CAPACITY TABLES FOR UNIVERSAL VENTURI TUBE

Metering Flow... Naturally!

Model 20181 Cast Iron
Model 20182 Grouted in Unit
Model 20182 Plastic Insert (4" & up)
Model 20182 (2" through 4")
Model 20183 Fabricated
Model 20610 Rate of Flow Controller
Model 20614 Rate of Flow Controller

This data is shown as a guide and is not intended for certified Flow vs. D/P curves.

Line Fluid Water –@ 60 Degrees F
hw = 100

Line Fluid Air - @ 90 Degrees F
7.5 PSIG, 15% RH
hw = 20

SIZE	(S) Static (C) Corner TAP	GPM	MGD	CFS	LOSS	SCFM	LOSS
2A: 2 x 0.9	S	45.8	0.066	0.102	18.37	92.2	3.60
	C	45.6	0.066	0.102	18.24	91.8	3.58
2B: 2 x 1.2	S	85.5	0.123	0.191	13.39	171.7	2.63
	C	83.9	0.121	0.187	12.91	168.3	2.53
2C: 2 x 1.45	S	136.9	0.197	0.306	8.65	273.5	1.70
	C	129.4	0.186	0.288	7.80	258.2	1.53
3A: 3 x 1.45	S	119.8	0.173	0.268	15.97	241.1	3.13
	C	119.3	0.172	0.266	15.81	239.7	3.10
3B: 3 x 1.8	S	192.5	0.277	0.430	12.35	386.4	2.42
	C	188.9	0.272	0.421	11.90	378.7	2.33
3C: 3 x 2.175	S	308.1	0.444	0.688	7.98	615.5	1.57
	C	291.3	0.420	0.649	7.19	580.9	1.41
4A: 4 x 1.8	S	183.4	0.264	0.409	15.99	369.1	3.13
	C	182.9	0.263	0.408	15.88	367.7	3.11
4B: 4 x 2.4	S	342.2	0.493	0.764	11.66	687.0	2.29
	C	335.8	0.484	0.748	11.24	673.2	2.20
4C: 4 x 2.9	S	547.8	0.789	1.223	7.53	1094.3	1.48
	C	517.9	0.746	1.154	6.79	1032.8	1.33
6A: 6 x 2.7	S	412.6	0.594	0.921	14.74	830.4	2.89
	C	411.8	0.593	0.919	14.64	827.3	2.87
6B: 6 x 3.6	S	769.9	1.109	1.719	10.75	1545.9	2.11
	C	757.8	1.091	1.691	10.36	1514.8	2.03
6C: 6 x 4.35	S	1232.7	1.775	2.752	6.95	2462.2	1.36
	C	1173.5	1.690	2.619	6.26	2323.9	1.23

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CAPACITY TABLE for UNIVERSAL VENTURI TUBES

Model 20181 Cast Iron
Model 20182 Grouted in Unit
Model 20182 Plastic Insert (4" & up)

Model 20182 (2" through 4")
Model 20183 Fabricated
Model 20610 Rate of Flow Controller
Model 20614 Rate of Flow Controller

This data is shown as a guide and is not intended for certified Flow vs. D/P curves.

