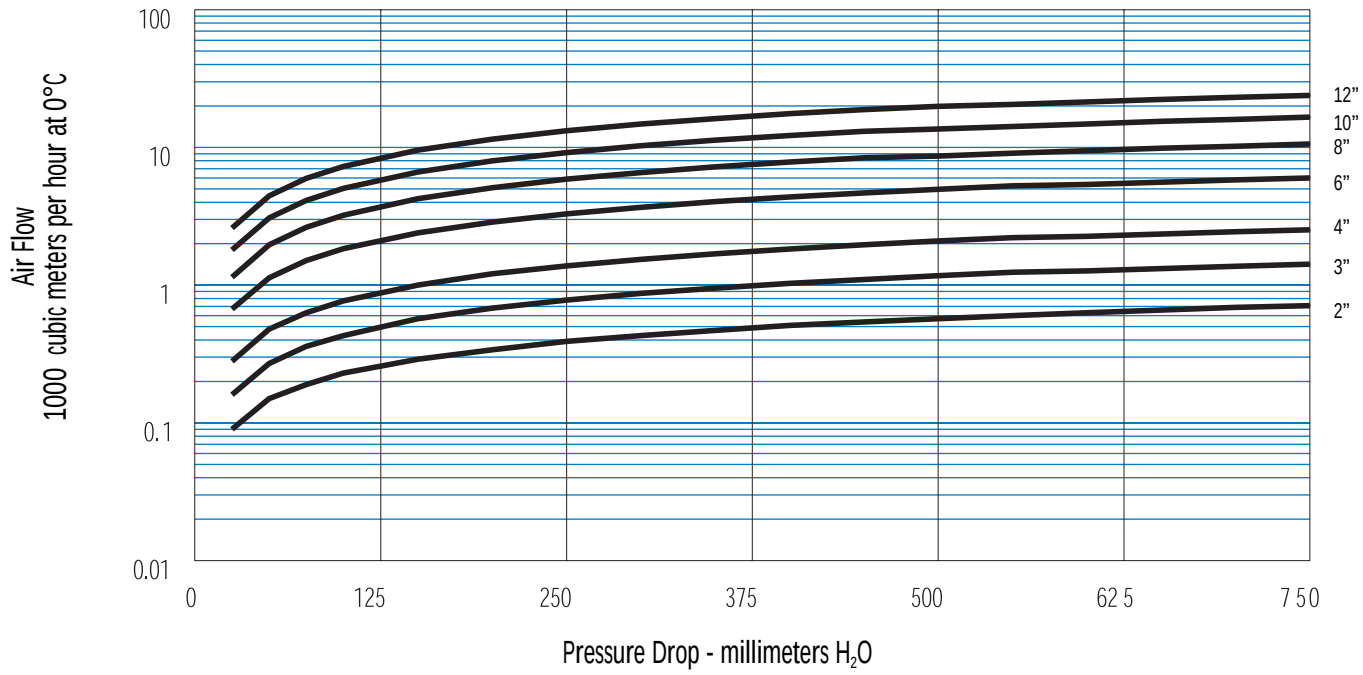
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.
4. Flow data are for in-line mounting and does not include entrance losses or exit losses.



Model 7628 / 7618
Flow Capacity
In-Line

Pressure Drop		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
25	2.45	0.09	0.16	0.28	0.67	1.14	1.80	2.60
50	4.90	0.15	0.27	0.48	1.13	1.96	3.08	4.45
75	7.35	0.19	0.36	0.63	1.51	2.63	4.13	5.97
100	9.80	0.23	0.43	0.77	1.84	3.22	5.05	7.29
150	14.7	0.29	0.57	1.00	2.39	4.24	6.63	9.55
200	19.6	0.34	0.68	1.21	2.87	5.10	7.98	11.5
250	24.5	0.39	0.78	1.38	3.29	5.88	9.18	13.2
300	29.4	0.43	0.87	1.54	3.68	6.58	10.3	14.8
350	34.3	0.47	0.95	1.69	4.04	7.23	11.3	16.2
400	39.2	0.51	1.03	1.83	4.37	7.84	12.2	17.6
450	44.1	0.54	1.10	1.96	4.68	8.41	13.1	18.8
500	49.0	0.57	1.17	2.09	4.97	8.66	13.6	19.9
550	53.9	0.60	1.24	2.21	5.26	9.08	14.2	20.5
600	59	0.63	1.27	2.26	5.38	9.48	14.8	21.4
650	64	0.66	1.32	2.35	5.60	9.87	15.5	22.3
700	69	0.69	1.37	2.44	5.81	10.2	16.0	23.1
750	74	0.71	1.42	2.52	6.01	10.6	16.6	23.9

1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.
4. Flow data are for in-line mounting and does not include entrance losses or exit losses.



Model 7622

- **Sizes 1/2” through 1-1/2”**
- **Available with carbon and stainless steel housing and stainless steel element (perforated plate construction**
- **Designed for easy maintenance**

MODEL 7622

FLAME CHECKS

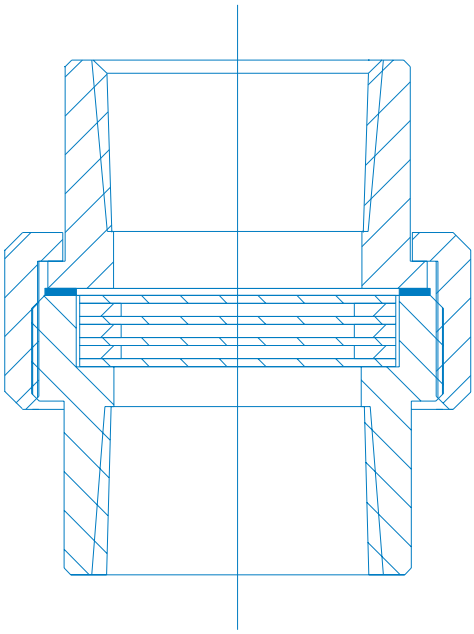
Model 7622 is designed to prevent flashback in small lines carrying flammable gases. They are often used in small pilot lines and are intended for use where the gas flow can be shut off. The Flame Checks are union type fittings with FNPT connections.

SPECIAL FEATURES

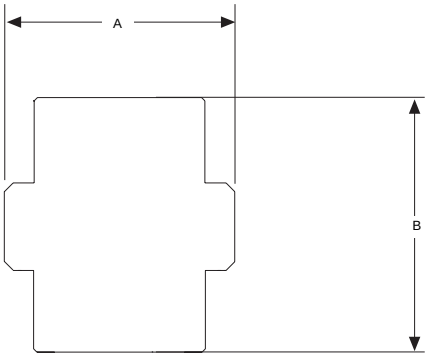
The Model 7622 flame element consists of perforated plates with sufficient openings to provide a minimum pressure drop and still prevent flash back in the line. The construction permits easy access for inspection and maintenance.

GROTH, THE CAPABILITY COMPANY

As with all Groth products every Model 7622 is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



SPECIFICATIONS



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

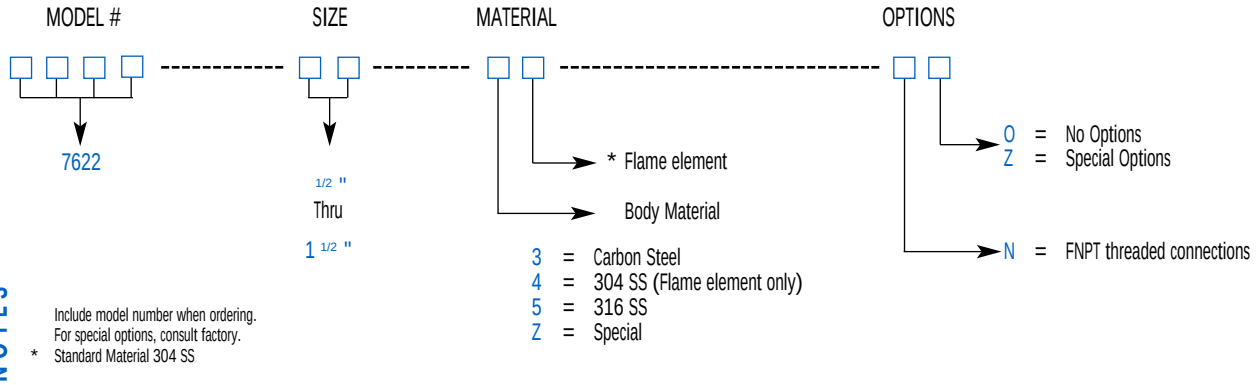
Size (FNPT)	A Width (mm)	B Height (mm)	Approximate Shipping Weight Lbs.
1/2 "* (13 mm)	1 7/8 " (48)	2.77" (70)	1 (.5 kg)
3/4 " (19 mm)	1 7/8 " (48)	1.84" (47)	1 (.5 kg)
1" (25 mm)	2 1/8 " (54)	2.34" (59)	3 (1.4 kg)
1 1/2 " (38 mm)	2 1/2 " (64)	2.59" (66)	4 (1.8 kg)

* 1/2 " size utilizes a 3/4 " flame check with 3/4 " x 1/2 " reducers.

Note: Maximum working pressure 25 PSIG

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

Include model number when ordering.
For special options, consult factory.
* Standard Material 304 SS

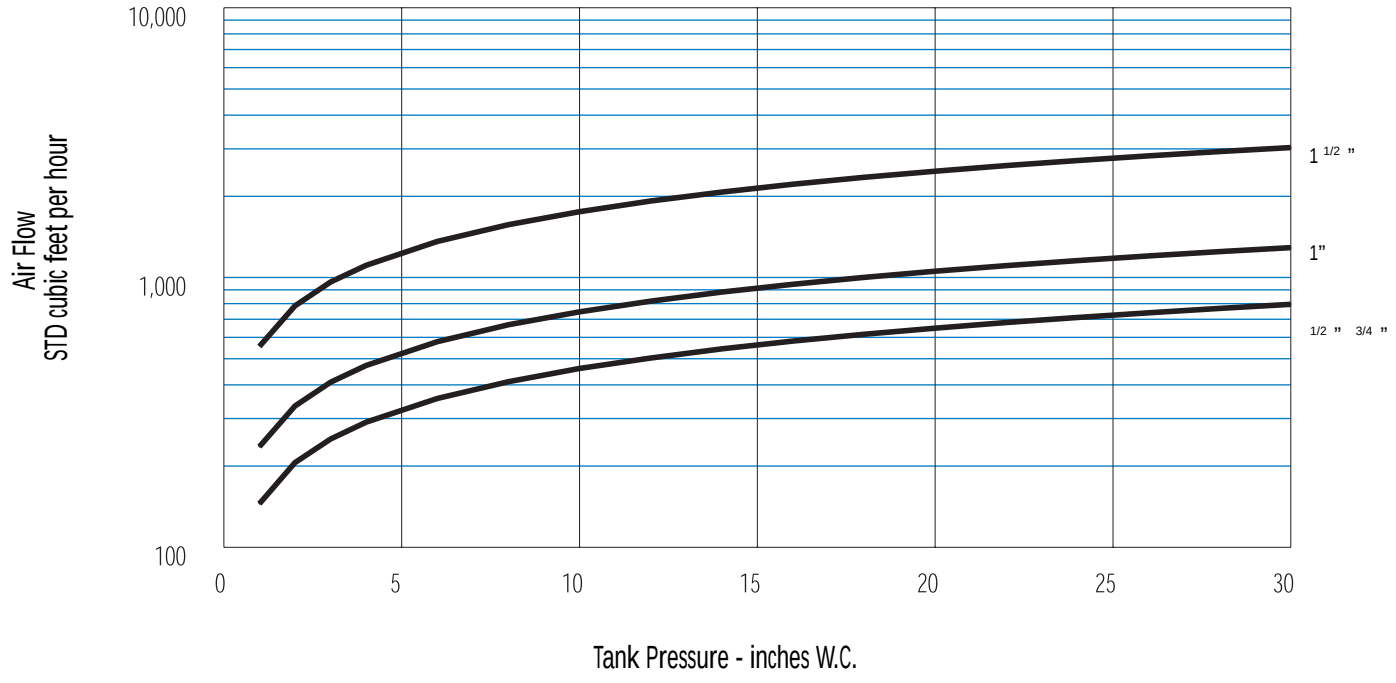
EXAMPLE 7 6 2 2 — 0 1 — 3 5 — N 0 0

Indicates a 1" Model 7622 with Carbon Steel, 316 SS Flame Element, FNPT connections and no options.

Model 7622
Flow Capacity

Pressure Drop		Air Flow - Standard Cubic feet per Hour		
In W.C.	oz / sq in	1/2 & 3/4 "	1"	1 1/2"
1	0.6	145	236	555
2	1.2	206	334	785
3	1.7	252	409	962
4	2.3	291	472	1110
6	3.5	356	578	1360
8	4.6	411	668	1570
10	5.8	460	746	1755
12	6.9	503	817	1922
14	8.1	544	883	2075
16	9.2	581	944	2218
18	10.4	616	1001	2353
20	11.6	649	1055	2479
22	12.7	681	1106	2600
24	13.9	711	1155	2715
26	15.0	740	1202	2825
28	16.2	768	1247	2932
30	17.3	795	1290	3034

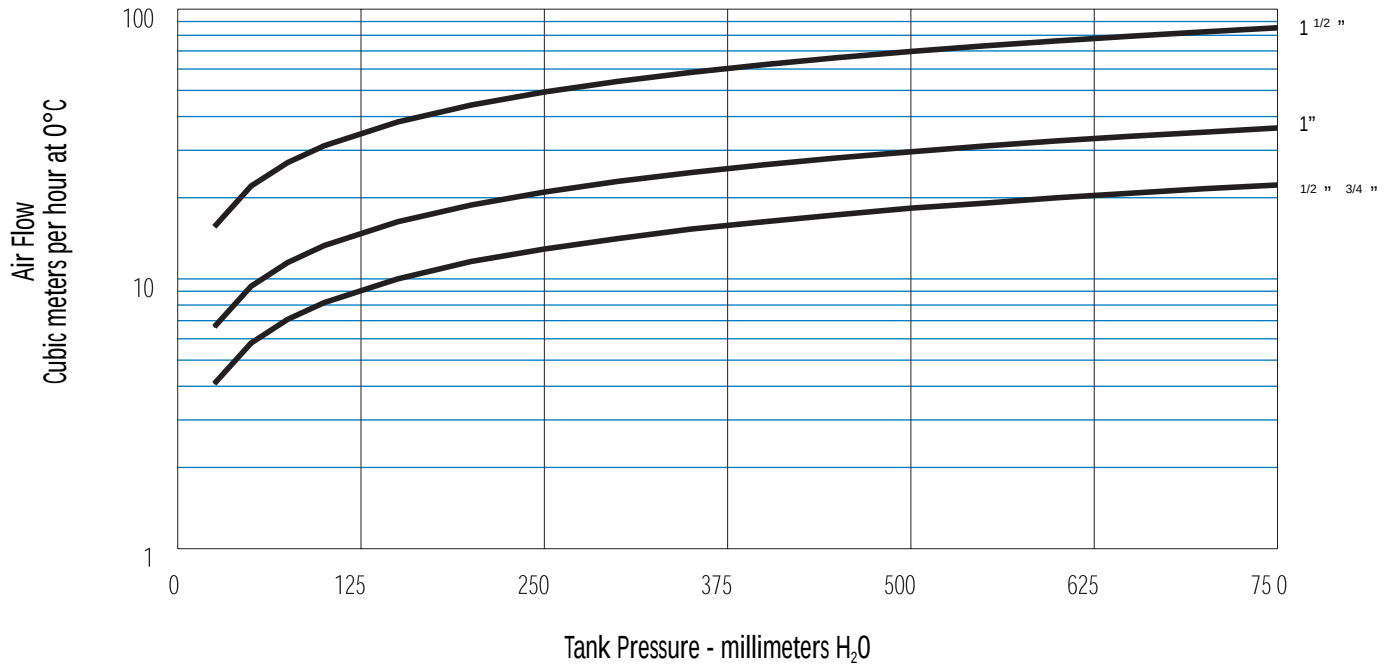
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 7622
Flow Capacity

Pressure Drop		Air Flow-Cubic meters per Hour at 0°C		
mm H_2O	mb	$^1/_2$ & $^3/_4$ "	1"	$1^1/_2$"
25	2.45	4.09	6.64	15.6
50	4.90	5.78	9.39	22.1
75	7.35	7.08	11.5	27.0
100	9.80	8.17	13.3	31.2
150	14.7	10.0	16.3	38.2
200	19.6	11.6	18.8	44.1
250	24.5	12.9	21.0	49.3
300	29.4	14.1	23.0	54.0
350	34.3	15.3	24.8	58.3
400	39.2	16.3	26.5	62.3
450	44.1	17.3	28.1	66.1
500	49.0	18.3	29.6	69.7
550	53.9	19.1	31.1	73.1
600	59	20.0	32.5	76.3
650	64	20.8	33.8	79.4
700	69	21.6	35.0	82.4
750	74	22.3	36.3	85.3

1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independant research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Steam Jacketed

- **Prevents freezing and product buildup**

MODEL 7618

STEAM JACKETED FLAME ARRESTERS

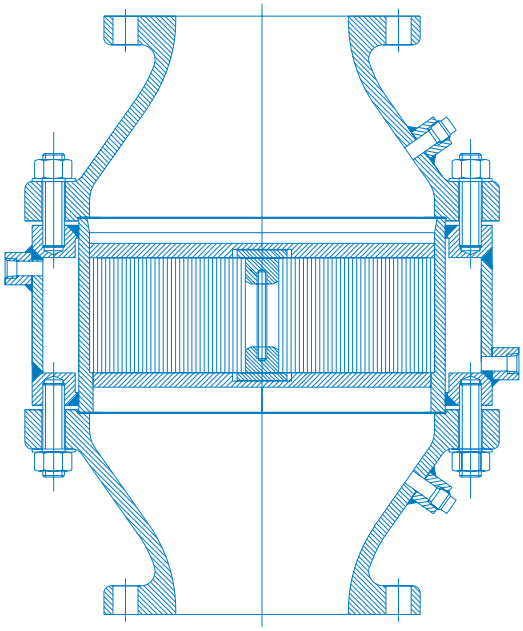
Steam Jacketed Flame Arresters are designed for use on tanks containing liquids whose vapors may crystallize at normal temperatures. Steam Jacketing protects the flame arrester bank element from clogging.

SPECIAL FEATURES

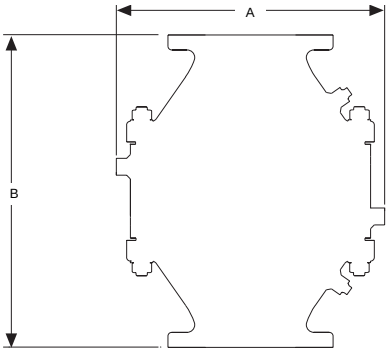
Steam Jacketed Flame Arresters are built of corrosion resistant materials throughout. Jacketed flame arresters are suitable for saturated steam up to 100 PSIG.

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Steam Jacketed Flame Arrester is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



SPECIFICATIONS



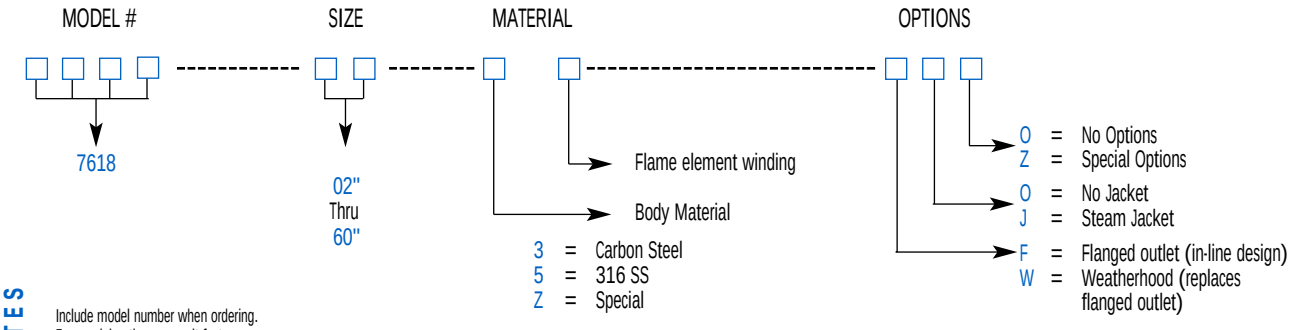
Specifications subject to change without notice. Certified dimensions available upon request.

Size*† Flange	A Width (Metric)	B Height (Metric)	Approx. Ship. Wt. Lbs.
2” (51 mm)	12 5/8 ” (321)	13 3/4 ” (349)	22 (10 kg)
3” (76 mm)	12 5/8 ” (321)	15 3/4 ” (400)	31 (14 kg)
4” (102 mm)	14 5/8 ” (372)	18” (457)	50 (23 kg)
6” (152 mm)	17 7/8 ” (454)	21” (533)	88 (40 kg)
8” (203 mm)	25 7/8 ” (657)	25” (635)	170 (77 kg)
10” (254 mm)	29 7/8 ” (759)	30” (762)	290 (132 kg)
12” (305 mm)	31 7/8 ” (810)	32 1/2 ” (826)	430 (195 kg)

* Larger sizes available on special application. †150# A.N.S.I. drilled compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

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

EXAMPLE

7 6 1 8 — 0 2 — 3 5 — F J 0

Indicates a 2" Model 7618 with Carbon Steel Body, 316 SS Flame Element Winding, Flanged Outlet, Steam Jacket and no other options.

GROTH CORPORATION
a Continental Disc Company

DETONATION FLAME ARRESTER

Model 7658A

Pre-ignition

Ignition

Confined Deflagration

Detonation

Arrested

Pressure Wave

Video Sequence of Detonation

- **USCG Approved**
- **Successfully Tested to Procedures Approved by USCG, IMO & CSA**
- **Multiple Flow Selections per pipe size**
- **In-line Maintenance Available**

INTRODUCTION

GROTH CORPORATION HAS PROVIDED THE MOST RELIABLE FIRE PREVENTION EQUIPMENT SINCE 1971.

As the industry leader in supplying fire protection equipment for liquid storage and the handling of flammable vapors, Groth Corporation has developed a complete line of deflagration and detonation flame arresters.

To verify the function and reliability of these arresters, Groth has installed a state of the art facility, capable of performing tests under any condition of vapor medium, system pressure and temperature, ignition and flame propagation characteristics and test specifications.

The Groth Model 7658A has been successfully tested to USCG and IMO standards for detonation flame arresters. Groth can provide additional testing under your specific operating conditions.By utilizing multiple flame element diameters for each pipe size, an arrester can be sized to provide your required flow capacity at minimum cost.

New and innovative solutions are constantly being developed at Groth Corporation. Groth will continue to provide the best available pressure/vacuum relief and fire prevention equipment for your liquid storage and vapor handling facilities.

Burn Test

FEATURES

- Sizes 2” through 24” (2” through 12” USCG approved).
- Low pressure drop with multiple element sizes available for each flange size.
- Easy cleaning.
- Bi-directional flame arresting.
- Vertical or horizontal installation.
- Standard materials of construction are carbon steel or stainless steel.
- 316 SS element is standard

Options

- In-line cleaning
- Large inspection and cleaning ports.
- Swing bolts for fast element removal.
- Special and exotic materials available.
- Testing to customer specifications available.

SPECIFICATIONS

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

SIZE *	2”x5” (50 mm)	3”x6” (80 mm)	4”x8” (100 mm)	6”x12” (150 mm)	8”x16” (200 mm)	10”x20” (250 mm)	12”x24” (300 mm)
“A” Length (metric)	17.19 (437)	20.31 (516)	22.43 (570)	25.75 (654)	29.63 (753)	32.43 (824)	38.19 (970)
“B” Diameter (metric)	9.00 (229)	11.00 (279)	13.50 (343)	19.00 (483)	23.50 (597)	27.50 (699)	32.00 (813)
Estimated Weight (metric)	100 (45 kg)	225 (102 kg)	350 (159 kg)	625 (284 kg)	1200 (545 kg)	1500 (682 kg)	1800 (818 kg)

* Larger sizes available on special application. All units with ANSI 150 RF flanges standard. (other flange drillings available)

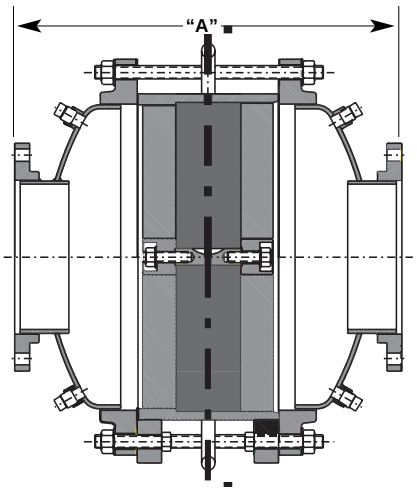
FLOW CAPACITY

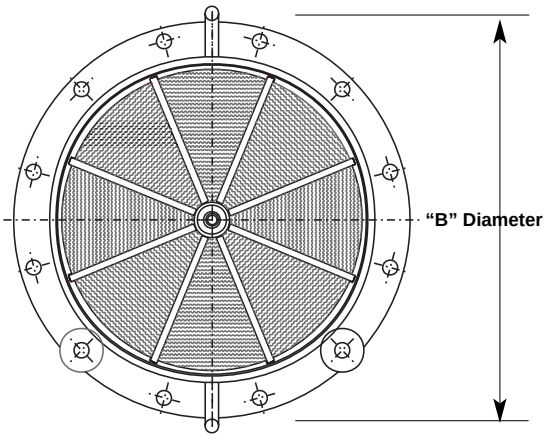
Air Flow Capacity
1000 Standard Cubic Feet per Hour at 60° F

NOMINAL PIPE SIZE	NOMINAL ELEMENT DIAMETER	Pressure Drop [OSI] / Pressure Drop [In WC]	0.58 / 1	1 / 1.73	1.16 / 2	1.73 / 3	2 / 3.46	2.31 / 4	3.47 / 6	4.62 / 8	5.78 / 10	6.93 / 12	9.24 / 16	11.6 / 20	13.9 / 24	16.0 / 27.7
2	5		0.63	1.08	1.24	1.82	2.08	2.39	3.46	4.48	5.45	6.37	8.11	9.72	11.2	12.6
2	6		0.89	1.50	1.72	2.50	2.84	3.23	4.60	5.85	7.02	8.12	10.1	12.0	13.7	15.2
2	8		1.48	2.40	2.72	3.81	4.27	4.79	6.54	8.07	9.46	10.7	13.0	15.1	17.0	18.6
3	6		0.92	1.58	1.82	2.70	3.11	3.57	5.27	6.90	8.49	10.0	13.0	15.8	18.5	20.9
3	8		1.61	2.73	3.14	4.60	5.25	6.00	8.66	11.1	13.5	15.7	19.9	23.7	27.3	30.4
3	10		2.43	4.05	4.63	6.64	7.52	8.52	11.9	15.0	17.9	20.5	25.4	29.7	33.7	37.2
3	12		3.32	5.40	6.11	8.57	9.61	10.8	14.7	18.2	21.3	24.1	29.3	33.9	38.2	41.8
4	8		1.63	2.81	3.23	4.81	5.52	6.35	9.36	12.3	15.1	17.8	23.1	28.1	32.9	37.2
4	10		2.52	4.30	4.95	7.29	8.34	9.55	13.9	17.9	21.8	25.5	32.4	38.9	44.9	50.2
4	12		3.57	6.01	6.88	9.99	11.4	12.9	18.4	23.4	28.1	32.5	40.5	47.9	54.7	60.7
4	16		5.91	9.60	10.9	15.2	17.1	19.2	26.1	32.3	37.8	42.9	52.1	60.3	67.8	74.3
6	12		3.67	6.31	7.3	10.8	12.4	14.3	21.1	27.6	34.0	40.2	52.0	63.3	74.1	83.7
6	16		6.43	10.9	12.5	18.4	21.0	24.0	34.6	44.6	53.9	62.8	79.4	94.8	109	122
6	20		9.72	16.2	18.5	26.6	30.1	34.1	47.8	60.1	71.5	82.1	101	119	135	149
6	24		13.3	21.6	24.5	34.3	38.4	43.1	58.8	72.6	85.1	96.6	117	136	153	167
8	16		6.53	11.2	12.9	19.2	22.1	25.4	37.4	49.1	60.4	71.4	92.5	113	132	149
8	20		10.1	17.2	19.8	29.1	33.3	38.2	55.4	71.7	87.2	102	130	156	180	201
8	24		14.3	24.0	27.5	40.0	45.4	51.7	73.6	93.6	112	130	162	192	219	243
8	30		21.2	34.9	39.6	56.0	63.0	70.9	97.7	121	143	163	199	231	261	286
10	20		10.2	17.5	20.2	30.0	34.5	39.7	58.5	76.7	94.4	112	145	176	206	233
10	24		14.6	24.9	28.7	42.3	48.4	55.5	80.9	105	128	150	191	230	267	299
10	30		22.3	37.5	43.0	62.4	71.0	80.8	115	146	175	203	253	299	342	379
10	42		39.9	64.3	72.7	101	113	126	171	210	246	278	336	388	435	476
12	24		14.7	25.2	29.1	43.3	49.7	57.2	84.2	110	136	161	208	253	297	335
12	36		32.1	54.1	61.9	89.9	102	116	166	211	253	292	365	431	493	546
12	42		42.4	70.3	80.1	114	129	146	203	254	301	345	424	495	560	616
12	48		53.2	86.4	97.8	137	154	172	235	291	340	386	469	543	610	668

Note: Contact factory for flow on other sizes.

hsng size	a		b		wt	
	in	mm	in	mm	lbs	kg
5”	17.19	437	9.00	229	75	34
6”	20.31	516	11.00	279	100	45
8”	22.43	570	13.50	343	175	79
12”	25.94	659	19.00	483	350	159
16”	29.63	753	23.50	597	550	249
20”	32.43	824	27.50	699	850	386
24”	38.75	984	32.00	813	1200	544
28”	35.75	908	36.50	927	1600	726
30”	42.88	1086	38.75	984	1900	862
32”	39.25	997	41.75	1060	2200	998
36”	42.00	1067	46.00	1219	2900	1315
42”	50.00	1270	53.00	1346	4100	1860
48”	56.00	1422	59.50	1511	5300	2404





Section A-A

FLOW CAPACITY METRIC

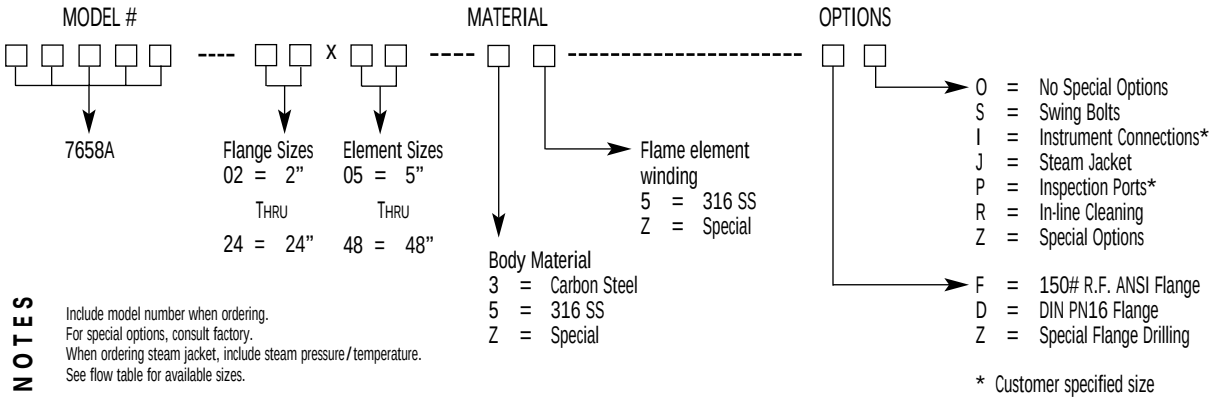
Air Flow Capacity
Cubic Meters per Hour at 0° C

Pressure Drop [mm WC] / Pressure Drop [mbar]		20.4 / 2	40.7 / 4	61.1 / 6	81.5 / 8	102 / 10	153 / 15	204 / 20	255 / 25	306 / 30	356 / 35	407 / 40	509 / 50	611 / 60	713 / 70
NOMINAL PIPE SIZE	NOMINAL ELEMENT DIAMETER														
2	5	14.8	29.2	43.1	56.6	69.8	101	131	159	186	212	237	284	328	370
2	6	21.0	40.8	59.5	77.4	94.5	134	171	205	237	267	296	350	400	446
2	8	35.2	65.6	92.6	117	140	191	236	276	313	348	380	440	495	546
3	6	21.5	42.7	63.6	84.2	104	154	202	248	293	337	380	463	542	617
3	8	37.8	74.1	109	143	175	253	326	394	459	521	580	692	797	895
3	10	57.5	110	159	205	249	349	439	522	599	672	740	868	985	1094
3	12	79.3	148	208	264	315	430	530	621	705	783	856	991	1114	1228
4	8	38.3	76.0	113	150	186	274	359	441	522	600	676	822	963	1097
4	10	59.3	117	172	226	279	405	524	637	745	848	947	1136	1313	1480
4	12	84.0	163	238	310	378	537	684	820	948	1069	1184	1400	1599	1785
4	16	141	262	370	469	560	764	943	1105	1254	1392	1522	1762	1980	2183
6	12	86.1	171	254	337	418	616	807	993	1174	1349	1520	1851	2166	2469
6	16	151	296	436	571	702	1012	1302	1576	1836	2083	2321	2768	3186	3579
6	20	230	441	637	821	996	1396	1757	2089	2398	2688	2962	3472	3940	4377
6	24	317	590	833	1055	1260	1718	2121	2486	2820	3132	3424	3964	4456	4911
8	16	153	304	452	599	743	1095	1435	1766	2086	2399	2703	3290	3851	4390
8	20	237	467	689	906	1116	1620	2096	2548	2979	3392	3790	4544	5251	5920
8	24	336	653	953	1238	1512	2150	2736	3282	3794	4278	4738	5599	6395	7140
8	30	505	950	1354	1726	2072	2854	3548	4178	4760	5302	5813	6756	7619	8419
10	20	239	475	707	935	1161	1710	2243	2759	3260	3748	4223	5141	6017	6859
10	24	342	675	999	1314	1623	2363	3067	3738	4381	4999	5594	6728	7795	8807
10	30	525	1020	1488	1935	2362	3359	4276	5128	5928	6684	7403	8748	9993	11157
10	42	955	1759	2467	3107	3695	5003	6146	7176	8119	8996	9817	11331	12710	13984
12	24	344	684	1018	1347	1671	2463	3229	3972	4695	5397	6082	7402	8665	9877
12	36	756	1468	2143	2786	3401	4837	6157	7384	8536	9625	10660	12597	14390	16066
12	42	1005	1914	2751	3530	4262	5931	7428	8796	10064	11252	12372	14450	16355	18125
12	48	1268	2360	3333	4220	5039	6873	8486	9943	11282	12528	13697	15855	17824	19646

Note: Contact factory for flow on other sizes.

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

Include model number when ordering.
For special options, consult factory.
When ordering steam jacket, include steam pressure/temperature.
See flow table for available sizes.

EXAMPLE 7 6 5 8 A — 0 3 X 0 6 — 3 5 — F 0

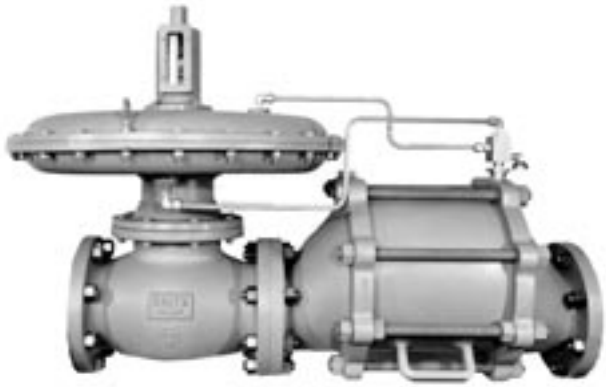
Indicates a 3" Model 7658A with Carbon Steel body, 316 SS Flame Element, ANSI Flanged Outlet and no other options.

