Extending Orifice Flow Data

EXTRAPOLATION

1. Specific Gravity

Other Gases

To convert air flow from chart to another gas flow.

Flow (gas) = Flow (air) / $\sqrt{\text{S.G.}}$ (gas)

EXAMPLE:

To obtain flow rate for helium when air flow is 5 SCFH

Flow (Helium) = Flow (air) / $\sqrt{.138}$

= 5 / .371 = 13.48 SCFH

S.G. = specific gravity of gas relative to air
S.G. = .138 for Helium

Gas	Specific Gravity[1]	Chart Multiplier[2]
Air	1.0	1.0
Argon	1.379	.852
Carbon Dioxide	1.53	.809
Helium	.138	2.68
Hydrogen	.0696	3.79
Methane	.554	1.34
Natural Gas	.61	1.28
Nitrogen	.972	1.01
Oxygen	1.1053	.95
Propane	1.56	.80

Note 1 Specific gravity relative to air @ 70°F, 14.7 psia

Note 2 To obtain the flow of gases other than air, multiply the air flow values on the charts on pages 20, 21 and 22 by the chart multiplier.

2. Pressure – Air Flow

High Pressure Extrapolation

To calculate flow rates at pressures higher than those on the charts, use the following formula.

$$Q_{HP} = Q_{80} \times \frac{P_{HP} + 14.7}{94.7}$$

Q_{HP} = Flow at elevated pressure (above 80 psig.).
Q_{80} = Chart flow reading at 80 psig.
P_{HP} = Elevated pressure in psig.

EXAMPLE:

To calculate the flow for the No. 16 metal orifice at 150 psig supply pressure.

$$Q_{HP} = 17.9 \times \frac{150 + 14.7}{94.7} = 31.13 \text{ SCFH}$$

(from chart)

Low Pressure Extrapolation

To calculate flow rates at pressures lower than those on the charts, use the following formula.

$$Q_{LP} = Q_5 \sqrt{\frac{P_{LP}^2 + 29.4\, P_{LP}}{13.12}}$$

Q_{LP} = Flow at the low pressure (below 5 psig.)
Q_5 = Chart flow reading at 5 psig.
P_{LP} = Low pressure in psig.

EXAMPLE:

To calculate the flow at a supply pressure of 0.5 psig. for the No. 16 metal orifice.

$$Q_{LP} = 3.26 \sqrt{\frac{0.5^2 + 29.4\,(.5)}{13.12}} = 0.96 \text{ SCFH}$$

(from chart)

3. Temperature Effects

Air Flow

The flow of gases through an orifice varies inversely as the absolute temperature. As the gas temperature rises and the gas density decreases, the mass flow rate also decreases.

To extend the chart data on pages 20-22 for air flow, use the following formula.

$$Q_T = Q_S \sqrt{\frac{T_S}{T_T}}$$

Where:
T_S = standard absolute temperature °R (°R = 460 + °F).
T_T = non standard absolute temperature °R.
Q_S = flow from chart at 70°F = 530°R.
Q_T = flow at a different temperature.

EXAMPLE:

At 70°F and an inlet pressure of 25 psig the No. 60 (.060" dia.) orifice has a flow rate of 52.8 SLPM (see page 21). Under similar conditions, the air flow rate at 300°F is

$$Q_T = 52.8 \sqrt{\frac{530}{760}} = 44.09 \text{ SLPM}$$

4. Other Orifice Sizes

Air Flow

To calculate the required diameter of an orifice that is not included in the charts on pages 20-22 use the following formula. The equations are based on data taken for the size no. 60 (.060" dia.) orifice.

$$d_L = .060 \sqrt{\frac{Q_L}{Q_{60}}} \text{ in. dia.}$$

Where:
d_L = diameter of the unknown orifice.
Q_L = flow through the unknown orifice.
Q_{60} = flow from chart on pages 20-22.

EXAMPLE: (data from page 21)
At supply pressure of 50 psig and outlet at standard conditions,

Q_{60} = 87.4 SLPM (from chart)
Let:
Q_L = 600 SLPM @ 50 psig

$$d_L = .060 \sqrt{\frac{600}{87.4}} = .157 \text{ in. dia.}$$

Water Flow

Using the C_V method for liquid flow, and using measured C_V data we can derive the following formula to calculate required orifice sizes.

$$d_L = \sqrt{\frac{1}{22.5} \frac{Q_L}{\sqrt{\Delta P}}}$$

Where:
d_L = diameter of unknown orifice (in.)
Q_L = required flow (gpm)

EXAMPLE:

Flow rate required =
.5 GPM @ ΔP = 1.0 psi

$$d_L = \sqrt{\frac{1}{22.5} \frac{.5}{\sqrt{1}}} = .149" \text{ dia.}$$

Also, to obtain the C_V

$$C_{VL} = \frac{Q_L}{\sqrt{\Delta P}} = \frac{.5}{1} = .5$$

C_{VL} is the C_V for the orifice with diameter = d_L.

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Conversion Factors

A. Gas Flow

SCFH - *standard cu. ft. per hour*
SLPM - *standard liters per minute*
SCCM - *standard cu. cm. per minute*

SCFH x .472 = SLPM
SCFH x 472 = SCCM
SLPM x 1000 = SCCM

EXAMPLE:

5 SCFH x .472 = 2.36 SLPM

B. Liquid Flow

GPM - *gallons per minute*
LPM - *liters per minute*
CCM - *cubic centimeters per minute*
CFH - *cubic feet per hour*
CFM - *cubic feet per minute*

GPM x 3.785 = LPM
GPM x 3785 = CCM
GPM x .1337 = CFM
GPM x 8.021 = CFH
CCM x .001 = LPM

EXAMPLE:

25 GPM x 3.785 = 94.625 LPM

C. Pressure – Gases or Liquids

PSIG - *pounds per sq. in. gage*
Kg/CM^2 - *kilograms per sq. cm*
KPA - *kilo pascals*
Bar - *unit of pressure equal to 1 atmos.*
In-H_2O - *pressure produced by 1" H_2O*

PSIG x .0703 = Kg/CM^2
PSIG x 6.895 = KPA
PSIG x .0689 = Bars
PSIG x 27.68 = In. H_2O

EXAMPLE:

25 psig x 6.895 = 172.37 KPA

Liquid Flow C_v Method

A. Water

The C_v method of rating flow capacity of various devices employs empirical data based on water flow. The basic formula for water flow is

$$Q = C_v \sqrt{\Delta P}$$

Q = flow in GPM
ΔP = pressure differential in psi
C_v = flow factor

For a flow of 1 gpm at $\Delta P = 1$, the $C_v = 1$

To obtain the water flow rate through precision orifices use the above equation and obtain the C_v value from the charts on pages 23, 24.

EXAMPLE:
Size Number 100 (.100" dia.) has a $C_v = .23$
For a 25 psig pressure differential:

$$Q = C_v \sqrt{\Delta P} = .23 \sqrt{25} = 1.15 \text{ GPM}$$

Selected flow data is also presented on pages 23, 24. The chart data assumes flooded conditions on both sides of the orifice. This is particularly important for orifices less than .020" diameter because of surface tension influences.

B. Other Liquids

For liquids other than water, the equation becomes:

$$Q = C_v \sqrt{\frac{\Delta P}{S.G}}$$

Where:
S.G. = Specific gravity of the liquid
(The specific gravity of water is 1.0)

To obtain the flow rate of an oil with S.G. = .85, use the above equation and obtain the C_v value from the charts on pages 20, 21, 22.

EXAMPLE: Size number 100 (.100" dia.) has a $C_v = .23$
For a 25 psig pressure differential:

$$Q = C_v \sqrt{\frac{\Delta P}{S.G.}} = .23 \sqrt{\frac{25}{.85}} = 1.25 \text{ GPM}$$

Specific Gravity of Various Liquids Relative to Water @ 60ºF

Alcohol, Ethyl	.79
Gasoline	.75
Glycerine	1.26
Kerosene	.80
Diesel Oil	.85
Lube Oil	.90
Turpentine	.87
Water	1.00

Test Procedures

A. Rotameters - Gas Flow

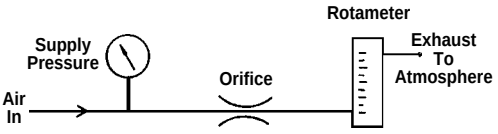
Rotameters for measurement of air or other gas flows must be used for the conditions for which they are calibrated. Typically they are calibrated for the following:

- Air Flow
- Outlet Conditions - 14.7 psig @ 70ºF

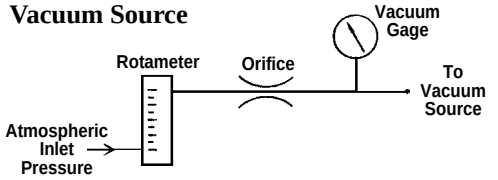
Rotameters can be calibrated for other gas flows or other outlet pressure conditions. Manufacturers also provide graphs or tables for correction of measured data when conditions vary from the calibration conditions.