Line Fluid Water –@ 60 Degrees F
hw = 100

Line Fluid Air - @ 90 Degrees F
7.5 PSIG, 15% RH
hw = 20

SIZE	(S) Static (C) Corner TAP	GPM	MGD	CFS	LOSS	SCFM	LOSS
8A: 8 x 3.6	S	733.6	1.056	1.637	13.92	1476.3	2.73
	C	731.9	1.054	1.634	13.82	1470.8	2.71
8B: 8 x 4.8	S	1368.8	1.971	3.055	10.15	2748.3	1.99
	C	1346.5	1.939	3.005	9.78	2693.0	1.92
8C: 8 x 5.8	S	2191.5	3.156	4.892	6.56	4377.3	1.29
	C	2084.9	3.002	4.654	5.91	4131.4	1.16
10A: 10 x 4.8	S	1312.4	1.890	2.929	12.63	2640.5	2.48
	C	1306.4	1.881	2.916	12.51	2626.2	2.45
10B: 10 x 5.8	S	1980.0	2.851	4.420	10.24	3977.3	2.01
	C	1950.6	2.809	4.354	9.94	3911.5	1.95
10C: 10 x 7.25	S	3424.3	4.931	7.643	6.27	6839.5	1.23
	C	3253.3	4.685	7.261	5.65	6455.3	1.11
12A: 12 x 5.8	S	1917.8	2.762	4.281	12.11	3858.2	2.37
	C	1905.5	2.744	4.253	11.98	3836.4	2.35
12B: 12 x 7.25	S	3129.4	4.506	6.985	9.25	6282.3	1.81
	C	3068.6	4.419	6.849	8.90	6150.6	1.75
12C: 12 x 8.7	S	4931.0	7.101	11.006	6.05	9848.9	1.19
	C	4685.0	6.747	10.457	5.45	9295.7	1.07
14A: 14 x 6.3	S	2246.6	3.235	5.015	12.44	4521.4	2.44
	C	2234.7	3.218	4.988	12.36	4504.3	2.42
14B: 14 x 8.7	S	4548.2	6.549	10.152	8.51	9126.1	1.67
	C	4448.7	6.406	9.929	8.14	8901.3	1.60
14C: 14 x 10.15	S	6711.7	9.665	14.981	5.86	13405.6	1.15
	C	6369.7	9.173	14.217	5.28	12652.5	1.04

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CAPACITY TABLE for UNIVERSAL VENTURI TUBES

Model 20181 Cast Iron
Model 20182 Grouted in Unit
Model 20182 Plastic Insert (4" & up)

Model 20182 (2" through 4")
Model 20183 Fabricated
Model 20610 Rate of Flow Controller
Model 20614 Rate of Flow Controller

This data is shown as a guide and is not intended for certified Flow vs. D/P curves.

Line Fluid Water –@ 60 Degrees F
hw = 100

Line Fluid Air - @ 90 Degrees F
7.5 PSIG, 15% RH
hw = 20

SIZE	(S) Static (C) Corner TAP	GPM	MGD	CFS	LOSS	SCFM	LOSS
16A: 16 x 7.25	S	2977	4.28	6.64	12.05	5991	2.36
	C	2960	4.26	6.60	11.96	5967	2.35
16B: 16 x 10.15	S	6237	8.98	13.92	7.95	12511	1.56
	C	6079	8.75	13.56	7.56	12165	1.48
16C: 16 x 11.6	S	8766	12.62	19.56	5.71	17509	1.12
	C	8325	11.98	18.58	5.14	16525	1.01
18A: 18 x 8.7	S	4315	6.21	9.63	11.16	8681	2.19
	C	4284	6.17	9.56	11.05	8632	2.17
18B: 18 x 10.15	S	6023	8.67	13.44	9.48	12102	1.86
	C	5932	8.54	13.24	9.24	11932	1.81
18C: 18 x 13.05	S	11094	15.97	24.76	5.58	22160	1.10
	C	10539	15.17	23.52	5.02	20915	0.99
20A: 20 x 10.15	S	5910	8.51	13.19	10.45	11886	2.05
	C	5850	8.42	13.05	10.31	11797	2.02
20B: 20 x 11.6	S	7920	11.40	17.67	8.92	15909	1.75
	C	7789	11.21	17.38	8.65	15646	1.70
20C: 20 x 14.5	S	13697	19.72	30.57	5.46	27358	1.07
	C	12978	18.68	28.96	4.92	25821	0.97
24A: 24 x 11.6	S	7671	11.04	17.12	10.54	15433	2.07
	C	7612	10.69	16.99	10.43	15345	2.05
24B: 24 x 14.5	S	12517	18.02	27.94	8.05	25129	1.58
	C	12246	17.63	27.33	7.75	24602	1.52
24C: 24 x 17.4	S	19724	28.40	44.02	5.26	39395	1.03
	C	18714	26.94	41.76	4.74	37182	0.93

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CAPACITY TABLE for UNIVERSAL VENTURI TUBES

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Model 20610 Rate of Flow Controller
Model 20614 Rate of Flow Controller

This data is shown as a guide and is not intended for certified Flow vs. D/P curves.