GROTH CORPORATION
a Continental Disc Company

PRESSURE RELIEF AND FLAME TRAP ASSEMBLY

Model 8400A

- **Sizes 2" through 12"**
- **Unit designed for quick and easy maintenance**
- **Single port regulator for tight shut-off**
- **Aluminum (type 356), carbon steel and stainless steel.**
- **Factory Mutual approved flame arrester**



MODEL 8400A

GROTH REGULATOR

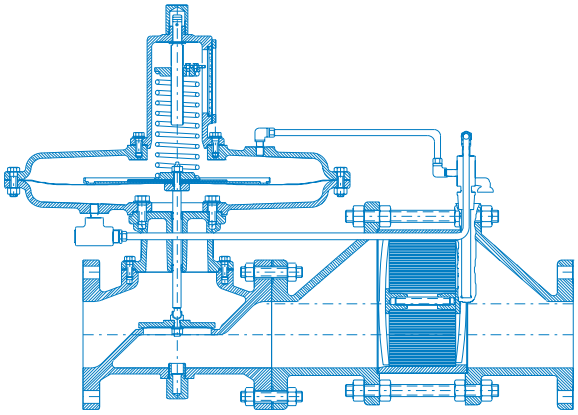
The regulator part of the assembly is a back pressure regulator to maintain upstream pressure over a range of 2" W.C. to 24" W.C. It provides a tight shut-off and maintains pressure at approximately 20% over the predetermined set pressure. This assembly is usually placed just upstream from a flare or burner.

GROTH FLAME ARRESTER

Model 7628 flame arrester is attached to Model 8860 Back Pressure Regulator with the thermal shut-off control valve. See Model 7628 information in this catalog.

SPECIAL FEATURES

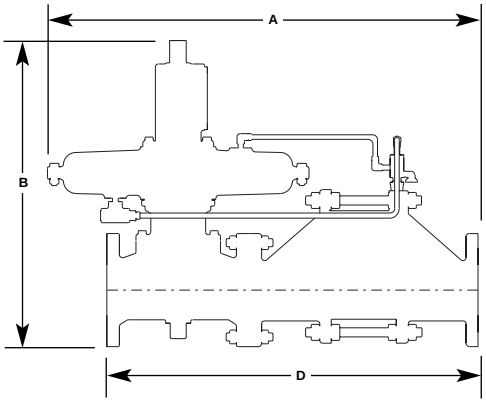
This unit accomplishes two purposes. It will maintain a predetermined back pressure in order that only surplus gas is flared and inhibits a possible flame flashback of the flare into the combustible fuel control system. A fusible element that is rated at 260°F precludes valve shut-off unless contacted by flame. The visual indicator provides operator with easy adjustments. The proven spiral wound, crimped ribbon, flame element was reported by NTIS of the Dept. of Commerce to provide the best flame quenching performance for the least pressure drop. The unit is corrosion resistant throughout and quick and easy to open and maintain. Standard operating range is 2" to 12" of water and special springs are available when higher pressures are required.



GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 8400A is factory inspected and tested to meet your critical requirements and special needs. Groth is ISO 9001 Certified to insure reliable quality.

SPECIFICATIONS



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

Model No.	Size*	A Length (Metric)	B Height (Metric)	C Width (Metric)	D Face to Face (Metric)	Approx. Ship. Wt. Lbs. (Aluminum)
8400A	2” (50.8 mm)	28.69” (729)	25” (635)	20.50” (521)	22.81” (579)	80 (36 KG)
8400A	3” (76.2 mm)	31.31” (795)	26” (660)	20.50” (521)	26.06” (662)	100 (45 KG)
8400A	4” (101.6 mm)	34.25” (870)	27” (686)	20.50” (521)	29.69” (754)	150 (68 KG)
8400A	6” (152.4 mm)	41.81” (1062)	32.25” (819)	26.50” (673)	36.06” (916)	200 (91 KG)
8400A	8” (203.2 mm)	50.06” (1272)	33.50” (851)	26.50” (673)	47.94” (1218)	300 (136 KG)
8400A	10” (254 mm)	55.63” (1413)	48.50” (1232)	25.50” (648)	55.63” (1413)	645 (293 KG)
8400A	12” (305 mm)	67.38” (1711)	50.75” (1289)	25.50” (648)	67.38” (1711)	795 (362 KG)

* 150# A.N.S.I. compatibility. F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

- MODEL #: 8400A
- SIZE: 02" THRU 12"
- MATERIAL:
  - Flame Element
  - Pallet Material
  - Body Material
    - 1 = Aluminum
    - 3 = Carbon Steel
    - 5 = 316 SS
    - Z = Special
- OPTIONS:
  - Z = Special Options
  - 0 = No Specials
  - Diaphragm Material
    - B = Buna-N
    - Z = Special

NOTES

For special options, consult factory.

EXAMPLE 8400A — 04 — 155 — BO

Indicates a 4" Model 8400A with aluminum body, 316SS pallet and flame element, Buna-N diaphragm.

FLAME TRAP ASSEMBLY

Model 8400A

Pressure	Air Flow Capacity 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	0.62	1.40	2.48	5.58	9.92	15.5	22.3
0.50	0.99	2.24	3.97	8.94	15.9	24.8	35.8
0.75	1.29	2.90	5.15	11.6	20.6	32.2	46.4
1.00	1.54	3.46	6.15	13.8	24.6	38.5	55.4
1.50	1.96	4.42	7.85	17.7	31.4	49.1	70.7
2.00	2.32	5.23	9.29	20.9	37.2	58.1	83.6
3.00	2.93	6.59	11.7	26.4	46.9	73.2	105
4.00	3.44	7.75	13.8	31.0	55.1	86.1	124
5.00	3.90	8.76	15.6	35.1	62.3	97.4	140
6.00	4.30	9.69	17.2	38.7	68.9	108	155
8.0	5.03	11.3	20.1	45.3	80.5	126	181
10.0	5.67	12.8	22.7	51.1	90.8	142	204
12.0	6.26	14.1	25.0	56.3	100	156	225
14.0	6.79	15.3	27.2	61.1	109	170	244
16.0	7.29	16.4	29.1	65.6	117	182	262
18.0	7.75	17.4	31.0	69.8	124	194	279
20.0	8.20	18.4	32.8	73.8	131	205	295
25.0	9.21	20.7	36.9	82.9	147	230	332
30.0	10.1	22.8	40.5	91.2	162	253	365

Pressure	Flow Capacity of 0.7 SG Digester Gas 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	0.74	1.67	2.97	6.67	11.9	18.5	26.7
0.50	1.19	2.67	4.75	10.7	19.0	29.7	42.7
0.75	1.54	3.46	6.16	13.9	24.6	38.5	55.4
1.00	1.84	4.14	7.36	16.6	29.4	46.0	66.2
1.50	2.35	5.28	9.39	21.1	37.5	58.7	84.5
2.00	2.78	6.25	11.1	25.0	44.4	69.4	100
3.00	3.50	7.88	14.0	31.5	56.0	87.5	126
4.00	4.11	9.26	16.5	37.0	65.8	103	148
5.00	4.66	10.5	18.6	41.9	74.5	116	168
6.00	5.15	11.6	20.6	46.3	82.3	129	185
8.0	6.02	13.5	24.1	54.1	96.2	150	217
10.0	6.78	15.3	27.1	61.0	109	170	244
12.0	7.48	16.8	29.9	67.3	120	187	269
14.0	8.12	18.3	32.5	73.0	130	203	292
16.0	8.71	19.6	34.8	78.4	139	218	314
18.0	9.27	20.9	37.1	83.4	148	232	334
20.0	9.80	22.0	39.2	88.2	157	245	353
25.0	11.0	24.8	44.0	99.1	176	275	396
30.0	12.1	27.2	48.4	109	194	303	436

FLAME TRAP ASSEMBLY

Model 8400A

Pressure	Air Flow Capacity Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	15.2	34.2	60.9	137	243	380	548
10	24.7	55.6	98.8	222	395	617	889
15	32.2	72.5	129	290	516	806	1160
20	38.7	87.0	155	348	619	967	1392
40	58.8	132	235	530	941	1471	2118
60	74.5	168	298	670	1192	1862	2681
80	87.7	197	351	789	1403	2193	3157
100	99.4	224	398	894	1590	2485	3578
150	124	280	497	1119	1989	3107	4475
200	145	327	581	1308	2325	3633	5232
250	164	369	656	1475	2622	4097	5900
300	181	406	723	1626	2890	4516	6504
350	196	441	784	1765	3137	4902	7059
400	210	474	842	1894	3367	5261	7576
450	224	504	896	2016	3583	5599	8062
500	237	533	947	2131	3788	5918	8522
600	260	586	1042	2344	4168	6512	9377
700	282	635	1129	2541	4517	7058	10164
800	303	681	1211	2724	4843	7567	10896

Pressure	Flow Capacity of 0.7 SG Digester Gas Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	18.2	40.9	72.8	164	291	455	655
10	29.5	66.4	118	266	472	738	1063
15	38.5	86.7	154	347	616	963	1387
20	46.2	104	185	416	739	1155	1663
40	70.3	158	281	633	1125	1758	2532
60	89.0	200	356	801	1424	2225	3204
80	105	236	419	943	1677	2621	3774
100	119	267	475	1069	1901	2970	4276
150	149	334	594	1337	2377	3714	5348
200	174	391	695	1563	2779	4342	6253
250	196	441	783	1763	3134	4897	7051
300	216	486	864	1943	3455	5398	7773
350	234	527	937	2109	3750	5859	8437
400	252	566	1006	2264	4025	6289	9056
450	268	602	1071	2409	4283	6692	9636
500	283	637	1132	2546	4527	7074	10186
600	311	701	1245	2802	4981	7783	11208
700	337	759	1350	3037	5399	8436	12148
800	362	814	1447	3256	5788	9044	13023

GROTH CORPORATION
a Continental Disc Company

FLAME TRAP ASSEMBLY
Model 8500A

- **Sizes 2" through 12"**
- **Aluminum (type 356), carbon steel and stainless steel.**
- **Designed for quick and easy maintenance**
- **Factory Mutual approved flame arrester**

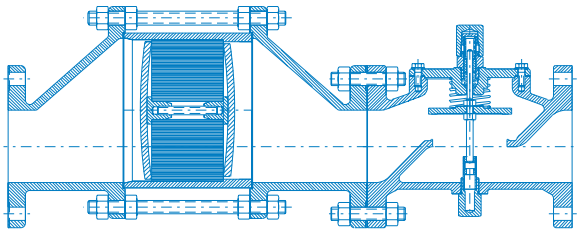
MODEL 8500A

FLAME TRAP ASSEMBLY

This unit includes a Groth Model 7628 horizontal flame arrester and a Groth Model 8530 thermal operated shut-off valve. This unit is generally installed in combustible vapor lines. They are also installed in a line to gas utilization equipment, as close as possible to the source of combustion.

SPECIAL FEATURES

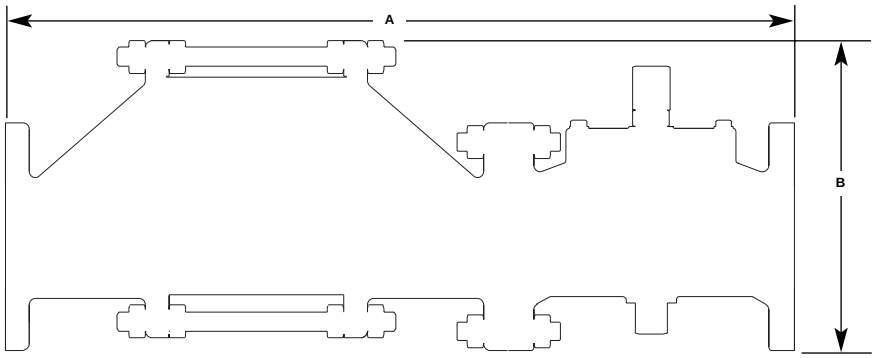
The unit may be installed in horizontal or vertical lines. The valve includes a fusible element which melts at 260°F and provides shut-down within 15 seconds. A pyrex sight glass is used to provide a view of the indicator rod showing valve position. Easy maintenance features are provided which enable the quick removal and cleaning of the Groth wafer type flame bank assembly. Additionally, the fusible element is replaceable without disassembly of valve.



GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 8500A is factory inspected and tested to meet your critical requirements and special needs. Groth is ISO 9001 Certified to insure reliable quality.

SPECIFICATIONS



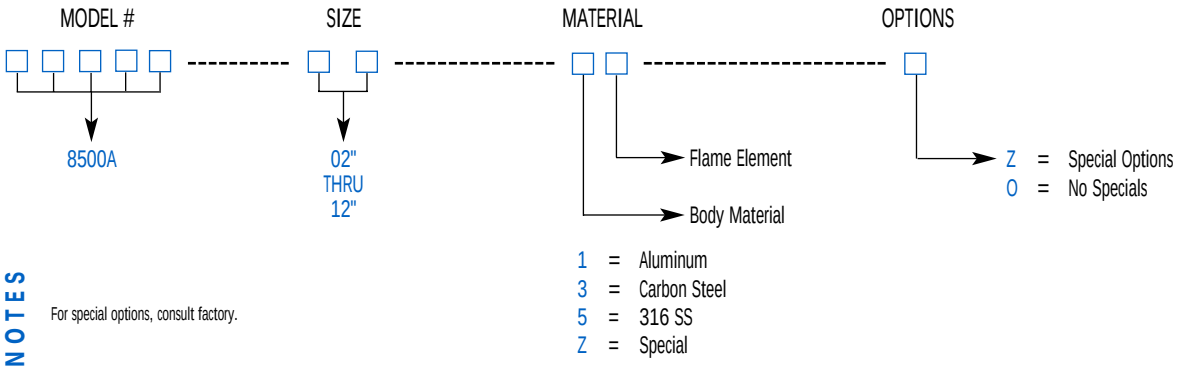
Specifications subject to change without notice. Certified dimensions available upon request.

Model No.	Size*	A Length (Metric)	B Height (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
8500A	2” (50.8 mm)	22.81” (579)	9.50” (241)	50 (23 KG)
8500A	3” (76.2 mm)	26.06” (662)	11.00” (279)	75 (34 KG)
8500A	4” (101.6 mm)	29.69” (754)	12.50” (318)	100 (45 KG)
8500A	6” (152.4 mm)	36.06” (916)	16.50” (419)	150 (68 KG)
8500A	8” (203.2 mm)	47.94” (1218)	20.50” (521)	200 (91 KG)
8500A	10” (254 mm)	55.63” (1413)	24.50” (622)	565 (257 KG)
8500A	12” (305 mm)	67.38” (1711)	28.50” (724)	715 (325 KG)

* 150# A.N.S.I. compatibility. F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

For special options, consult factory.

EXAMPLE 8500A — 02 — 11 — 0

Indicates a 2" Model 8500A with aluminum body, pallet and flame element and no specials.

Model 8500A

Pressure	Air Flow Capacity 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	0.62	1.40	2.48	5.58	9.92	15.5	22.3
0.50	0.99	2.24	3.97	8.94	15.9	24.8	35.8
0.75	1.29	2.90	5.15	11.6	20.6	32.2	46.4
1.00	1.54	3.46	6.15	13.8	24.6	38.5	55.4
1.50	1.96	4.42	7.85	17.7	31.4	49.1	70.7
2.00	2.32	5.23	9.29	20.9	37.2	58.1	83.6
3.00	2.93	6.59	11.7	26.4	46.9	73.2	105
4.00	3.44	7.75	13.8	31.0	55.1	86.1	124
5.00	3.90	8.76	15.6	35.1	62.3	97.4	140
6.00	4.30	9.69	17.2	38.7	68.9	108	155
8.0	5.03	11.3	20.1	45.3	80.5	126	181
10.0	5.67	12.8	22.7	51.1	90.8	142	204
12.0	6.26	14.1	25.0	56.3	100	156	225
14.0	6.79	15.3	27.2	61.1	109	170	244
16.0	7.29	16.4	29.1	65.6	117	182	262
18.0	7.75	17.4	31.0	69.8	124	194	279
20.0	8.20	18.4	32.8	73.8	131	205	295
25.0	9.21	20.7	36.9	82.9	147	230	332
30.0	10.1	22.8	40.5	91.2	162	253	365

Pressure	Flow Capacity of 0.7 SG Digester Gas 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	0.74	1.67	2.97	6.67	11.9	18.5	26.7
0.50	1.19	2.67	4.75	10.7	19.0	29.7	42.7
0.75	1.54	3.46	6.16	13.9	24.6	38.5	55.4
1.00	1.84	4.14	7.36	16.6	29.4	46.0	66.2
1.50	2.35	5.28	9.39	21.1	37.5	58.7	84.5
2.00	2.78	6.25	11.1	25.0	44.4	69.4	100
3.00	3.50	7.88	14.0	31.5	56.0	87.5	126
4.00	4.11	9.26	16.5	37.0	65.8	103	148
5.00	4.66	10.5	18.6	41.9	74.5	116	168
6.00	5.15	11.6	20.6	46.3	82.3	129	185
8.0	6.02	13.5	24.1	54.1	96.2	150	217
10.0	6.78	15.3	27.1	61.0	109	170	244
12.0	7.48	16.8	29.9	67.3	120	187	269
14.0	8.12	18.3	32.5	73.0	130	203	292
16.0	8.71	19.6	34.8	78.4	139	218	314
18.0	9.27	20.9	37.1	83.4	148	232	334
20.0	9.80	22.0	39.2	88.2	157	245	353
25.0	11.0	24.8	44.0	99.1	176	275	396
30.0	12.1	27.2	48.4	109	194	303	436

FLAME TRAP ASSEMBLY

Model 8500A

Pressure	Air Flow Capacity Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	15.2	34.2	60.9	137	243	380	548
10	24.7	55.6	98.8	222	395	617	889
15	32.2	72.5	129	290	516	806	1160
20	38.7	87.0	155	348	619	967	1392
40	58.8	132	235	530	941	1471	2118
60	74.5	168	298	670	1192	1862	2681
80	87.7	197	351	789	1403	2193	3157
100	99.4	224	398	894	1590	2485	3578
150	124	280	497	1119	1989	3107	4475
200	145	327	581	1308	2325	3633	5232
250	164	369	656	1475	2622	4097	5900
300	181	406	723	1626	2890	4516	6504
350	196	441	784	1765	3137	4902	7059
400	210	474	842	1894	3367	5261	7576
450	224	504	896	2016	3583	5599	8062
500	237	533	947	2131	3788	5918	8522
600	260	586	1042	2344	4168	6512	9377
700	282	635	1129	2541	4517	7058	10164
800	303	681	1211	2724	4843	7567	10896

Pressure	Flow Capacity of 0.7 SG Digester Gas Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	18.2	40.9	72.8	164	291	455	655
10	29.5	66.4	118	266	472	738	1063
15	38.5	86.7	154	347	616	963	1387
20	46.2	104	185	416	739	1155	1663
40	70.3	158	281	633	1125	1758	2532
60	89.0	200	356	801	1424	2225	3204
80	105	236	419	943	1677	2621	3774
100	119	267	475	1069	1901	2970	4276
150	149	334	594	1337	2377	3714	5348
200	174	391	695	1563	2779	4342	6253
250	196	441	783	1763	3134	4897	7051
300	216	486	864	1943	3455	5398	7773
350	234	527	937	2109	3750	5859	8437
400	252	566	1006	2264	4025	6289	9056
450	268	602	1071	2409	4283	6692	9636
500	283	637	1132	2546	4527	7074	10186
600	311	701	1245	2802	4981	7783	11208
700	337	759	1350	3037	5399	8436	12148
800	362	814	1447	3256	5788	9044	13023

GROTH CORPORATION
a Continental Disc Company

BACK PRESSURE CHECK VALVE
Model 8110

- **Sizes 2" through 12"**
- **Full Flow with low pressure drop**
- **Standard aluminum (type 356), carbon steel and stainless steel construction**

MODEL 8110

BACK PRESSURE CHECK VALVE

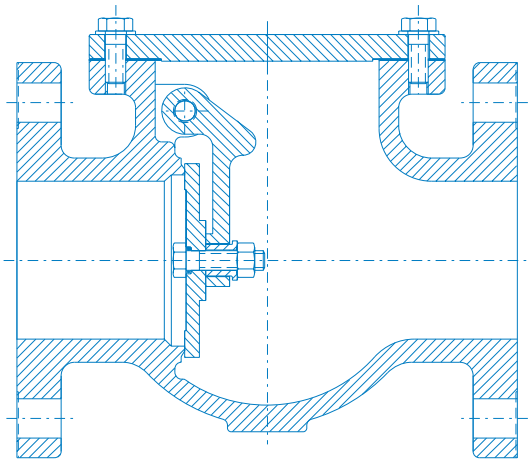
Model 8110 is used specifically in low pressure gas control lines where minimum pressure drops and maximum flow capacity are required.

SPECIAL FEATURES

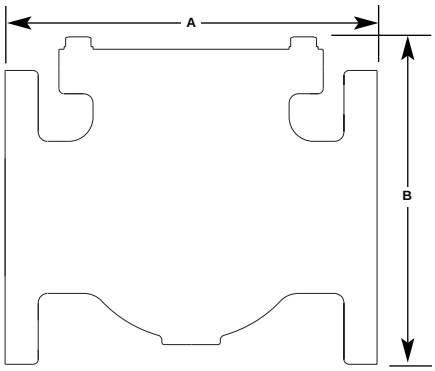
Model 8110 valves are built of corrosion resistant trim. Furnished standard in aluminum with free swinging aluminum pendulum type pallet. By removing the cover, easy access is provided for quick inspection and maintenance. Model 8110 check valves should be installed in your low pressure line downstream of meters, regulators and other gas control devices that may be otherwise damaged by an accidental reversal of the pressure in the system due to pressure waves from a flashback or similar disturbance.

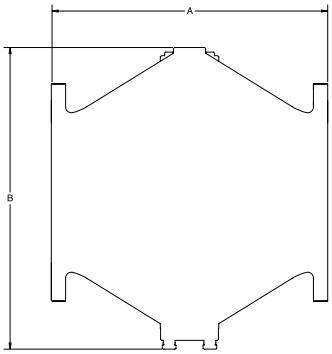
GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 8110 is factory inspected and tested to meet your critical requirements and special needs. Groth is ISO 9001 Certified to insure reliable quality.



SPECIFICATIONS





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

Model No.	Size*	Length Flange A (Metric)	Height Flange B (max) (Metric)	Approx. Shipping Lbs. (Aluminum) Flanged
8110	2” (50.8 mm)	8” (203)	8.12” (206)	9 (4 KG)
8110	3” (76.2 mm)	9.50” (241)	10.50” (267)	15 (7 KG)
8110	4” (101.6 mm)	11.50” (292)	11.50” (292)	28 (13 KG)
8110	6” (152.4 mm)	14” (356)	13.50” (343)	50 (23 KG)
8110	8” (203.2 mm)	19.50” (495)	16.50” (419)	90 (41 KG)
8110	10” (254 mm)	22” (559)	24.75” (629)	140 (64)
8110	12” (305 mm)	24.25 (616)	28.62 (727)	210 (95)

* 150# A.N.S.I. compatibility.

F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # □□□□ — 8110

SIZE □□ — 02" THRU 12"

MATERIAL □ — Body Material
- 1 = Aluminum
- 3 = Carbon Steel
- 5 = 316 SS
- Z = Special

OPTIONS □□
- Z = Special Options
- O = No Specials
- F = Flanged

NOTES

For special options, consult factory.

EXAMPLE

8 1 1 0 — 0 4 — 1 — F O

Indicates a 4" Model 8110 with an aluminum body, flanged and no specials.

Model 8110

Pressure	Air Flow Capacity 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	1.11	2.50	4.44	10.0	17.8	27.8	40.0
0.50	2.22	5.00	8.89	20.0	35.6	55.6	80.0
0.75	3.33	7.50	13.3	30.0	53.3	83.3	120
1.00	4.44	10.0	17.8	40.0	71.1	111	160
1.50	6.67	15.0	26.7	60.0	107	167	240
2.00	7.70	17.3	30.8	69.3	123	192	277
3.00	9.43	21.2	37.7	84.9	151	236	339
4.00	10.9	24.5	43.5	98.0	174	272	392
5.00	12.2	27.4	48.7	110	195	304	438
6.00	13.3	30.0	53.3	120	213	333	480
8.0	15.4	34.6	61.6	139	246	385	554
10.0	17.2	38.7	68.9	155	275	430	620
12.0	18.9	42.4	75.4	170	302	471	679
14.0	20.4	45.8	81.5	183	326	509	733
16.0	21.8	49.0	87.1	196	348	544	784
18.0	23.1	52.0	92.4	208	370	577	831
20.0	24.3	54.8	97.4	219	389	609	876
25.0	27.2	61.2	109	245	435	680	980
30.0	29.8	67.1	119	268	477	745	1073

Pressure	Flow Capacity of 0.7 SG Digester Gas 1000 Standard Cubic Feet per Hour at 60° F						
In WC	2”	3”	4”	6”	8”	10”	12”
0.25	1.33	2.99	5.31	12.0	21.2	33.2	47.8
0.50	2.66	5.98	10.6	23.9	42.5	66.4	95.6
0.75	3.98	8.96	15.9	35.9	63.7	100	143
1.00	5.31	12.0	21.2	47.8	85.0	133	191
1.50	7.97	17.9	31.9	71.7	127	199	287
2.00	9.20	20.7	36.8	82.8	147	230	331
3.00	11.3	25.4	45.1	101	180	282	406
4.00	13.0	29.3	52.0	117	208	325	468
5.00	14.5	32.7	58.2	131	233	364	524
6.00	15.9	35.9	63.7	143	255	398	574
8.0	18.4	41.4	73.6	166	294	460	662
10.0	20.6	46.3	82.3	185	329	514	741
12.0	22.5	50.7	90.1	203	361	563	811
14.0	24.3	54.8	97.4	219	389	609	876
16.0	26.0	58.6	104	234	416	651	937
18.0	27.6	62.1	110	248	442	690	994
20.0	29.1	65.5	116	262	466	727	1047
25.0	32.5	73.2	130	293	520	813	1171
30.0	35.6	80.2	143	321	570	891	1283

Model 8110

Pressure	Air Flow Capacity Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	24.8	55.8	99.1	223	397	620	892
10	49.6	112	198	446	793	1239	1784
15	74.4	167	297	669	1190	1859	2677
20	99.1	223	397	892	1586	2478	3569
40	194	435	774	1742	3096	4838	6966
60	237	533	948	2133	3792	5925	8532
80	274	616	1095	2463	4379	6842	9852
100	306	688	1224	2754	7895	7649	11015
150	375	843	1499	3373	5996	9368	13490
200	433	974	1731	3894	6923	10817	15577
250	484	1088	1935	4354	7740	12094	17416
300	530	1192	2120	4770	8479	13249	19078
350	572	1288	2290	5152	9159	14310	20607
400	612	1377	2448	5507	9791	15298	22029
450	649	1460	2596	5841	10385	16226	23366
500	684	1539	2737	6157	10947	17104	24630
600	749	1686	2998	6745	11991	18736	26980
700	810	1821	3238	7286	12952	20238	29142
800	865	1947	3462	7789	13846	21635	31154

Pressure	Flow Capacity of 0.7 SG Digester Gas Normal Cubic Meters per Hour at 0° C						
mm WC	2”	3”	4”	6”	8”	10”	12”
5	30.4	68.5	122	274	487	761	1095
10	60.8	137	243	548	974	1521	2190
15	91.3	205	365	821	1460	2282	3286
20	122	274	487	1095	1947	3042	4381
40	238	534	950	2138	3801	5938	8551
60	291	655	1164	2618	4655	7273	10473
80	336	756	1344	3023	5375	8398	12093
100	376	845	1502	3380	6009	9389	13521
150	460	1035	1840	4140	7360	11500	16560
200	531	1195	2125	4780	8498	13279	19121
250	594	1336	2375	5345	9501	14846	21378
300	651	1464	2602	5855	10408	16263	23419
350	703	1581	2811	6324	11242	17566	25295
400	751	1690	3005	6760	12019	18779	27042
450	797	1793	3187	7171	12748	19918	28682
500	840	1890	3359	7558	13437	20995	30233
600	920	2070	3680	8280	14720	22999	33119
700	994	2236	3975	8943	15899	24842	35773
800	1062	2390	4249	9561	16997	26557	38243

GROTH CORPORATION®
a Continental Disc Company

SECTION 3
PRESSURE / VACUUM RELIEF VALVES

1260A Pressure Relief Valves w/Pipe-Away Feature •

2300A Pressure Relief Valves •

1300A Vacuum Relief Valves •

1360A Vacuum Relief Valves •

5000, 5100 Free Vents •

6000, 6100 Gauge Hatch •

6200 Gauge Hatch •

GROTH CORPORATION
a Continental Disc Company

PRESSURE RELIEF VALVE
Model 1260A

- **Sizes 2” through 12”**
- **Pressure settings 0.5 oz/in² to 15 PSIG**
- **Available in aluminum (type 356), carbon steel, stainless steel, fiberglass, and other materials**
- **Modular construction**

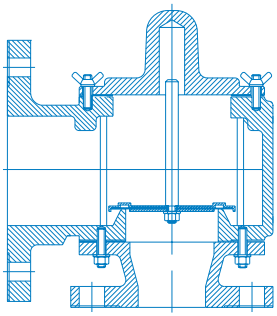
MODEL 1260A

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

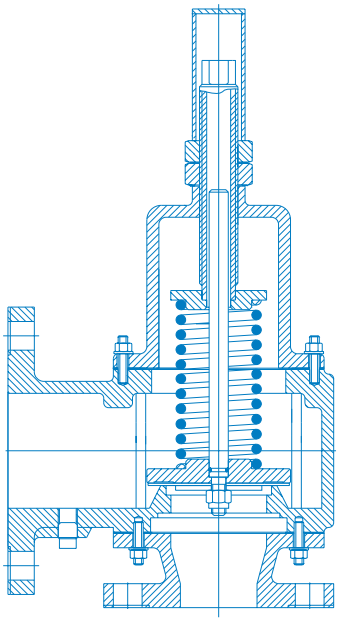
Model 1260A offers Groth’s special “cushioned air” seating. Superior performing Teflon®[1] seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1260A has a self-draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, Viton® and other seating diaphragms can be provided when required.



MODEL 1260A

GROTH, THE CAPABILITY COMPANY

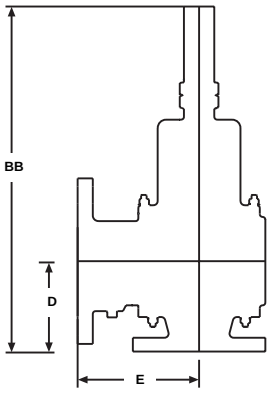
As with all Groth products, every Model 1260A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

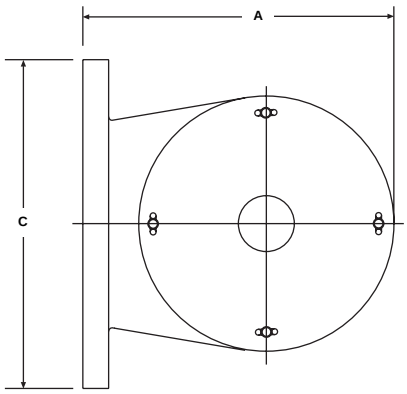


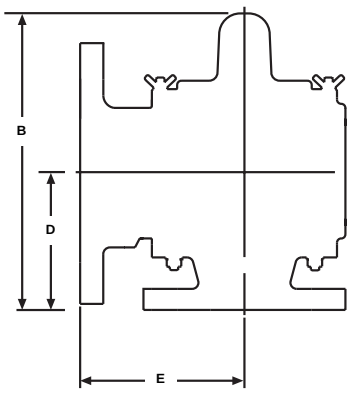
MODEL 1261A

[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 Pressure Spring Loaded	Min. Setting Weight Loaded	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 (48.3 gm/cm²)	15 PSIG SPRING LOADED PRESSURE (1.05 kg./cm²)	*0.5 oz/in² WEIGHT LOADED (2.20 gm./cm²)	8 5/8" (219)	9 3/8" (238)	7 1/2" (191)	4 1/8" (105)	5 1/2" (140)	16 5/8" (422)	16 (7 kg)
3" (80 mm)	4" (100 mm)	13 oz/in² (57.1 gm/cm²)			10" (254)	11 1/8" (282)	9" (229)	5" (127)	6" (152)	20 1/4" (514)	22 (10 kg)
4" (100 mm)	6" (150 mm)	16 oz/in² (70.3 gm/cm²)			11" (279)	13 7/8" (352)	11" (279)	6 1/2" (165)	6 1/2" (165)	25 5/8" (651)	29 (13 kg)
6" (150 mm)	8" (200 mm)	16 oz/in² (70.3 gm/cm²)			14 1/2" (368)	17 3/8" (441)	13 1/2" (343)	8 1/2" (216)	8 1/2" (216)	34 1/2" (876)	55 (25 kg)
8" (200 mm)	10" (250 mm)	16 oz/in² (70.3 gm/cm²)			18" (457)	21 1/4" (539)	16" (406)	9 3/4" (248)	10 3/4" (273)	39 3/4" (1010)	92 (42 kg)
10" (250 mm)	12" (300 mm)	16 oz/in² (70.3 gm/cm²)			20 3/4" (527)	23 5/8" (600)	19" (483)	10 1/4" (260)	12 1/2" (318)	46 3/8" (1178)	105 (48 kg)
12" (300 mm)	14" (350 mm)	16 oz/in² (70.3 gm/cm²)			24 3/4" (629)	26 5/8" (676)	21" (533)	11" (279)	15" (381)	49 1/4" (1251)	149 (68 kg)

‡ 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 □□□

MODEL #
- 1260A Weight Loaded
- 1261A Pressure Spring

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

EXAMPLE

1 2 6 0 A — 0 2 — 1 1 5 — T 0 0

Indicates a 2" Model 1260A 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 1260A
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 1260A
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 1260A
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 1260A
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 1261A
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 1261A
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 1261A
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 1261A
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***

GROTH CORPORATION
a Continental Disc Company

PRESSURE RELIEF VALVE
Model 2300A

- **Sizes 2” through 12”**
- **Pressure settings 0.5 oz/in² to 15 PSIG**
- **Available in aluminum (type 356), carbon steel, stainless steel and other materials.**

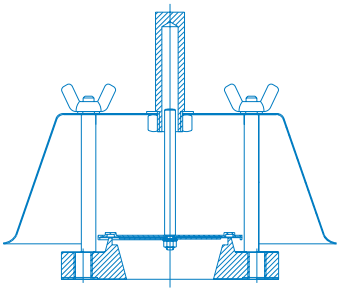
EMERGENCY RELIEF VALVE

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.

MODEL 2300A

SPECIAL FEATURES

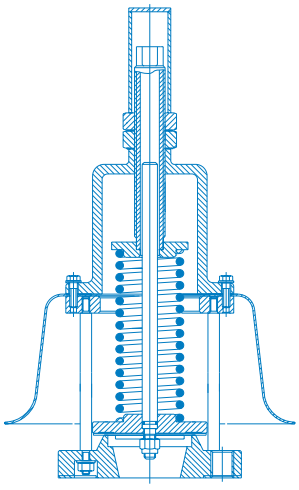
Model 2300A is built of corrosion resistant material throughout. Groth’s self-closing special teflon “cushioned air” pallet with center stabilizing stem and peripheral guiding provides uniform seating and alignment. Superior performing Teflon®[1] seating diaphragms are standard to minimize sticking caused 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.