When using rotameters calibrated for standard outlet conditions use the test procedures shown below.

Positive Supply Pressure



Vacuum Source



B. Mass Flowmeters - Gas Flow

Mass flowmeters are generally insensitive to gas pressure or barometric pressure conditions. Consequently their location in the test circuit is not critical. Consult your instrument manufacturer for recommended test procedures.

C. Instrument Accuracy - Gas Flow

The three variables to be measured in gas flow applications are:

- Pressure
- Temperature
- Flow Rate

The accuracy of the flow measurement of a gas through an orifice is limited by the combined accuracy of the instruments used in the measurement. Expected accuracy of a gas flow measurement is generally in the range of 1 to 20%. 1% accuracy can only be achieved with high quality instruments.

Metal Orifice Air Flow – SCFH

Orifice Diameter Inches		0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033
Size Number		**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**31**	**32**	**33**
C_v		0.00035	0.00061	0.00086	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.0088	0.0096	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
Supply Pressure – psig	1	0.075	0.136	0.182	0.269	0.360	0.479	0.593	0.653	0.843	0.962	1.11	1.30	1.40	1.64	1.82	2.03	2.22	2.39	2.73	2.99	3.26	3.54	4.05	4.13	4.68	5.06	5.62	6.10	6.42
	5	0.18	0.33	0.45	0.64	0.85	1.10	1.37	1.51	1.94	2.25	2.56	2.99	3.26	3.73	4.20	4.70	5.23	5.62	6.29	6.87	7.48	8.12	9.20	9.41	10.5	11.3	12.4	13.6	14.4
	10	0.25	0.47	0.65	0.91	1.21	1.57	1.97	2.14	2.73	3.14	3.56	4.13	4.26	4.79	5.38	6.00	6.70	7.48	9.17	10.1	11.0	11.8	13.0	13.6	15.2	16.6	18.3	19.9	21.1
	15	0.34	0.59	0.82	1.14	1.53	1.97	2.48	2.67	3.43	3.92	4.45	5.17	5.30	6.04	6.84	7.56	8.50	9.34	11.3	12.6	13.6	14.7	16.1	16.8	18.6	20.3	22.5	24.6	26.1
	20	0.40	0.70	0.97	1.38	1.80	2.33	2.92	3.16	4.07	4.64	5.28	6.08	6.29	7.20	8.18	9.03	10.3	11.1	13.5	14.7	16.1	17.3	18.9	19.7	21.8	23.7	26.3	28.6	30.3
	25	0.47	0.82	1.12	1.59	2.08	2.69	3.37	3.62	4.66	5.30	6.06	6.95	7.25	8.31	9.43	10.4	11.8	12.7	15.5	16.8	18.3	19.9	21.6	22.7	24.8	27.1	30.1	32.6	34.5
	30	0.53	0.92	1.26	1.80	2.37	3.03	3.81	4.09	5.23	5.98	6.80	7.82	8.20	9.39	10.7	11.8	13.4	14.4	17.4	19.0	20.7	22.5	24.4	25.4	28.0	30.5	33.7	36.7	39.0
	40	0.64	1.15	1.56	2.22	2.92	3.75	4.68	5.02	6.44	7.31	8.33	9.56	10.1	11.6	13.2	14.5	16.5	17.8	21.4	23.3	25.4	27.5	29.9	31.1	34.1	37.1	41.1	44.7	47.7
	50	0.76	1.37	1.86	2.67	3.50	4.45	5.55	5.93	7.59	8.62	9.83	11.3	12.1	13.8	15.7	17.3	19.6	21.2	25.2	27.5	30.1	32.6	35.2	36.7	40.3	43.9	48.5	53.0	56.4
	60	0.89	1.59	2.16	3.09	4.05	5.13	6.40	6.84	8.75	10.0	11.3	13.0	14.0	16.0	18.2	20.0	22.7	24.6	29.2	31.8	34.7	37.5	40.7	42.4	46.4	50.4	55.9	61.0	65.0
	70	1.02	1.82	2.46	3.54	4.60	5.83	7.27	7.76	9.92	11.3	12.8	14.7	16.0	18.2	20.7	22.9	25.9	28.0	33.1	36.0	39.2	42.6	46.0	48.1	52.5	57.2	63.6	69.3	73.9
	80	1.14	2.04	2.75	3.96	5.15	6.53	8.12	8.67	11.1	12.6	14.3	16.5	17.9	20.5	23.3	25.6	29.0	31.6	37.1	40.3	43.9	47.7	51.3	53.6	58.7	64.0	71.2	77.8	82.6
	90	1.27	2.27	3.05	4.41	5.70	7.20	8.96	9.56	12.2	13.9	15.9	18.3	19.9	22.7	25.9	28.4	32.2	35.0	40.9	44.5	48.5	52.8	56.8	59.3	65.0	71.0	78.8	86.0	91.5
	100	1.40	2.48	3.35	4.83	6.25	7.88	9.81	10.5	13.4	15.3	17.4	20.0	21.8	25.0	28.4	31.1	35.2	38.1	44.7	48.7	53.2	58.1	62.3	65.3	71.4	78.0	86.7	94.5	101
Vacuum Level In. Hg.	5	0.113	0.203	0.273	0.405	0.536	0.703	0.860	0.953	1.23	1.40	1.64	1.90	2.07	2.41	2.70	2.99	3.28	3.60	4.03	4.45	4.87	5.25	5.81	6.00	6.70	7.23	8.01	8.73	9.15
	10	0.145	0.263	0.356	0.521	0.687	0.892	1.10	1.20	1.55	1.77	2.06	2.37	2.62	2.99	3.35	3.79	4.15	4.62	5.17	5.68	6.12	6.63	7.29	7.59	8.48	9.11	10.1	10.9	11.5
Choked Flow	15	0.158	0.284	0.392	0.568	0.744	0.964	1.20	1.30	1.68	1.91	2.26	2.59	2.86	3.28	3.71	4.11	4.64	4.92	5.53	6.04	6.61	7.08	7.73	8.01	8.90	9.56	10.7	11.5	12.1
	20	0.158	0.284	0.392	0.568	0.744	0.964	1.20	1.30	1.68	1.91	2.26	2.59	2.86	3.28	3.71	4.11	4.64	4.92	5.53	6.04	6.61	7.08	7.73	8.01	8.90	9.56	10.7	11.5	12.1
	30	0.158	0.284	0.392	0.568	0.744	0.964	1.20	1.30	1.68	1.91	2.26	2.59	2.86	3.28	3.71	4.11	4.64	4.92	5.53	6.04	6.61	7.08	7.73	8.01	8.90	9.56	10.7	11.5	12.1