Line Fluid Water –@ 60 Degrees F
hw = 100

Line Fluid Air - @ 90 Degrees F
7.5 PSIG, 15% RH
hw = 20

SIZE	(S) Static (C) Corner TAP	GPM	MGD	CFS	LOSS	SCFM	LOSS
30A: 30 x 13.05	S	9614	13.84	21.45	10.96	19350	2.15
	C	9572	13.78	21.36	10.90	19288	2.14
30B: 30 x 17.4	S	17820	25.66	39.77	8.22	35795	1.61
	C	17513	25.22	39.08	7.98	35203	1.56
30C: 30 x 21.75	S	30819	44.37	68.78	5.03	61556	0.99
	C	29224	42.08	65.22	4.54	58098	0.89
36A: 36 x 17.4	S	17260	24.85	38.52	9.72	34724	1.91
	C	17114	24.64	38.19	9.62	34528	1.89
36B: 36 x 21.75	S	28164	40.55	62.86	7.42	56540	1.46
	C	27578	39.71	61.55	7.14	55355	1.40
36C: 36 x 26.1	S	44379	63.90	99.05	4.85	88640	0.95
	C	42082	60.60	93.92	4.37	83661	0.86
42A: 42 x 18.9	S	20219	29.11	45.13	9.99	40692	1.96
	C	20096	28.94	44.85	9.92	40539	1.95
42B: 42 x 26.1	S	40933	58.94	91.36	6.83	82135	1.34
	C	39965	57.55	89.20	6.53	80112	1.28
42C: 42 x 30.45	S	60405	86.98	134.82	4.71	120650	0.92
	C	57195	82.50	127.88	4.24	113872	0.83
48A: 48 x 21.75	S	26793	38.58	59.80	9.67	53921	1.90
	C	26609	38.32	59.39	9.60	53709	1.88
48B: 48 x 30.45	S	56139	80.84	125.30	6.38	112600	1.25
	C	54687	78.75	122.06	6.07	109492	1.19
48C: 48 x 34.8	S	78896	113.61	176.09	4.58	157583	0.90
	C	74743	107.63	166.82	4.13	148731	0.81

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USE OF CAPACITY TABLE

This table is for convenience and assistance in sizing of Universal Venturi Flowmeters. It is based on standard throat sizes, and values shown are approximate only. **It in no way should be considered a final sizing or final calculation.** Please contact a BIF Representative for actual size, flow and differential relationship.

WATER

The water portion of this table is based on water at 60° F and flow rates are shown for a differential pressure of 100 inches of water and nominal pipe line diameters. No attempt is made to determine special throat sizes or to determine the relationship of the many 'standard special' throat sizes available for several models. The following relationships are applicable in determining capacities at other than a differential pressure of 100 inches or the differential pressure at other flow rates.

(Design Flow Rate / Table Flow Rate) ^{2} x 100 ≈ Differential at the Design Flow Rate

(Design Flow Rate / Table Flow Rate) ^{2} x Table Head Loss ≈ Head Loss at the Design Flow Rate

EXAMPLE 1

Installation Design Flow Rate = 3500 GPM
Line Size = 12" and a Cast Iron Model 20181 is required having a Static Tap
The Maximum Head Loss permissible = 24 inches of water

From the table for 12" Line Size, the Flow Rate at the 100 inches of water differential and head loss at that flow rate read as follows...

Meter Size	Flow Rate at hw = 100	Head Loss
12 A	1917.8	12.11
12 B	3129.4	9.25
12 C	4931.0	6.05

12A

$(3500 / 1917.8)^2 \times 100 = 333$ $\qquad$ $(3500 / 1917.8)^2 \times 12.11 = 40.3$

12B

$(3500 / 3129.4)^2 \times 100 = 125$ $\qquad$ $(3500 / 3129.4)^2 \times 9.25 = 11.6$

12C

$(3500 / 4931.5)^2 \times 100 = 50.4$ $\qquad$ $(3500 / 4931)^2 \times 6.05 = 3.05$

The 12A, while having an acceptable differential pressure, would have a pressure drop greater than the allowed 24". Both the 12B and 12C would be acceptable from a differential pressure and head loss standpoint. You may want to make the decision now based on other issues such as installation piping, secondary availability, future capacity needs or cost.