MODEL 2300A

GROTH, THE CAPABILITY COMPANY

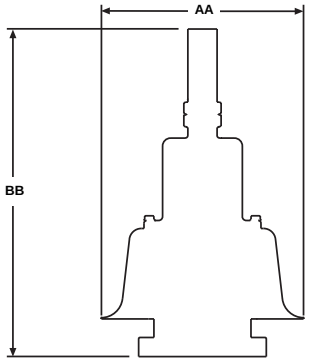
As with all Groth products, every Model 2300A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

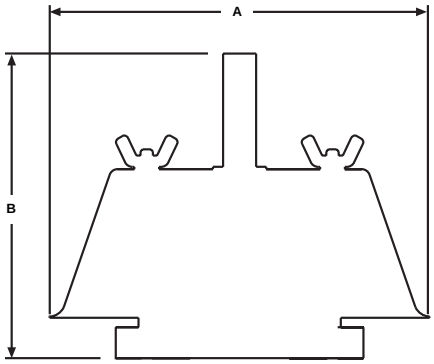


MODEL 2301A

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

SPECIFICATIONS





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

Size*† Flange	Maximum Set Pressure	Minimum Set Pressure	A Diameter (mm)	AA Diameter (mm)	B Height (mm)	BB Height (mm)	Approx. Ship Wt. Lbs. (Aluminum)
2" (50 mm)	16 oz/in² WEIGHT LOADED (70.3 gm /cm²) 15 PSIG SPRING LOADED (1.05 kg. /cm²)	**0.5 oz/in² (2.2 gm/cm²) WEIGHT LOADED	9 1/2 " (241)	9 1/2 " (241)	6 5/8 " (168)	16 1/2 " (419)	12 (5 kg)
3" (80 mm)			11 1/2 " (292)	13" (330)	8 5/8 " (219)	18 5/8 " (467)	15 (7 kg)
4" (100 mm)			13" (330)	13" (330)	10 9/16 " (268)	22 1/2 " (572)	20 (9 kg)
6" (150 mm)			19" (482)	19 1/2 " (495)	15" (381)	30 1/2 " (784)	30 (14 kg)
8" (200 mm)			23 5/8 " (600)	23 1/2 " (597)	16 5/8 " (422)	35 3/8 " (899)	45 (20 kg)
10" (250 mm)			30 3/4 " (781)	25 1/2 " (648)	17" (431)	41 3/8 " (1051)	65 (30 kg)
12" (300 mm)			36" (914)	25 1/2 " (648)	18" (457)	42 3/8 " (1076)	100 (45 kg

‡ On spring-loaded valves, change to model 2301A. † Larger sizes available - consult factory. * 150# A.N.S.I. 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/ sq. in. setting.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

2300A Weight Loaded
2301A Spring Loaded

02" Thru 12"

Pallet Material
Seat Material
* Body Material

1 = Aluminum #
3 = Carbon Steel
5 = 316 SS
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 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 and stems are standard with aluminum and carbon steel bodies. Stainless steel seats standard with carbon steel bodies.
# Aluminum body not available on 2301A.

EXAMPLE

2 3 0 0 A — 0 2 — 1 1 5 — T 0 0

Indicates a 2" Model 2300A 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 2300A
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	6.98	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 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 2300A
4 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 125,000 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 125,000 = 108,750 SCFH***

Model 2300A
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	0.20	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 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 2300A
100 mm WC Set Pressure [P_s]
175 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 3,490 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 ,490 = 3,036 NCMH***

Model 2301A
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	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 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 2301A
4 PSIG set pressure [P_s]
7 PSIG flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 456,000 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 456,000 = 378,480 SCFH***

Model 2301A
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	0.80	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 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 2301A
0.4 BarG Set Pressure [P_s]
0.7 BarG Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 17,100 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 17,100 = 14,193 NCMH***

GROTH CORPORATION
a Continental Disc Company

VACUUM RELIEF VALVE
Model 1300A

- **Sizes 2” through 12”**
- **Vacuum settings 0.5 oz/in² to 12 PSIG**
- **Available in aluminum (type 356), carbon steel, stainless steel and other materials.**
- **Modular construction**

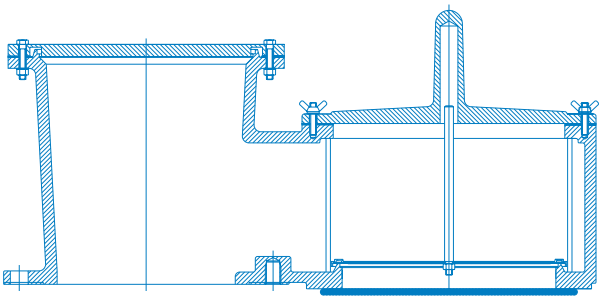
VACUUM RELIEF VALVE

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.

MODEL 1300A

SPECIAL FEATURES

Model 1300A 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 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, Viton® and other seating diaphragms can be provided when required.

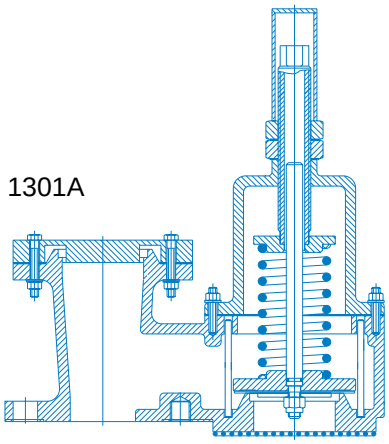


MODEL 1300A

GROTH, THE CAPABILITY COMPANY

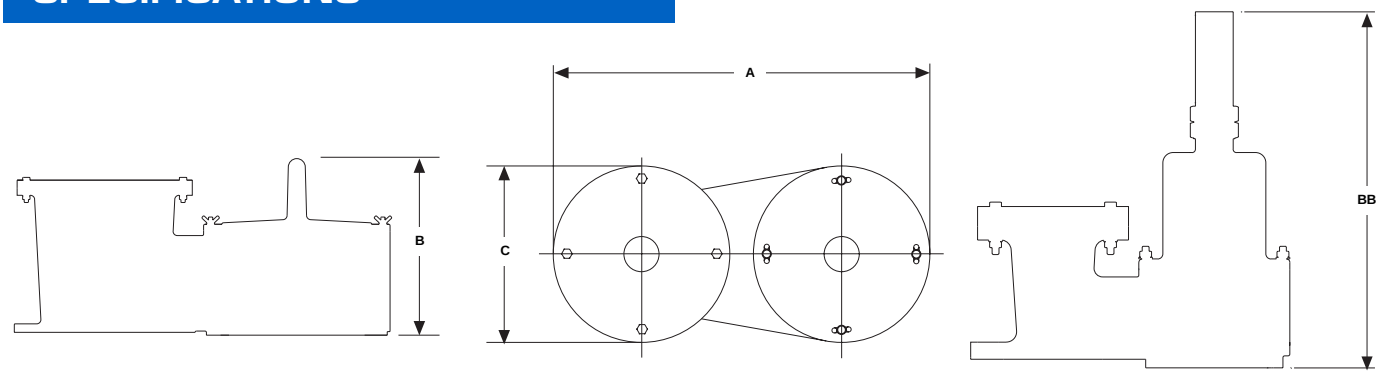
As with all Groth products, every Model 1300A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

MODEL 1301A



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

SPECIFICATIONS



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

Size	Max. Set Vacuum Weight Loaded	Max. Set Vacuum Spring Loaded	Min. Set Vacuum Weight Loaded	Max. W.P.† for Min. Vac. Setting	Min. Vac. Setting vs. Max. W.P.†	A Length (mm)	B Height (mm)	BB Height (mm)	C Width (mm)	Approx. Ship. Wt. Lbs. (Aluminum)
2" (50 mm)	12 oz/in² (52.7 gm/cm²)	12 PSIG SPRING LOADED (0.84 kg. /cm²)	*0.5 oz/in² WEIGHT LOADED (2.20 gm. /cm²)	See TPD2 for Vacuum Settings and MAWP		11 5/8" (295)	6 7/8" (174)	14" (356)	6" (152)	15 (7 kg)
3" (80 mm)	11 oz/in² (48.3 gm/cm²)					15 3/4" (400)	7 3/4" (196)	16 1/4" (413)	7 3/4" (197)	21 (10 kg)
4" (100 mm)	11 oz/in² (48.3 gm/cm²)					17 1/4" (438)	9 5/8" (244)	19 7/8" (505)	9" (229)	32 (14 kg)
6" (150 mm)	16 oz/in² (70.3 gm/cm²)					23 1/2" (597)	11 7/8" (301)	27" (686)	12" (305)	61 (28 kg)
8" (200 mm)	16 oz/in² (70.3 gm/cm²)					28 1/2" (724)	15 1/2" (393)	31 7/8" (810)	14 1/2" (368)	81 (37 kg)
10" (250 mm)	16 oz/in² (70.3 gm/cm²)					33 1/4" (845)	18 5/8" (473)	37 7/8" (962)	16 1/2" (419)	121 (55 kg)
12" (300 mm)	16 oz/in² (70.3 gm/cm²)					37 1/4" (946)	21 5/8" (549)	42" (1067)	19" (483)	165 (75 kg)

† W.P. = Working Pressure. ‡ On spring loaded valves, change model number. 150# A.N.S.I. 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 #

1300A Weight Loaded
1301A Spring Loaded

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®
M = Metal-to-Metal
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 and stems are standard with aluminum and carbon steel bodies.

EXAMPLE

1 3 0 0 A — 0 2 — 1 1 5 — T 0 0

Indicates a 2" Model 1300A 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 1300A
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 1300A
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 1300A
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 1300A
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 1301A
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 1301A
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 1301A
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 1301A
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 = 2,492 NCMH***

GROTH CORPORATION
a Continental Disc Company

VACUUM RELIEF VALVE
Model 1360A

- **Sizes 3” through 14”**
- **Vacuum settings 0.5 oz/in² to 12 PSIG**
- **Available in aluminum (type 356), carbon steel, stainless steel, fiberglass and other materials**

MODEL 1360A

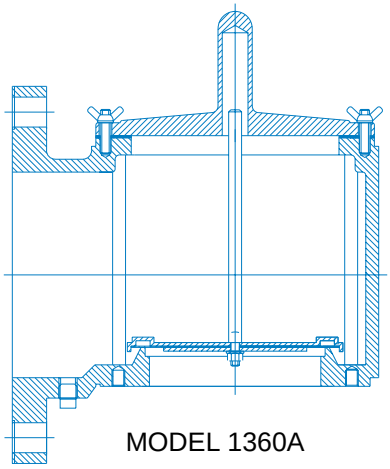
VACUUM RELIEF VALVE

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 and provides increased fire protection and safety.

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

SPECIAL FEATURES

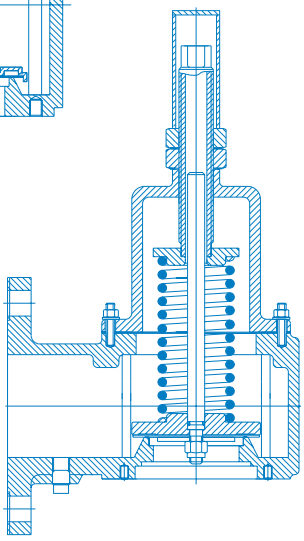
Model 1360A offers Groth’s special “cushioned air” seating. Superior performing Teflon®[1] seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1360A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids vacuum buildup due to binding or clogging of the vent. Metal-to metal, Buna-N, Viton® and other seating diaphragms can be provided when required.



MODEL 1360A

GROTH, THE CAPABILITY COMPANY

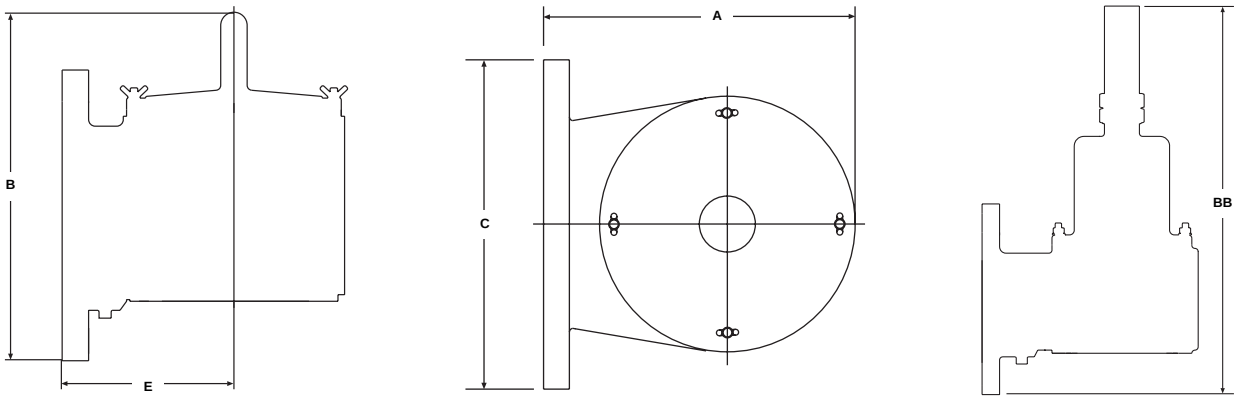
As with all Groth products, every Model 1360A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



MODEL 1361A

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

SPECIFICATIONS



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

Size Flange	Max. Set Vacuum Weight Loaded	Max. Set Vacuum Spring Loaded	Min. Set Vacuum Weight Loaded	Max. W.P.† for Min. Vac. Setting	Min. Vac. Setting vs. Max. W.P.†	A Length (mm)	B Height (mm)	C Width (mm)	E (mm)	BB Height (mm)	Approx. Ship. Wt. Lbs. (Aluminum)
3" (80 mm)	11 oz/in² (48.2 gm/cm²)	12 PSIG SPRING LOADED VACUUM (0.84 kg. /cm²)	*0.5 oz/in² WEIGHT LOADED (2.20 gm. /cm²)	See TPD2 for Vacuum Settings and MAWP		8 5/8" (219)	9 1/4" (235)	7 1/2" (191)	5 1/2" (140)	16 1/4" (413)	12 (6 kg)
4" (100 mm)	13 oz/in² (57.0 gm/cm²)					10" (254)	11 1/2" (292)	9" (229)	6" (152)	19 3/4" (502)	17 (8 kg)
6" (150 mm)	16 oz/in² (70.3 gm/cm²)					11" (279)	14 1/4" (362)	11" (279)	6 1/2" (165)	24 5/8" (626)	23 (10 kg)
8" (200 mm)	16 oz/in² (70.3 gm/cm²)					14 1/2" (368)	17 3/4" (451)	13 1/2" (343)	8 1/2" (216)	32 3/4" (832)	42 (19 kg)
10" (250 mm)	16 oz/in² (70.3 gm/cm²)					18" (457)	21 1/4" (539)	16" (406)	10 3/4" (273)	38" (965)	71 (32 kg)
12" (300 mm)	16 oz/in² (70.3 gm/cm²)					20 3/4" (527)	25 3/4" (654)	19" (483)	12 1/2" (318)	45 3/8" (1153)	83 (38 kg)
14" (350 mm)	16 oz/in² (70.3 gm/cm²)					24 3/4" (629)	29 1/4" (742)	21" (533)	15" (381)	48 3/4" (1238)	118 (54 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

MODEL #
- 1360A Weight loaded
- 1361A Spring loaded

SIZE
- 03" Thru 14"

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 maximum working pressure.
- Include model number and setting when ordering.
- For special options, consult factory.
- When ordering steam jacket, include steam pressure / temperature.
- * Stainless steel guides and stems are standard with aluminum and carbon steel bodies. Stainless steel seats standard with carbon steel bodies.

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

Indicates a 3" Model 1360A 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 1360A
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	3"	4"	6"	8"	10"	12"	14"
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 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 1360A
4 In WC set vacuum [P_s]
7 In WC flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 59,300 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 59,300 = 1,591 SCFH***

Model 1360A
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	3"	4"	6"	8"	10"	12"	14"
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 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 1360A
100 mm WC Set Vacuum [P_s]
175 mm WC Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 1,660 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 1,660 = 1,444 NCMH***

Model 1361A
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	3"	4"	6"	8"	10"	12"	14"
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 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 1361A
2 PSIG set vacuum [P_s]
3.5 PSIG flowing vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 116,000 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 116,000 = 96,280 SCFH***

Model 1361A
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	3"	4"	6"	8"	10"	12"	14"
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 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 1361A
0.12 BarG Set Vacuum [P_s]
0.17 BarG Flowing Vacuum [P_f]

1. Read flow capacity at set vacuum from table — Flow = 3,200 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 3,200 = 1,760 NCMH***

Model 5000

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

FREE VENTS

Model 5000 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

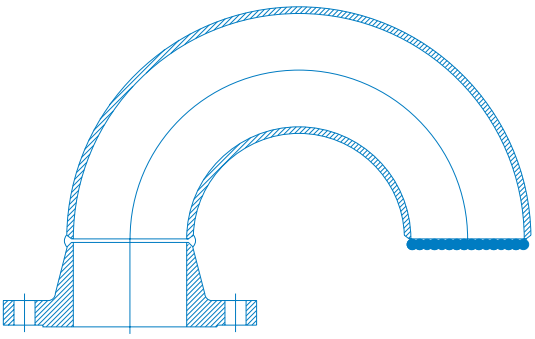
Model 5000 Series are built of corrosion resistant materials throughout. A wire mesh screen prevents foreign matter from entering the tank or pipe opening. Weather hoods are easily removable for inspection of vent and wire mesh screen.

GROTH, THE CAPABILITY COMPANY

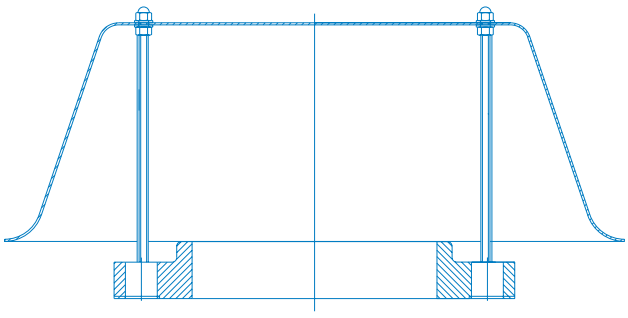
As with all Groth products, every Model 5000 Series is factory inspected to meet all critical requirements and special needs. Inventory is maintained to insure rapid delivery.

MODEL 5100

MODEL 5000

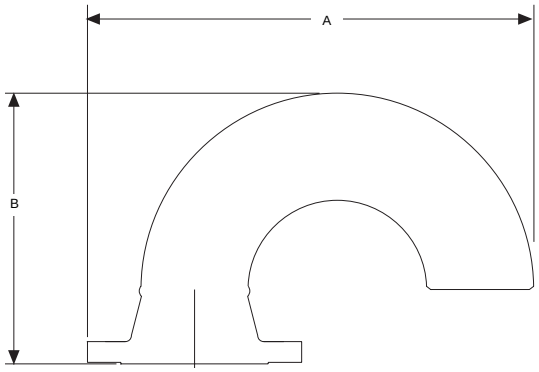


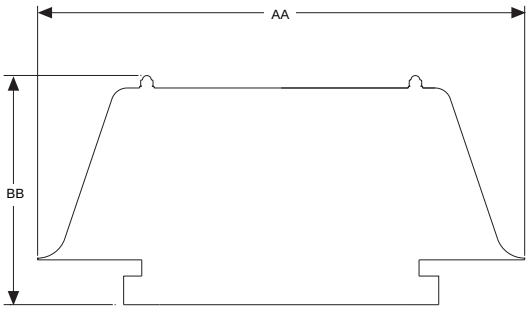
MODEL 5000



MODEL 5100

SPECIFICATIONS





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

MODEL 5000

Size* Flange	A Width (Metric)	B Height (Metric)	Approx. Ship. Wt. Lbs.
2"	10 1/4"	6 7/8"	8
(51 mm)	(260)	(175)	(4 kg)
3"	14 1/2"	9 1/4"	20
(76 mm)	(368)	(235)	(9 kg)
4"	18 3/4"	11 3/8"	35
(102 mm)	(476)	(289)	(16 kg)
6"	26 7/8"	15 11/16"	70
(152 mm)	(683)	(398)	(32 kg)
8"	35 1/8"	20 1/8"	135
(203 mm)	(892)	(511)	(61 kg)
10"	43 3/8"	24"	235
(254 mm)	(1102)	(610)	(107 kg)
12"	51 7/8"	28 7/16"	350
(305 mm)	(1318)	(722)	(159 kg)

* Larger sizes available on special application.

MODEL 5100

Size* Flange	AA Width (Metric)	BB Height (Metric)	Approx. Ship. Wt. Lbs. (CS / SS)
2"	9 1/2"	5 3/8"	11
(51 mm)	(241)	(137)	(5 kg)
3"	11 1/2"	5 13/16"	14
(76 mm)	(292)	(148)	(6 kg)
4"	13"	6 5/16"	18
(102 mm)	(330)	(160)	(8 kg)
6"	17"	7 3/8"	28
(152 mm)	(432)	(187)	(13 kg)
8"	19 1/2"	9 1/4"	42
(203 mm)	(495)	(235)	(19 kg)
10"	23 1/2"	10 5/8"	60
(254 mm)	(597)	(270)	(27 kg)
12"	25 1/2"	11 1/8"	95
(305 mm)	(648)	(283)	(43 kg)

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

- MODEL #: 5000, 5100
- SIZE: 02" Thru 12"
- MATERIAL (Body Material):
  - 3 = Carbon Steel
  - 5 = 316 SS
  - Z = Special
- OPTIONS:
  - 0 = No Options
  - Z = Special Options

NOTES

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

EXAMPLE

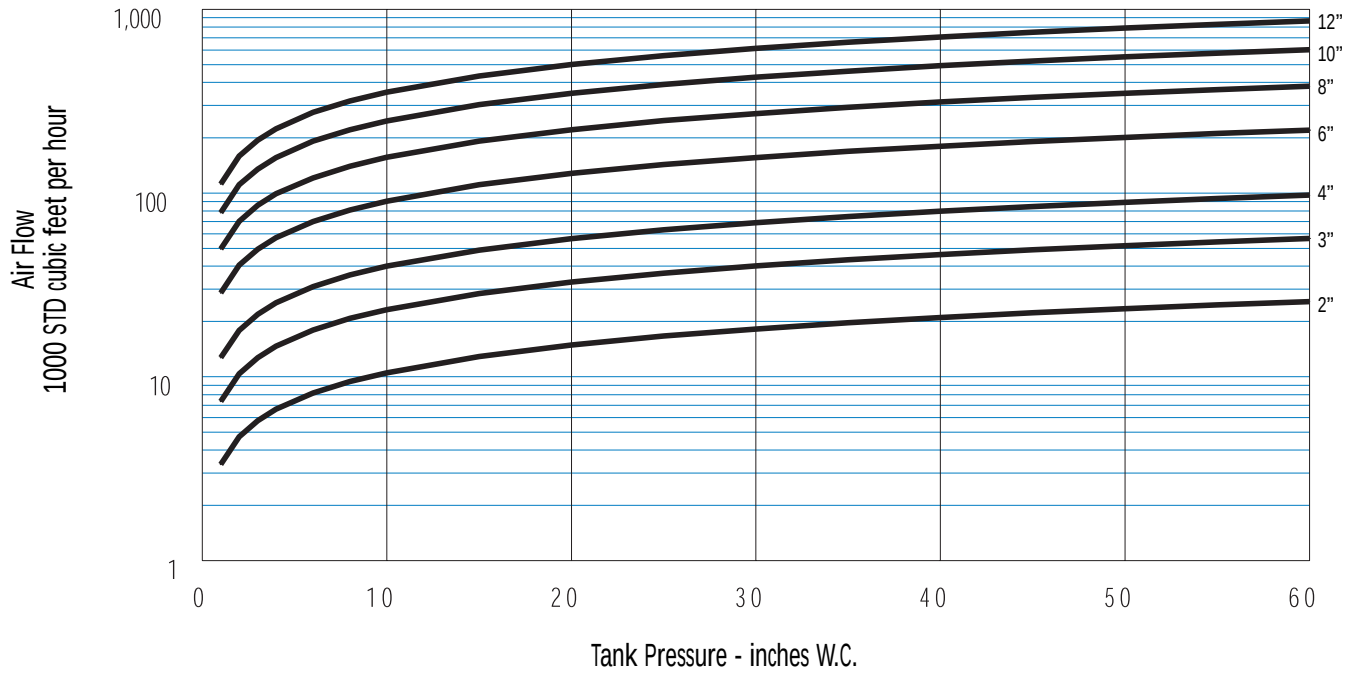
5 0 0 0 — 0 2 — 3 — 0

Indicates a 2" Model 5000 with Carbon Steel and no options.

Model 5000
Flow Capacity

Tank Pressure		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	Oz / Sq In	2”	3”	4”	6”	8”	10”	12”
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

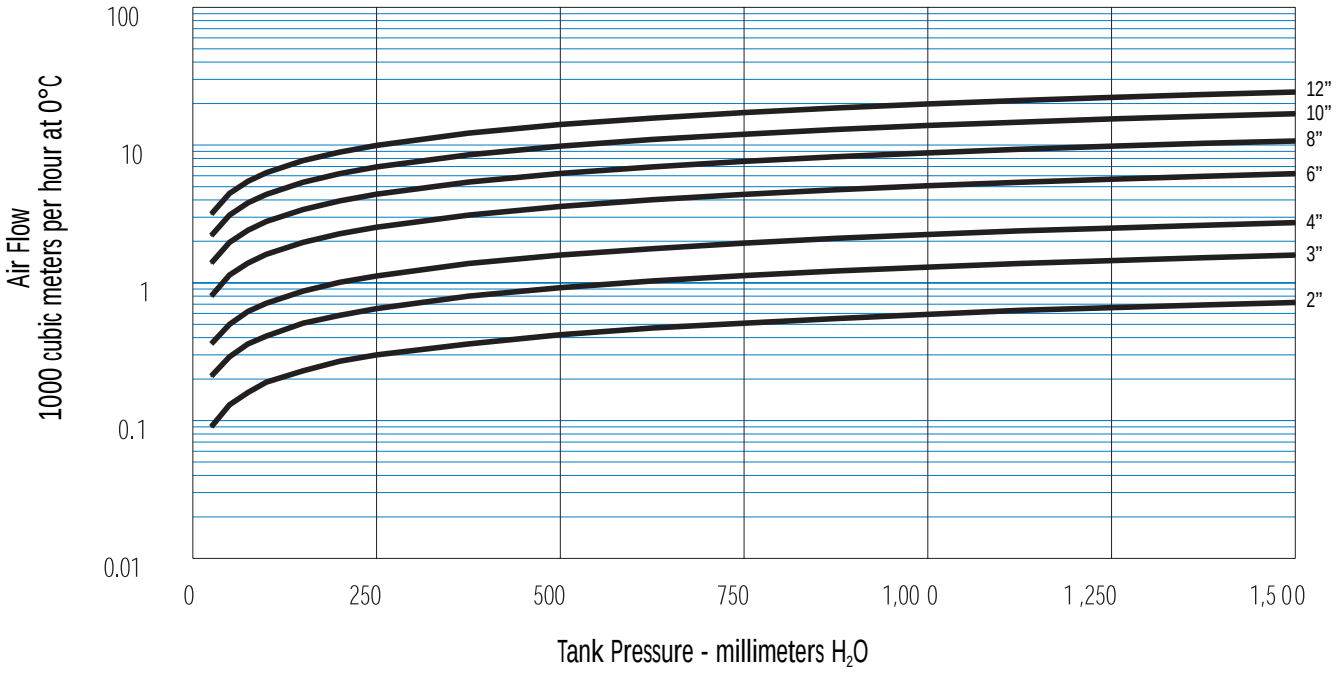
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5000
Flow Capacity

Tank Pressure		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
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

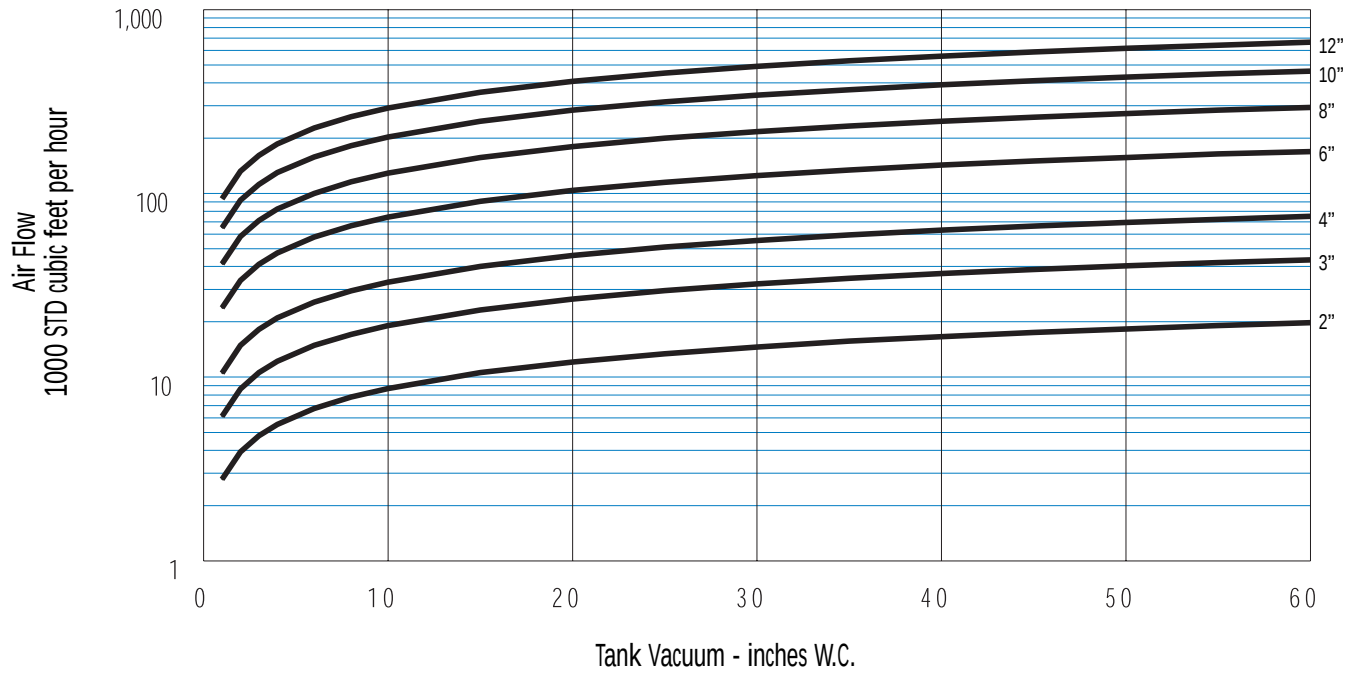
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5000
Flow Capacity

Tank Vacuum		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	Oz / Sq In	2”	3”	4”	6”	8”	10”	12”
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

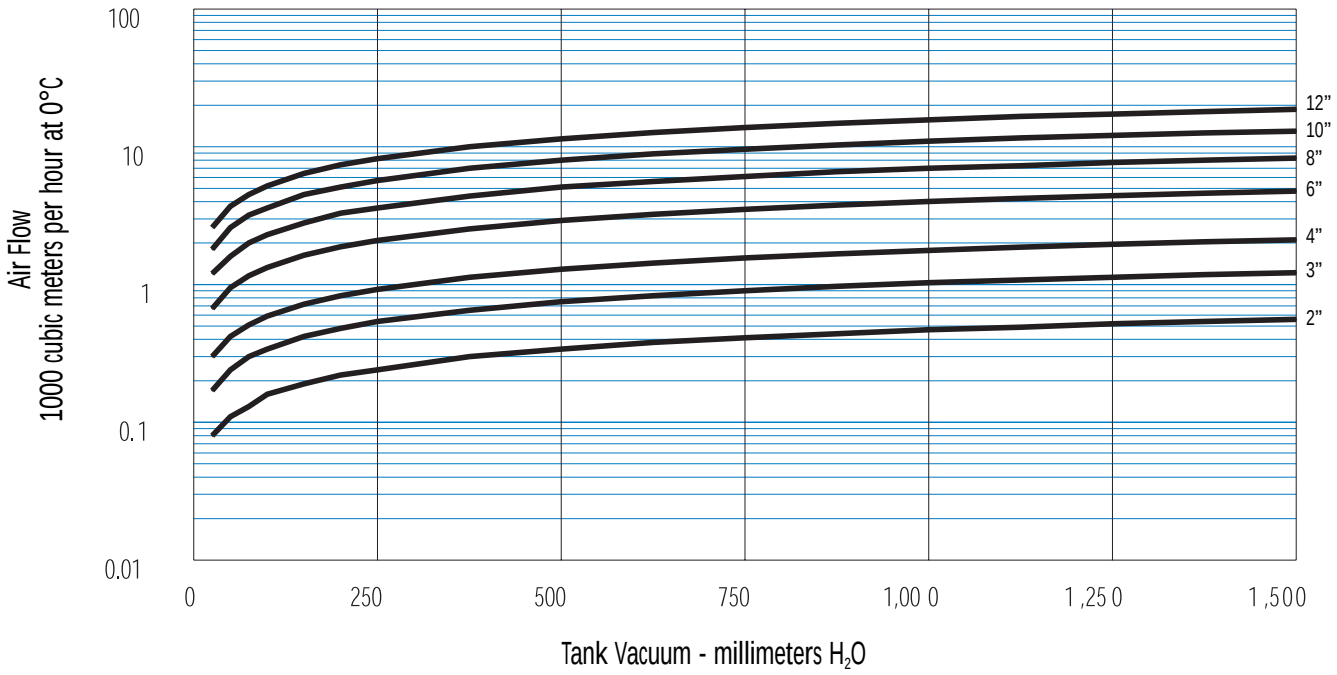
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5000
Vacuum Relief Capacity

Tank Vacuum		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
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

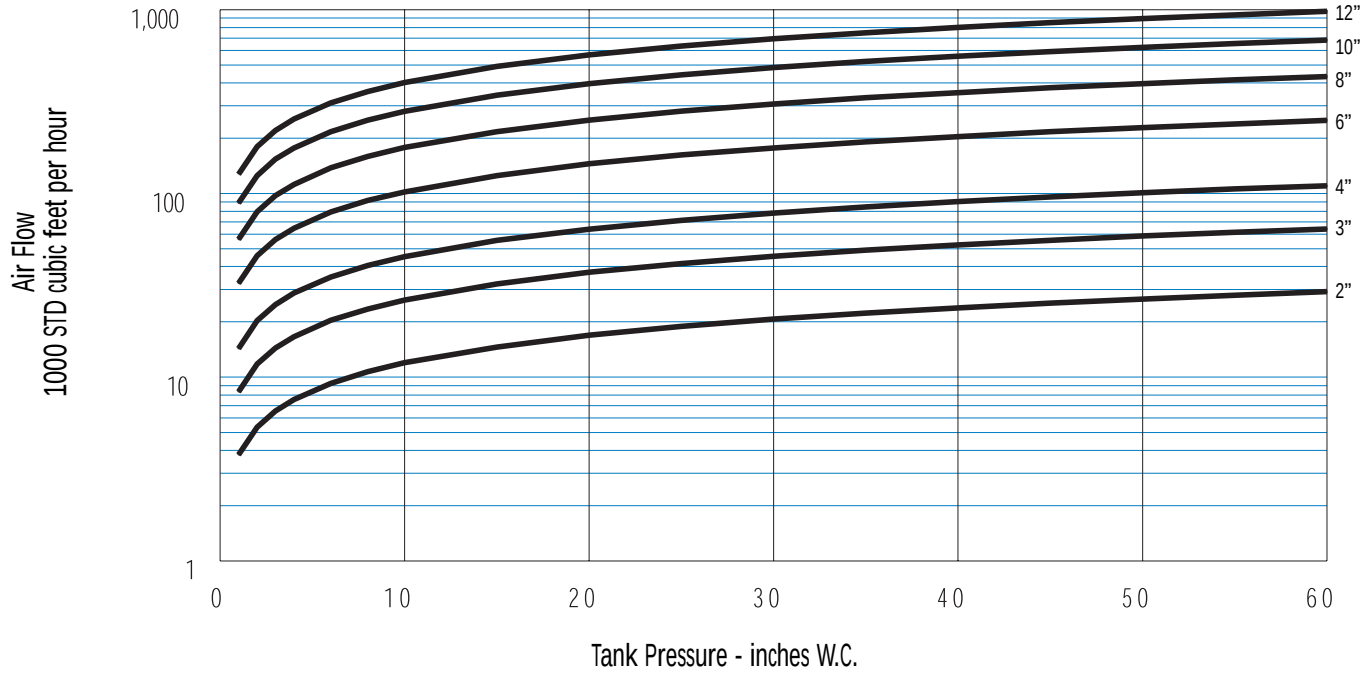
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5100
Flow Capacity

Tank Pressure		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	Oz / Sq In	2”	3”	4”	6”	8”	10”	12”
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