Orifice Diameter Inches		0.035	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.047	0.052	0.055	0.060	0.063	0.067	0.070	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.100	0.104	0.109	0.113	0.120	0.125
Size Number		**35**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**47**	**52**	**55**	**60**	**63**	**67**	**70**	**73**	**76**	**79**	**81**	**86**	**89**	**94**	**96**	**100**	**104**	**109**	**113**	**120**	**125**
Cv		0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.10	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.25	0.27	0.31	0.34	0.37
Supply Pressure – psig	1	7.37	8.12	8.75	9.45	9.75	9.90	10.6	11.4	13.6	17.0	19.9	23.7	25.9	30.1	33.6	35.9	39.3	43.0	46.0	49.7	53.7	60.2	63.7	69.8	75.2	83.9	91.4	101	106
	5	16.3	18.0	19.3	20.6	21.6	22.5	23.9	25.6	30.1	37.3	43.0	50.6	55.3	64.2	71.6	76.5	83.5	91.3	97.5	108	116	131	138	150	162	180	195	216	229
	10	22.5	25.0	26.5	28.8	30.5	31.4	33.1	35.6	41.0	51.9	57.4	68.2	74.6	86.2	96.6	103	112	121	131	144	153	172	181	196	216	237	250	286	314
	15	27.8	30.7	32.6	35.4	37.5	38.6	40.5	43.2	50.0	62.9	69.7	82.6	90.3	104	117	125	136	147	158	174	185	207	218	235	261	286	303	345	377
	20	32.4	36.0	38.4	41.5	44.3	45.3	47.7	50.9	58.7	74.2	82.0	97.3	106	123	138	146	160	172	185	203	216	242	256	275	305	335	354	403	445
	25	37.5	41.5	44.1	47.9	50.9	52.3	54.9	58.5	67.6	85.4	94.5	112	122	141	158	168	183	198	212	233	248	278	292	316	347	381	405	464	511
	30	42.4	47.0	50.0	54.2	57.6	59.3	62.3	66.3	76.3	96.6	107	126	138	160	179	190	206	222	239	265	280	314	331	356	392	432	458	525	578
	40	52.5	58.1	67.2	67.0	71.2	73.3	76.9	82.0	94.3	119	132	156	170	196	220	233	254	273	295	324	343	384	405	439	483	532	566	648	714
	50	62.5	69.1	73.7	79.7	85.0	87.5	91.7	97.5	112	142	157	185	202	233	261	278	301	324	347	384	407	456	481	523	576	634	672	771	850
	60	72.7	80.5	86.0	92.8	99	102	107	113	130	165	182	214	233	269	301	320	347	375	400	445	473	530	559	606	667	735	780	894	985
	70	83.1	91.7	98.1	106	113	117	122	129	148	187	207	244	267	307	343	362	394	428	458	509	538	604	638	693	763	839	892	1021	1125
	80	93	103	110	119	127	131	137	145	167	210	231	273	298	343	384	405	443	481	513	570	604	678	716	778	856	943	1000	1146	1263
	90	106	115	122	132	141	146	151	161	185	231	256	303	331	379	424	447	489	532	568	631	670	750	792	860	947	1042	1106	1267	1398
	100	114	126	135	146	156	164	167	177	203	254	282	331	362	415	468	496	540	587	627	697	739	831	875	951	1047	1153	1225	1403	1545
Vacuum Level In. Hg.	5	10.4	11.4	12.3	13.3	14.3	14.5	15.4	16.3	19.2	23.9	26.4	31.4	36.2	42.4	47.7	50.6	55.1	60.0	64.0	70.3	76.1	84.9	88.6	96.1	104	114	123	138	150
	10	13.1	14.4	15.4	16.6	17.6	18.0	19.2	20.3	23.6	29.4	32.7	38.6	44.9	51.7	57.6	63.4	68.9	74.8	79.9	87.9	94.9	106	110	120	130	142	153	173	187
Choked Flow	15	13.8	15.2	16.2	17.4	18.3	18.8	20.0	21.1	24.5	30.5	33.7	39.4	46.8	54.0	60.2	66.1	71.8	78.0	83.5	91.7	99.0	110	115	125	135	148	160	180	195
	20	13.8	15.2	16.2	17.4	18.3	18.8	20.0	21.1	24.5	30.5	33.7	39.4	46.8	54.0	60.2	66.1	71.8	78.0	83.5	91.7	99.0	110	115	125	135	148	160	180	195
	30	13.8	15.2	16.2	17.4	18.3	18.8	20.0	21.1	24.5	30.5	33.7	39.4	46.8	54.0	60.2	66.1	71.8	78.0	83.5	91.7	99.0	110	115	125	135	148	160	180	195

Standard Conditions 70°F, 14.7 psia

SCFH – Standard Cu. Ft. Per Hour
SLPM – Standard Liters Per Minute

Above data obtained with Type B restrictor. Flow rates for other metal restrictors are essentially the same as for Type B. Above data supercedes previous publications.

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Metal Orifice Air Flow – SLPM

	Orifice Diameter Inches	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033
	Size Number	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**31**	**32**	**33**
	C_v	0.00035	0.00061	0.00086	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.0088	0.0096	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
Supply Pressure – psig	1	0.035	0.064	0.086	0.127	0.170	0.226	0.280	0.308	0.398	0.45	0.52	0.61	0.66	0.77	0.86	0.96	1.05	1.13	1.29	1.41	1.54	1.67	1.91	1.95	2.21	2.39	2.65	2.88	3.03
	5	0.09	0.16	0.21	0.30	0.40	0.52	0.65	0.71	0.92	1.06	1.21	1.41	1.54	1.76	1.98	2.22	2.47	2.65	2.97	3.24	3.53	3.83	4.34	4.44	4.94	5.31	5.86	6.42	6.80
	10	0.12	0.22	0.31	0.43	0.57	0.74	0.93	1.01	1.29	1.48	1.68	1.95	2.01	2.26	2.54	2.83	3.16	3.53	4.33	4.75	5.18	5.55	6.15	6.43	7.18	7.83	8.63	9.40	9.98
	15	0.16	0.28	0.39	0.54	0.72	0.93	1.17	1.26	1.62	1.85	2.10	2.44	2.50	2.85	3.23	3.57	4.01	4.41	5.35	5.93	6.43	6.95	7.58	7.95	8.78	9.58	10.6	11.6	12.3
	20	0.19	0.33	0.46	0.65	0.85	1.10	1.38	1.49	1.92	2.19	2.49	2.87	2.97	3.40	3.86	4.26	4.84	5.22	6.35	6.95	7.58	8.15	8.90	9.28	10.3	11.2	12.4	13.5	14.3
	25	0.22	0.39	0.53	0.75	0.98	1.27	1.59	1.71	2.20	2.50	2.86	3.28	3.42	3.92	4.45	4.91	5.59	6.01	7.30	7.95	8.65	9.38	10.2	10.7	11.7	12.8	14.2	15.4	16.3
	30	0.25	0.44	0.60	0.85	1.12	1.43	1.80	1.93	2.47	2.82	3.21	3.69	3.87	4.43	5.03	5.56	6.33	6.81	8.23	8.98	9.75	10.6	11.5	12.0	13.2	14.4	15.9	17.3	18.4
	40	0.30	0.54	0.74	1.05	1.38	1.77	2.21	2.37	3.04	3.45	3.93	4.51	4.78	5.47	6.21	6.85	7.81	8.42	10.1	11.0	12.0	13.0	14.1	14.7	16.1	17.5	19.4	21.1	22.5
	50	0.36	0.65	0.88	1.26	1.65	2.10	2.62	2.80	3.58	4.07	4.64	5.31	5.70	6.51	7.40	8.15	9.26	10.0	11.9	13.0	14.2	15.4	16.6	17.3	19.0	20.7	22.9	25.0	26.6
	60	0.42	0.75	1.02	1.46	1.91	2.42	3.02	3.23	4.13	4.70	5.34	6.13	6.61	7.56	8.58	9.46	10.7	11.6	13.8	15.0	16.4	17.7	19.2	20.0	21.9	23.8	26.4	28.8	30.7
	70	0.48	0.86	1.16	1.67	2.17	2.75	3.43	3.66	4.68	5.32	6.05	6.96	7.53	8.61	9.77	10.8	12.2	13.2	15.6	17.0	18.5	20.1	21.7	22.7	24.8	27.0	30.0	32.7	34.9
	80	0.54	0.96	1.30	1.87	2.43	3.08	3.83	4.09	5.23	5.95	6.77	7.79	8.46	9.67	11.0	12.1	13.7	14.9	17.5	19.0	20.7	22.5	24.2	25.3	27.7	30.2	33.6	36.7	39.0
	90	0.60	1.07	1.44	2.08	2.69	3.40	4.23	4.51	5.78	6.58	7.49	8.62	9.38	10.7	12.2	13.4	15.2	16.5	19.3	21.0	22.9	24.9	26.8	28.0	30.7	33.5	37.2	40.6	43.2
	100	0.66	1.17	1.58	2.28	2.95	3.72	4.63	4.94	6.33	7.22	8.21	9.46	10.3	11.8	13.4	14.7	16.6	18.0	21.1	23.0	25.1	27.4	29.4	30.8	33.7	36.8	40.9	44.6	47.5
Vacuum Level In. Hg.	5	0.053	0.096	0.129	0.191	0.253	0.332	0.406	0.450	0.582	0.661	0.773	0.899	0.977	1.14	1.28	1.41	1.55	1.70	1.90	2.10	2.30	2.48	2.74	2.83	3.16	3.41	3.78	4.12	4.32
	10	0.069	0.124	0.168	0.246	0.324	0.421	0.519	0.564	0.730	0.834	0.972	1.12	1.24	1.41	1.58	1.79	1.96	2.18	2.44	2.68	2.89	3.13	3.44	3.58	4.00	4.30	4.77	5.16	5.43
	15 (Choked Flow)	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72
	20 (Choked Flow)	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72
	30 (Choked Flow)	0.075	0.134	0.185	0.268	0.351	0.455	0.566	0.614	0.792	0.902	1.07	1.22	1.35	1.55	1.75	1.94	2.19	2.32	2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72