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AIR

The Air portion of this table is based on the Line Fluid being at 90° F, 7.5 PSIG, 15% Relative humidity and flow rates are shown for a differential pressure of 20 inches of water and nominal pipe line diameters. No attempt is made to determine special throat sizes or to determine the relationship of the many 'standard special' throat sizes available for several models. The following relationships are applicable in determining capacities at other than a differential pressure of 20 inches or the differential pressure at other flow rates.

(Design Flow Rate / Table Flow Rate)^2 x 20 ≈ Differential at the Design Flow Rate

(Design Flow Rate / Table Flow Rate)^2 x Table Head Loss ≈ Head Loss at the Design Flow Rate

EXAMPLE 2

Installation Design Flow Rate = 10,000 SCFM
Line Size = 18" and a Fiberglass Insert Model 20182 is required having a Corner Tap
The Maximum Head Loss permissible = 2 inch of water
Line Conditions are Air at 90° F, 7.5 PSIG and 15% Relative humidity. The same as the table conditions.

From the table for 18" Line Size, the Flow Rate at the 20 inches of water differential and head loss at that flow rate read as follows...

Meter Size	Flow Rate at hw = 20	Head Loss
18 A	8632	2.17
18 B	11932	1.81
18 C	20915	0.99

18A

(10000 / 8632)^2 x 20 = 26.8 (10000 / 8632)^2 x 2.17 = 2.91

18B

(10000 / 11932)^2 x 20 = 14.0 (10000 / 11932)^2 x 1.81 = 1.27

18C

(10000 / 20815.41)^2 x 20 = 4.62 (10000 / 20815.41)^2 x 0.99 = 0.23

The 18A has a pressure drop greater than the allowed 2". Both the 18B and 18C would be acceptable from a differential pressure and head loss standpoint. You may want to make the decision now based on other issues such as installation piping, secondary availability, future capacity needs or cost.

AIR continued...

EXAMPLE 3

As in **EXAMPLE 2** above, Installation Design Flow Rate = 10,000 SCFM
Line Size = 18" and a Fiberglass Insert Model 20182 is required having a Corner Tap
The Maximum Head Loss permissible = 2 inch of water
Line Conditions are Air at 180° F, 8.3 PSIG and 15% Relative humidity. Different from the table conditions.

The Design Flow Rate should first be adjusted to a Table Equivalent value.

Design Flow Rate x $(0.2009 / ((\text{Line Pressure} + 14.7) / (\text{Line Temperature} + 460))^{0.5}) \approx$
Table Equivalent Flow Rate

Table Equivalent Flow Rate = $10{,}000 \times (0.2009 / ((8.3 + 14.7) / (180 + 460))^{0.5}) = 10{,}598$

From the table for 18" Line Size, the Flow Rate at the 20 inches of water differential and head loss at that flow rate read as follows...

Meter Size	Flow Rate at hw = 20	Head Loss
18 A	8632	2.17
18 B	11932	1.81
18 C	20915	0.99

18A

$(10598 / 8632)^2 \times 20 = 30.1$ $(10598 / 8632)^2 \times 2.17 = 3.27$

18B

$(10598 / 11932)^2 \times 20 = 15.8$ $(10598 / 11932)^2 \times 1.81 = 1.43$

18C

$(10598 / 20815)^2 \times 20 = 5.18$ $(10598 / 20815)^2 \times 0.99 = 0.26$

As in **EXAMPLE 2** the 18A has a pressure drop greater than the allowed 2". Both the 18B and 18C would be acceptable from a differential pressure and head loss standpoint. You may want to make the decision now based on other issues such as installation piping, secondary availability, future capacity needs or cost.

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Supplement to Capacity Table

The purpose of this section is to size Universal Venturi Tubes with throat sizes other than the standard ones listed in the Capacity Tables. This applies to Model 20182 and 20183 meters. Model 20183 meters can have any throat size within 0.30<ß <0.75, Model 20182 throat sizes are given in the table below.