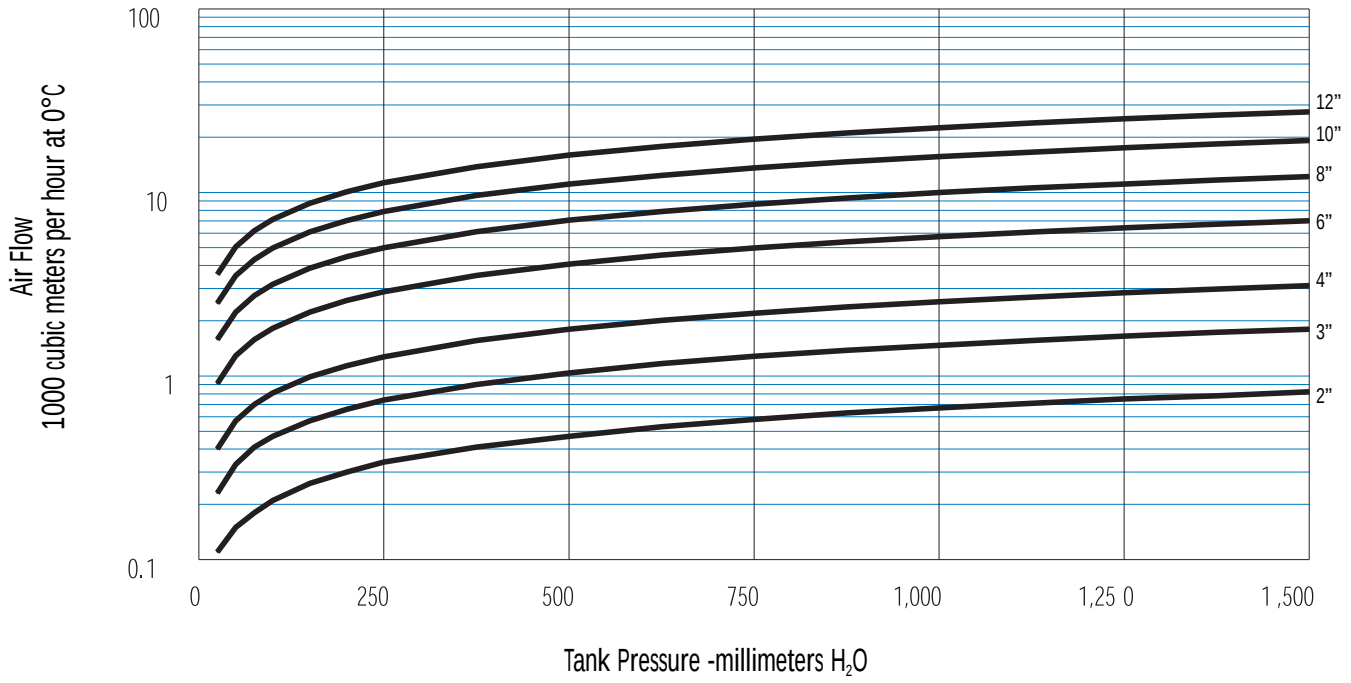
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5100
Flow Capacity

Tank Pressure		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
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

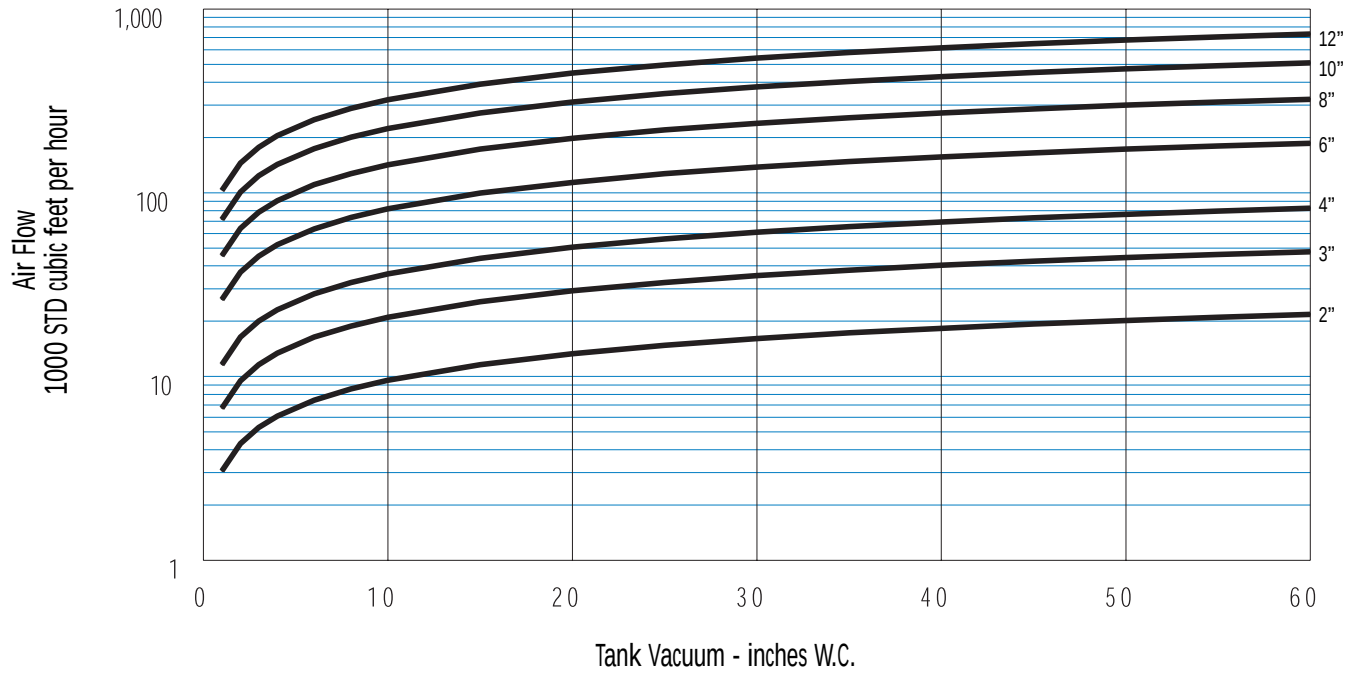
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5100
Flow Capacity

Tank Vacuum		Air Flow - 1000 Standard Cubic feet per Hour						
In W.C.	Oz / Sq In	2”	3”	4”	6”	8”	10”	12”
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

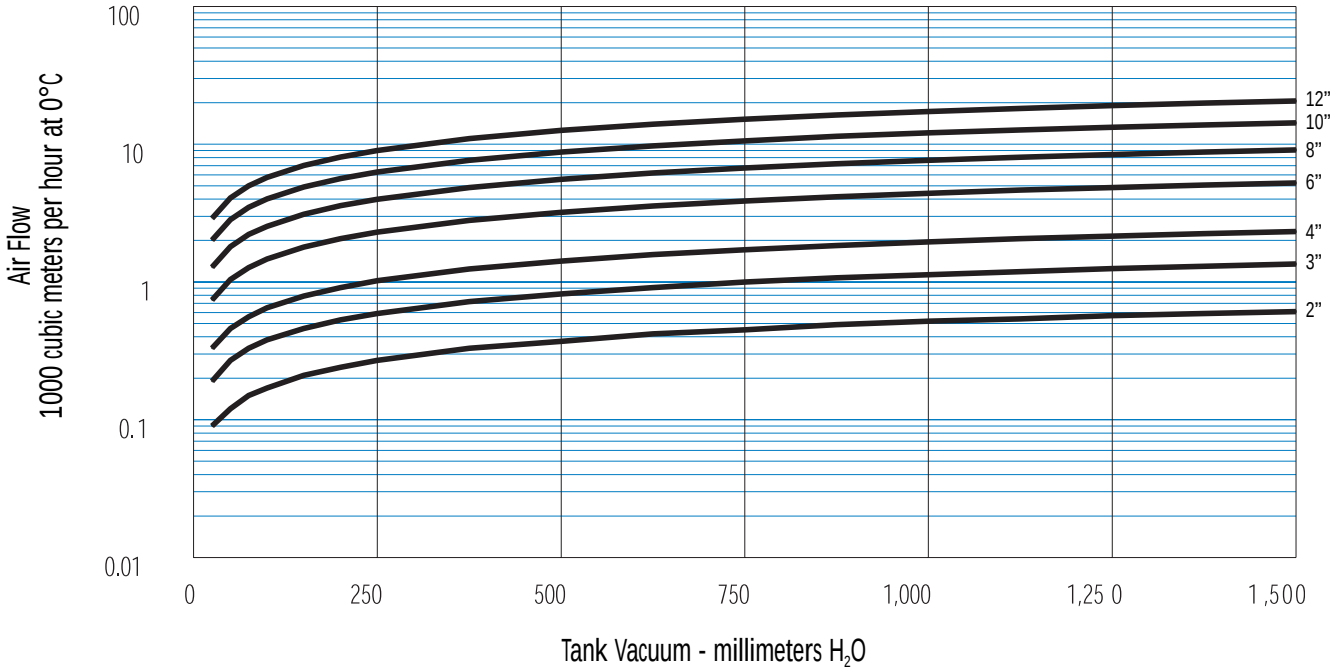
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



Model 5100
Flow Capacity

Tank Vacuum		Air Flow - 1000 Cubic Meters per Hour at 0°C						
mm H_2O	mb	2”	3”	4”	6”	8”	10”	12”
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

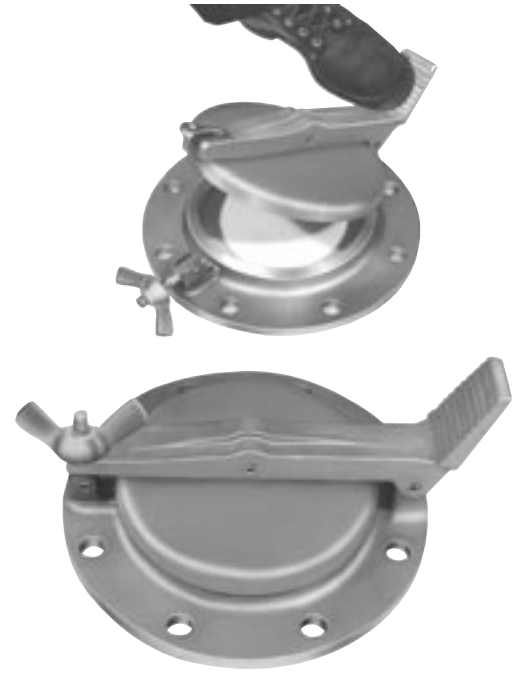
1. Flow facility and equipment comply with API 2000.
2. Flow measurement accuracy verified by an independent research organization.
3. Flow capacity is based on actual tests and certified by Groth Corporation.



GROTH CORPORATION
a Continental Disc Company

GAUGE HATCH
Model 6000

- **Sizes 4” through 10”**
- **Constructed in aluminum, carbon steel, stainless steel, and additional materials.**
- **Available in free lift or lock down-cover**
- **Designed to assure uniform seating**



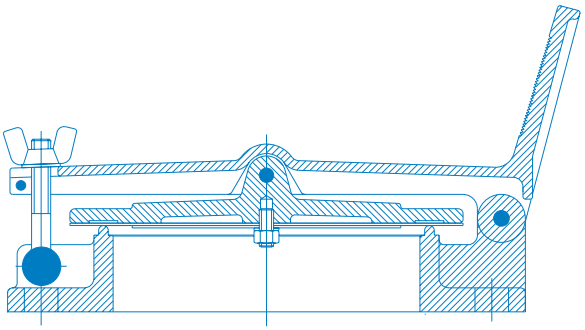
MODEL 6100

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 lock down capability.

SPECIAL FEATURES

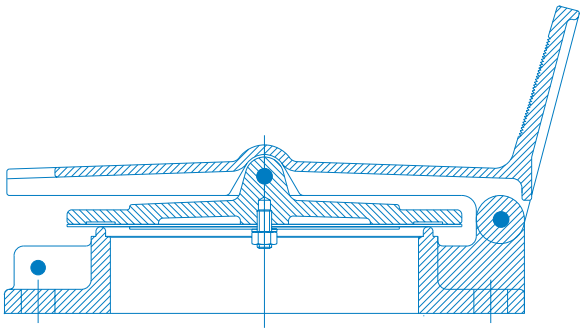
Model 6000 Series is designed with a serrated foot treadle surface to avoid foot slippage when opening. This model permits the use of both hands during gauging or sampling. Gravity will close the cover upon removal of pressure on the foot treadle. Groth’s special “cushioned-air” seating or metal-to-metal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



MODEL 6100

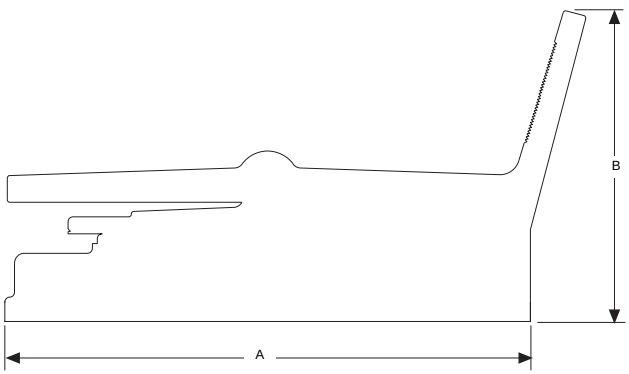
GROTH, THE CAPABILITY COMPANY

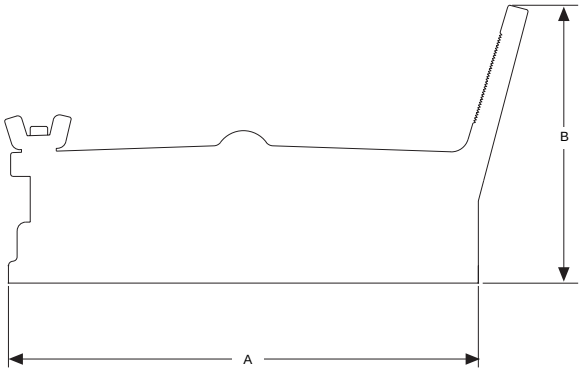
As with all Groth products, every Model 6000 Series is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



MODEL 6000

SPECIFICATIONS





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

Size	A Width (Metric)	B Height (Metric)	Approx. Ship Wt. Lbs. (Aluminum)
4”	10”	6”	7
(102 mm)	(254)	(152)	(3 Kg)
6”	12 1/2”	8”	10
(152 mm)	(318)	(203)	(5 Kg.)
8”	15”	8”	13
(203 mm)	(381)	(203)	(6 Kg)
10”	17 3/4”	9”	17
(254 mm)	(451)	(229)	(8 Kg)

‡ When gauge hatch includes the lock down feature, change model number to 6100. † 150 # A.N.S.I. drilling compatibility, F.F. on aluminum, carbon steel and stainless steel alloys.

HOW TO ORDER

For easy ordering, select proper model numbers

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

MODEL #
- 6000
- 6100

SIZE
- 04" Thru 10"

MATERIAL
- 1 = Aluminum
- 3 = Carbon Steel
- 5 = 316 SS
- Z = Special

OPTIONS
- 0 = No Options
- Z = Special Options
- D = Drilled 150 # A.N.S.I.
- U = Undrilled
- Diaphragm Material (Seat):
  - B = Buna-N
  - T = Teflon® [1]
  - V = Viton®
  - M = Metal-to-Metal
  - Z = Special

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

EXAMPLE

6 0 0 0 — 0 4 — 1 — T D 0

Indicates a 4" Model 6000 with Aluminum material, Teflon® [1] Diaphragm, Drilled Flange and no other options.

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

GROTH CORPORATION
a Continental Disc Company

GAUGE HATCH
Model 6200

- **Low Cost Design**
- **Size 8”**
- **Constructed in aluminum (type 356) with Buna-N seat insert.**
- **Available in free lift cover**
- **Set 2 oz/in² in free lift design**
- **150# ANSI Flat Face drilled flange**

MODEL 6200

GAUGE HATCH

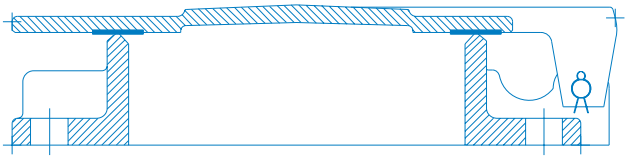
Model 6200 provides access for gauging or obtaining product samples from storage tanks. The Model 6200 also provides pressure relief as emergency venting.

SPECIAL FEATURES

Models 6200 will stay in the full open position which will permit the use of both hands during gauging or sampling. Units are mass produced in type 356 aluminum cover and base with a Buna-N seat insert. Optional seals are available.

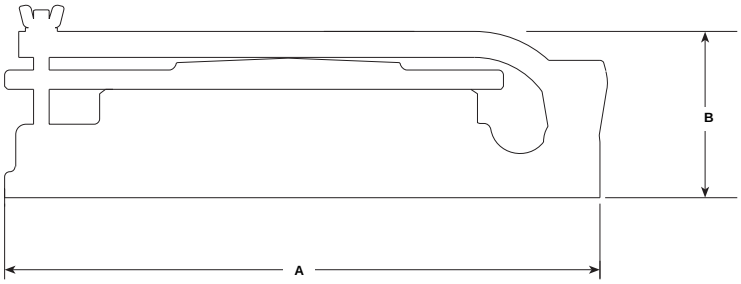
GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 6200 is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



MODEL 6200

SPECIFICATIONS



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

Size	A Width (mm)	B Height (mm)	Approx. Ship. Wt. Lbs. (kg)
8" (200)	13 1/2" (343)	3 1/2" (89)	10 (5)

‡ When gauge hatch includes the lock down feature, change model number to 6300. † 150 # flat face A.N.S.I. drilling compatibility.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

6200

08"

Material

1 = Aluminum

O = No Options
Z = Special Options

Diaphragm Material (Seat):
B = Buna-N* (Insert)
V = Viton®

* Buna-N is Standard; Teflon seal not available

NOTES

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

EXAMPLE

6 2 0 0 — 0 8 — 1 — B 0

Indicates a 8" Model 6200 with Aluminum material, Buna-N insert.

GROTH CORPORATION®
a Continental Disc Company

SECTION 4
EMERGENCY PRESSURE RELIEF VALVES

GROTH CORPORATION
a Continental Disc Company

EMERGENCY PRESSURE RELIEF VALVE
Model 2000A

- **Sizes 16," 20" and 24"**
- **Pressure settings 1.5 - 16 oz/in²**
- **Vacuum settings 0.5 - 4 oz/in²**
- **Available in carbon steel, stainless steel, fiberglass and other materials**
- **Easy access manway combined with emergency relief.**

MODEL 2000A (PRESSURE)

MODEL 2050A (PRESSURE & VACUUM)

EMERGENCY PRESSURE RELIEF VALVE

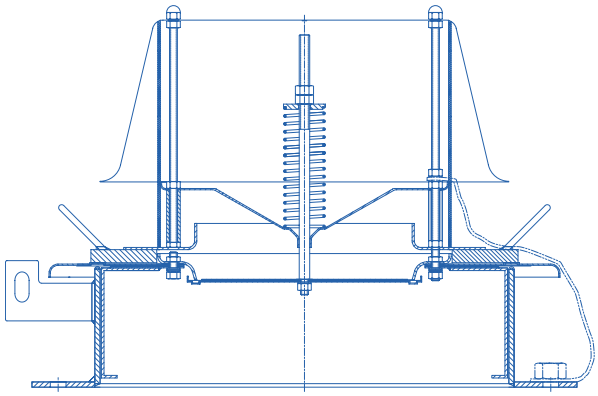
Model 2000A is designed to provide emergency relief capacity beyond that furnished by the normal operating pressure relief valve on the tank. The valve protects the tank against rupture or explosion that could result from excessive internal pressures caused by fire, etc. As excessive pressure builds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

SPECIAL FEATURES

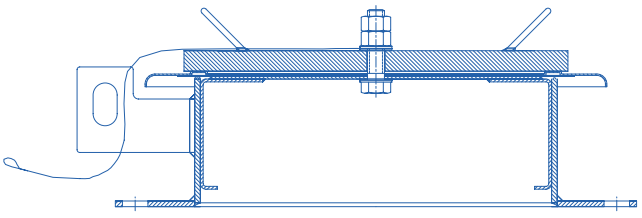
Model 2000A is built of corrosion resistant materials throughout. A restraining cable connects the head and flange and also serves as a grounding cable. Groth's special Teflon®[1] "cushioned air" pallet and peripheral guiding insures proper alignment and integrity of seating. Model 2050A incorporates a vacuum breaker.

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 2000A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



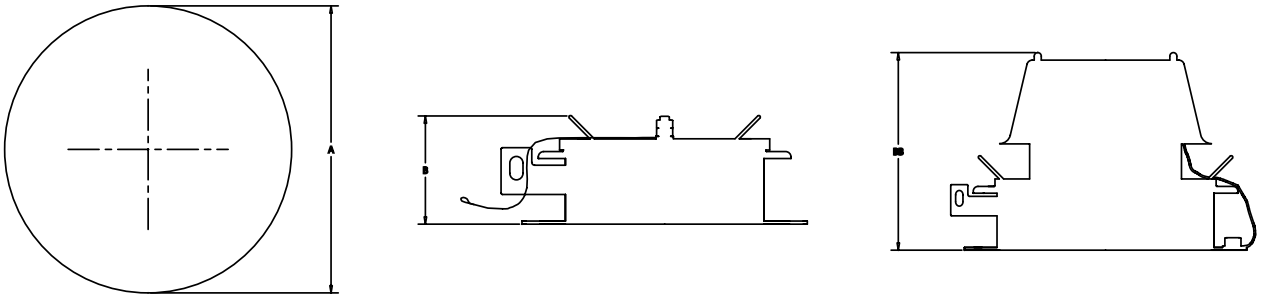
MODEL 2050A



MODEL 2000A

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

SPECIFICATIONS



MODEL 2000A

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

Size*	Minimum Pressure Setting Weight Loaded	Maximum Pressure Setting Weight Loaded	A Width (mm)	B Height‡ (mm)	Approx. Ship. Weight Lbs. (kg) (At min. setting)
16" (400mm)	1.80 oz/in² (7.8 mbar)		23 1/2 " (597)	11" (279)	62 (28)
20" (500 mm)	1.60 oz/in² (6.9 mbar)	16 oz/in² (69 mbar)	27 1/2 " (699)	11" (279)	88 (40)
24" (600 mm)	1.50 oz/in² (6.5 mbar)		32" (813)	11" (279)	114 (52)

MODEL 2050A

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

Size*	Minimum Setting Pressure Weight Loaded	Minimum Setting Vacuum Spring Loaded	Max. Settings Pressure▲ Weight Loaded	A Width (mm)	BB Height Closed (mm)	Approx. Ship. Weight Lbs. (kg) (At min. setting)
16" (400 mm)	2.6 oz/in² (11.2 mbar)			23 1/2 " (597)	17 3/4 " (451)	69 (31)
20" (500 mm)	2.1 oz/in² (9.1 mbar)	0.5 oz/in² (2.2 mbar)	8 oz/in² (34.5 mbar)	27 1/2 " (699)	17 3/4 " (451)	95 (43)
24" (600 mm)	1.9 oz/in² (8.2 mbar)			32" (813)	17 3/4 " (451)	120 (55)

* 150# A.N.S.I. or API 650 drilling compatibility. "Caution" — See IOM when mounting to API 650 flange. ▲ Maximum pressure setting on 16" size = 4 oz/sq. in. Max. Vacuum Setting is 4 oz./sq. in. Fiberglass dimensions on request.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # □□□□□ — SIZE □□ — MATERIAL □ — OPTIONS □□□□

MODEL #
- 2000A Pressure only
- 2050A Pressure/vacuum

SIZE
- 16"
- 20"
- 24"

MATERIAL
- * Material
- 3 = Carbon Steel
- 5 = 316 SS
- 6 = Vinyl Ester Resin
- 7 = Furan
- Z = Special

OPTIONS
- 0 = No Options
- Z = Special Options
- 0 = No Jacket
- J = Steam Jacket
- 1 = A.N.S.I. 150# drilled
- 2 = A.P.I. 650 drilled
- 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.
* Seat material on Carbon Steel base is 316 S.S. weld overlay

EXAMPLE

2 0 0 0 A — 2 0 — 5 — T 1 J 0

indicates a 20" Model 2000A with 316 SS Material, Teflon®[1] Seat Diaphragm, ANSI 150# Drilled, Steam Jacket and no other options.

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

Model 2000A
Emergency Pressure Relief Capacity

Set Pressure / Vacuum (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure / Vacuum) 1000 Standard Cubic Feet per Hour at 60° F				
In WC	Oz / Sq In	16" Pressure	20" Pressure	24" Pressure	All Vacuum	2050 Only
0.87	0.50 *				65	Use "C" Factor Chart on Page 412 for Vacuum Flow
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	10.0	1087	1720	2498		
20.8	12.0	1190	1883	2735		
24.2	14.0	1284	2033	2952		
27.7	16.0	1372	2172	3154		

* Standard vacuum settings, consult factory for other settings.

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.

Vacuum flow rating applies only to Model 2050A.

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. Note: Vacuum capacity is modified using the "C" factor on page 412.

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 = **0.95**

"C" 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 In WC set pressure [P_s]
7 In WC flowing pressure [P_f]

1.	Read flow capacity at set pressure from table	Flow = 829,000 SCFH
2.	Calculate over-pressure	% OP = [(7 - 4)/4] x 100 = 75%
3.	Read "C" factor from table	"C" = 0.95
4.	Calculate flow capacity	***Flow = 0.95 x 829,000 = 787,550 SCFH***

Type	2000A	2050A
Pressure	✔	✔
Vacuum		✔

Model 2000A
Emergency Pressure Relief Capacity

Set Pressure / Vacuum (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure / Vacuum) 1000 Standard Cubic Meters per Hour at 0° C				
mm WC	mb	16" Pressure	20" Pressure	24" Pressure	All Vacuum	2050 Only
22	2.16 *				1.83	Use "C" Factor Chart on Page 413 for Vacuum Flow
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 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.

Vacuum flow rating applies only to Model 2050A.

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. Note: Vacuum capacity is modified using the "C" factor on page 413.

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 = **0.95**

"C" 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 mm WC Set Pressure [P_s]
175 mm WC Flowing Pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 23,300 NCMH
2. Calculate over-pressure — % OP = [(175 - 100)/100] x 100 = 75%
3. Read "C" factor from table — "C" = 0.95
4. Calculate flow capacity — ***Flow = 0.95 x 23,300 = 22,135 NCMH***

Type	2000A	2050A
Pressure	✔	✔
Vacuum		✔

GROTH CORPORATION
a Continental Disc Company

EMERGENCY PRESSURE RELIEF VALVE

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. Model 2100 is designed to be self-closing. As excessive pressure builds up, Model 2100 relieves, then reseats when the overpressure has been dissipated.

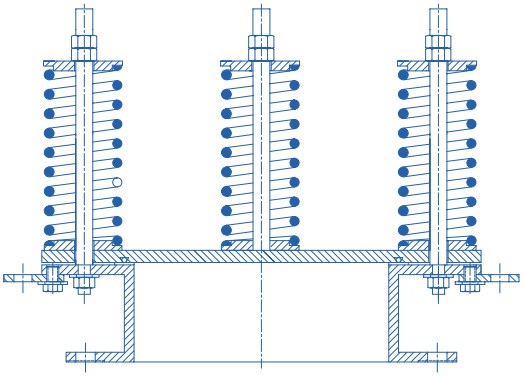
MODEL 2100

SPECIAL FEATURES

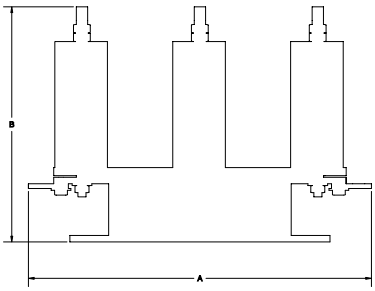
Model 2100 is built of corrosion resistant materials throughout. It is designed with independently adjustable springs which load the cover and keep the valve tightly sealed until emergency relief is required. Model 2100 features Viton® seating to insure a tight seal.

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 2100 is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.



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 (mm)	B Height (mm)	Approx. Shipping Weight Lbs. (kg) (At min. set.)	Approx. Shipping Weight Lbs. (kg) (At max. set.)
16" (400 mm)	1 PSIG (69 mbar)	15 PSIG (1.03 bar)	36 3/4 " (933)	23" (584)	310 (141)	490 (223)
20" (500 mm)			36 3/4 " (933)	23" (584)	335 (152)	500 (227)
24" (600 mm)			40 3/4 " (1035)	27" (686)	420 (190)	670 (304)

* 150# A.N.S.I. drilling compatibility, or API 650 drilled Flange option

HOW TO ORDER

For easy ordering, select proper model numbers

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

MODEL #: 2100

SIZE: 16" 20" 24"

MATERIAL: * Material
- 3 = Carbon Steel
- 5 = 316 SS
- 8 = Hastelloy
- Z = Special

OPTIONS:
- 1st □: 0 = No Options; Z = Special Options
- 2nd □: 0 = No Jacket; J = Steam Jacket
- 3rd □: 1 = A.N.S.I. 150# drilled; 2 = A.P.I. 650 drilled
- 4th □: O-Ring Material (Seat)#
  - B = Buna-N
  - 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.
- * Seat material on Carbon Steel base is 316 Stainless Steel weld overlay.
- # Teflon O-ring not available.

EXAMPLE

2 1 0 0 — 2 0 — 5 — V 1 J 0

indicates a 20" Model 2100 with 316 SS Material, Viton® Seat O-Ring, ANSI 150# Drilled, Steam Jacket and no other options.

Model 2100
Emergency 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	16"	20"	24"
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 values listed above are based on full open valves at 100% over-pressure.

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

20" Model 2100
4 PSIG set pressure [P_s]
7 PSIG flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 1,877,000 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 1,877,000 = 1,557,910 SCFH***

Model 2100
Emergency Pressure Relief Capacity

Set Pressure (P_s)	Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Standard Cubic Meters per Hour at 0°C		
BarG	16"	20"	24"
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 values listed above are based on full open valves at 100% over-pressure.

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

20" Model 2100
0.4 BarG Set Pressure [P_s]
0.7 BarG Flowing Pressure [P_f]

1.	Read flow capacity at set pressure from table	Flow = 64,900 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 64,900 = 53,867 NCMH***

GROTH CORPORATION
a Continental Disc Company

EMERGENCY PRESSURE RELIEF VALVE
Model 2400A

- **Sizes 16”, 20” and 24”**
- **Pressure settings 1.5 - 8 oz/in²**
- **Vacuum settings 0.5 - 4 oz/in²**
- **Hinged with lift stop for positive reseating**
- **Available in carbon steel, stainless steel and other materials**
- **Easy access manway combined with emergency relief**

MODEL 2450A PRESSURE/VACUUM

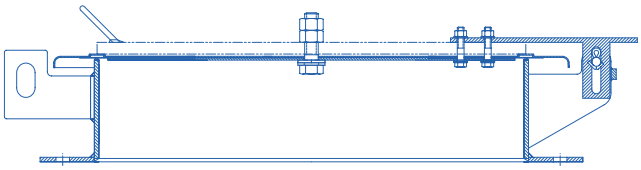
MODEL 2400A (PRESSURE)

EMERGENCY PRESSURE RELIEF VALVE

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

SPECIAL FEATURES

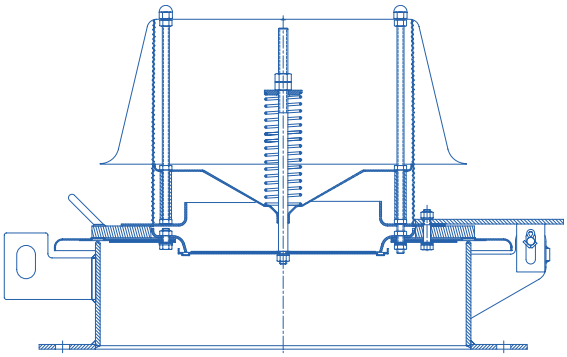
Series 2400A is built of corrosion resistant material throughout. Groth’s special Teflon®[1] “cushioned air” pallet provides integrity of seating. Model 2450A incorporates a vacuum breaker.



MODEL 2400A

GROTH, THE CAPABILITY COMPANY

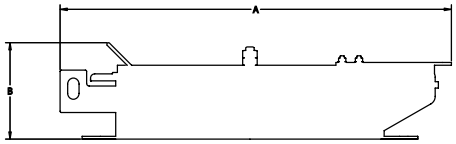
As with all Groth products, every Series 2400A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

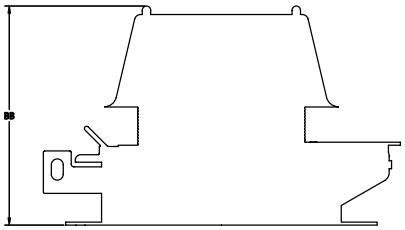


MODEL 2450A

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

SPECIFICATIONS





MODEL 2400A

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

Size *	Standard† Setting Pressure Weight Loaded	Maximum Setting Pressure Weight Loaded	A Width (mm)	B Height (At max. setting) (mm) Closed	B Height (At max. setting) (mm) Open	Approx. Ship. Weight Lbs. (kg) (At min. setting)
16" (400 mm)	2.0 oz/in² (8.6 mbar)		23 1/2 " (597)		20 1/2 " (521)	72 (33)
20" (500 mm)	1.8 oz/in² (7.8 mbar)	8 oz/in² (34.5 mbar)	28 3/4 " (730)	11" (279)	22 1/2 " (572)	98 (45)
24" (600 mm)	1.7 oz/in² (7.3 mbar)		33 1/4 " (845)		24 1/2 " (622)	124 (56)

MODEL 2450A

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

Size *	Standard Setting Pressure †** Weight Loaded	Standard Setting Vacuum Spring Loaded	Maximum Setting Pressure▲ Weight Loaded	A Width (mm)	BB Height (mm) Closed	BB Height (mm) Open	Approx. Ship. Weight Lbs. (kg) (At min. setting)
16" (400 mm)	2.7 oz/in² (11.6 mbar)			23 1/2 " (597)		24 1/2 " (622)	79 (36)
20" (500 mm)	2.3 oz/in (9.9 mbar)	0.5 oz/in² (2.2 mbar)	8 oz/in² (34.5 mbar)	28 3/4 " (730)	18 1/2 " (470)	26" (661)	105 (48)
24" (600 mm)	2.0 oz/in (8.6 mbar)			33 1/4 " (845)		27 1/2 " (699)	130 (59)

* 150# A.N.S.I. or API 650 drilling compatibility. † Minimum pressure setting 1.0 oz/in² on special application. ▲ Maximum pressure setting on 16" size = 4 oz/sq. in. Fiberglass dimensions on request. "Caution" — See IOM when mounting to API 650 flange. Max. Vacuum Setting is 4 oz./sq. in. **Minimum pressure setting 1.5 oz/in² on special application.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — OPTIONS

2400A Pressure only
2450A Pressure/vacuum

16"
20"
24"

* Material

3 = Carbon Steel
5 = 316 SS
Z = Special

O = No Options
Z = Special Options

O = No Jacket
J = Steam Jacket

1 = A.N.S.I. 150# drilled
2 = A.P.I. 650 drilled

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.
* Seat material on a carbon steel base is type 316 Stainless Steel weld overlay.

EXAMPLE 2 4 0 0 A — 2 0 — 5 — T 1 J 0

indicates a 20" Model 2400A with 316 SS Material, Teflon®[1] Seat Diaphragm, ANSI 150# Drilled, Steam Jacket and no other options.

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

Model 2400A
Emergency Pressure Relief Capacity

Set Pressure / Vacuum (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure / Vacuum) 1000 Standard Cubic Feet per Hour at 60° F				
In WC	Oz / Sq In	16" Pressure	20" Pressure	24" Pressure	All Vacuum#	2450 Only
0.87	0.50				65	Use "C" Factor Chart on Page 412 for Vacuum Flow
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		

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.

Other vacuum settings available on special order.

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

Vacuum flow rating applies only to Model 2450A.

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. Note: Vacuum capacity is modified using the "C" factor on page 412.

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 = **0.95**

"C" Factor Table										
%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 In WC Set pressure [P_s]
7 In WC Flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 829,000 SCFH
2. Calculate over-pressure — % OP = [(7 - 4)/4] x 100 = 75%
3. Read "C" factor from table — "C" = 0.95
4. Calculate flow capacity — ***Flow = 0.95 x 829,000 = 787,550 SCFH***

Type	2400A	2450A
Pressure	✔	✔
Vacuum		✔

Model 2400A
Emergency Pressure Relief Capacity

Set Pressure / Vacuum (P_s)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure / Vacuum) 1000 Standard Cubic Meters per Hour at 0° C				
mm WC	mb	16" Pressure	20" Pressure	24" Pressure	All Vacuum#	2450 Only
22	2.16				1.83	Use "C" Factor Chart on Page 413 for Vacuum Flow
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		
351	34.3	27.5	43.5	63.2		

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.