	Orifice Diameter Inches	0.035	0.037	0.038	0.039	0.040	0.041	0.042	0.043	0.047	0.052	0.055	0.060	0.063	0.067	0.070	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.100	0.104	0.109	0.113	0.120	0.125
	Size Number	**35**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**47**	**52**	**55**	**60**	**63**	**67**	**70**	**73**	**76**	**79**	**81**	**86**	**89**	**94**	**96**	**100**	**104**	**109**	**113**	**120**	**125**
	Cv	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.10	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.20	0.21	0.23	0.25	0.27	0.31	0.34	0.37
Supply Pressure – psig	1	3.48	3.83	4.13	4.46	4.60	4.67	4.99	5.36	6.43	8.04	9.40	11.2	12.2	14.2	15.9	16.9	18.5	20.3	21.7	23.5	25.4	28.4	30.1	32.9	35.5	39.6	43.1	47.8	50.1
	5	7.67	8.48	9.09	9.70	10.2	10.6	11.3	12.1	14.2	17.6	20.3	23.9	26.1	30.3	33.8	36.1	39.4	43.1	46.0	51.1	54.9	61.9	65.0	70.8	76.6	84.8	92.1	102	108
	10	10.6	11.8	12.5	13.6	14.4	14.8	15.6	16.8	19.4	24.5	27.1	32.2	35.2	40.7	45.6	48.5	52.9	57.3	61.6	67.9	72.3	81.0	85.5	92.3	102	112	118	135	148
	15	13.1	14.5	15.4	16.7	17.7	18.2	19.1	20.4	23.6	29.7	32.9	39.0	42.6	49.3	55.3	58.8	64.0	69.4	74.5	82.1	87.3	97.8	103	111	123	135	143	163	178
	20	15.3	17.0	18.1	19.6	20.9	21.4	22.5	24.0	27.7	35.0	38.7	45.9	50.1	58.0	65.0	69.0	75.3	81.4	87.3	95.6	102	114	121	130	144	158	167	190	210
	25	17.7	19.6	20.8	22.6	24.0	24.7	25.9	27.6	31.9	40.3	44.6	52.8	57.7	66.7	74.7	79.3	86.4	93.5	100	110	117	131	138	149	164	180	191	219	241
	30	20.0	22.2	23.6	25.6	27.2	28.0	29.4	31.3	36.0	45.6	50.4	59.7	65.2	75.4	84.3	89.5	97.4	105	113	125	132	148	156	168	185	204	216	248	273
	40	24.8	27.4	31.7	31.6	33.6	34.6	36.3	38.7	44.5	56.3	62.2	73.6	80.3	92.7	104	110	120	129	139	153	162	181	191	207	228	251	267	306	337
	50	29.5	32.6	34.8	37.6	40.1	41.3	43.3	46.0	52.9	66.9	74.0	87.4	95.4	110	123	131	142	153	164	181	192	215	227	247	272	299	317	364	401
	60	34.3	38.0	40.6	43.8	46.7	48.1	50.3	53.5	61.5	77.7	85.8	101	110	127	142	151	164	177	189	210	223	250	264	286	315	347	368	422	465
	70	39.2	43.3	46.3	50.0	53.3	55.0	57.4	61.0	70.0	88.4	97.6	115	126	145	162	171	186	202	216	240	254	285	301	327	360	396	421	482	531
	80	44.0	48.7	52.1	56.2	60.0	61.9	64.5	68.5	78.6	99.1	109	129	141	162	181	191	209	227	242	269	285	320	338	367	404	445	472	541	596
	90	50.0	54.2	57.8	62.4	66.7	68.9	71.5	76.0	87.2	109	121	143	156	179	200	211	231	251	268	298	316	354	374	406	447	492	522	598	660
	100	53.9	59.6	63.7	68.7	73.5	77.3	78.6	83.5	95.8	120	133	156	171	196	221	234	255	277	296	329	349	392	413	449	494	544	578	662	729
Vacuum Level In. Hg.	5	4.92	5.40	5.81	6.29	6.76	6.82	7.29	7.67	9.08	11.3	12.4	14.8	17.1	20.0	22.5	23.9	26.0	28.3	30.2	33.2	35.9	40.1	41.8	45.3	49.0	53.9	57.9	65.3	70.9
	10	6.18	6.78	7.29	7.85	8.31	8.50	9.08	9.58	11.1	13.9	15.4	18.2	21.2	24.4	27.2	29.9	32.5	35.3	37.7	41.5	44.8	50.0	52.1	56.6	61.2	67.2	72.2	81.4	88.4
	15 (Choked Flow)	6.50	7.17	7.63	8.22	8.66	8.87	9.46	10.0	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59.0	63.8	70.1	75.3	84.9	92.2
	20 (Choked Flow)	6.50	7.17	7.63	8.22	8.66	8.87	9.46	10.0	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59.0	63.8	70.1	75.3	84.9	92.2
	30 (Choked Flow)	6.50	7.17	7.63	8.22	8.66	8.87	9.46	10.0	11.6	14.4	15.9	18.6	22.1	25.5	28.4	31.2	33.9	36.8	39.4	43.3	46.7	52.1	54.4	59.0	63.8	70.1	75.3	84.9	92.2

Standard Conditions 70°F, 14.7 psia

SCFH – Standard Cu. Ft. Per Hour
SLPM – Standard Liters Per Minute

Above data obtained with Type B restrictor. Flow rates for other metal restrictors are essentially the same as for Type B. Above data supercedes previous publications.

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Sapphire Orifice Air Flow – SLPM