Possible Throat Diameters for Model 20182 Plastic Inserts

Nominal Size	Throat Diameters	
6"	2.175	2.900
	2.400	3.600
	2.700	4.350
8"	2.175	3.600
	2.400	4.350
	2.700	4.800
	2.900	
10"	2.900	5.800
	3.600	6.300
	4.350	7.250
	4.800	

Nominal Size	Throat Diameters	
12"	3.600	6.300
	4.350	7.250
	4.800	8.700
	5.800	
14"	4.350	7.250
	4.800	8.700
	5.800	10.15
	6.300	
16"	4.800	8.700
	5.800	10.15
	6.300	11.60
	7.250	

Nominal Size	Throat Diameters	
18"	5.800	10.15
	6.300	11.60
	7.250	13.05
	8.700	
20"	5.800	10.15
	6.300	11.60
	7.250	13.05
	8.700	14.50
24"	7.250	13.05
	8.700	14.50
	10.15	17.40
	11.60	

While the relations presented are approximate, they are sufficiently accurate for the purpose of determining the following:

1. Throat size
2. Differential Pressure

Mass Flow

$$ß^2K = \frac{0.00279\ (W_{PPH})}{D_2 \sqrt{h} \sqrt{\rho_L}}$$

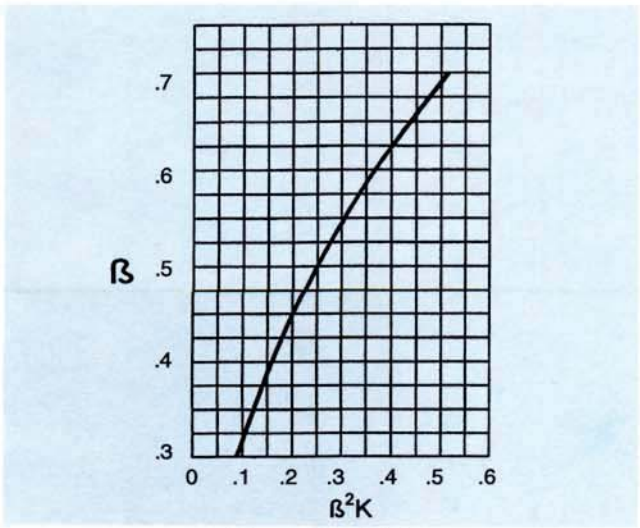
$ß^2K$ = Value from graphs
h = differential pressure (in water at °)F.
G = specific gravity of line fluid at 60°F.

Volumetric Flow

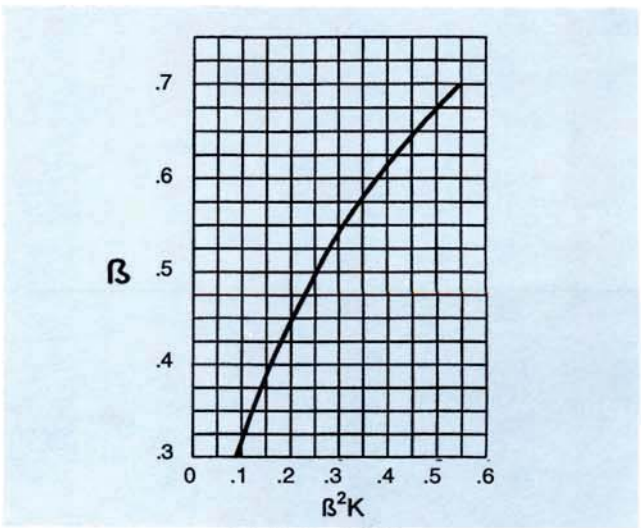
$$ß^2K = \frac{.00021\ (V_{SCHF}) \sqrt{G}}{D_2 \sqrt{h} \sqrt{\rho_L}}$$

D = Pipe ID
ρ = specific WT of line fluid

Note: For all gas calculations, refer to section on Compressible Flow or contact your BIF Representative



Corner Tap UVTs



Static Tap UVTs

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