Other vacuum settings available on special order.

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

Vacuum flow rating applies only to Model 2450A.

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. Note: Vacuum capacity is modified using the "C" factor on page 413.

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 = **0.95**

"C" Factor Table										
%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 mm WC Set pressure [P_s]
175 mm WC Flowing pressure [P_f]

1. Read flow capacity at set pressure from table — Flow = 23,300 NCMH
2. Calculate over-pressure — % OP = [(175 - 100)/100]x 100 = 75%
3. Read "C" factor from table — "C" = 0.95
4. Calculate flow capacity — ***Flow = 0.95 x 23,300 = 22,135 NCMH***

Type	2400A	2450A
Pressure	✔	✔
Vacuum		✔

GROTH CORPORATION
a Continental Disc Company

EMERGENCY PRESSURE RELIEF VALVE

Model 2500A

Pilot Operated

- **Documented compliance to EPA's Method 21 testing (<500 ppm)**
- **Derakane, Furan, Carbon Steel, 316 SS and other body materials available**
- **Available in Flange sizes 18" - 24" (Consult factory for other sizes)**
- **ANSI 150# and API 650 drilling**
- **Full lift by 20% overpressure**
- **Trim available in 316 SS or Hastelloy C**
- **Standard FEP Diaphragm**
- **Pressure settings 5" W.C. to 6 PSIG**

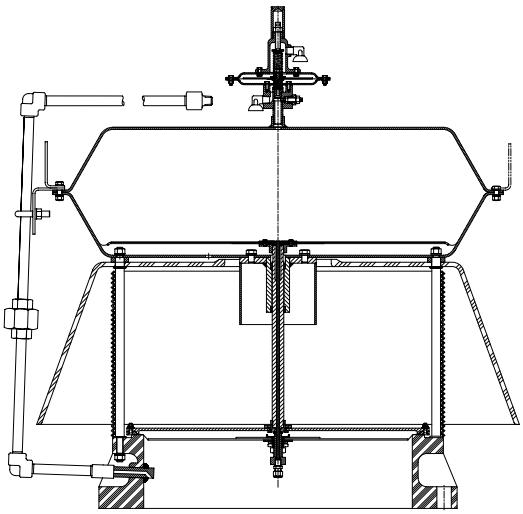
MODEL 2500A

PILOT OPERATED EMERGENCY PRESSURE RELIEF VALVE

Model 2500A 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 an external fire, etc. Model 2500A is designed to be self-closing. As excessive pressure builds up, Model 2500A relieves, then reseats when overpressure has been dissipated.

SPECIAL FEATURES

Model 2500A is designed to assist in meeting the requirements of the 1990 Clean Air Act Amendments as best available control technology. Unit provides the capability to meet the leakage rate requirement of 500 ppm or less. This pilot-operated valve with large actuator is the only proven way to insure the necessary sealing force to meet the requirement. The Model 2500A is built of corrosion resistant materials throughout which allows it to be used in severe service environments, i.e. ethylene dichloride, methylene chloride.

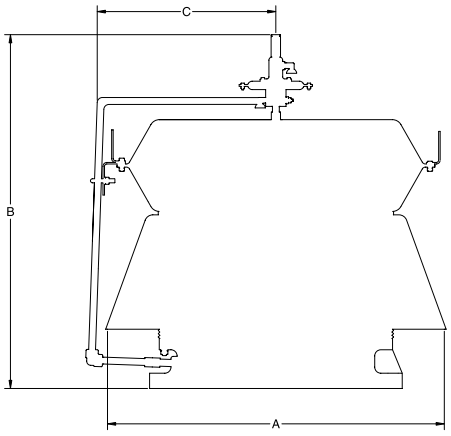


MODEL 2500A

GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 2500A is factory inspected and tested to meet your critical requirements and special needs.

SPECIFICATIONS



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

Size*	Min. Setting Pressure	Max. Setting Pressure	A Width (Metric)	C Height (Metric)	Approx. Center Line (Metric)	Ship. Wt. Lbs.
18” (457 mm)	12” W.C. (standard) (29.9 mbar) 5” W.C. (1402 Pilot) (12.5mbar)	6 PSIG (0.41 bar)	36” (914)	40” (1016)	21” (533)	280 (127 kg)
20” (508 mm)			39” (991)	42” (1067)	23” (584)	350 (159 kg)
24” (610 mm)			42” (1067)	44 1/2” (1130)	24” (610)	450 (204 kg)

* 150 # A.N.S.I. or API 650 drilling available. Consult factory for special settings.
** See Techincal Section (page TS4) “PILOT OPERATED VALVES - Modes of Failure”.

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # — SIZE — MATERIAL — SOFT GOODS — OPTIONS

MODEL #
- 2500A

SIZE
- 16”
- 18”
- 20”
- 24”

MATERIAL

Body Material
- 3 = Carbon Steel
- 5 = Stainless Steel
- 6 = Derakane
- 7 = Furan
- Z = Special

Pilot
- 5 = 316 S.S.
- 8 = Hastelloy C-276

Trim
- 5 = 316 S.S.
- H = Hastelloy C-276
- Z = Special

Actuator (Weatherhood)
- 3 = Carbon Steel
- 5 = 316 S.S.
- Z = Special

SOFT GOODS

Soft Goods (“O” rings)*
- B = Buna-N
- E = EPR
- V = Viton®
- K = Kalrez
- Z = Special

* Teflon diaphragms

OPTIONS
- L = Low Pressure Pilot
- 0 = No Special Options
- Z = Special Options

NOTES
Include model number when ordering.
For special options, consult factory.

EXAMPLE

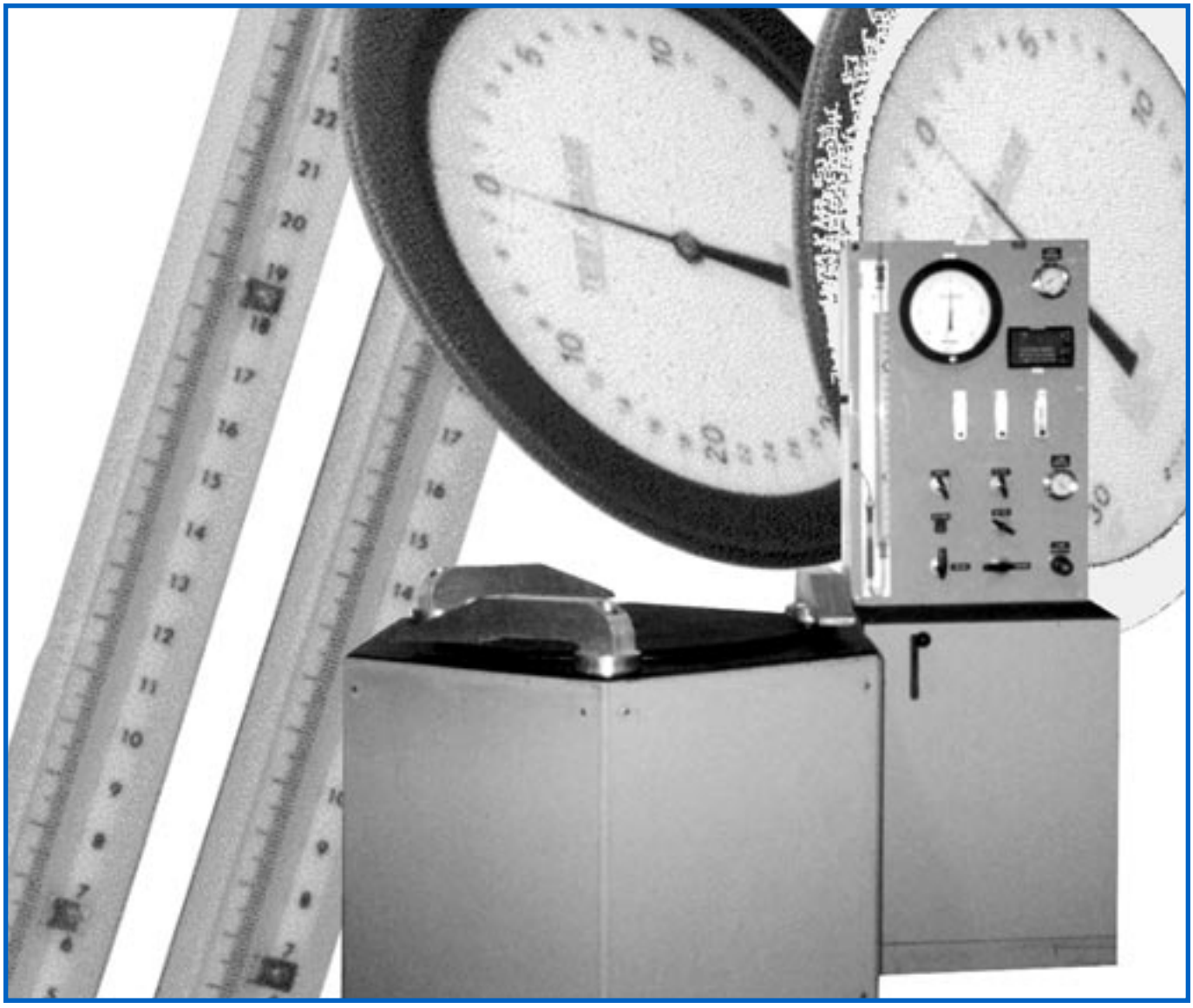
2 5 0 0 A — 2 0 — 6 5 5 — V — 0

Indicates a 20" Model 2500A with Derakane body, 316 S.S. Trim and Pilot, Viton® soft goods, no other options.

SECTION 5
TEST STANDS

GROTH CORPORATION®
a Continental Disc Company

VALVE TEST STANDS



- Pressure/Vacuum Relief Valve Test Stand
- Pilot Valve Test Stand
- Pneumatic/Hydraulic Pressure Relief Valve Test Stand - Manual or Automatic Clamping
- Compressor and Air Receiver

INTRODUCTION

Since 1960, the Groth name has been synonymous with the repair, manufacture or testing of valves. this vast experience lead us into the venture of manufacturing valve test equipment. Simple in design; easy to use; inexpensive to maintain, included with these principals, the standard modesl discussed in this brochure offer the user many years of trouble-free operation.

Groth can also provide the following:

- Optional digital interface, critical valve data can be captured with appropriate software
- Optional digital pressure gauges feature data logging capability and a serial interface for data downloading
- Units designed to meet your specific requirement
- Start-up assistance

The final inspection of any new or repaired valve is an actual test in accordance with approved standards and codes. To do this, you need the best available test equipment.

We welcome you to visit our Stafford, Texas facility, where will be pleased to demonstrate various models of test stands under actual conditions.

SERIES 200 TEST STANDS

Pressure / Vacuum Relief Valve

STANDARD

- Pressure/Vacuum testing
- Dial gages
- Flowmeters
- Manometers
- Pressure vessel directly under test flange for smooth regulated pressure or vacuum
- Heavy steel construction
- SS tubing
- Mounting adapters and gaskets included

MODEL 210

OPTIONS

- Digital Gages
- Skid Mounted

SERIES 200 TEST STANDS

The Groth Series 200 test stand contains all valves and gages necessary to accurately verify settings for both pressure and vacuum conditions. Seat leakage is monitored using flow meters rangng from 0.1 - 100 SCFH.

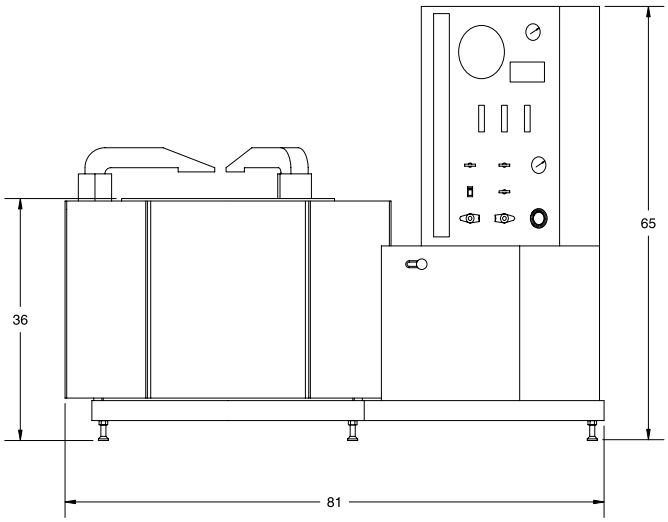
The Series 200 is designed to assist in meeting the requirements of the 1990 Clean Air Act Amendments.

MODEL 220

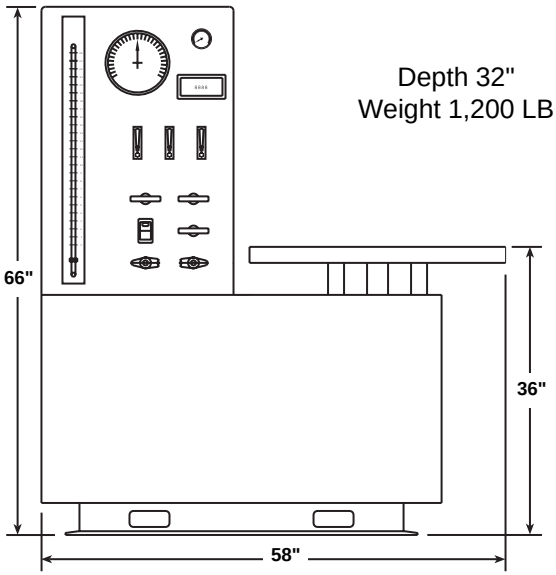
SPECIFICATIONS

Model 200-3

Depth 43"
Weight 1,600 LB



Model 200-1



Depth 32"
Weight 1,200 LB

TEST SYSTEM SPECIFICATION

Valve size range	=	2" - 24"
MAWP	=	30 psig
Test Pressure	=	12 PSI Vacuum to 15 PSI Pressure

UTILITY REQUIREMENTS

Compressed Air	=	80 - 150 psig 1/2" nominal line size
Electric Power	=	100/115/230 VAC Single Phase 50/60 Hz 10 Amp

HOW TO ORDER

For easy ordering, select proper model number

MODEL # — **CLAMPING** — **GAGES** — **OTHER**

□□□ ---------- □ ---------- □ ---------- □

200

1 = Flange bolting

1 = Dial
2 = Digital
3 = Both

0 = No Special Options
Z = Special Options

EXAMPLE 2 1 0 — 3 — 3 — 0

Indicates a Model 210, hydraulic clamps, digital and dial gages, and no other options.

Specifications subject to change without notice.

PILOT VALVE TEST STAND

STANDARD

- Easy setup and installation
- 4" dial test gages
- Up to 1500 psi test pressure
- SS tubing and valves
- Moisture removal filter
- Dome simulation vessel
- Tank simulation vessel

OPTIONS

- Digital gages with precision of 0.07%
- Custom designed to meet your needs

MODEL 220

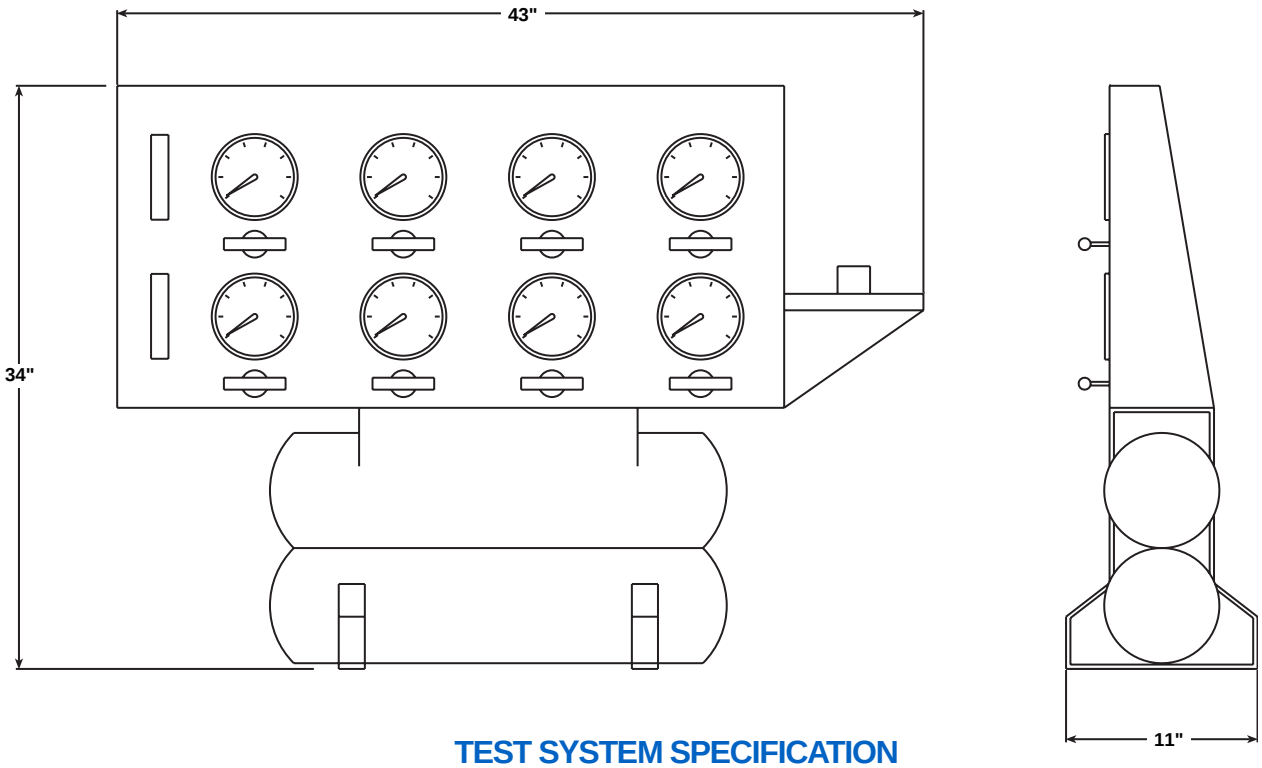
Note: Dome Simulation Vessel not shown in above picture. Contact Groth Corporation for current drawings and layouts.

PILOT VALVE TEST STAND

The Groth Pilot Valve Test Stand is used to set and test the pilot valve independent of the main pressure relief valve. The 1990 Clean Air Act Amendments mandate leak testing of all pressure relief valves to insure that leakage rates are within acceptable levels. The ability to perform in house pilot operated relief valve setting and testing will enable the individual plant to expedite the process and retain complete control of records.

Detailed specifications are available from Groth Products Group.

SPECIFICATIONS



TEST SYSTEM SPECIFICATION

Test Pressure — Model 150	=	2” WC - 20 PSIG
Test Pressure — Model 160	=	15 - 1500 PSIG

UTILITY REQUIREMENTS

Compressed Air or Nitrogen — Model 150	=	150 PSI
— Model 160	=	2000 PSI
Electric Power (Digital Gages)	=	100/115/230 VAC Single Phase 50/60 Hz 5 Amp

HOW TO ORDER

For easy ordering, select proper model number

MODEL # — **GAGES** — **OTHER**

□□□ ---------- □ ---------- □

150 Low pressure testing
160 High pressure testing

1 = Manometers (used only for IN WC)
2 = Dial
3 = Digital
4 = Dials and Digital

0 = None
Z = Other

EXAMPLE 1 5 0 — 1 — 0

Indicates a Model 150, low pressure testing, with manometers, and no options.

Specifications subject to change without notice.

SERIES 100 TEST STANDS

Pressure Relief Valve - Pneumatic / Hydraulic

Bolt on Unit

Manual or Automatic Clamping

STANDARD

- Easy setup and installation
- 6" dial test gages
- 1/2" thru 10" valve mountings
- Up to 2000 psi test pressure
- SS tubing & valves
- 360 degree accessibility

OPTIONS

- Manual or hydraulic clamping with safety interlock
- Digital gages with precision of 0.07%
- High pressure compressor and air receiver
- Skid mounted

SERIES 100 — PRESSURE RELIEF VALVE TEST STAND

All Groth pressure relief valve test stands combine extremely high accuracy with maximum productivity in testing and determining set pressure.

Groth provides various options to meet your testing needs. Mounting of valves is quick and safe with either flange bolting, manual or automatic clamping. The test stands have easy to read dial or digital pressure gauges.

Test stand construction is robust and is based on almost forty years of relief valve assembly and testing.

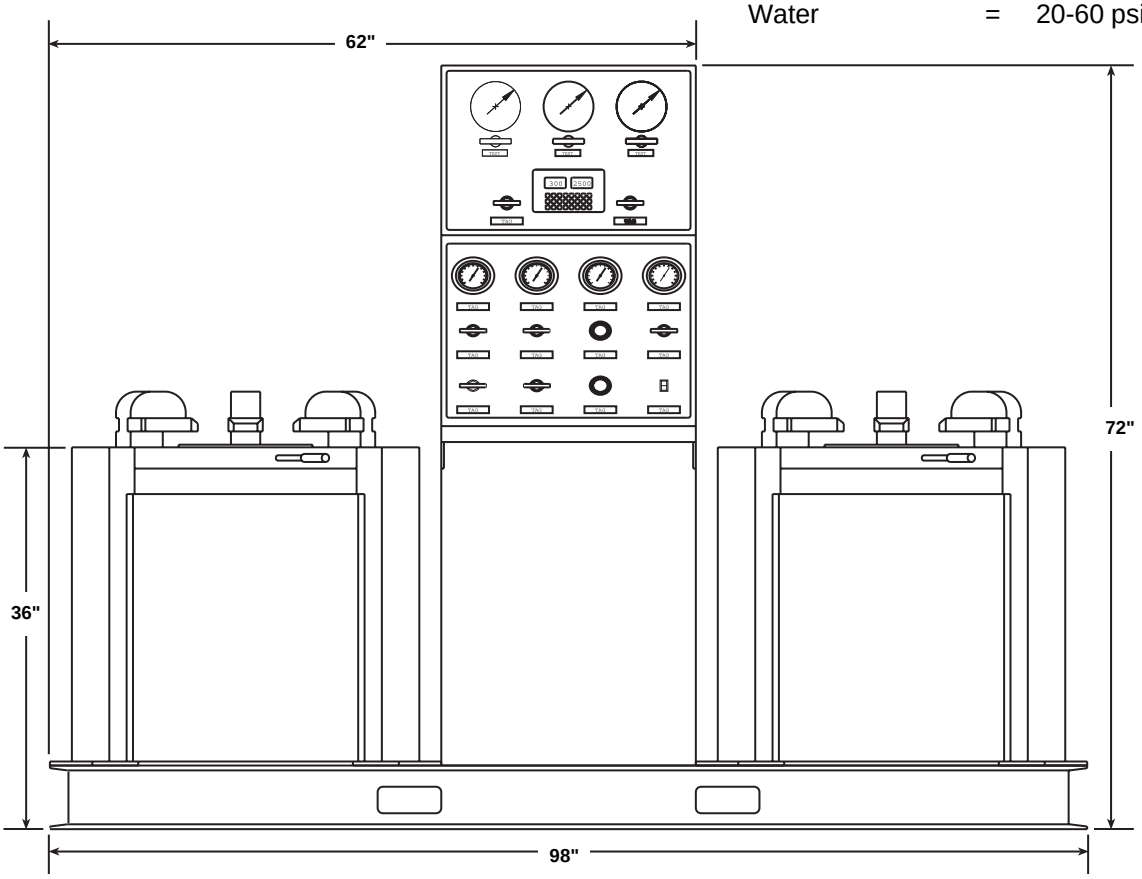
SPECIFICATIONS

TECHNICAL SPECIFICATIONS

Valve size range	=	1" 2500# through 10" 150# flanged 1/2" through 1-1/2" threaded
Air Test Pressure	=	15-2750 psig
Water Test Pressure	=	15-2750 psig

UTILITY REQUIREMENTS/CONNECTIONS

High Pressure Air	=	3000 psig
Low Pressure Air	=	60 - 150 psig 1/2" nominal size
Electric Power	=	100/115/230 VAC Single Phase 50/60 Hz 5 Amp
Water	=	20-60 psig



Depth 33"

Weight: Single Stump — 1250 lb
Dual Stump — 2000 lb

HOW TO ORDER

For easy ordering, select proper model number

MODEL # **CLAMPING** **GAGES** **OTHER**

□□□ ---------- □ ---------- □ ---------- □

110 Pneumatic, Single stump
111 Pneumatic & Hydraulic, Single stump
120 Pneumatic & Hydraulic, Dual stump

1 = Bolt On
2 = Manual clamps
3 = Hydraulic clamps

1 = Dial
2 = Digital
3 = Both

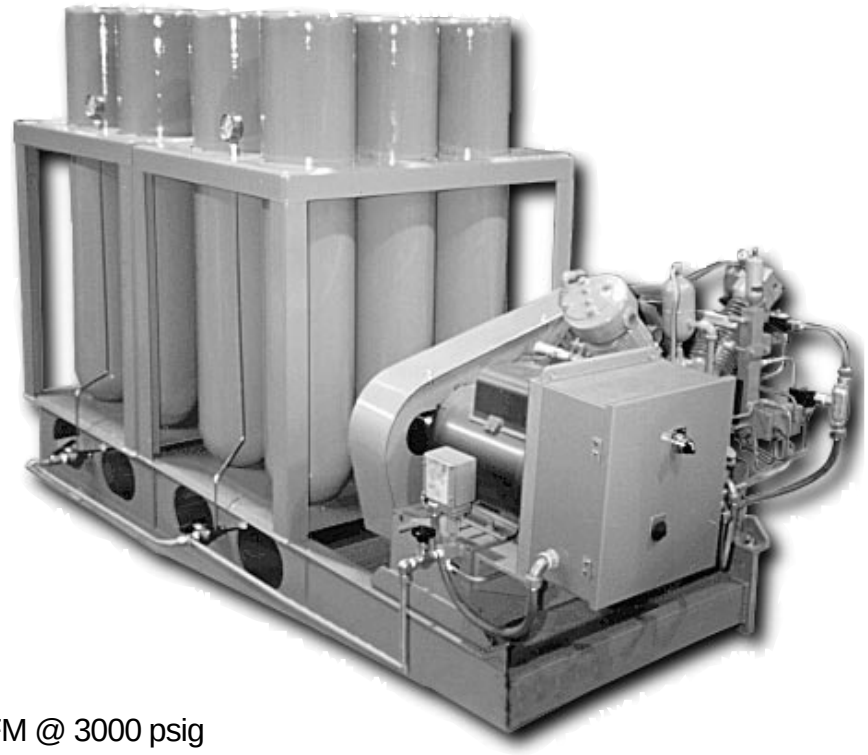
0 = None
Z = Other

EXAMPLE [1][1][0] — [2] — [2] — [0]

Indicates a Model 110, Pneumatic SRV test stand, Manual clamps, Digital gages, and no other options.

Specifications subject to change without notice.

COMPRESSOR and AIR RECEIVER



Model 140

Note: Compressor and Bottle Rack can be modified to meet your specific needs (i.e. higher pressures). Contact Groth for additional information including dimensions and layouts.

STANDARD

- Compressor generates 5 CFM @ 3000 psig
- 5 hp, TEFC motor
- Nema 4 A.T.L. motor starter
- Automatic On/Off pressure switch
- Low oil level switch
- Automatic condensate drain

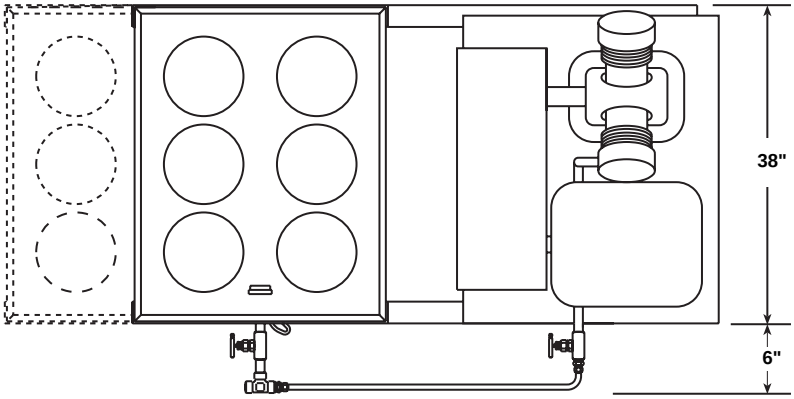
COMPRESSOR AND AIR RECEIVER

Groth's test stands are designed for high and low pressure testing. Upon request, Groth can furnish a compressor system for your testing needs. All components and adapters are included. Standard compressors and air receivers will test valves up to 2000 psig.

SPECIAL FEATURES

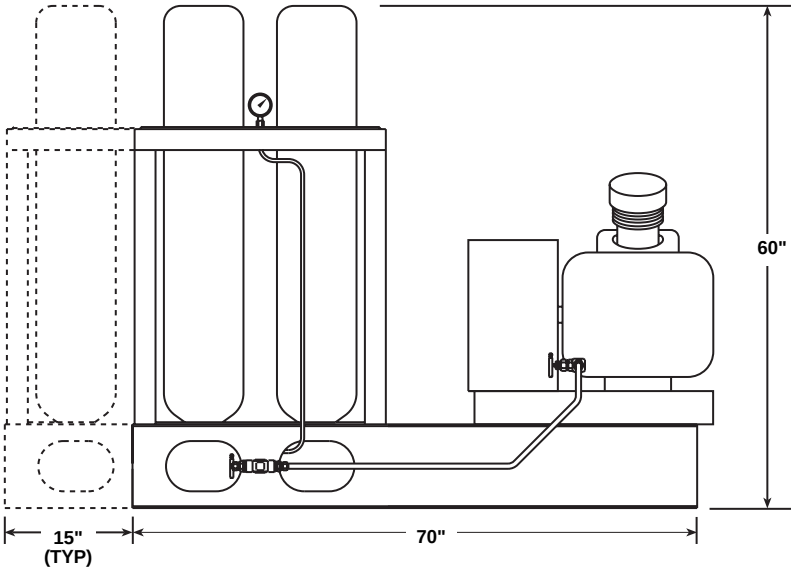
All Compressor units are completely self contained. Each unit is designed to provide a substantial volume of high pressure air when needed. This eliminates the long waiting period if a low volume compressor supplies air directly to the valve test stand.

SPECIFICATIONS



SPECIFICATIONS

Compressor	=	5.6 CFM @ 3000 - 5 H.P. 7.0 CFM @ 6000 - 7.5 H.P.
Receiver (6 Bottles)	=	9.0 cu. ft. 1850 SCF @ 3000 psi



UTILITY REQUIREMENTS

Electrical Power	=	208/230/460 VAC Single Phase/3 Phase 50/60 Hz

Weight 1,900 LB

HOW TO ORDER

For easy ordering, select proper model number

MODEL #	NO. OF BOTTLES	MAX PRESSURE	OPTIONS
140	03 06 09 12	3000 PSI 6000 PSI	0 = No Options 1 = Air Dryer Z = Special

EXAMPLE 1 4 0 — 1 2 — 3 0 0 0 — 0

Indicates a compressor with 12 bottles and a maximum pressure of 3000 psi. (as shown in picture on front)

Specifications subject to change without notice.

Innovative ***Global*** *Solutions*
for Low Pressure Systems Protection

13650 N. Promenade Blvd.
Stafford, Texas 77477

tel **(281) 295-6800**
fax **(281) 295-6999**

www.grothcorp.com

GROTH CORPORATION®
a Continental Disc Company

SECTION 6

PILOT OPERATED RELIEF VALVES

Series 1660A Pilot Operated Valves •

Series 1400 Pilot Operated Valves •

Series 1500 Pilot Operated Valves •

GROTH®
CORPORATION
a Continental Disc Company

PILOT OPERATED RELIEF VALVE
SERIES 1660A

Model 1660A
U.S. Patent No. 5,499,648

Model 1401E
U.S. Patent No. 5,163,471

Model 1402
U.S. Patent No. 5,992,449

- **Premium seat tightness to set pressure**
- **Snap or modulating valve action**
- **Provides ability to meet “Clean Air Act” requirements**

INTRODUCTION

Typical Tank Installation

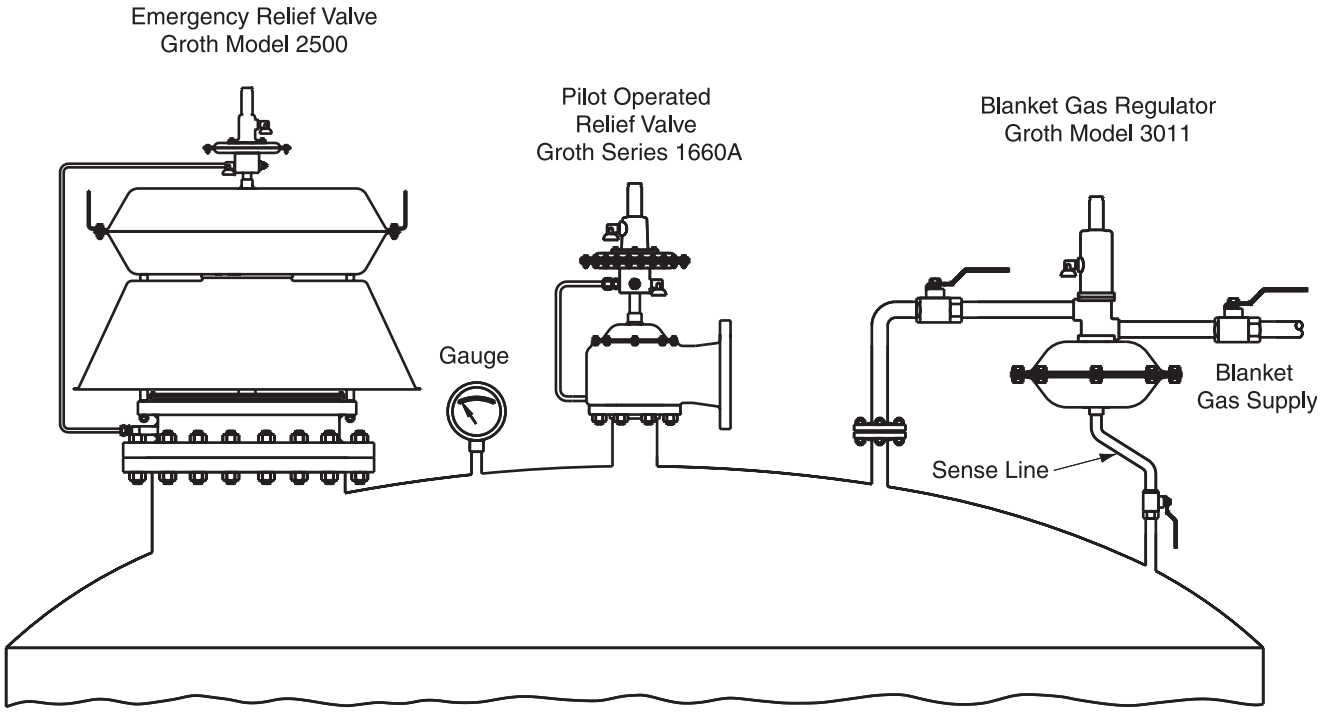


Figure 1

Pressure and/or vacuum relief valves are used on liquid storage tanks and other process vessels or systems to prevent structural damage due to excess internal pressure or vacuum.

Storage tanks are pressurized when liquid is pumped in and compresses the existing vapor or when increasing temperature causes increased evaporation or expansion of existing vapor. Conversely, vacuum may be created when pumping out or decreasing temperature. To prevent damage, vapor must be allowed to escape or enter the tank at a specified pressure or vacuum. The volume rate of venting depends upon the tank size, volatility of the contents, the pumping rate and the temperature. See API Standard 2000 for the procedures to determine venting requirements.

The pilot operated relief valve has two principal advantages over other types of relief valves:

1) It is bubble tight to set pressure.

2) It is fully open at less than 10% above set pressure.

These characteristics permit an operating pressure nearer to the maximum allowable working pressure of the tank. High operating pressures reduce evaporation and total venting volume, thereby reducing product loss and cost of processing emissions.

A tank may also have provisions for emergency pressure relief due to fire exposure and/or an inert gas blanket in the vapor space.