	Orifice Diameter Inches	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0035	0.0039	0.0043	0.0047	0.0051	0.0055	0.0059	0.0063	0.0067	0.0071	0.0079	0.0087	0.0094	0.0102	0.0110	0.0118	0.0126	0.0134	0.0142	0.0157	0.0173	0.0189	0.0205	0.0213	0.0228	0.0252
	Size Number	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	32	34	36	40	44	48	52	54	58	64
	C_v	0.000030	0.000053	0.000090	0.00012	0.00017	0.00022	0.00028	0.00035	0.00042	0.00050	0.00061	0.00071	0.00084	0.00094	0.0011	0.0012	0.0015	0.0018	0.0021	0.0024	0.0028	0.0032	0.0036	0.0040	0.0046	0.0057	0.0067	0.0080	0.0091	0.010	0.011	0.013
Supply Pressure – psig	1	0.003	0.005	0.010	0.014	0.020	0.025	0.034	0.040	0.050	0.058	0.068	0.080	0.095	0.106	0.120	0.139	0.161	0.194	0.259	0.275	0.300	0.340	0.393	0.446	0.499	0.677	0.822	0.965	1.10	1.12	1.38	1.69
	5	0.009	0.013	0.027	0.036	0.047	0.059	0.076	0.093	0.108	0.136	0.159	0.192	0.223	0.256	0.273	0.313	0.350	0.430	0.584	0.623	0.695	0.800	0.933	1.06	1.20	1.51	1.81	2.16	2.50	2.57	3.26	4.06
	10	0.010	0.016	0.036	0.049	0.065	0.082	0.107	0.132	0.164	0.193	0.228	0.264	0.308	0.357	0.382	0.430	0.480	0.590	0.830	0.868	0.968	1.09	1.27	1.45	1.63	2.01	2.43	2.90	3.32	3.45	4.43	5.58
	15	0.014	0.021	0.046	0.062	0.082	0.104	0.134	0.166	0.205	0.240	0.285	0.329	0.386	0.443	0.482	0.535	0.613	0.755	1.05	1.11	1.24	1.42	1.63	1.85	2.09	2.56	3.08	3.69	4.26	4.43	5.55	7.08
	20	0.016	0.025	0.055	0.074	0.099	0.125	0.159	0.197	0.243	0.284	0.337	0.390	0.457	0.525	0.569	0.635	0.730	0.910	1.25	1.32	1.48	1.70	1.95	2.20	2.48	3.04	3.64	4.36	5.06	5.31	6.55	8.33
	25	0.019	0.030	0.063	0.087	0.115	0.144	0.184	0.229	0.280	0.327	0.389	0.450	0.526	0.605	0.654	0.733	0.843	1.05	1.44	1.52	1.70	1.95	2.24	2.52	2.84	3.50	4.19	5.03	5.81	6.11	7.53	9.55
	30	0.022	0.034	0.072	0.098	0.132	0.164	0.208	0.260	0.317	0.370	0.440	0.511	0.595	0.685	0.710	0.838	0.958	1.19	1.63	1.69	1.91	2.19	2.52	2.84	3.19	3.96	4.75	5.69	6.57	6.90	8.48	10.7
	40	0.027	0.043	0.089	0.122	0.163	0.203	0.257	0.321	0.390	0.456	0.543	0.632	0.734	0.845	0.880	1.04	1.18	1.47	2.02	2.11	2.35	2.67	3.07	3.46	3.90	4.89	5.86	7.02	8.10	8.50	10.4	13.1
	50	0.032	0.052	0.106	0.147	0.195	0.241	0.306	0.383	0.463	0.542	0.652	0.753	0.872	1.00	1.05	1.24	1.41	1.75	2.39	2.50	2.78	3.16	3.63	4.08	4.59	5.83	6.96	8.35	9.63	10.1	12.3	15.5
	60	0.037	0.061	0.123	0.171	0.227	0.280	0.356	0.445	0.536	0.630	0.751	0.875	1.01	1.16	1.23	1.45	1.64	2.03	2.77	2.89	3.20	3.63	4.17	4.69	5.29	6.77	8.10	9.69	11.1	11.7	14.2	17.9
	70	0.042	0.070	0.141	0.195	0.259	0.318	0.403	0.507	0.609	0.717	0.855	0.996	1.15	1.32	1.40	1.66	1.87	2.31	3.14	3.28	3.62	4.12	4.72	5.31	5.99	7.71	9.23	11.0	12.7	13.3	16.0	20.2
	80	0.047	0.080	0.158	0.200	0.292	0.357	0.453	0.569	0.683	0.804	0.959	1.12	1.28	1.48	1.57	1.86	2.09	2.59	3.51	3.66	4.04	4.68	5.28	5.93	6.69	8.65	10.4	12.3	14.3	14.8	17.9	22.6
	90	0.053	0.089	0.175	0.244	0.324	0.396	0.502	0.632	0.757	0.891	1.06	1.24	1.42	1.64	1.75	2.06	2.32	2.87	3.89	4.05	4.47	5.07	5.83	6.56	7.41	9.60	11.5	13.7	15.7	16.4	19.7	24.9
	100	0.058	0.098	0.193	0.269	0.356	0.435	0.551	0.692	0.830	0.978	1.17	1.36	1.56	1.80	1.92	2.27	2.55	3.15	4.26	4.44	4.89	5.57	6.38	7.18	8.12	10.6	12.6	15.0	17.2	18.0	21.6	27.3
Vacuum Level In. Hg.	5	0.003	0.006	0.014	0.020	0.028	0.036	0.047	0.057	0.073	0.085	0.100	0.116	0.137	0.156	0.169	0.199	0.229	0.277	0.377	0.401	0.451	0.510	0.591	0.673	0.764	0.982	1.16	1.38	1.61	1.64	2.13	2.61
	10	0.004	0.008	0.018	0.027	0.036	0.046	0.061	0.073	0.093	0.109	0.128	0.149	0.175	0.200	0.217	0.253	0.292	0.352	0.482	0.503	0.556	0.638	0.734	0.833	0.955	1.26	1.51	1.80	2.06	2.11	2.55	3.19
	15 (Choked Flow)	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48
	20 (Choked Flow)	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48
	30 (Choked Flow)	0.006	0.010	0.021	0.030	0.040	0.050	0.065	0.079	0.100	0.117	0.138	0.159	0.188	0.214	0.235	0.269	0.320	0.390	0.525	0.554	0.626	0.711	0.818	0.921	1.07	1.39	1.65	1.99	2.31	2.39	2.77	3.48

Sapphire Orifice Air Flow – SCFH

	Orifice Diameter Inches	0.0012	0.0016	0.0020	0.0024	0.0028	0.0031	0.0035	0.0039	0.0043	0.0047	0.0051	0.0055	0.0059	0.0063	0.0067	0.0071	0.0079	0.0087	0.0094	0.0102	0.0110	0.0118	0.0126	0.0134	0.0142	0.0157	0.0173	0.0189	0.0205	0.0213	0.0228	0.0252
	Size Number	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	22	24	26	28	30	32	34	36	40	44	48	52	54	58	64
	C_v	0.000030	0.000053	0.000090	0.00012	0.00017	0.00022	0.00028	0.00035	0.00042	0.00050	0.00061	0.00071	0.00084	0.00094	0.0011	0.0012	0.0015	0.0018	0.0021	0.0024	0.0028	0.0032	0.0036	0.0040	0.0046	0.0057	0.0067	0.0080	0.0091	0.010	0.011	0.013
Supply Pressure – psig	1	0.007	0.011	0.021	0.030	0.042	0.053	0.072	0.085	0.106	0.123	0.144	0.169	0.201	0.225	0.254	0.294	0.341	0.411	0.549	0.583	0.636	0.720	0.833	0.945	1.06	1.43	1.74	2.04	2.33	2.37	2.92	3.58
	5	0.019	0.027	0.056	0.075	0.100	0.124	0.161	0.197	0.228	0.288	0.337	0.407	0.471	0.542	0.577	0.663	0.740	0.911	1.24	1.32	1.47	1.70	1.98	2.25	2.53	3.20	3.83	4.58	5.30	5.44	6.90	8.60
	10	0.021	0.034	0.076	0.104	0.138	0.174	0.227	0.280	0.347	0.409	0.483	0.559	0.653	0.756	0.809	0.911	1.02	1.25	1.76	1.84	2.05	2.31	2.69	3.07	3.45	4.26	5.15	6.14	7.03	7.31	9.39	11.8
	15	0.030	0.044	0.097	0.131	0.174	0.220	0.284	0.352	0.434	0.508	0.604	0.697	0.818	0.939	1.02	1.13	1.30	1.60	2.22	2.35	2.63	3.01	3.45	3.92	4.43	5.42	6.53	7.82	9.03	9.39	11.8	15.0
	20	0.034	0.053	0.117	0.157	0.210	0.265	0.337	0.417	0.515	0.602	0.714	0.826	0.968	1.11	1.21	1.35	1.55	1.93	2.65	2.80	3.14	3.60	4.13	4.66	5.25	6.44	7.71	9.24	10.7	11.3	13.9	17.6
	25	0.040	0.064	0.133	0.184	0.244	0.305	0.390	0.485	0.593	0.693	0.824	0.953	1.11	1.28	1.39	1.55	1.79	2.22	3.05	3.22	3.60	4.13	4.75	5.34	6.02	7.42	8.88	10.7	12.3	12.9	16.0	20.2
	30	0.046	0.072	0.152	0.208	0.280	0.347	0.441	0.551	0.672	0.784	0.932	1.08	1.26	1.45	1.50	1.78	2.03	2.52	3.45	3.58	4.05	4.64	5.34	6.02	6.76	8.39	10.1	12.1	13.9	14.6	18.0	22.7
	40	0.057	0.091	0.189	0.258	0.345	0.430	0.544	0.680	0.826	0.966	1.15	1.34	1.56	1.79	1.86	2.20	2.50	3.11	4.28	4.47	4.98	5.66	6.50	7.33	8.26	10.4	12.4	14.9	17.2	18.0	22.0	27.8
	50	0.068	0.110	0.225	0.311	0.413	0.511	0.648	0.811	0.981	1.15	1.38	1.60	1.85	2.13	2.22	2.63	2.99	3.71	5.06	5.30	5.89	6.69	7.69	8.64	9.72	12.4	14.7	17.7	20.4	21.4	26.1	32.8
	60	0.079	0.129	0.261	0.362	0.481	0.593	0.754	0.943	1.14	1.33	1.59	1.85	2.14	2.46	2.61	3.07	3.47	4.30	5.87	6.12	6.78	7.69	8.83	9.94	11.2	14.3	17.2	20.5	23.5	24.8	30.1	37.9
	70	0.089	0.149	0.299	0.413	0.549	0.674	0.854	1.07	1.29	1.52	1.81	2.11	2.43	2.80	2.97	3.52	3.96	4.89	6.65	6.95	7.67	8.73	10.0	11.3	12.7	16.3	19.6	23.3	26.9	28.2	33.9	42.8
	80	0.100	0.168	0.335	0.424	0.619	0.756	0.960	1.21	1.45	1.70	2.03	2.37	2.72	3.13	3.33	3.94	4.43	5.49	7.44	7.75	8.56	9.75	11.2	12.6	14.2	18.3	22.0	26.1	30.3	31.4	37.9	47.9
	90	0.111	0.188	0.371	0.517	0.686	0.839	1.06	1.34	1.60	1.89	2.25	2.62	3.01	3.47	3.71	4.36	4.92	6.08	8.24	8.58	9.47	10.7	12.4	13.9	15.7	20.3	24.4	29.0	33.3	34.7	41.7	52.8
	100	0.122	0.208	0.409	0.570	0.754	0.922	1.17	1.47	1.76	2.07	2.47	2.88	3.30	3.81	4.07	4.81	5.40	6.67	9.03	9.41	10.4	11.8	13.5	15.2	17.2	22.5	26.7	31.8	36.4	38.1	45.8	57.8
Vacuum Level In. Hg.	5	0.007	0.013	0.029	0.043	0.059	0.076	0.100	0.121	0.154	0.180	0.212	0.246	0.290	0.331	0.358	0.422	0.485	0.587	0.799	0.850	0.956	1.08	1.25	1.43	1.62	2.08	2.46	2.92	3.41	3.47	4.51	5.53
	10	0.009	0.018	0.039	0.057	0.076	0.098	0.128	0.155	0.197	0.231	0.271	0.316	0.371	0.424	0.460	0.536	0.619	0.746	1.02	1.07	1.18	1.35	1.56	1.76	2.02	2.67	3.19	3.81	4.36	4.47	5.40	6.76
	15 (Choked Flow)	0.012	0.020	0.045	0.063	0.085	0.107	0.138	0.168	0.212	0.248	0.292	0.337	0.398	0.453	0.498	0.570	0.678	0.826	1.11	1.17	1.33	1.51	1.73	1.95	2.26	2.95	3.50	4.22	4.89	5.06	5.87	7.37
	20 (Choked Flow)	0.012	0.020	0.045	0.063	0.085	0.107	0.138	0.168	0.212	0.248	0.292	0.337	0.398	0.453	0.498	0.570	0.678	0.826	1.11	1.17	1.33	1.51	1.73	1.95	2.26	2.95	3.50	4.22	4.89	5.06	5.87	7.37
	30 (Choked Flow)	0.012	0.020	0.045	0.063	0.085	0.107	0.138	0.168	0.212	0.248	0.292	0.337	0.398	0.453	0.498	0.570	0.678	0.826	1.11	1.17	1.33	1.51	1.73	1.95	2.26	2.95	3.50	4.22	4.89	5.06	5.87	7.37

Standard Conditions 70°F, 14.7 psia

SCFH – Standard Cu. Ft. Per Hour
SLPM – Standard Liters Per Minute

Above data obtained with Type S restrictors. Flow rates for other sapphire types are essentially the same as for Type S. Above data supercedes previous publications.

O'Keefe Controls Co.
P.O. BOX Q • TRUMBULL, CONNECTICUT 06611 • CT PHONE (203) 261-6711 • TOLL FREE PHONE (800) 533-3285 • FAX (203) 261-8331

Metal Orifice Water Flow – Gallons/minute

Orifice Diameter Inches	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.020	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033
Size Number	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**31**	**32**	**33**
C_v	0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
Supply Pressure – psig																													
1	0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
2	0.00049	0.0009	0.0012	0.0017	0.0021	0.0027	0.0035	0.0040	0.0048	0.0054	0.0061	0.0071	0.0078	0.0095	0.0103	0.0113	0.012	0.014	0.016	0.017	0.018	0.020	0.023	0.024	0.025	0.027	0.031	0.034	0.035
3	0.00061	0.0011	0.0015	0.0021	0.0026	0.0033	0.0043	0.0048	0.0059	0.0066	0.0074	0.0087	0.0095	0.0116	0.0126	0.0139	0.015	0.017	0.019	0.021	0.023	0.024	0.028	0.029	0.031	0.033	0.038	0.042	0.043
4	0.00070	0.0012	0.0017	0.0024	0.0030	0.0038	0.0050	0.0056	0.0068	0.0076	0.0086	0.0100	0.0110	0.0134	0.0146	0.0160	0.018	0.019	0.022	0.024	0.026	0.028	0.032	0.034	0.036	0.038	0.044	0.048	0.050
5	0.00078	0.0014	0.0019	0.0027	0.0034	0.0042	0.0056	0.0063	0.0076	0.0085	0.0096	0.0112	0.0123	0.0150	0.0163	0.0179	0.020	0.021	0.025	0.027	0.029	0.031	0.036	0.038	0.040	0.042	0.049	0.054	0.056
6	0.00086	0.0015	0.0021	0.0029	0.0037	0.0047	0.0061	0.0069	0.0083	0.0093	0.0105	0.0122	0.0135	0.0164	0.0179	0.0196	0.022	0.024	0.027	0.029	0.032	0.034	0.039	0.042	0.044	0.047	0.054	0.059	0.061
7	0.00093	0.0016	0.0023	0.0032	0.0040	0.0050	0.0066	0.0074	0.0090	0.0101	0.0114	0.0132	0.0146	0.0177	0.0193	0.0212	0.023	0.025	0.029	0.032	0.034	0.037	0.042	0.045	0.048	0.050	0.058	0.063	0.066
8	0.00099	0.0017	0.0024	0.0034	0.0042	0.0054	0.0071	0.0079	0.0096	0.0107	0.0122	0.0141	0.0156	0.0190	0.0206	0.0226	0.025	0.027	0.031	0.034	0.037	0.040	0.045	0.048	0.051	0.054	0.062	0.068	0.071
9	0.00105	0.0018	0.0026	0.0036	0.0045	0.0057	0.0075	0.0084	0.0102	0.0114	0.0129	0.0150	0.0165	0.0201	0.0219	0.0240	0.026	0.029	0.033	0.036	0.039	0.042	0.048	0.051	0.054	0.057	0.066	0.072	0.075
10	0.00111	0.0019	0.0027	0.0038	0.0047	0.0060	0.0079	0.0089	0.0108	0.0120	0.0136	0.0158	0.0174	0.0212	0.0231	0.0253	0.028	0.030	0.035	0.038	0.041	0.044	0.051	0.054	0.057	0.060	0.070	0.076	0.079
15	0.00136	0.0024	0.0033	0.0046	0.0058	0.0074	0.0097	0.0108	0.0132	0.0147	0.0167	0.0194	0.0213	0.0259	0.0283	0.0310	0.034	0.037	0.043	0.046	0.050	0.054	0.062	0.066	0.070	0.074	0.085	0.093	0.097
20	0.00157	0.0027	0.0038	0.0054	0.0067	0.0085	0.0112	0.0125	0.0152	0.0170	0.0192	0.0224	0.0246	0.0300	0.0326	0.0358	0.039	0.043	0.049	0.054	0.058	0.063	0.072	0.076	0.080	0.085	0.098	0.107	0.112
30	0.00192	0.0033	0.0047	0.0066	0.0082	0.0104	0.0137	0.0153	0.0186	0.0208	0.0236	0.0274	0.0301	0.0367	0.0400	0.0438	0.048	0.053	0.060	0.066	0.071	0.077	0.088	0.093	0.099	0.104	0.120	0.131	0.137
40	0.00221	0.0039	0.0054	0.0076	0.0095	0.0120	0.0158	0.0177	0.0215	0.0240	0.0272	0.0316	0.0348	0.0424	0.0462	0.0506	0.056	0.061	0.070	0.076	0.082	0.089	0.101	0.108	0.114	0.120	0.139	0.152	0.158
50	0.00247	0.0043	0.0061	0.0085	0.0106	0.0134	0.0177	0.0198	0.0240	0.0269	0.0304	0.0354	0.0389	0.0474	0.0516	0.0566	0.062	0.068	0.078	0.085	0.092	0.099	0.113	0.120	0.127	0.134	0.156	0.170	0.177
60	0.00271	0.0047	0.0067	0.0093	0.0116	0.0147	0.0194	0.0217	0.0263	0.0294	0.0333	0.0387	0.0426	0.0519	0.0565	0.0620	0.068	0.074	0.085	0.093	0.101	0.108	0.124	0.132	0.139	0.147	0.170	0.186	0.194
70	0.00293	0.0051	0.0072	0.0100	0.0125	0.0159	0.0209	0.0234	0.0284	0.0318	0.0360	0.0418	0.0460	0.0561	0.0611	0.0669	0.074	0.080	0.092	0.100	0.109	0.117	0.134	0.142	0.151	0.159	0.184	0.201	0.209
80	0.00313	0.0055	0.0077	0.0107	0.0134	0.0170	0.0224	0.0250	0.0304	0.0340	0.0385	0.0447	0.0492	0.0599	0.0653	0.0716	0.079	0.086	0.098	0.107	0.116	0.125	0.143	0.152	0.161	0.170	0.197	0.215	0.224
90	0.00332	0.0058	0.0082	0.0114	0.0142	0.0180	0.0237	0.0266	0.0323	0.0360	0.0408	0.0474	0.0522	0.0636	0.0693	0.0759	0.083	0.091	0.104	0.114	0.123	0.133	0.152	0.161	0.171	0.180	0.209	0.228	0.237
100	0.00350	0.0061	0.0086	0.0120	0.0150	0.0190	0.0250	0.0280	0.0340	0.0380	0.0430	0.0500	0.0550	0.0670	0.0730	0.0800	0.088	0.096	0.110	0.120	0.130	0.140	0.160	0.170	0.180	0.190	0.220	0.240	0.250