A typical tank installation is shown in Figure 1 which includes a pilot operated pressure/vacuum relief valve, a gas blanketing regulator and a pilot operated emergency pressure relief valve.

The Groth Series 1660A Pilot Operated Valve is available in the following configurations:

	RELIEF SERVICE	
	PRESSURE	VACUUM
1660A	✔	
1661A	✔	✔ DIRECT ACTUATED
1662A		✔ PILOT OPERATED
1663A	✔	✔ PILOT OPERATED

See pages 603, 604 and 611.

FEATURES

- Sizes 2” through 12”
- Full Pipe Bore Seat Nozzle
- Standard Pressure Settings from 2.0" W.C. to 15 PSIG
- Temperature Range from -323° F to 300° F
- Designed for Easy Maintenance
- Minimal Spare Parts Requirements
- Inherent Backflow Prevention
- ISO 9001 Certified Manufacturing Process
- Easily Adjustable Blowdown
- Snap Action or Modulating Pilot
- Premium Seat Tightness to Set Pressure.
- Standard Body Materials are Aluminum, Carbon Steel, or 316 S.S.
- Film seat design meets EPA Method 21

APPLICATIONS

LOW PRESSURE STORAGE TANKS
The Groth Model 1660A Pilot Operated Valves can meet seat tightness requirements of environmental regulations, even when the operating pressure is close to the set pressure, such as when gas blanketing is used.

CRYOGENIC STORAGE TANKS
Leaking pressure relief valves on low temperature tanks cause unsafe freeze-ups. Tight pilot operated valves with snap action are the safest devices known. Modulating valves must not be used on cryogenic service.

NATURAL GAS
Some natural gas production facilities require large volume relief capacities at low pressures and pilot operated valves are ideal for these applications. When the relief valve is installed downstream of a pressure reducing valve, the modulating mode can prevent destructive interaction between the two valves.

AIR SEPARATION PLANTS
Pilot operated valves prevent the accidental loss of gases when used in both low pressure process and storage applications.

AIR BLOWERS
Air blowers for conveyor systems and waste water treatment plants, as well as other uses, often require accurate relief for both pressure and vacuum. Pilot operated relief valves—both pressure valves and vacuum valves—are extremely well suited for such services.

Model 1660A - Pressure Relief - Pilot Actuated

The function of the pilot valve (A) is to control pressure in the main valve actuator (B) or upper dome of the main valve. The effective area of the actuator diaphragm (1) is significantly larger than the pallet seat area (2). Tank pressure is applied both on top of the actuator diaphragm and below the main valve seat area. **Because of the area ratio, the downward force is greater than the opening force and results in a tight main valve seat.**

When tank pressure reaches set pressure, the force acting upward on the pilot valve sense diaphragm overcomes the downward spring force. The pilot valve begins to flow through the seat (6) to the breather port (3). This flow results in a pressure drop in the upper dome (B). **As a result, pressure acting under the main valve pallet will open the valve and relieve the over-pressure condition.**

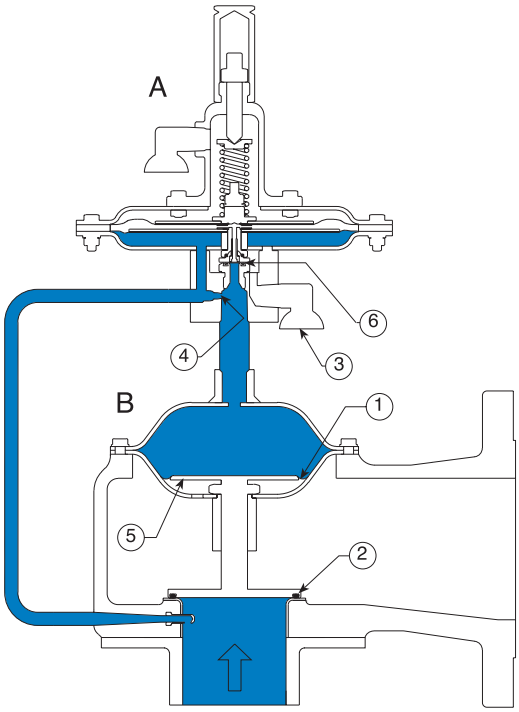
Adjustment of the blowdown needle (4) can provide either **"snap action" or "modulating" pilot valve operation.** For snap-action operation, the main valve pallet lifts quickly to full open. In modulating service, the pallet will lift sufficiently to maintain set pressure regardless of the flow rate up to the rated capacity of the valve at the specified set pressure.

The main valve remains open (and flowing) as long as the tank pressure is higher than the pilot valve set pressure.

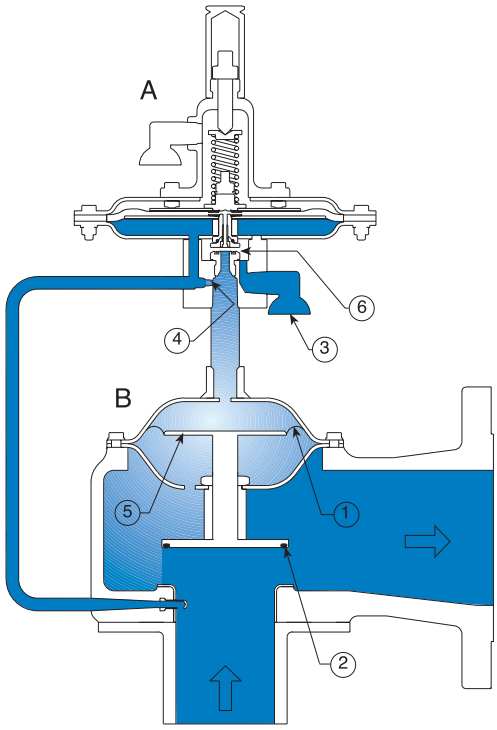
As tank pressure decreases to the pilot valve reseat pressure, the pilot valve closes allowing tank vapors to flow back into the upper dome (B). As the upper dome pressure rises, the pallet assembly is tightly closed against the seat.

The adjustable orifice or blowdown needle (4) affects the closing of the pilot valve. Blowdown can vary from zero for modulating operation to 10% for snap-action operation.

NOTE: The actuator diaphragm (1) is not attached to the support plate (5) unless vacuum relief or Low set 1402 pilot is specified. This design provides **"inherent back-flow prevention"** when the discharge header pressure exceeds tank pressure. No additional hardware is required for this protection.



Closed Condition

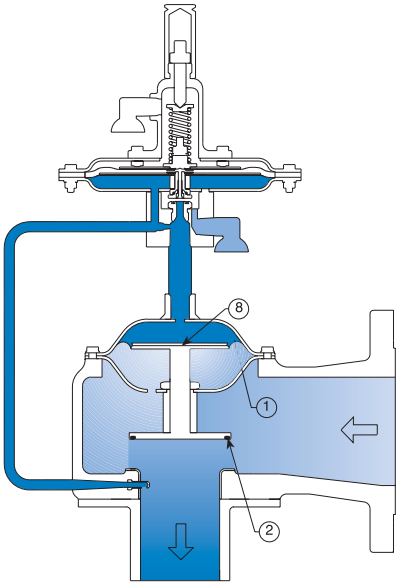


Open Condition

Model 1661A - Pressure Relief - Pilot Actuated Vacuum Relief - Direct Actuated

Vacuum relief is provided by attachment of the actuator diaphragm to the pallet/support plate assembly. This provides pressure and vacuum protection with a single main valve and a single pilot valve.

The valve opens when the tank vacuum acting on the actuator diaphragm overcomes the weight of the pallet assembly. The vacuum applied to the area differential between the actuator diaphragm (1) and the pallet seat area (2) provides the lifting force. The vacuum cracking pressure is approximately 1.0 - 2.0" WC, and is determined by the weight of the pallet assembly and related components. Full open flow is achieved in the 1.7" to 3.5" WC range, depending on valve size, pressure setting and materials of construction. The diaphragm is attached by the upper support plate (8), so backflow prevention is not provided by this valve.

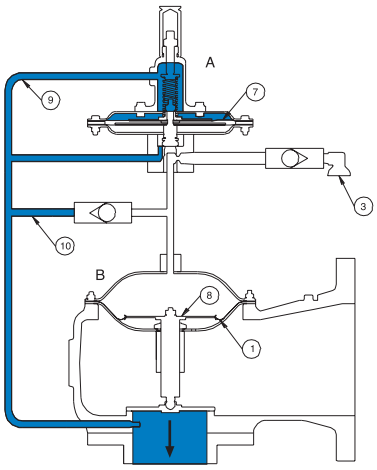


Open Condition—Direct Actuated

Model 1662A - Vacuum Relief - Pilot Valve Actuated

Operation of a Pilot Actuated Vacuum Relief Valve is similar to pressure relief except for the physical connections between the pilot and main valve. The vacuum sense lines (9 & 10) connect the spring chamber breather port and the pilot valve exhaust port to the main valve total pressure pick-up as shown.

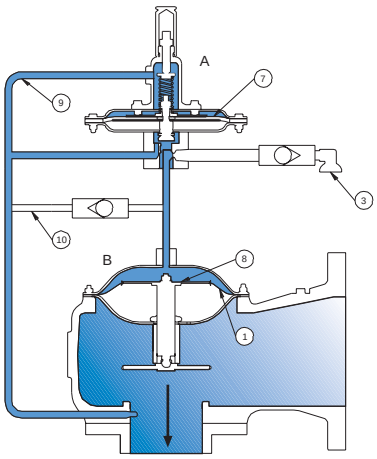
Atmospheric pressure is applied under the boost and sense diaphragms and in the upper dome (B) through the breather port (3). Below set vacuum the spring force is greater than the lift created by tank vacuum above the sense diaphragm (7) so both the pilot valve and the main valve will remain closed.



Closed Condition

At set vacuum the pilot valve opens and the upper dome is reduced to tank vacuum. The diaphragm is attached by a second actuator support plate (8) for vacuum operated valves. Main valve internal pressure under the actuator diaphragm (1) opens the main valve. The valve remains open and flowing until the system reaches the pilot valve reseat pressure.

NOTE: Backflow pressure relief prevention is provided for pilot operated vacuum relief valves in case positive system pressure can occur. A bypass line with a check valve is used to apply pressure to the upper dome. Another check valve prevents pressure discharge from the pilot vent.

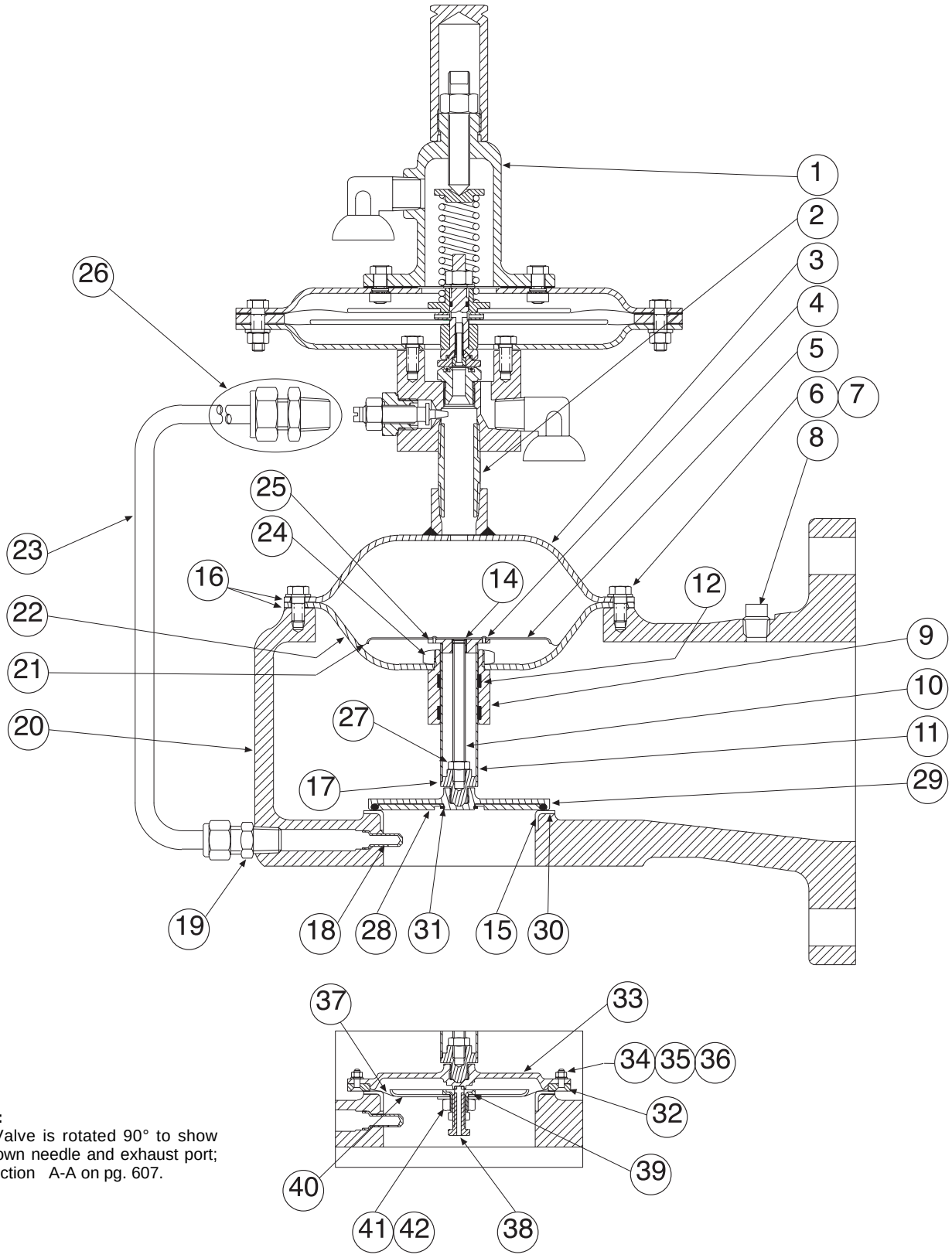


Open Condition

CAUTION:

See Technical Section TPD3 for Modes of Failure.

Model 1660A Pilot Operated Relief Valve



NOTE:
Pilot Valve is rotated 90° to show blowdown needle and exhaust port; see section A-A on pg. 607.

Film Seat Detail

U.S. PATENT NO. 5,499,648

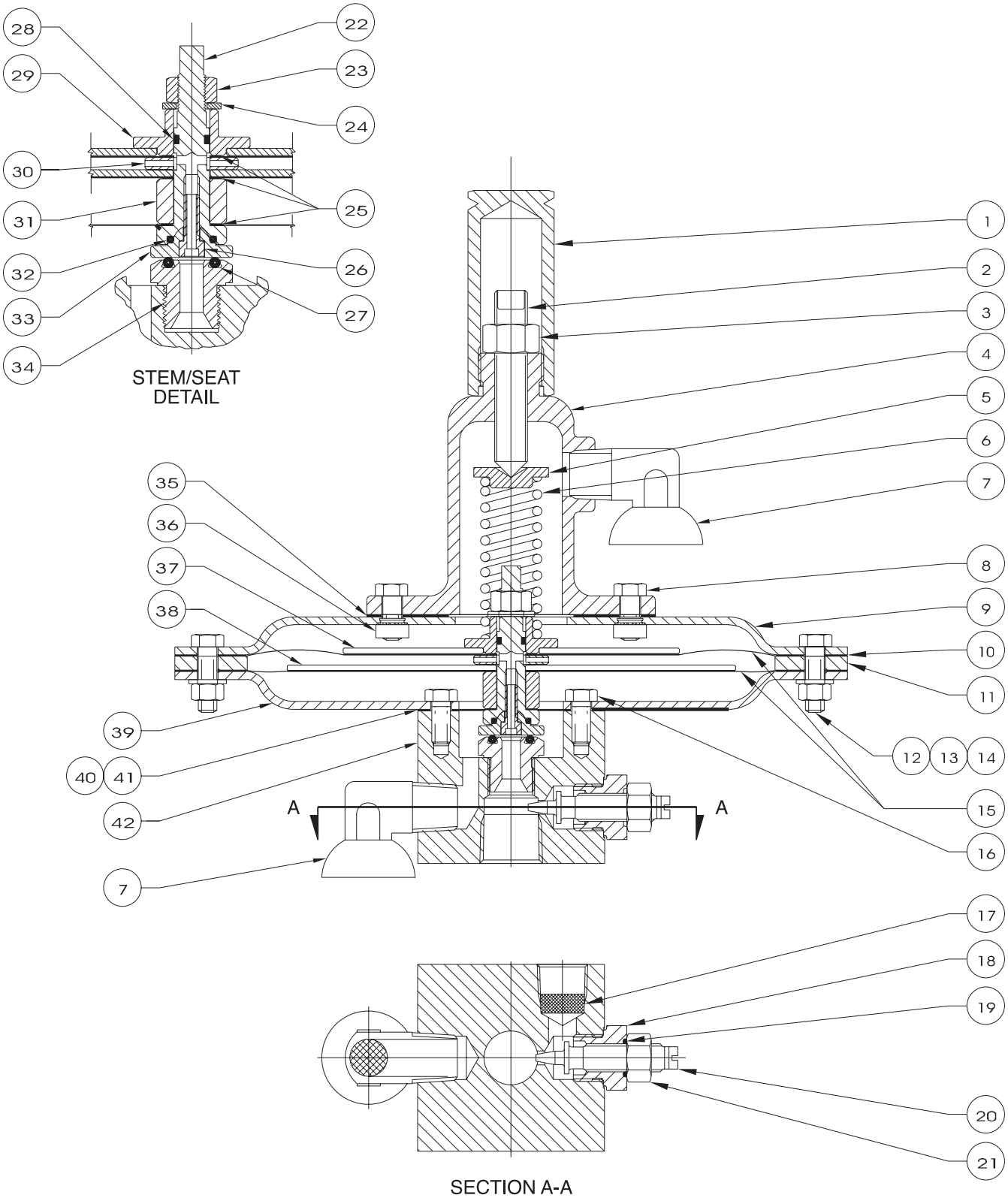
Model 1660 Pilot Operated Relief Valve

Item	Description	Materials of Construction		
		Aluminum	Carbon Steel	Stainless Steel
1	Pilot	SS	SS	SS
2	Nipple, Pipe	316 SS	316 SS	316 SS
3	Housing, Upper Actuator	AL	CS	316 SS
4	Rivet	SS	SS	SS
5	Plate, Diaphragm	AL	316 SS	316 SS
6	Bolt, Hex	316 SS	316 SS	316 SS
7	Washer, Lock	316 SS	316 SS	316 SS
8	Plug, Pipe	316 SS	316 SS	316 SS
9	Guide, Spindle	AL	316 SS	316 SS
10	Rod, Spindle	316 SS	316 SS	316 SS
11	Spindle	316 SS	316 SS	316 SS
12	Bearing, Spindle	PTFE	PTFE	PTFE
13	Stud/Nut (not shown)	316 SS	316 SS	316 SS
14	Insert, Locking	316 SS	316 SS	316 SS
15	Seat, Body	See Note 3	316 SS	See Note 3
16	Gasket, Actuator	Teflon® FEP [4]	Teflon® FEP [4]	Teflon® FEP [4]
17	Cap Spindle, Lower	AL	316 SS	316 SS
18	Pickup, Pressure	316 SS	316 SS	316 SS
19	Tube Connector	316 SS	316 SS	316 SS
20	Body	AL	CS	CF8M (316 SS)
21	Diaphragm, Actuator	Teflon® FEP [4]	Teflon® FEP [4]	Teflon® FEP [4]
22	Housing, Lower Actuator	AL	CS	316 SS
23	Tubing	316 SS	316 SS	316 SS
24	Nut, Hex Jam	316 SS	316 SS	316 SS
25	Cap, Spindle-Upper	AL	316 SS	316 SS
26	Connector, Tube	316 SS	316 SS	316 SS
27	Nut, Hex Jam	316 SS	316 SS	316 SS
28	Retainer Plate, O-Ring	AL	316 SS	316SS
29	Pallet, O-Ring	AL	316 SS	316 SS
30	O-Ring	See Note 1	See Note 1	See Note 1
31	Retainer, Snap Ring	SS	SS	SS
	FILM SEAT COMPONENTS (ITEMS 1-27 ARE SAME AS ABOVE)			
32	Ring, Film Seat	AL	316 SS	316 SS
33	Plate, Film Seat	AL	316 SS	316 SS
34	Screw, Hex Skt Flt Hd	SS	SS	SS
35	Nut, Hex	SS	SS	SS
36	Washer, Lock	SS	SS	SS
37	Seat, Film	Teflon® FEP [4]	Teflon® FEP [4]	Teflon® FEP [4]
38	Jackscrew	316 SS	316 SS	316 SS
39	Bushing, Jackscrew	316 SS	316 SS	316 SS
40	Retainer, Film Seat	AL	316 SS	316 SS
41	Nut, Hex Jam	316 SS	316 SS	316 SS
42	Washer, Flat	316 SS	316 SS	316 SS

1. Elastomer material options are specified by the soft goods option in the part number; refer to the “How to Order Section” on page 615 of this catalog.
2. Consult factory for material options not listed above.
3. 316 SS Seat Insert Optional.
4. Teflon is a registered trademark of DuPont Corporation.

ASSEMBLY

Model 1401E Pilot Valve



U.S. PATENT NO. 5,163,471

Model 1401E Pilot Valve

Item	Description	Qty.	Materials of Construction All 316 SS
1	Cap, Adjustment Screw	1	316 SS
2	Screw, Adjustment	1	316 SS
3	Nut, Hex	1	316 SS
4	Bonnet, Spring	1	316 SS
5	Button, Spring	1	316 SS
6	Spring	1	316 SS (Note 2)
7	Vent, Breather	2	Plastic
8	Bolt, Hex	4	316 SS
9	Case, Diaphragm-Upper	1	316 SS
10	Gasket, Actuator	1	Teflon® FEP [4]
11	Spacer, Actuator Housing	1	316 SS
12	Bolt Hex	12	316 SS
13	Nut, Hex	12	316 SS
14	Washer, Lock	12	316 SS
15	Diaphragm, Actuator	1	Teflon® FEP [4]
16	Bolt, Hex	8	316 SS
17	Screen, Filter	1	316 SS
18	Bushing, Blowdown	1	316 SS
19	O-Ring	1	PTFE
20	Needle, Blowdown	1	316 SS
21	Nut, Hex Jam	1	316 SS
22	Stem	1	316 SS
23	Nut, Hex	1	316 SS
24	Washer, Lock	1	316 SS
25	Washer	1	Teflon® FEP [4]
26	Screw, Stem	1	316 SS
27	O-Ring	1	Note 1
28	O-Ring	1	Note 1
29	Guide, Spring	1	316 SS
30	Spacer, Central	1	316 SS
31	Spacer, Lower	1	316 SS
32	O-Ring	1	Note 1
33	Disc, Stem	1	316 SS
34	Bushing, Seat	1	316 SS
35	Gasket, Spring Bonnet	1	Note 1
36	Nut, Swage	4	304 SS
37	Plate, Support-Upper	1	316 SS
38	Plate, Support-Lower	1	316 SS
39	Case, Diaphragm-Lower	1	316 SS
40	Diaphragm, Body	1	Teflon® FEP [4]
41	Gasket, Body	1	Teflon® FEP [4]
42	Body	1	316 SS

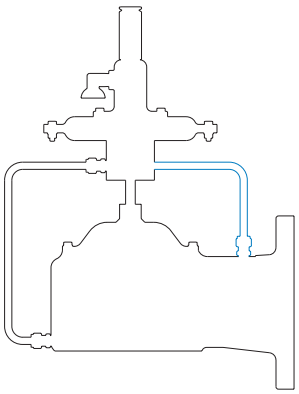
1. Elastomer material options for the pilot valve(s) are specified by the soft goods designation in the “How to Order Section” section on page 615 of this catalog.
2. 17-7 PH SS or Chrome Vanadium for Set Pressure greater than 8 PSI.
3. Consult factory for material options not listed above.
4. Teflon is a registered trademark of DuPont Corporation

OPTIONS

The following options are frequently utilized to reduce vapor emissions, improve serviceability or expand the capabilities of a pilot operated relief valve.

Pilot exhaust piped to discharge header

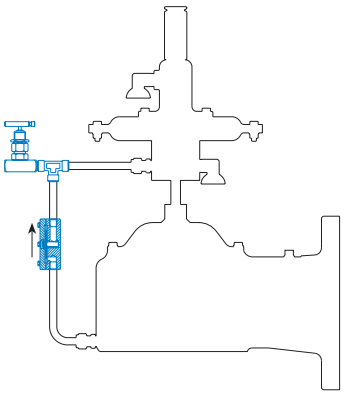
The exhaust port of the pilot valve may be piped to the outlet body to avoid any vapor emission to the atmosphere.



Field Test Connection

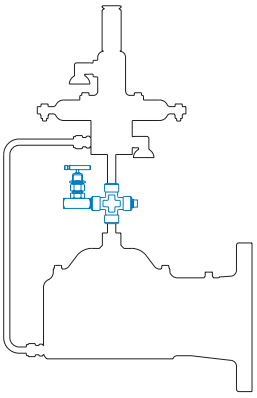
A 1/2” NPT(F) connection, block valve and check valve is provided for field testing the pilot valve pressure setting. This is accomplished with an independent pressure source; the check valve prevents back flow into the tank during testing.

Note: Field test connection shown is for a pressure relief valve. Field test connections for vacuum and pressure/vacuum relief are also available.



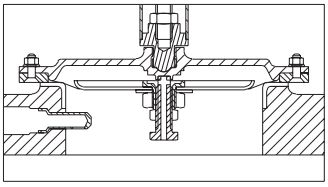
Manual Blowdown

A manually controlled block valve is provided to allow the upper dome pressure to be bled to atmosphere or a process vapor discharge system. If the tank is pressurized, releasing the dome pressure will open the main valve. An electric solenoid valve can be provided for remote blowdown control.



Conical Film Seat

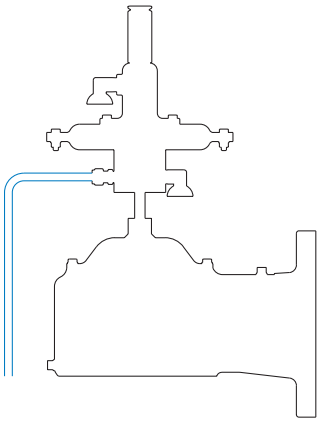
To provide maximum tight shut-off, a patented “Conical Film Seat” is available with Groth Pilot Operated Valves. This unique design will avoid fugitive emissions and will exceed the requirements of “Method 21” in the EPA Regulation, CFR 40, Part 60.



OPTIONS

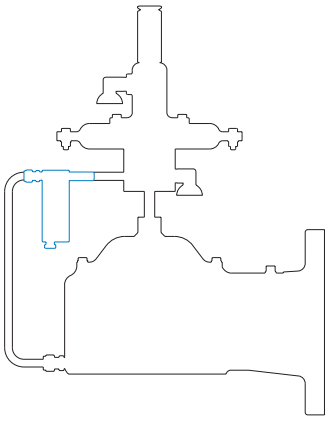
Remote Sense

Normally Pilot Operated Relief Valves have a total pressure pickup in the main valve inlet. For applications where inlet piping losses are significant, a remote sense connection will assure that the main valve will open fully at the specified pressure regardless of inlet piping pressure loss. Note that the valve sizing must take into account the reduced flow because of the inlet pressure drop. Remote sense is recommended for applications that have entrained particulates. (Tubing/Fittings provided by others.)



Pilot Supply Filter

An auxiliary filter for the pilot supply line is recommended for services with an unusual amount of foreign particulates. The standard filter is equipped with a 35 micron stainless steel screen that can be easily cleaned.



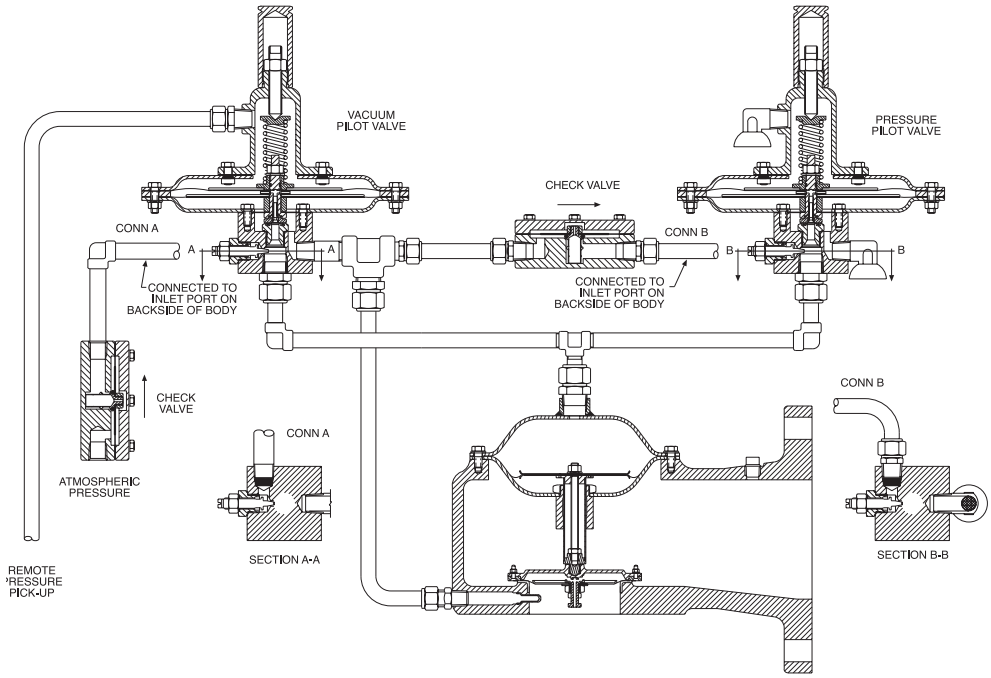
Model 1900 Check Valve

The 1900 Check Valve can also be used in non-relief valve applications such as for corrosive service or low cracking pressure.

- 316 SS Body, Cover and Fasteners
- 0.25" WC Cracking Pressure
- Teflon® FEP [1] film & Viton® or Kalrez® O-Ring
- 1/4" NPT(F) Connections (straight through body)

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

Model 1663A Dual Pilot Operated Pressure and Vacuum Relief Valve



The Model 1663A will be required for pilot operated pressure and vacuum relief when the vacuum setting is greater than the direct actuated vacuum setting of the Model 1661. Minimum vacuum setting for Model 1663A is 3" W.C. and rated capacity is achieved at 10% over-pressure.

Dual pilot valves allow a single relief valve to provide independent settings for pressure and vacuum. Two Groth Model 1900 Check Valves provide isolation of the pressure and vacuum functions. The valve is closed within the set pressure range specified and opens above the positive pressure setting and below the vacuum setting. Backflow prevention protection is not available if the discharge header pressure exceeds tank pressure.

Model 1660A Series Cryogenic Services

- Tested and proven reliable below minus 300° F.
- Snap action at lowest temperatures.
- Tight shut-off with patented conical film seat
- No freeze-up for safe operation.
- All Teflon®[1] diaphragms

The Groth Series 1660A pilot operated valves are designed to provide the safest and most reliable operation for Cryogenic service. With the incorporation of a Teflon® FEP[1] diaphragm and aluminum or 316 SS seat materials, the low temperature does not effect valve operation or valve seat tightness. Tight shut-off and dependable service is assured.

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

OPTIONS

Model 1402 Low Set Pilot Operated Relief Valve

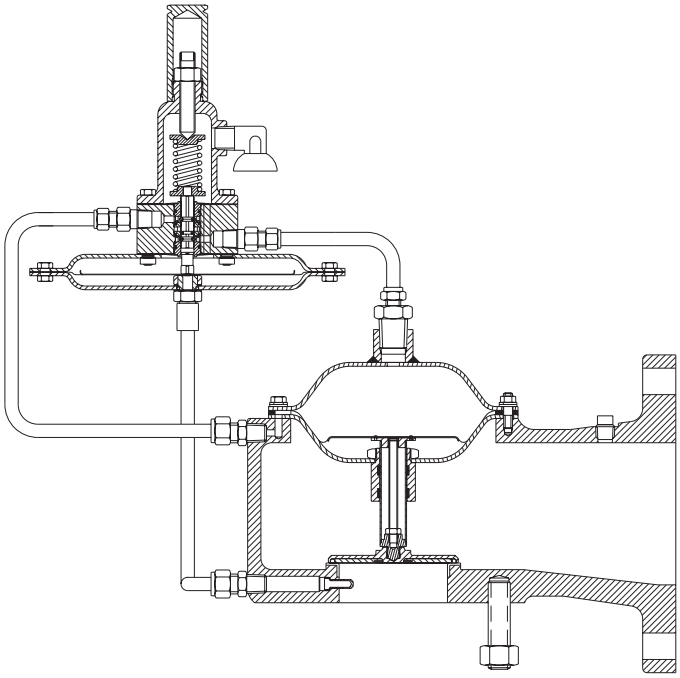
The Model 1402 Pilot Valve lowers the effective pressure range of all Groth Pilot Operated Valves to 2.0" WC (depending on valve model, size and materials of construction).

The Model 1402 pilot valve functions as a 4-way valve and the main valve is supplied with a double acting actuator. Below set pressure, the pilot uses tank pressure to pressurize the upper chamber of the actuator and vents the lower chamber. At set pressure, the pilot exhausts the upper chamber and pressurizes the lower chamber, applying sufficient upward force to overcome the weight of the valve stem assembly.

The action is modulating and non-flowing (the pilot only emits vapors while the main valve actuator is being exhausted).

The pilot valve pressure setting is adjustable throughout the range of 2.0" to 8.0" WC. It is used for pressure relief only and is available with all applicable materials and options shown on pages 608-610.