Orifice Diameter Inches	0.035	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.047	0.052	0.055	0.06	0.063	0.067	0.07	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.1	0.104	0.109	0.113	0.12	0.125
Size Number	**35**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**47**	**52**	**55**	**60**	**63**	**67**	**70**	**73**	**76**	**79**	**81**	**86**	**89**	**94**	**96**	**100**	**104**	**109**	**113**	**120**	**125**
C_v	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370
Supply Pressure – psig																													
1	0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370
2	0.040	0.044	0.045	0.047	0.051	0.054	0.055	0.058	0.068	0.083	0.096	0.115	0.124	0.141	0.156	0.170	0.184	0.198	0.212	0.240	0.255	0.283	0.297	0.325	0.354	0.382	0.438	0.481	0.523
3	0.048	0.054	0.055	0.057	0.062	0.066	0.068	0.071	0.083	0.102	0.118	0.140	0.152	0.173	0.191	0.208	0.225	0.242	0.260	0.294	0.312	0.346	0.364	0.398	0.433	0.468	0.537	0.589	0.641
4	0.056	0.062	0.064	0.066	0.072	0.076	0.078	0.082	0.096	0.118	0.136	0.162	0.176	0.200	0.220	0.240	0.260	0.280	0.300	0.340	0.360	0.400	0.420	0.460	0.500	0.540	0.620	0.680	0.740
5	0.063	0.069	0.072	0.074	0.080	0.085	0.087	0.092	0.107	0.132	0.152	0.181	0.197	0.224	0.246	0.268	0.291	0.313	0.335	0.380	0.402	0.447	0.470	0.514	0.559	0.604	0.693	0.760	0.827
6	0.069	0.076	0.078	0.081	0.088	0.093	0.096	0.100	0.118	0.145	0.167	0.198	0.216	0.245	0.269	0.294	0.318	0.343	0.367	0.416	0.441	0.490	0.514	0.563	0.612	0.661	0.759	0.833	0.906
7	0.074	0.082	0.085	0.087	0.095	0.101	0.103	0.108	0.127	0.156	0.180	0.214	0.233	0.265	0.291	0.317	0.344	0.370	0.397	0.450	0.476	0.529	0.556	0.609	0.661	0.714	0.820	0.900	0.979
8	0.079	0.088	0.091	0.093	0.102	0.107	0.110	0.116	0.136	0.167	0.192	0.229	0.249	0.283	0.311	0.339	0.368	0.396	0.424	0.481	0.509	0.566	0.594	0.651	0.707	0.764	0.877	0.962	1.047
9	0.084	0.093	0.096	0.099	0.108	0.114	0.117	0.123	0.144	0.177	0.204	0.243	0.264	0.300	0.330	0.360	0.390	0.420	0.450	0.510	0.540	0.600	0.630	0.690	0.750	0.810	0.930	1.020	1.110
10	0.089	0.098	0.101	0.104	0.114	0.120	0.123	0.130	0.152	0.187	0.215	0.256	0.278	0.316	0.348	0.379	0.411	0.443	0.474	0.538	0.569	0.632	0.664	0.727	0.791	0.854	0.980	1.075	1.170
15	0.108	0.120	0.124	0.128	0.139	0.147	0.151	0.159	0.186	0.229	0.263	0.314	0.341	0.387	0.426	0.465	0.503	0.542	0.581	0.658	0.697	0.775	0.813	0.891	0.968	1.046	1.201	1.317	1.433
20	0.125	0.139	0.143	0.148	0.161	0.170	0.174	0.183	0.215	0.264	0.304	0.362	0.394	0.447	0.492	0.537	0.581	0.626	0.671	0.760	0.805	0.894	0.939	1.029	1.118	1.207	1.386	1.521	1.655
30	0.153	0.170	0.175	0.181	0.197	0.208	0.214	0.225	0.263	0.323	0.372	0.444	0.482	0.548	0.602	0.657	0.712	0.767	0.822	0.931	0.986	1.095	1.150	1.260	1.369	1.479	1.698	1.862	2.027
40	0.177	0.196	0.202	0.209	0.228	0.240	0.247	0.259	0.304	0.373	0.430	0.512	0.557	0.632	0.696	0.759	0.822	0.885	0.949	1.075	1.138	1.265	1.328	1.455	1.581	1.708	1.961	2.150	2.340
50	0.198	0.219	0.226	0.233	0.255	0.269	0.276	0.290	0.339	0.417	0.481	0.573	0.622	0.707	0.778	0.849	0.919	0.990	1.061	1.202	1.273	1.414	1.485	1.626	1.768	1.909	2.192	2.404	2.616
60	0.217	0.240	0.248	0.256	0.279	0.294	0.302	0.318	0.372	0.457	0.527	0.627	0.682	0.775	0.852	0.930	1.007	1.084	1.162	1.317	1.394	1.549	1.627	1.782	1.936	2.091	2.401	2.634	2.866
70	0.234	0.259	0.268	0.276	0.301	0.318	0.326	0.343	0.402	0.494	0.569	0.678	0.736	0.837	0.920	1.004	1.088	1.171	1.255	1.422	1.506	1.673	1.757	1.924	2.092	2.259	2.594	2.845	3.096
80	0.250	0.277	0.286	0.295	0.322	0.340	0.349	0.367	0.429	0.528	0.608	0.724	0.787	0.894	0.984	1.073	1.163	1.252	1.342	1.521	1.610	1.789	1.878	2.057	2.236	2.415	2.773	3.041	3.309
90	0.266	0.294	0.304	0.313	0.342	0.360	0.370	0.389	0.455	0.560	0.645	0.768	0.835	0.949	1.044	1.138	1.233	1.328	1.423	1.613	1.708	1.897	1.992	2.182	2.372	2.561	2.941	3.226	3.510
100	0.280	0.310	0.320	0.330	0.360	0.380	0.390	0.410	0.480	0.590	0.680	0.810	0.880	1.000	1.100	1.200	1.300	1.400	1.500	1.700	1.800	2.000	2.100	2.300	2.500	2.700	3.100	3.400	3.700

Above chart data calculated based on the C_V for each orifice. Flow = $C_V \sqrt{\Delta P}$. ΔP = differential pressure in psid. It is assumed that the region on either side of the orifice is fully flooded with no air pockets.