**Patent Protected*



TECHNICAL DATA

MATERIAL OPTION	ALUMINUM	CARBON STEEL	STAINLESS STEEL
Sizes	2" - 12"	2" - 12"	2" - 12"
Pressure Settings	*2" WC to 15 PSIG 5.0 mb to 1.0 BarG	**2" WC to 15 PSIG 5.0 mb to 1.0 BarG	**2" WC to 15 PSIG 5.0 mb to 1.0 BarG
Vacuum Settings	***3" WC to 12 PSIG 7.5 mb to 0.83 BarG	***3" WC to 12 PSIG 7.5 mb to 0.83 BarG	***3" WC to 12 PSIG 7.5 mb to 0.83 BarG
Temperature Limits	-323°F to 300°F -197°C to 150°C	-20°F to 300°F -29°C to 150°C	-323°F to 300°F -197°C to 150°C

* Model 1402 pilot required for settings less than 3" WC [7.5 mb].
** Model 1402 pilot required for settings less than 7" WC [17.2 mb].
*** Direct acting vacuum [Model 1661A] achieves rated capacity at 3.5" WC (8.6 mb)

CAPACITY

Model 1660A, 1661A, 1663A Pilot Operated Valve Pressure Relief Capacity

Set Pressure (P_S)		Air Flow Capacity at 10% Over-pressure 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2”	3”	4”	6”	8”	10”	12”
2.00	1.16	5.46	12.0	20.9	46.8	81.9	129	185
4.00	2.31	7.73	17.1	29.5	66.3	116	182	262
6.00	3.47	9.48	20.9	36.2	81.3	142	223	322
8.00	4.62	11.0	24.2	41.9	94.0	165	258	372
10.00	5.78	12.3	27.1	46.9	105	184	289	417
15.00	8.66	15.1	33.3	57.7	129	227	356	512
20.00	11.6	17.5	38.6	66.8	150	262	412	594
25.00	14.4	19.6	43.3	75.0	168	294	462	666
PSIG								
1		20.7	45.7	79.0	177	311	488	702
2		29.8	65.8	114	255	447	702	1011
3		37.1	81.9	142	318	557	875	1260
4		43.6	96.1	166	373	654	1027	1478
5		49.4	109	189	424	742	1165	1677
6		54.9	121	210	471	824	1294	1863
8		65.1	144	248	557	976	1533	2207
10		74.4	164	284	638	1117	1754	2525
12		83.2	184	318	713	1249	1961	2825
14		91.6	202	350	785	1375	2159	3109
15		95.7	211	366	820	1436	2255	3247

Model 1662A, 1663A Pilot Operated Valve Vacuum Relief Capacity

Set Vacuum (P_S)		Air Flow Capacity at 10% Over-vacuum 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2”	3”	4”	6”	8”	10”	12”
3.00	1.73	6.66	14.7	25.5	57.1	100	157	226
4.00	2.31	7.69	17.0	29.4	65.9	115	181	261
6.00	3.47	9.41	20.8	35.9	80.6	141	222	319
8.00	4.62	10.8	23.9	41.4	93.0	163	256	368
10.00	5.78	12.1	26.7	46.3	104	182	285	411
12.00	6.93	13.3	29.2	50.6	114	199	312	450
16.00	9.27	15.3	33.7	58.3	131	229	360	518
20.00	11.6	17.0	37.6	65.0	146	255	401	578
25.00	14.4	19.0	41.9	72.5	163	285	447	644
PSIG								
1		19.9	44.0	76.1	171	299	470	676
2		27.7	61.0	106	237	415	652	938
3		33.2	73.2	127	284	498	781	1125
4		37.4	82.5	143	320	561	881	1268
5		40.7	89.8	155	349	610	959	1380
6		43.2	95.3	165	370	648	1018	1466
7		45.0	99.3	172	386	675	1060	1527

Model 1661A Direct Actuated Valve Vacuum Relief Capacity

Air Flow Capacity at 3.5” WC (2 oz/in^2) vacuum 1000 Standard Cubic Feet per Hour at 60° F						
2”	3”	4”	6”	8”	10”	12”
6.82	15.1	26.1	58.5	102	161	232

Actual setting depends on size, material and pallet type and varies from 1.0 - 2.0” WC

CAPACITY

Model 1660A, 1661A, 1663A Pilot Operated Valve Pressure Relief Capacity

Set Pressure (P_S)		Air Flow Capacity at 10% Over-pressure 1000 Normal Cubic Meters per Hour at 0° C						
mm WC	mb	2”	3”	4”	6”	8”	10”	12”
50	4.90	0.16	0.35	0.60	1.34	2.35	3.69	5.31
100	9.80	0.22	0.49	0.85	1.90	3.33	5.22	7.52
150	14.7	0.27	0.60	1.04	2.33	4.08	6.41	9.23
200	19.6	0.31	0.69	1.20	2.69	4.72	7.41	10.7
300	29.4	0.42	0.93	1.61	3.62	6.34	9.95	14.3
400	39.2	0.46	1.02	1.76	3.95	6.93	10.9	15.7
500	49.0	0.50	1.11	1.92	4.30	7.52	11.8	17.0
600	58.8	0.54	1.19	2.06	4.63	8.10	12.7	18.3
Bar g								
0.07		0.61	1.35	2.34	5.24	9.18	14.4	20.8
0.10		0.63	1.39	2.40	5.39	9.44	14.8	21.4
0.20		1.05	2.31	3.99	8.96	15.7	24.6	35.5
0.30		1.38	3.04	5.27	11.8	20.7	32.5	46.8
0.40		1.67	3.68	6.38	14.3	25.1	39.4	56.7
0.50		1.93	4.26	7.38	16.6	29.0	45.5	65.6
0.60		2.06	4.55	7.87	17.7	30.9	48.6	69.9
0.70		2.20	4.85	8.40	18.8	33.0	51.8	74.6
0.80		2.34	5.17	8.95	20.1	35.2	55.2	79.5
0.90		2.49	5.49	9.50	21.3	37.3	58.6	84.4
1.00		2.69	5.94	10.3	23.1	40.4	63.5	91.4

Model 1662A, 1663A Pilot Operated Valve Vacuum Relief Capacity

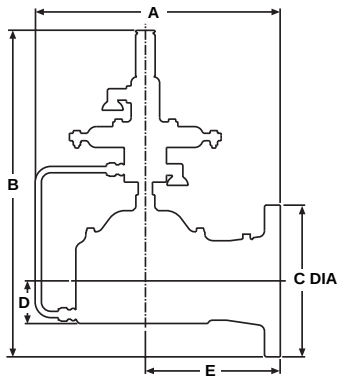
Set Vacuum (P_S)		Air Flow Capacity at 10% Over-vacuum 1000 Normal Cubic Meters per Hour at 0° C						
mm WC	mb	2”	3”	4”	6”	8”	10”	12”
75	7.35	0.19	0.42	0.74	1.65	2.89	4.54	6.53
100	9.80	0.22	0.49	0.85	1.90	3.33	5.24	7.54
150	14.70	0.27	0.60	1.04	2.33	4.08	6.40	9.22
200	19.6	0.31	0.69	1.20	2.69	4.70	7.39	10.6
250	24.5	0.35	0.77	1.34	3.00	5.25	8.25	11.9
300	29.4	0.38	0.84	1.46	3.28	5.75	9.02	13.0
400	39.2	0.44	0.97	1.68	3.78	6.62	10.4	15.0
500	49.0	0.49	1.09	1.88	4.21	7.38	11.6	16.7
600	58.8	0.54	1.19	2.05	4.61	8.07	12.7	18.2
Bar g								
0.07		0.58	1.29	2.23	5.01	8.77	13.8	19.8
0.10		0.69	1.53	2.65	5.94	10.4	16.3	23.5
0.15		0.84	1.85	3.20	7.17	12.6	19.7	28.4
0.20		0.95	2.10	3.63	8.15	14.3	22.4	32.3
0.30		1.12	2.48	4.30	9.64	16.9	26.5	38.2
0.40		1.24	2.75	4.75	10.7	18.7	29.3	42.2
0.50		1.32	2.91	5.04	11.3	19.8	31.1	44.8

Model 1661A Direct Actuated Valve Vacuum Relief Capacity

Air Flow Capacity at 50 mm WC (5.0 mb) vacuum 1000 Normal Cubic Meters per Hour at 0° C						
2”	3”	4”	6”	8”	10”	12”
0.20	0.44	0.76	1.70	2.98	4.68	6.75

Actual setting depends on size, material and pallet type and varies from 1.0 - 2.0” WC

SPECIFICATIONS



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

SIZE INLET	SIZE OUTLET	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	APPROX. SHIP WT. (Aluminum) Lbs (kg)
2” (50 mm)	3” (80 mm)	11.75" (298)	19.75" (502)	7.50" (190)	2.75" (70)	6.00" (152)	30 (14)
3” (80 mm)	4” (100 mm)	14.75" (375)	21.50" (546)	9.00" (229)	2.53" (64)	8.00" (203)	45 (20)
4” (100 mm)	6” (150 mm)	18.00" (457)	21.75" (552)	11.00" (279)	4.00" (102)	10.00" (254)	56 (25)
6” (150 mm)	8” (200 mm)	21.25" (540)	26.00" (660)	13.50" (343)	4.32" (110)	12.00" (305)	80 (36)
8” (200 mm)	10” (250 mm)	25.50" (648)	28.00" (711)	16.00" (406)	5.31" (135)	14.00" (356)	130 (59)
10” (250 mm)	12” (300 mm)	31.75" (806)	31.50" (800)	19.00" (483)	6.65" (169)	18.00" (457)	170 (77)
12” (300 mm)	16” (400 mm)	36.50" (927)	35.00" (889)	23.50" (597)	8.00" (203)	20.10" (510)	230 (104)

HOW TO ORDER

For easy ordering, select proper model numbers

MODEL # ☐☐☐☐ **SIZE** ☐☐ **MATERIAL** ☐ **SOFT GOODS** (see notes 1-4) ☐ **TYPE** ☐☐ **OPTIONS** ☐☐☐☐

- **MODEL #**: 1660A, 1661A, 1662A, 1663A
- **SIZE**: 02 = 2”, 03 = 3”, 04 = 4”, 06 = 6”, 08 = 8”, 10 = 10”, 12 = 12”
- **MATERIAL** (Main Valve): 1 = Alum, 3 = C. Steel, 5 = S.S.
- **SOFT GOODS**: B = Buna-N, E = EPR, V = Viton®, K = Kalrez®, Z = Special
- **TYPE**: M = Modulating, S = SnapAction; Seat: R = “O” Ring (see note 4), F = Film Seat (see note 5)
- **OPTIONS**:
  - O = No Special Options, Z = Special Options
  - O = No Blowdown or Remote Sense, B = Manual Blowdown, R = Remote Sense, 2 = Both Blowdown and Remote Sense
  - O = No Pilot to Hdr or Test Connection, H = Pilot Exhaust Piped to Dischg Header, T = Field Test Connection, 2 = Both Pilot to Hdr & Test Connection
  - O = No Filter or Low Set 1402 Pilot, F = Pilot Supply Filter, L = Low Set 1402 Pilot, 2 = Both Filter and Low Set 1402 Pilot

NOTES

1. Refer to BOM on pages 606 and 608.
2. Diaphragm material for main valve (actuator and film seat) and Pilot Valve are only available in Teflon® FEP [1].
3. 300 Series Pilot is standard (see page 608).
4. O-ring material is specified by soft goods selection; PTFE is not available.
5. FEP Film only; Kalrez O-rings in Pilot Valve (see page 605-8).

EXAMPLE

1660A — 06 — 3 — V — RS — OORO

Indicates a 6” Model 1660A (pressure relief only) with carbon steel body and “O-Ring” seat using Viton® soft goods with snap action pilot with remote pilot sense connection and no specials.

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

GROTH CORPORATION
a Continental Disc Company

PILOT OPERATED VALVES

SERIES 1400

Patent Protected

Pilot operated valves are used to replace weight loaded or spring loaded valves in many applications to increase efficiency and reduce evaporation losses. Several advantages are obtained over the traditional type. For example, the process pressures may be closer to the set pressure than would be considered prudent and safe with the traditional valve. Additionally, greater conservation is obtained due to minimum product loss which in turn provides increased profits.

The Groth 1400 Series valves provide safe, dependable and accurate low pressure and/or vacuum protection. Full flow is attained at no more than 10% over-pressure. This reduces the need for a large over-pressure and saves product, which translates into profit. Blowdown may be adjusted to requirements between 0 and 10% of set pressure. The Models 1400 and 1420 incorporate a vacuum breaker.

GROTH, THE CAPABILITY COMPANY

Groth manufactures a complete line of tank protection equipment and is the number one company in this field. As with all Groth products, every 1400 Series valve is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.

Model 1400

Model 1420

Model 1430

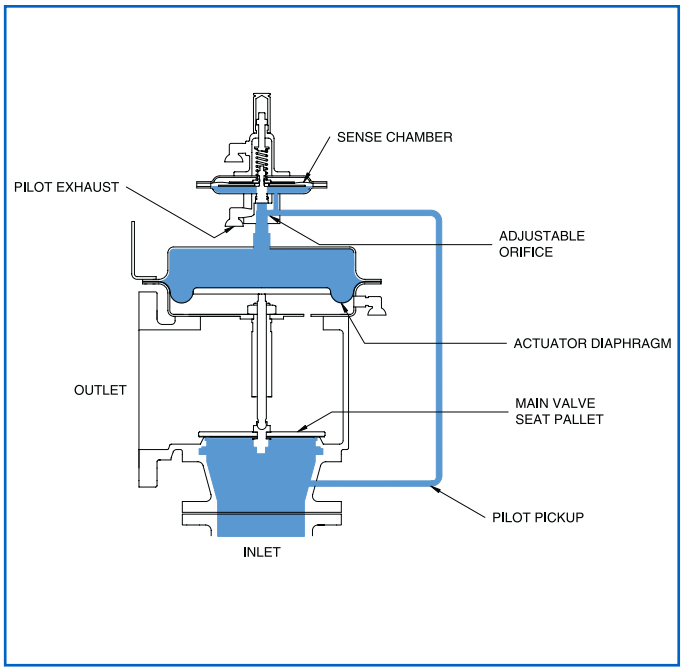
Model 1460

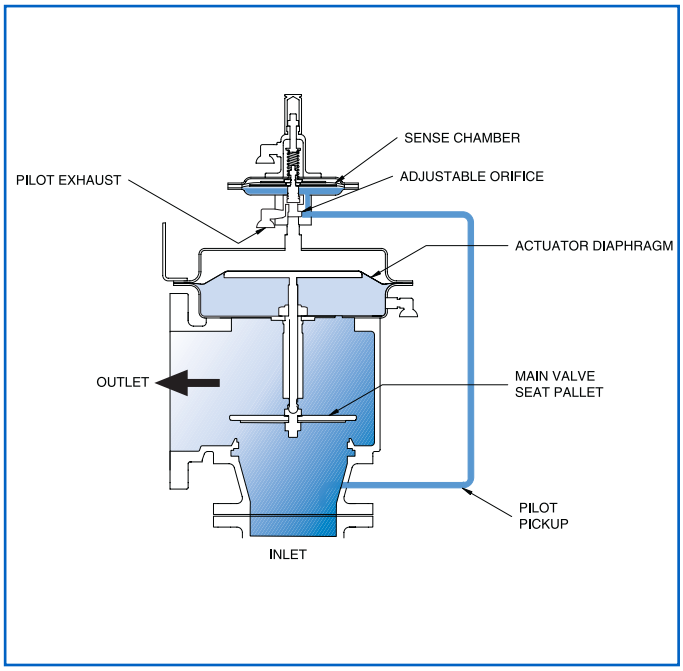
FEATURES AND BENEFITS

MODEL 1400 SERIES
Pilot operated valves for atmospheric and low pressure storage tanks

FEATURES	BENEFITS
PILOT OPERATED	• Ease of precision settings. • Only the pilot needs to be set. • Lower profile and weight than spring operated models for high settings. • Remote pilot sensing option allows the pilot to sense the true system pressure. • Remote or manual blowdown available.
EXTRA TIGHT SEAL	• Main valve remains tight to set pressure.
FULL FLOW	• Full open at less than 10% overpressure.
SNAP ACTION OR MODULATING ACTION	• Modulating action conserves product since valve opening is proportional to overpressure. • Noise is reduced since the valve only opens fully when required.
SOFT SEATED	• Soft seats seal tight to conserve product and minimize valve wear which improves reliability.
TOP ENTRY	• Reduces maintenance costs since the valve can be completely serviced without removal from its mounting.
CHOICE OF ALUMINUM, CARBON STEEL, STAINLESS STEEL, OR SPECIAL MATERIALS FOR THE MAIN BODY.	• Wide range of materials to meet most corrosive media and temperature applications at the lowest possible cost.
SIZES 2" THROUGH 12"	• There is a size to meet your relieving capacity requirements without the need of expensive oversizing.
HIGH CAPACITY DESIGN	• Groth pilot operated valves have more capacity for your money.
PRESSURE SETTINGS ♦ 2" W.C. TO 15 PSIG	• Setting range covers all atmospheric and low pressure storage tanks. ♦ Requires 1402 Pilot for minimum settings
VACUUM SETTINGS 1/2 OZ. T0 12 PSI	• Wide setting range to meet your design requirements. • Direct Acting or Pilot Operated Vacuum relief available.

OPERATION





The pilot operated valve is a self-contained system which does not require any external power or pressure source. The pilot valve, using system medium and pressure, automatically controls the actuator pressure to either open or close the main valve depending on the pressure setting of the pilot vs. the actual system pressures.

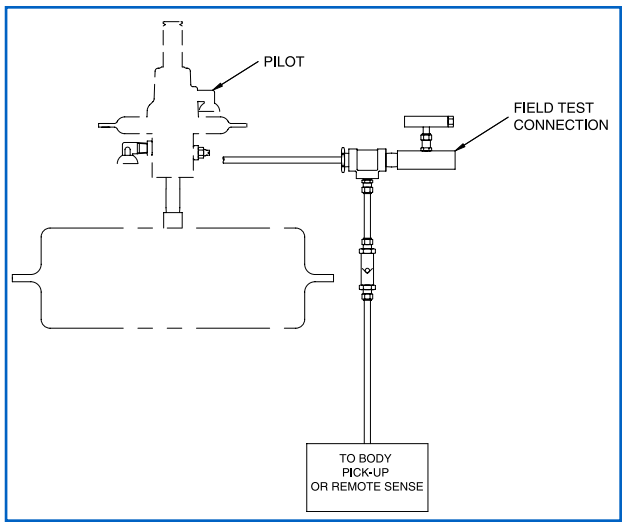
System medium and pressure is sensed at the pickup fitting just above the inlet flange. In the case of remote sensing, the pickup point is directly on the vessel and usually close to the valve inlet. The medium and pressure is then channeled to the pilot inlet and is redistributed to the sense chamber and to the actuator.

Under normal system operating conditions, the same pressure is acting downward against the actuator and upwards against the seat pallet. Since the actuator has a larger area than the seat pallet, the net force is downward which will press the pallet against the seat and thus keep the main valve closed. While the pilot and main valve are closed, there is no bleed to the atmosphere.

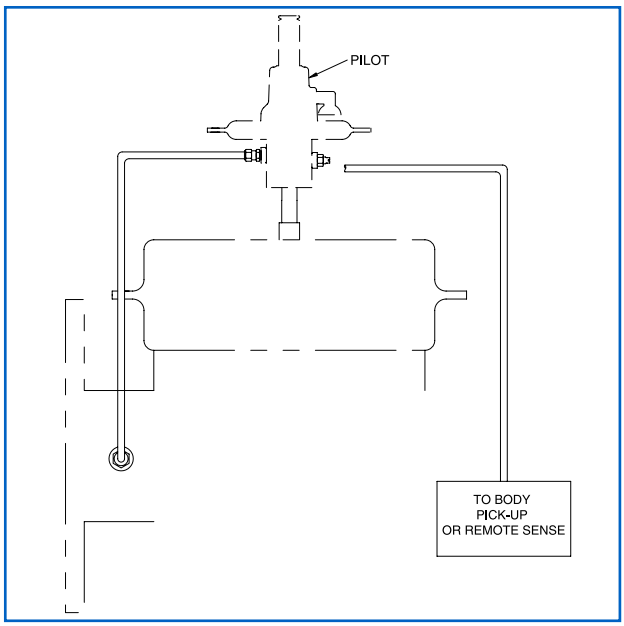
When the system pressure rises to the pilot set point due to an over-pressure condition, the upward force in the pilot sense chamber will overcome the downward spring force to lift the pilot stem. As the stem lifts, it opens the pilot seat to allow flow through the pilot and out to the atmosphere. (In applications where nothing is permitted to discharge directly into the atmosphere, the pilot discharge may be plumbed to the main valve outlet for channeling to a collection header. Notify the vendor if this is the situation in case compensating adjustments need to be made.) The flow through the pilot and adjustable orifice will cause a pressure drop downstream of the orifice which in turn causes the pressure in the actuator to drop. When the actuator pressure decreases to a point where the upward force on the seat pallet is greater than the downward force of the actuator, the main valve will open. The amount the main valve opens depends on the system over-pressure. The greater the over-pressure, the wider the main valve opens, until full open is obtained at approximately 10% over-pressure.

After the excess pressure has been relieved and the system pressure is again below the set point of the pilot, the valve will return to its normal closed position as described in Figure 1.

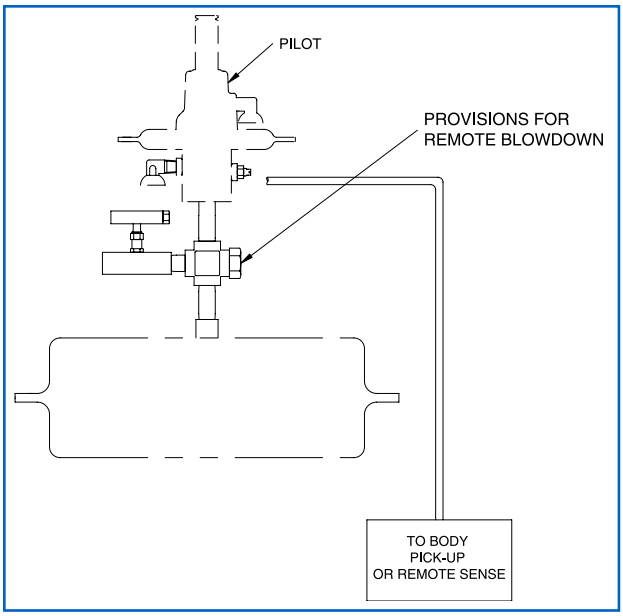
CONFIGURATIONS



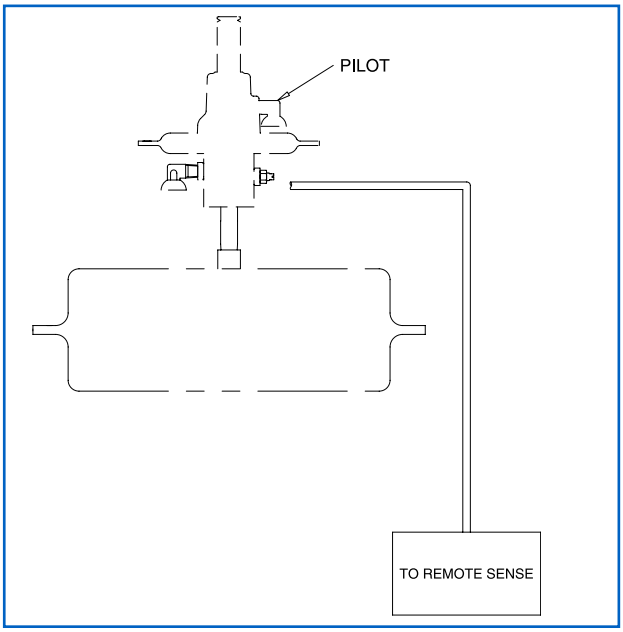
FIELD TEST CONNECTION
(Backflow Prevention Included)



PILOT DISCHARGE TUBED TO MAIN VALVE OUTLET



MANUAL OR REMOTE BLOWDOWN



Remote Pickup for Pilot

MODEL 1900 CHECK VALVE

The 1900 Check Valve can also be used in non-relief valve applications such as for corrosive service or low cracking pressure.

- 316 SS Body, Cover and Fasteners
- 0.25" WC Cracking Pressure
- Teflon®[1] film & Viton® or Kalrez® O-Ring
- 1/4" NPT(F) Connections (straight through body)

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

SIZING TABLES

Tables are provided to allow you to select the proper size valve for your application. It is suggested that API Standard 2000 be utilized to obtain the required flow capacity.

TABLE I
Model 1400/1430
SCFM Air Capacity
@10% Over-pressure
and 60°F

Pressure Setting psig	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
0.07	84.7	200	353	814	1418	2241	3218
0.2	141	333	587	1355	2360	3730	5356
0.4	207	488	860	1985	3457	5464	7847
0.6	259	610	1075	2481	4321	6830	9809
0.8	303	715	1259	2907	5062	8000	11490
1.0	343	808	1423	3286	5722	9040	12989
1.2	379	893	1573	3632	6324	9995	14355
1.4	413	972	1712	3952	6882	10877	15621
1.6	444	1046	1842	4252	7404	11702	16807
1.8	473	1115	1964	4535	7897	12481	17925
2.0	501	1182	2081	4803	8365	13221	18988
3.0	625	1474	2595	5992	10434	16491	23685
4.0	731	1723	3034	7004	12197	19277	27685
5.0	825	1943	3422	7900	13759	21745	31231
6.0	901	2124	3741	8636	15039	23769	34137
7.0	971	2289	4030	9304	16203	25608	36778
8.0	1036	2440	4298	9921	17278	27307	39218
9.0	1096	2582	4547	10497	18280	28891	41494
10.0	1152	2715	4781	11037	19222	30379	43631
11.0	1205	2841	5002	11548	20111	31785	45650
12.0	1256	2960	5212	12033	20955	33119	47566
13.0	1304	3074	5413	12495	21760	34390	49392
14.0	1350	3182	5604	12937	22529	35606	51138
15.0	1395	3286	5787	13360	23266	36772	52812

TABLE II
Model 1420/1460
SCFM Air Capacity
@10% Over-pressure
and 60°F

Pressure Setting psig	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
0.07	76.9	181	320	737	1268	1980	2809
0.2	128	302	532	1227	2111	3296	4675
0.4	184	434	764	1764	3035	4738	6720
0.6	228	537	946	2183	3756	5864	8318
0.8	265	625	1101	2542	4373	6826	9682
1.0	299	704	1239	2861	4922	7683	10898
1.2	329	775	1366	3152	5432	8466	12008
1.4	357	842	1483	3423	5889	9193	13039
1.6	384	904	1593	3677	6325	9875	14006
1.8	409	964	1697	3917	6739	10520	14922
2.0	433	1020	1796	4146	7133	11136	15795
3.0	540	1272	2240	5171	8896	13887	19697
4.0	633	1491	2626	6062	10429	16281	23092
5.0	717	1690	2976	6869	11818	18449	26168
6.0	795	1874	3300	7618	13106	20460	29021
7.0	869	2047	3605	8323	14319	22354	31707
8.0	939	2212	3896	8994	15474	24156	34263
9.0	1006	2371	4175	9638	16581	25885	36715
10.0	1071	2523	4444	10259	17649	27552	39080
11.0	1134	2672	4705	10860	18684	29168	41372
12.0	1195	2816	4958	11363	19535	30473	43189
13.0	1254	2956	5177	11799	20284	31642	44847
14.0	1308	3082	5360	12216	21001	32761	46433
15.0	1351	3183	5535	12616	21689	33834	47953

TABLE III
Vacuum Flow Capacity
Model 1400/1420
SCFM Air Capacity
@100% Over-pressure
and 60°F

Vacuum Setting In. WC	VALVE SIZE						
	2"	3"	4"	6"	8"	10"	12"
0.87	78	172	267	578	1008	1518	2150
1.00	84	183	287	622	1083	1632	2300
1.73	111	242	377	817	1422	2150	3033
2.00	119	260	403	877	1527	2300	3250
3.00	145	317	493	1070	1867	2817	3967
4.00	167	365	568	1233	2150	3233	4567
6.00	203	445	692	1502	2617	3950	5567
8.00	233	510	795	1717	3000	4533	6400
10.00	260	567	883	1917	3333	5033	7117

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

SIZING TABLES

Tables are provided to allow you to select the proper size valve for your application. It is suggested that API Standard 2000 be utilized to obtain the required flow capacity.

TABLE I
Model 1400/1430
NCMM Air Capacity @100% Over-pressure and 0° C

Pressure Setting mbarg	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
5	2.47	5.84	10.3	23.8	41.4	65.4	93.9
10	3.50	8.26	14.6	33.6	58.5	92.5	133
20	5.13	12.1	21.3	49.2	85.7	135	195
30	6.42	15.1	26.7	61.5	107	169	243
40	7.51	17.7	31.2	72.1	126	198	285
50	8.51	20.0	35.3	81.5	142	224	322
100	12.1	28.6	50.4	116	202	320	460
150	15.0	35.3	62.1	143	250	395	567
200	17.4	41.0	72.2	167	290	459	659
250	19.5	46.1	81.2	187	326	516	741
300	21.5	50.8	89.4	206	359	568	816
350	23.7	55.8	98.3	227	395	625	897
400	25.6	60.4	106	246	428	676	971
450	27.4	64.6	114	263	458	723	1039
500	28.8	68.0	120	276	481	761	1093
550	30.2	71.2	125	289	504	796	1143
600	31.5	74.1	131	301	525	829	1191
650	32.7	77.0	136	313	545	861	1237
700	33.8	79.7	140	324	564	891	1280
750	34.9	82.3	145	334	582	920	1322
800	36.0	84.8	149	345	600	948	1362
850	37.0	87.2	153	354	617	975	1401
900	38.0	89.5	158	364	633	1001	1438
1000	39.9	94.1	166	383	666	1053	1512

TABLE II
Model 1420/1460
NCMM Air Capacity @100% Over-pressure and 0° C

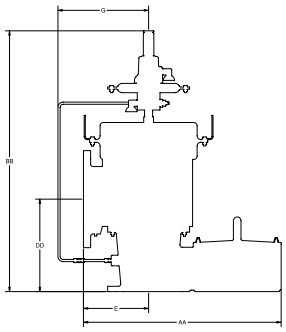
Pressure Setting mbarg	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
5	2.24	5.30	9.33	21.5	37.0	57.8	82.0
10	3.17	7.49	13.2	30.4	52.3	81.7	116
20	4.56	10.8	18.9	43.7	75.3	117	167
30	5.65	13.3	23.5	54.1	93.1	145	206
40	6.57	15.5	27.3	63.0	108	169	240
50	7.41	17.5	30.7	70.9	122	191	270
100	10.5	24.8	43.7	101	174	271	384
150	13.0	30.6	53.8	124	214	334	473
200	15.1	35.4	62.5	144	248	387	549
250	16.9	39.8	70.1	162	279	435	617
300	18.6	43.8	77.1	178	306	478	678
350	20.5	48.2	84.8	196	337	526	746
400	22.2	52.3	92.1	213	366	571	810
450	23.9	56.2	99.0	229	393	614	871
500	25.5	60.0	106	244	420	655	929
550	27.0	63.6	112	259	445	695	986
600	28.5	67.2	118	273	470	734	1041
650	30.0	70.7	124	287	494	771	1094
700	31.4	74.0	130	301	518	808	1147
750	32.8	77.4	136	314	541	845	1198
800	34.2	80.6	142	325	559	873	1237
850	35.6	83.8	147	335	575	897	1272
900	36.8	86.7	151	343	591	921	1306
1000	38.7	91.1	158	361	621	969	1373

TABLE III
Vacuum Flow Capacity Model 1400/1420
NCMM Air Capacity @100% Over-pressure and 0° C

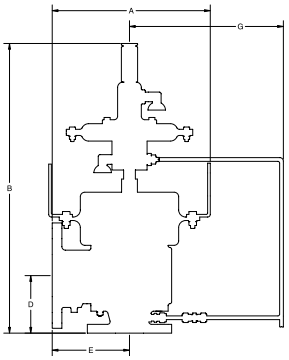
Vacuum Setting mbarg	VALVE SIZE						
	2"	3"	4"	6"	8"	10"	12"
2	2.20	4.80	7.48	16.2	28.3	42.6	60.2
3	2.69	5.88	9.15	19.9	34.6	52.1	73.7
4	3.10	6.77	10.5	22.9	39.9	60.1	84.9
5	3.46	7.57	11.8	25.6	44.6	67.1	94.9
7	4.09	8.93	13.9	30.2	52.6	79.2	112
10	4.87	10.6	16.6	36.0	62.7	94.4	133
15	5.93	13.0	20.2	43.8	76.4	115	163
20	6.81	14.9	23.2	50.3	87.7	132	187
25	7.58	16.6	25.8	55.9	97.5	147	208

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

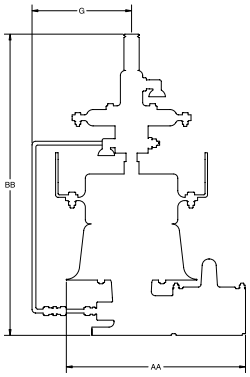
SPECIFICATIONS



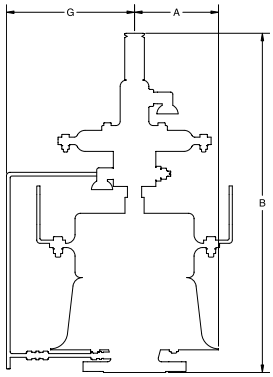
Model 1420



Model 1460



Model 1400



Model 1430

MODELS 1420 and 1460

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

SIZE		STANDARD SETTINGS				A	B	D	E	G	AA	BB	DD	APPROX. SHIP WT. LBS *
		PRESSURE		VACUUM										
INLET	OUT.	MAX.	**MIN.	MAX.	MIN.	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
2" (50 mm)	3" (80 mm)	15 PSIG (1.035 BarG)	7" W.C. (17.5 mb)	12 PSIG (.828 BarG)	0.5 oz/in² (2.16 mb) See TPD3	10½" (267)	23½" (597)	4⅛" (105)	5½" (140)	7" (178)	14½" (368)	26½" (673)	7" (178)	35 (16 KG)
3" (80 mm)	4" (100 mm)					11½" (292)	25½" (648)	5" (127)	6" (152)	7½" (191)	18" (457)	28¾" (730)	8⅛" (206)	40 (18 KG)
4" (100 mm)	6" (150 mm)					12½" (318)	28½" (724)	6½" (165)	6½" (165)	8" (203)	19¼" (489)	31½" (800)	9½" (241)	50 (23 KG)
6" (150 mm)	8" (200 mm)					16¾" (425)	32¼" (819)	8½" (216)	8½" (216)	10¼" (260)	26½" (673)	36½" (927)	12¾" (324)	70 (32 KG)
8" (200 mm)	10" (250 mm)					20½" (521)	36¾" (933)	9¾" (248)	10¾" (273)	11¾" (298)	32½" (826)	42¼" (1073)	15¼" (387)	90 (41 KG)
10" (250 mm)	12" (300 mm)					20¼" (616)	38¾" (984)	10¼" (260)	12½" (318)	13¾" (349)	37¾" (959)	46½" (1181)	18" (457)	125 (57 KG)
12" (300 mm)	14" (350 mm)					27¾" (705)	42¾" (1086)	11" (279)	15" (381)	14¾" (375)	42¾" (1086)	52½" (1334)	20⅝" (524)	150 (69 KG)

*Approximate weight of aluminum Model 1420. **2" WC minimum set with 1402 Pilot (see 1660 Brochure).

MODELS 1400 and 1430

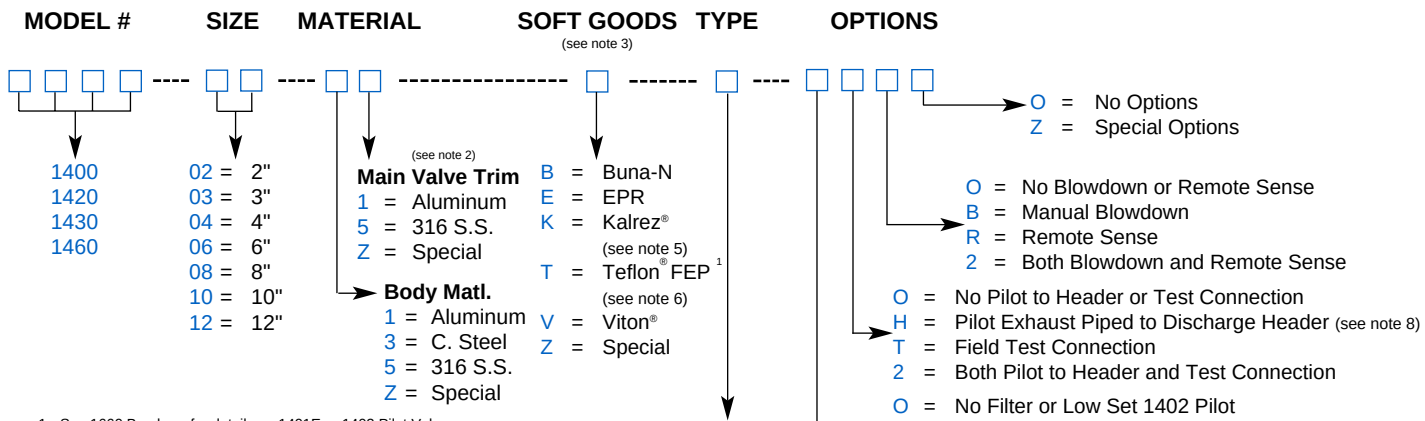
Specifications subject to change without notice. Certified dimensions available on request.

SIZE	STANDARD SETTINGS				A	B	G	AA	BB	APPROX. SHIP WT. LBS *
	PRESSURE		VACUUM							
	MAX.	**MIN.	MAX.	MIN.	(METRIC)	(METRIC)	(METRIC)	(METRIC)	(METRIC)	
2" (50 mm)	15 PSIG (1.035 BarG)	7" W.C. (17.5 mb)	12 PSIG (.828 BarG)	0.5 oz/in² (2.16 mb) See TPD3	4¾" (121)	25½" (648)	7" (178)	13½" (178)	27½" (699)	30 (14 KG)
3" (80 mm)					5¾" (146)	26½" (673)	7¾" (197)	17¾" (451)	29" (737)	35 (16 KG)
4" (100 mm)					6½" (165)	27½" (699)	8½" (216)	19½" (495)	30¼" (768)	40 (18 KG)
6" (150 mm)					8½" (216)	29½" (749)	10½" (267)	26½" (673)	34" (864)	50 (23 KG)
8" (200 mm)					9¾" (248)	32½" (826)	11¾" (298)	31½" (800)	40" (1016)	65 (30 KG)
10" (250 mm)					11¾" (298)	34½" (876)	13¾" (349)	37" (940)	43¾" (1111)	95 (43 KG)
12" (300 mm)					12¾" (324)	36½" (927)	14¾" (375)	40½" (1029)	48" (1219)	125 (57 KG)

*Approximate weight of aluminum Model 1400. **2" WC minimum set with 1402 Pilot (see 1660 Brochure).

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

1. See 1660 Brochure for details on 1401E or 1402 Pilot Valves.
2. Carbon and Stainless Steel Valves include 316 SS Trim.
3. Diaphragm material for main actuator and pilot valve are only available in Teflon® FEP[1].
4. 300 Series Pilot is standard; see 1660 Brochure for pilot valve details.
5. Kalrez O-rings; Teflon® FEP[1] Diaphragms and Gaskets.
6. Teflon® FEP[1] Diaphragms and Gaskets with Viton® O-rings.
7. 1402 pilot valve available for modulating service only.
8. Pilot Exhaust Piped to Discharge Header is not available w/1402 pilot valve. Pilot will only exhaust vapors in the dome.

EXAMPLE

1 4 3 0 — 0 6 — 3 5 — V — S — 0 0 R 0 0

Indicates a 6" Model 1430 with carbon steel body and 316 SS trim using viton soft goods, snap action with remote pilot pickup and no options.

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

GROTH CORPORATION
a Continental Disc Company

PILOT OPERATED VALVES
Series 1500

Model 1500
Air Operated
Pressure / Vacuum Relief Valves
Relief to atmosphere design

Model 1530
Air Operated Pressure Relief Valve
Relief to atmosphere design

Model 1520
Air Operated
Pressure / Vacuum Relief Valves
Pipe-away design

Model 1560
Air Operated
Pressure Relief Valves
Pipe-away design

- **Severe service application**
- **Premium tight seal**
- **Snap Acting**
- **Instrument air operated**

FEATURES AND BENEFITS

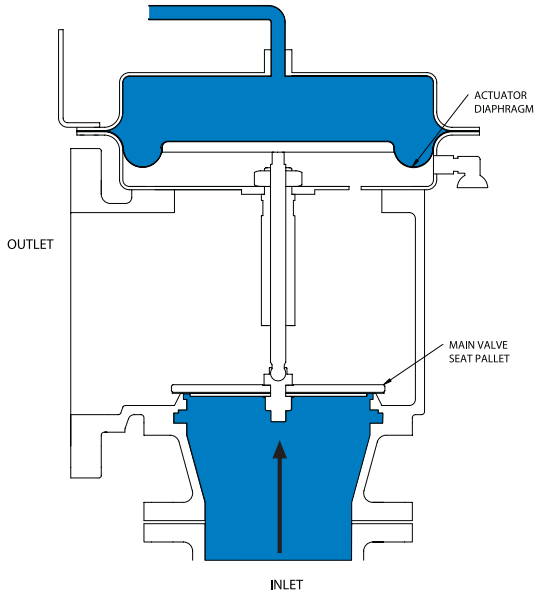
SERIES 1500
Air operated valves for atmospheric and low pressure storage tanks

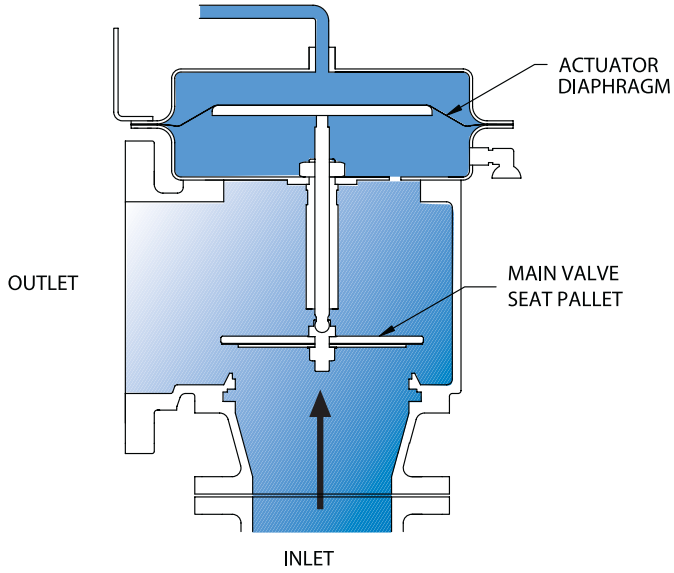
FEATURES	BENEFITS
AIR OPERATED	• Use instrument air or N_2 • Non-corrosive and non-pluggng • Lower profile and weight than spring operated models for high settings. • Remote pilot sensing from pressure switch. • Remote or manual blowdown available.
EXTRA TIGHT SEAL	• Main valve remains tight to set pressure.
FULL FLOW	• Full open at set point
SNAP ACTION	• Snap acting for immediate efficiency
SOFT SEATED	• Soft seats seal tight to conserve product and minimize valve wear which improves reliability.
TOP ENTRY	• Reduces maintenance costs since the valve can be completely serviced without removal from its mounting.
CHOICE OF Aluminum, Carbon Steel, Fiberglass (FRP), or special materials for the main body.	• Wide range of materials to meet most corrosive media and temperature applications at the lowest possible cost.
SIZES 2" THROUGH 12"	• There is a size to meet your relieving capacity requirements without the need of expensive oversizing.
HIGH CAPACITY DESIGN	• Groth air pilot operated valves have higher capacity, size for size, than most other relief valves. You get more capacity for your money.
PRESSURE SETTINGS 5" W.C. TO 15 PSIG	• Setting range covers all atmospheric and low pressure storage tanks.
VACUUM SETTINGS 1/2 OZ. T0 12 PSI (Model 1500 and 1520 ONLY)	• Wide setting range to meet your design requirements. • Weight or spring loaded valve.

Air operated valves are used to replace weight loaded, spring loaded and pilot operated valves in severe application where polymerization and crystallization may take place and plug as well as corrode the control orifices. The air operated valve increases valve efficiency and reduces evaporation losses. the pressure switch coupled with a solenoid valve and using plant instrument air instead of corrosive product vapor provides a bubble tight seal in the valve. additionally, the use of clean air greatly reduces maintenance time when compared with the pilot operated valve. By using the air operated valve, remote sensing is provided by the pressure switch. This valve provides greater conservation due to minimum product loss which in turn add to the profits at the bottom line.

The Groth 1500 Series group provides safe, dependable and accurate low pressure and/or vacuum on your storage tank. a range of pressure and vacuum requirements may be easily set. full flow is obtainable at set point and the snap acting feature provides immediate efficiency. This reduces the requirement for large overpressure and saves product, translating into profit. the standard valve may incorporate a vacuum breaker when desired.

OPERATION





The 1500 Series air operated valve is available in five basic models: the 1500, 1520, 1530, 1560 and 1580. the 1500 and 1520 are combination pressure/vacuum valves. The 1500 discharges to the atmosphere and 1520 has an outlet flange for pipe-away applications. The 1530 is a pressure only valve that discharges to atmosphere. The 1560 may be used for pressure or vacuum for pipe-away applications. All valves are held in the closed position by low pressure plant air. When the air pressure is removed the valve is forced open by the process pressure or vacuum. Full open position is achieved as low as 5" WC pressure or vacuum in some cases.

The system is composed of the air operated valve, a pressure switch and a three-way solenoid valve. The pressure switch is attached to the tank or vessel and connected to the solenoid valve which controls the instrument air or N_2 line. This is the normal configuration but if desired or necessary more than one switch or solenoid valve may be used. Placement on the tank for the pressure switch and placement of the solenoid valve may be located to meet your requirements.

The pressure switch is adjusted to the desired valve set point. when the pressure in the tank reaches the set point a signal is sent to the solenoid valve which is de-energized and the plant air is cut off and exhausted. This releases the pressure on the valve actuator allowing the main valve seat pallet to move up thereby venting the tank.

In a similar manner the reverse takes place when the set point pressure is reached when the valve is open. the pressure switch energizes the solenoid valve which is then energized to open. This opening permits the line to open and plant instrument air enters the actuator forcing the main valve seat pallet to move down closing the valve which eliminates the tank vapor flow.

SIZING TABLES

Tables are provided to allow you to select the proper size valve for your application. It is suggested that API Standard 2000 be utilized to obtain the required flow capacity.

TABLE I
Model 1500/1530
SCFM Air Capacity
@10% Over-pressure
and 60°F

Pressure Setting psig	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
0.2	141	333	587	1355	2360	3730	5356
0.4	207	488	860	1985	3457	5464	7847
0.6	259	610	1075	2481	4321	6830	9809
0.8	303	715	1259	2907	5062	8000	11490
1.0	343	808	1423	3286	5722	9040	12989
1.2	379	893	1573	3632	6324	9995	14355
1.4	413	972	1712	3952	6882	10877	15621
1.6	444	1046	1842	4252	7404	11702	16807
1.8	473	1115	1964	4535	7897	12481	17925
2.0	501	1182	2081	4803	8365	13221	18988
3.0	625	1474	2595	5992	10434	16491	23685
4.0	731	1723	3034	7004	12197	19277	27685
5.0	825	1943	3422	7900	13759	21745	31231
6.0	901	2124	3741	8636	15039	23769	34137
7.0	971	2289	4030	9304	16203	25608	36778
8.0	1036	2440	4298	9921	17278	27307	39218
9.0	1096	2582	4547	10497	18280	28891	41494
10.0	1152	2715	4781	11037	19222	30379	43631
11.0	1205	2841	5002	11548	20111	31785	45650
12.0	1256	2960	5212	12033	20955	33119	47566
13.0	1304	3074	5413	12495	21760	34390	49392
14.0	1350	3182	5604	12937	22529	35606	51138
15.0	1395	3286	5787	13360	23266	36772	52812

TABLE II
Model 1520/1560
SCFM Air Capacity
@10% Over-pressure
and 60°F

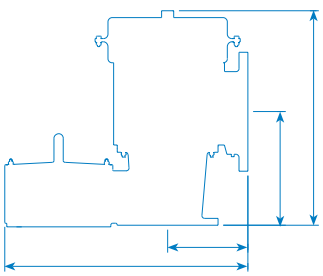
Pressure Setting psig	VALVE SIZE (ORIFICE SIZE)						
	2" (2.976 in²)	3" (7.013 in²)	4" (12.35 in²)	6" (28.51 in²)	8" (49.65 in²)	10" (78.47 in²)	12" (112.7 in²)
0.2	128	302	532	1227	2111	3296	4675
0.4	184	434	764	1764	3035	4738	6720
0.6	228	537	946	2183	3756	5864	8318
0.8	265	625	1101	2542	4373	6826	9682
1.0	299	704	1239	2861	4922	7683	10898
1.2	329	775	1366	3152	5432	8466	12008
1.4	357	842	1483	3423	5889	9193	13039
1.6	384	904	1593	3677	6325	9875	14006
1.8	409	964	1697	3917	6739	10520	14922
2.0	433	1020	1796	4146	7133	11136	15795
3.0	540	1272	2240	5171	8896	13887	19697
4.0	633	1491	2626	6062	10429	16281	23092
5.0	717	1690	2976	6869	11818	18449	26168
6.0	795	1874	3300	7618	13106	20460	29021
7.0	869	2047	3605	8323	14319	22354	31707
8.0	939	2212	3896	8994	15474	24156	34263
9.0	1006	2371	4175	9638	16581	25885	36715
10.0	1071	2523	4444	10259	17649	27552	39080
11.0	1134	2672	4705	10860	18684	29168	41372
12.0	1195	2816	4958	11363	19535	30473	43189
13.0	1254	2956	5177	11799	20284	31642	44847
14.0	1308	3082	5360	12216	21001	32761	46433
15.0	1351	3183	5535	12616	21689	33834	47953

TABLE III
Vacuum Flow Capacity
Model 1500/1520
SCFM Air Capacity
@100% Over-pressure
and 60°F

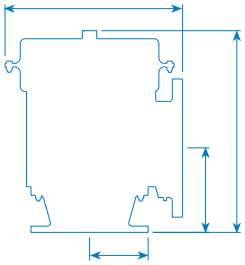
Vacuum Setting In. WC	VALVE SIZE						
	2"	3"	4"	6"	8"	10"	12"
0.87	78	172	267	578	1008	1518	2150
1.00	84	183	287	622	1083	1632	2300
1.73	111	242	377	817	1422	2150	3033
2.00	119	260	403	877	1527	2300	3250
3.00	145	317	493	1070	1867	2817	3967
4.00	167	365	568	1233	2150	3233	4567
6.00	203	445	692	1502	2617	3950	5567
8.00	233	510	795	1717	3000	4533	6400
10.00	260	567	883	1917	3333	5033	7117

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

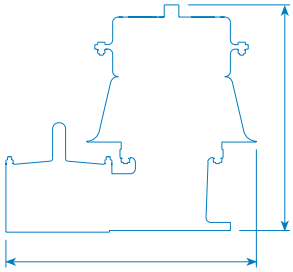
SPECIFICATIONS



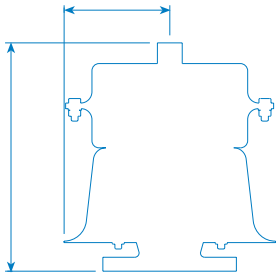
Model 1520



Model 1560



Model 1500



Model 1530

MODELS 1520 and 1560

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

SIZE		STANDARD SETTINGS				A	B	D	E	AA	BB	DD	APPROX. SHIP WT. LBS *
		PRESSURE		VACUUM									
INLET	OUT.	MAX.	MIN.	MAX.	MIN.	(metric)	(metric)	(metric)	(metric)	(mm)	(mm)	(mm)	
2" (51 mm)	3" (76 mm)	15 PSIG (1.05 kg/cm²)	3 oz/in² (13.2 gm/cm²)	10 oz/in² (43.9 gm/cm²)	1/2 oz/in² (2.2 gm/cm²)	11 1/2 " (292)	14 1/2 " (368)	4 1/8 " (105)	5 1/2 " (140)	14 1/2 " (368)	17 1/2 " (673)	7" (178)	35 (13.75 kg)
3" (76 mm)	4" (102 mm)			12 oz/in² (52.7 gm/cm²)		12 1/2 " (318)	16 1/2 " (420)	5" (127)	6" (152)	18" (457)	19 3/4 " (502)	8 1/8 " (206)	35 (15.75 kg)
4" (102 mm)	6" (152 mm)			12 oz/in² (52.7 gm/cm²)		13 3/8 " (340)	19 1/2 " (496)	6 1/2 " (165)	6 1/2 " (165)	19 1/4 " (489)	22 1/2 " (572)	9 1/2 " (241)	45 (20.75 kg)
6" (152 mm)	8" (203 mm)			14 oz/in² (61.5 gm/cm²)		17 3/4 " (451)	23 1/4 " (591)	8 1/2 " (216)	8 1/2 " (216)	26 1/2 " (673)	27 1/2 " (699)	12 3/4 " (324)	65 (29.75 kg)
8" (203 mm)	10" (254 mm)			16 oz/in² (70.3 gm/cm²)		21 1/2 " (546)	27 3/4 " (705)	9 3/4 " (248)	10 3/4 " (273)	32 1/2 " (826)	33 1/4 " (845)	15 1/4 " (387)	85 (38.75 kg)
10" (254 mm)	12" (305 mm)			16 oz/in² (70.3 gm/cm²)		25 1/4 " (641)	29 3/4 " (756)	10 1/4 " (260)	12 1/2 " (318)	37 3/4 " (959)	37 1/2 " (953)	18" (457)	120 (54.75 kg)
12" (305 mm)	14" (356 mm)			16 oz/in² (70.3 gm/cm²)		28 3/4 " (730)	33 3/4 " (858)	11" (279)	15" (381)	42 3/4 " (1086)	43 1/2 " (1106)	20 5/8 " (524)	145 (66.25 kg)

*Approximate weight of aluminum Model 1520.

MODELS 1500 and 1530

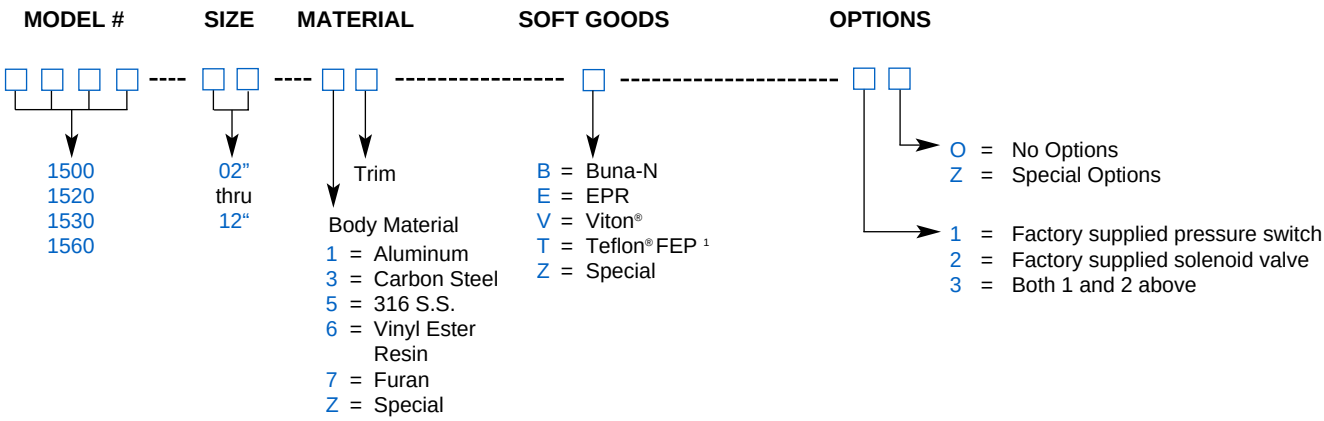
Specifications subject to change without notice. Certified dimensions available on request.

SIZE	STANDARD SETTINGS				A	B	AA	BB	APPROX. SHIP WT. LBS *
	PRESSURE		VACUUM						
	MAX.	MIN.	MAX.	MIN.	(METRIC)	(METRIC)	(METRIC)	(METRIC)	
2" (51 mm)	15 PSIG* (1.05 kg/cm²)	3 oz/in² (17.5 mb)	10 oz/in² (43.9 gm/cm²)	1/2 oz/in² (2.2 gm/cm²) See TPD3	4 3/4 " (121)	16 1/2 " (420)	13 1/2 " (343)	18 1/2 " (471)	25 (11.75 kg)
3" (76 mm)			12 oz/in² (52.7 gm/cm²)		5 3/4 " (146)	17 3/4 " (445)	17 3/4 " (451)	20" (508)	30 (13.75 kg)
4" (102 mm)			12 oz/in² (52.7 gm/cm²)		6 1/2 " (165)	18 1/2 " (471)	19 1/2 " (495)	21 1/4 " (540)	35 (15.75 kg)
6" (152 mm)			14 oz/in² (61.5 gm/cm²)		8 1/2 " (216)	20 1/2 " (521)	26 1/2 " (673)	25" (636)	45 (20.75 kg)
8" (203 mm)			16 oz/in² (70.3 gm/cm²)		9 3/4 " (248)	23 1/2 " (598)	31 1/2 " (800)	31" (788)	60 (27.75 kg)
10" (250 mm)			16 oz/in² (70.3 gm/cm²)		11 3/4 " (298)	25 1/2 " (648)	37" (940)	34 3/4 " (833)	90 (40.75 kg)
12" (254 mm)			16 oz/in² (70.3 gm/cm²)		12 3/4 " (324)	27 1/2 " (699)	40 1/2 " (1029)	39" (991)	120 (54.75 kg)

*Approximate weight of aluminum Model 1500.

HOW TO ORDER

For easy ordering, select proper model numbers



NOTES

1. Aluminum body will include stainless steel and/or aluminum trim.
2. Carbon steel and stainless steel body wil include stainless steel trim.
3. Aluminum and carbon steel will include carbon steel actuator housing, all other are stainless steel.

EXAMPLE

1 5 3 0 — 0 6 — 3 5 — V — 0 0

Indicates a 6" Model 1530 with carbon steel body and 316 SS trim using Viton® soft goods with factory supplied pressure switch and solenoid.

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

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GROTH CORPORATION
a Continental Disc Company

SECTION 7
BLANKET GAS REGULATORS

Series 3011 Blanket Gas Regulators •

GROTH CORPORATION
a Continental Disc Company

BLANKET GAS REGULATORS
Series 3011

3011H cutaway shown

Patented
US 5,238,021 and 5,931,188

FEATURES

- **Balanced chambers for accurate performance**
- **Single stage regulation - 200 PSI to 0.5”WC**
- **Bubble tight shut-off**
- **Setting range from 0.5”WC to 8.0”WC**
- **All stainless steel construction**
- **Compact design**

3011 SERIES

Both the 3011L and 3011H gas blanket regulators provide a controlled gas environment in storage tanks for the following applications.

- Refineries
- Chemical & Petrochemical Plants
- Liquid Bulk Storage Terminals
- Pulp & Paper Plants

The blanket gas is controlled at a defined pressue (or vacuum) level and is used to exclude air from the tank. This is done for the following reasons.

- Elimination of a potentially flammable mixture by maintaining either an inert or fuel rich environment.
- Minimize tank corrosion.
- Prevent product contamination.
- Reduce hydrocarbon emissions during normal breathing.
- Prevent product evaporation.

Groth gas blanket regulators have the following features:

- Direct acting, modulating valves with a patented force multiplying linkage.
- Balanced forces acting on piston (setting is not affected by supply pressure.)
- Compact size and weight.
- Setting range is from 0.5” WC - 8.0” WC (Consult factory for other settings)
- NPT (F) or ANSI flange connections.
- Wide selection of elastomer seal materials.
- Adjustable flow capacity (5-100%)
- Available for vacuum service (consult factory)

Benefits of storage tank blanketing are recognized by the following government regulations and industrial standards.

- API Standard 2000
- EPA Publication AP-42
- NFPA 69 - Standard on Explosion Prevention Systems
- OSHA Part 1910.106

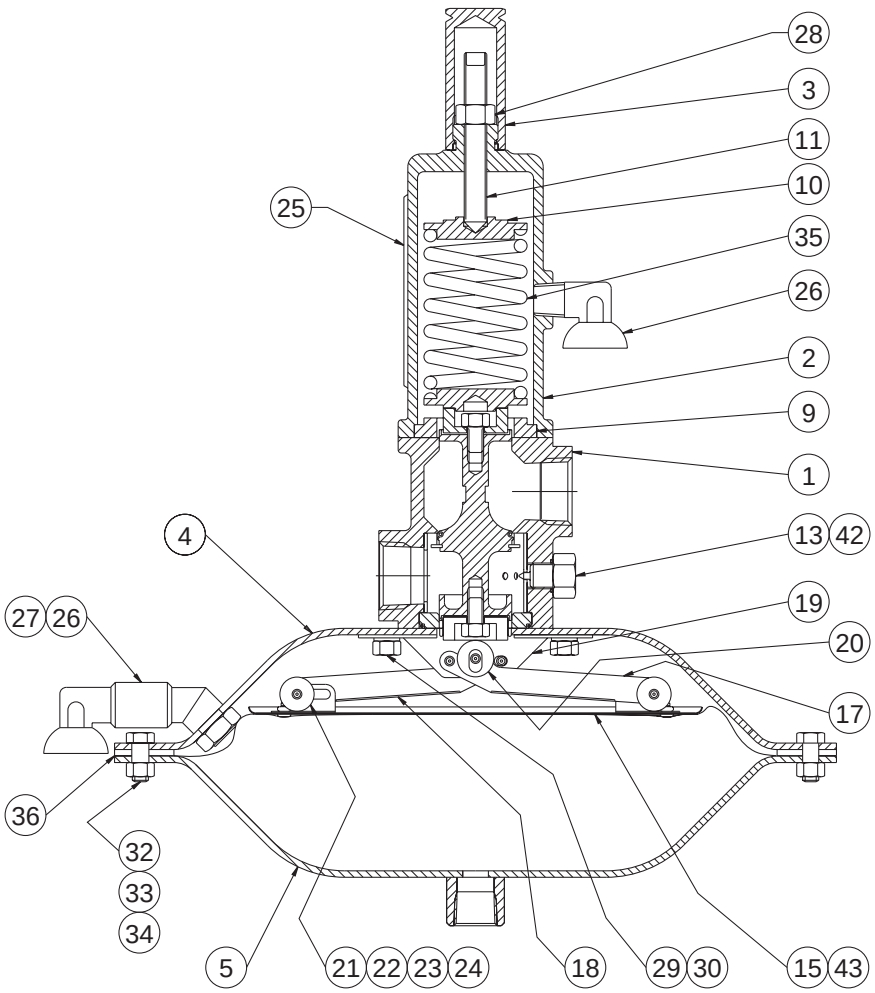

Figure 1: Cross-section of 3011H

SPECIFICATIONS

Please note when spring ranges overlap, select the lighter spring

MODEL #	SPRING RANGE	MAX SUPPLY PSI	MAX SUPPLY BAR	MIN SETTING IN WC	MIN SETTING MBAR	MAX SETTING IN WC	MAX SETTING MBAR
3011L pressure service weight 33lb / 15kg MAWP 2 PSI / .14 BAR	3	200	13.8	0.5	1.2	0.7	1.7
	4	200	13.8	0.7	1.7	1.0	2.5
	5	200	13.8	1.0	2.5	2.0	5.0
3011H pressure service weight 21lb / 10kg MAWP 8 PSI / 0.5 BAR	1	50	3.4	0.5	1.2	1.0	2.5
	2	100	6.9	1.0	2.5	1.5	3.7
	3	150	10.3	1.5	3.7	2.0	5.0
	4	200	13.8	2.0	5.0	3.5	8.7
	5	200	13.8	3.5	8.7	6.5	16.2
	6	200	13.8	6.5	16.2	8.0	20.0

MODEL SELECTION

Use 3011H when set pressure range overlaps.

SET PRESSURE IN WC	SUPPLY PRESSURE (PSI) 5-50	51-100	101-150	151-200
0.5 - 1.0	3011L			
1.0 - 1.5				
1.5 - 2.0	3011H			
2.0 - 8.0				

SET PRESSURE MBAR	SUPPLY PRESSURE (BAR) 0.3-3.4	3.5-6.9	7.0-10.3	10.4-13.8
1.2 - 2.5	3011L			
2.5 - 3.7				
3.7 - 5.0	3011H			
5.0 - 20				

ASSEMBLY

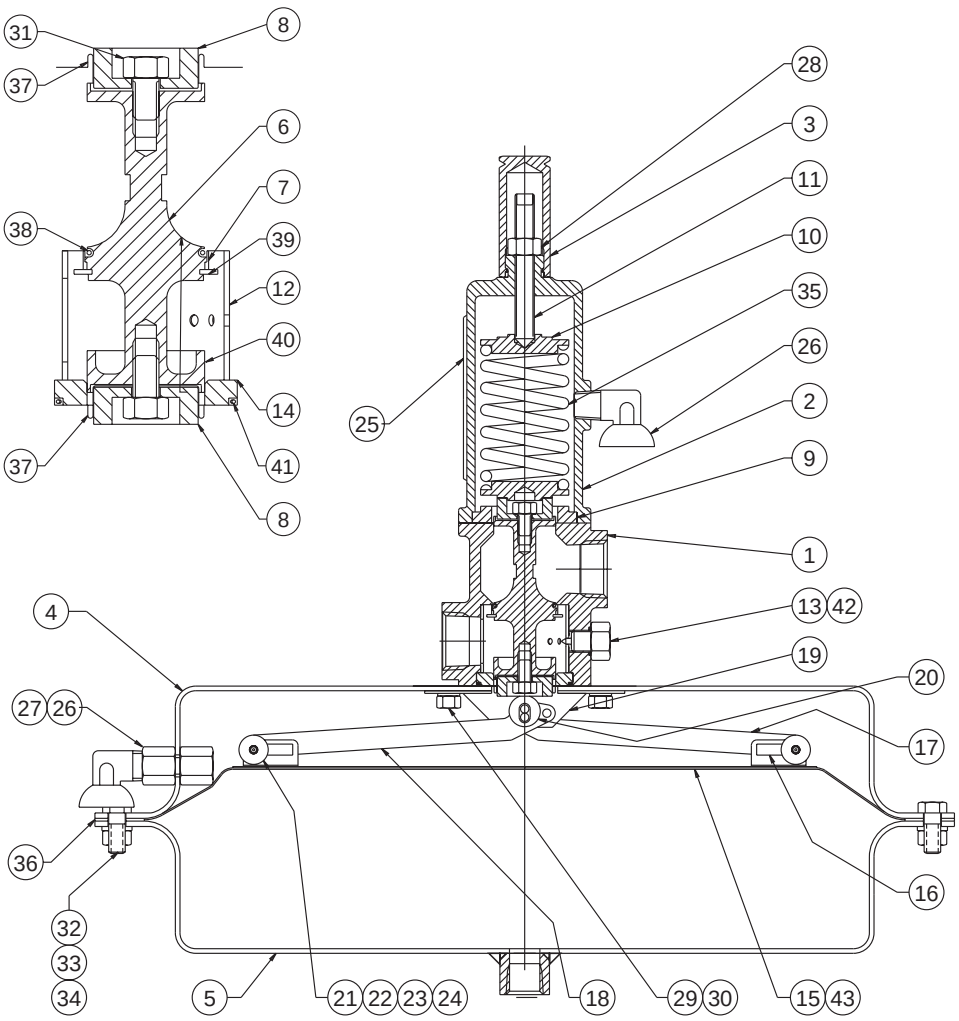

Figure 2: Cross-section of 3011L

BILL OF MATERIALS

Item	Name	Material
1	Body	316SS
2	Bonnet, Spring	316SS
3	Cap, Adjustment acrew	316SS
4	Housing, Upper actuator	316SS
5	Housing, Lower actuator	316SS
6	Piston	316SS
7	Retainer, O-Ring piston seat	316SS
8	Retainer, Diaphragm	316SS
9	Adapter, Bonnet	316SS
10	Button, Spring	316SS
11	Screw, Pressure adjustment	316SS
12	Sleeve, Orifice selector	316SS
13	Screw, Sleeve locking	316SS
14	Ring, Piston guide	316SS
15	Plate, Diaphragm support	316SS
16	Bracket, Actuator linkage	316SS
17	Arm, Actuator linkage	316SS
18	Arm, Actuator linkage	316SS
19	Bracket, Actuator linkage	316SS
20	Roller, Actuator	Nylon
21	Roll, Actuator	Nylon
22	Spacer, Roll pin	Tygon®
23	Rivet, Pop	316SS
24	Pin, Actuator linkage	316SS
25	Nameplate	316SS
26	Vent	Alum
27	Vent connector	PVC
28	Nut, Hex	316SS
29	Bolt, Hex	316SS
30	Washer, Lock	316SS
31	Bolt, Hex	316SS
32	Bolt, Hex	316SS
33	Washer, Lock	316SS
34	Nut, Hex	316SS
35	Spring	316SS

SOFT GOODS KIT

36	Gasket, Actuator	Teflon® FEP[1]
37	Diaphragm, Piston	Viton® *
38	O-Ring, Piston seat	Viton® *
39	Ring, Retaining	SS
40	Stop, Lift	SS
41	O-Ring, Guide ring	Viton® *
42	O-Ring,Locking screw	Viton® *
43	Diaphragm, Actuator	Teflon® FEP[1]

*See Soft Goods selection for available materials

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

FLOW CAPACITY

Table shows flow capacity for a regulator set at 100% full open. For restricted flow, multiply the table values by the appropriate orifice selection percentage. Unless otherwise specified, the orifice selector sleeve (12) is factory set at 100% capacity.

SUPPLY PRESSURE		CARBON DIOXIDE		NITROGEN		NATURAL GAS 0.6 SG	
PSI	BAR	SCFH	NCMH	SCFH	NCMH	SCFH	NCMH
5	0.34	4600	130	5800	164	7400	210
10	0.69	7100	201	8800	249	11300	320
15	1.03	9200	261	11500	326	14600	414
20	1.38	11200	317	14000	397	17900	507
30	2.07	15100	428	18900	535	24000	680
40	2.76	18800	533	23600	669	30000	850
50	3.45	22500	637	28200	799	35800	1014
60	4.14	26000	737	32600	924	41500	1176
80	5.52	33000	935	41300	1170	52600	1490
100	6.90	40000	1133	50100	1419	63700	1805
120	8.28	47000	1331	58800	1666	74800	2119
140	9.66	53900	1527	67500	1912	85900	2433
160	11.0	60900	1725	76300	2161	97000	2748
180	12.4	67900	1924	85000	2408	108100	3062
200	13.8	74900	2122	93700	2654	119200	3377

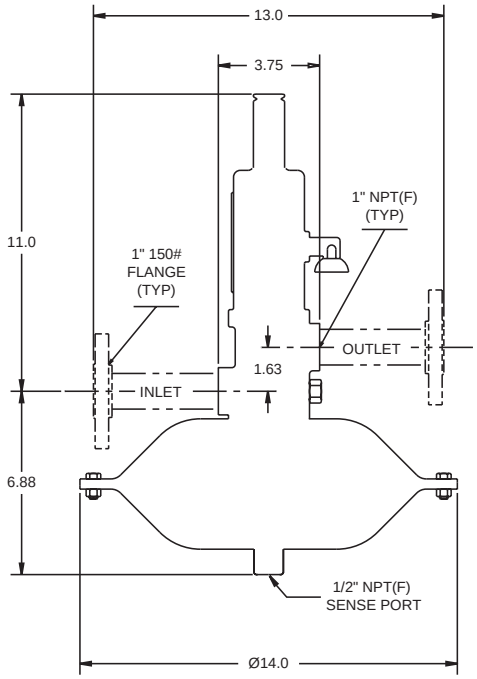

Figure 3: 3011H

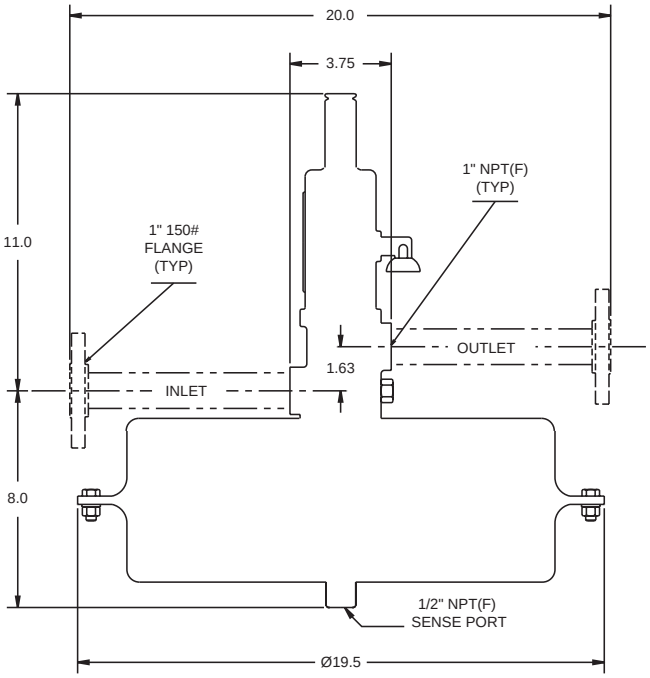

Figure 4: 3011L

HOW TO ORDER

For easy ordering, select proper model number

MODEL #	INLET OUTLET	MATERIAL	SOFT GOODS	ORIFICE SELECTION	SPRING RANGE	OPTIONS
3011L 3011H 3041L 3041H	Inlet Outlet N = 1" NPT(F) F = 1" 150# Flg Z = Special	Body Material 5 = 316 SS	Soft Goods B = Buna - N C = Chemraz® E = EPDM V = Viton® Z = Special	Orifice Selection 1 = 100% 2 = 75% 3 = 50% 4 = 25% 5 = 20% 6 = 15% 7 = 10% 8 = 5%	Spring Range Select from Spring Range Table	Options O = No Special Options Z = Special Options

NOTES

- Include model number when ordering.
- For special options, consult factory.
- See flow table for available sizes.
- Consult factory for regulators with vacuum settings (3041L and 3041H).
- Actuator diaphragm is only available in Teflon® FEP[1].

EXAMPLE

3 0 1 1 H — N — 5 — V — 1 — 2 — O

Indicates a Model 3011H Regulator with 1" NPT body connections, 316 SS construction, Viton®elastomers, full capacity orifice, set pressure range from 1.0" WC to 1.5" WC and no special requirements.

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