Metal Orifice Water Flow – Liters/minute

Orifice Diameter Inches		0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.017	0.018	0.019	0.02	0.021	0.022	0.023	0.024	0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033
Size Number		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	31	32	33
C_v		0.00035	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0028	0.0034	0.0038	0.0043	0.0050	0.0055	0.0067	0.0073	0.0080	0.009	0.010	0.011	0.012	0.013	0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
Supply Pressure – psig	1	0.0013	0.0023	0.0033	0.0045	0.0057	0.0072	0.0095	0.0106	0.0129	0.0144	0.0163	0.0189	0.0208	0.0254	0.0276	0.0303	0.033	0.036	0.042	0.045	0.049	0.053	0.061	0.064	0.068	0.072	0.083	0.091	0.095
	2	0.0019	0.0033	0.0046	0.0064	0.0080	0.0102	0.0134	0.0150	0.0182	0.0203	0.0230	0.0268	0.0294	0.0359	0.0391	0.0428	0.047	0.051	0.059	0.064	0.070	0.075	0.086	0.091	0.096	0.102	0.118	0.128	0.134
	3	0.0023	0.0040	0.0056	0.0079	0.0098	0.0125	0.0164	0.0184	0.0223	0.0249	0.0282	0.0328	0.0361	0.0439	0.0479	0.0525	0.058	0.063	0.072	0.079	0.085	0.092	0.105	0.111	0.118	0.125	0.144	0.157	0.164
	4	0.0026	0.0046	0.0065	0.0091	0.0114	0.0144	0.0189	0.0212	0.0257	0.0288	0.0326	0.0379	0.0416	0.0507	0.0553	0.0606	0.067	0.073	0.083	0.091	0.098	0.106	0.121	0.129	0.136	0.144	0.167	0.182	0.189
	5	0.0030	0.0052	0.0073	0.0102	0.0127	0.0161	0.0212	0.0237	0.0288	0.0322	0.0364	0.0423	0.0466	0.0567	0.0618	0.0677	0.074	0.081	0.093	0.102	0.110	0.119	0.135	0.144	0.152	0.161	0.186	0.203	0.212
	6	0.0032	0.0057	0.0080	0.0111	0.0139	0.0176	0.0232	0.0260	0.0315	0.0352	0.0399	0.0464	0.0510	0.0621	0.0677	0.0742	0.082	0.089	0.102	0.111	0.121	0.130	0.148	0.158	0.167	0.176	0.204	0.223	0.232
	7	0.0035	0.0061	0.0086	0.0120	0.0150	0.0190	0.0250	0.0280	0.0341	0.0381	0.0431	0.0501	0.0551	0.0671	0.0731	0.0801	0.088	0.096	0.110	0.120	0.130	0.140	0.160	0.170	0.180	0.190	0.220	0.240	0.250
	8	0.0037	0.0065	0.0092	0.0128	0.0161	0.0203	0.0268	0.0300	0.0364	0.0407	0.0460	0.0535	0.0589	0.0717	0.0782	0.0857	0.094	0.103	0.118	0.128	0.139	0.150	0.171	0.182	0.193	0.203	0.236	0.257	0.268
	9	0.0040	0.0069	0.0098	0.0136	0.0170	0.0216	0.0284	0.0318	0.0386	0.0432	0.0488	0.0568	0.0625	0.0761	0.0829	0.0908	0.100	0.109	0.125	0.136	0.148	0.159	0.182	0.193	0.204	0.216	0.250	0.273	0.284
	10	0.0042	0.0073	0.0103	0.0144	0.0180	0.0227	0.0299	0.0335	0.0407	0.0455	0.0515	0.0599	0.0658	0.0802	0.0874	0.0958	0.105	0.115	0.132	0.144	0.156	0.168	0.192	0.203	0.215	0.227	0.263	0.287	0.299
	15	0.0051	0.0089	0.0126	0.0176	0.0220	0.0279	0.0367	0.0411	0.0498	0.0557	0.0630	0.0733	0.0806	0.0982	0.1070	0.1173	0.129	0.141	0.161	0.176	0.191	0.205	0.235	0.249	0.264	0.279	0.323	0.352	0.367
	20	0.0059	0.0103	0.0146	0.0203	0.0254	0.0322	0.0423	0.0474	0.0576	0.0643	0.0728	0.0846	0.0931	0.1134	0.1236	0.1354	0.149	0.163	0.186	0.203	0.220	0.237	0.271	0.288	0.305	0.322	0.372	0.406	0.423
	30	0.0073	0.0126	0.0178	0.0249	0.0311	0.0394	0.0518	0.0581	0.0705	0.0788	0.0892	0.1037	0.1140	0.1389	0.1514	0.1659	0.182	0.199	0.228	0.249	0.270	0.290	0.332	0.352	0.373	0.394	0.456	0.498	0.518
	40	0.0084	0.0146	0.0206	0.0287	0.0359	0.0455	0.0599	0.0670	0.0814	0.0910	0.1029	0.1197	0.1317	0.1604	0.1748	0.1915	0.211	0.230	0.263	0.287	0.311	0.335	0.383	0.407	0.431	0.455	0.527	0.575	0.599
	50	0.0094	0.0163	0.0230	0.0321	0.0402	0.0509	0.0669	0.0749	0.0910	0.1017	0.1151	0.1338	0.1472	0.1793	0.1954	0.2141	0.236	0.257	0.294	0.321	0.348	0.375	0.428	0.455	0.482	0.509	0.589	0.642	0.669
	60	0.0103	0.0179	0.0252	0.0352	0.0440	0.0557	0.0733	0.0821	0.0997	0.1114	0.1261	0.1466	0.1613	0.1965	0.2140	0.2346	0.258	0.281	0.323	0.352	0.381	0.411	0.469	0.498	0.528	0.557	0.645	0.704	0.733
	70	0.0111	0.0193	0.0272	0.0380	0.0475	0.0602	0.0792	0.0887	0.1077	0.1203	0.1362	0.1584	0.1742	0.2122	0.2312	0.2534	0.279	0.304	0.348	0.380	0.412	0.443	0.507	0.538	0.570	0.602	0.697	0.760	0.792
	80	0.0119	0.0207	0.0291	0.0406	0.0508	0.0643	0.0846	0.0948	0.1151	0.1287	0.1456	0.1693	0.1862	0.2268	0.2472	0.2709	0.298	0.325	0.372	0.406	0.440	0.474	0.542	0.576	0.609	0.643	0.745	0.813	0.846
	90	0.0126	0.0219	0.0309	0.0431	0.0539	0.0682	0.0898	0.1006	0.1221	0.1365	0.1544	0.1796	0.1975	0.2406	0.2622	0.2873	0.316	0.345	0.395	0.431	0.467	0.503	0.575	0.610	0.646	0.682	0.790	0.862	0.898
	100	0.0132	0.0231	0.0326	0.0454	0.0568	0.0719	0.0946	0.1060	0.1287	0.1438	0.1628	0.1893	0.2082	0.2536	0.2763	0.3028	0.333	0.363	0.416	0.454	0.492	0.530	0.606	0.644	0.681	0.719	0.833	0.908	0.946

Orifice Diameter Inches		0.035	0.037	0.038	0.039	0.04	0.041	0.042	0.043	0.047	0.052	0.055	0.06	0.063	0.067	0.07	0.073	0.076	0.079	0.081	0.086	0.089	0.094	0.096	0.1	0.104	0.109	0.113	0.12	0.125
Size Number		35	37	38	39	40	41	42	43	47	52	55	60	63	67	70	73	76	79	81	86	89	94	96	100	104	109	113	120	125
C_v		0.028	0.031	0.032	0.033	0.036	0.038	0.039	0.041	0.048	0.059	0.068	0.081	0.088	0.100	0.110	0.120	0.130	0.140	0.150	0.170	0.180	0.200	0.210	0.230	0.250	0.270	0.310	0.340	0.370
Supply Pressure – psig	1	0.106	0.117	0.121	0.125	0.136	0.144	0.148	0.155	0.182	0.223	0.257	0.307	0.333	0.379	0.416	0.454	0.492	0.530	0.568	0.644	0.681	0.757	0.795	0.871	0.946	1.022	1.173	1.287	1.401
	2	0.150	0.166	0.171	0.177	0.193	0.203	0.209	0.219	0.257	0.316	0.364	0.434	0.471	0.535	0.589	0.642	0.696	0.749	0.803	0.910	0.964	1.071	1.124	1.231	1.338	1.445	1.660	1.820	1.981
	3	0.184	0.203	0.210	0.216	0.236	0.249	0.256	0.269	0.315	0.387	0.446	0.531	0.577	0.656	0.721	0.787	0.852	0.918	0.983	1.115	1.180	1.311	1.377	1.508	1.639	1.770	2.033	2.229	2.426
	4	0.212	0.235	0.242	0.250	0.273	0.288	0.295	0.310	0.363	0.447	0.515	0.613	0.666	0.757	0.833	0.908	0.984	1.060	1.136	1.287	1.363	1.514	1.590	1.741	1.893	2.044	2.347	2.574	2.801
	5	0.237	0.262	0.271	0.279	0.305	0.322	0.330	0.347	0.406	0.499	0.576	0.686	0.745	0.846	0.931	1.016	1.100	1.185	1.270	1.439	1.524	1.693	1.778	1.947	2.116	2.285	2.624	2.878	3.132
	6	0.260	0.287	0.297	0.306	0.334	0.352	0.362	0.380	0.445	0.547	0.631	0.751	0.816	0.927	1.020	1.113	1.205	1.298	1.391	1.576	1.669	1.854	1.947	2.133	2.318	2.504	2.874	3.153	3.431
	7	0.280	0.310	0.320	0.331	0.361	0.381	0.391	0.411	0.481	0.591	0.681	0.811	0.881	1.002	1.102	1.202	1.302	1.402	1.502	1.703	1.803	2.003	2.103	2.304	2.504	2.704	3.105	3.405	3.706
	8	0.300	0.332	0.343	0.353	0.385	0.407	0.418	0.439	0.514	0.632	0.728	0.867	0.942	1.071	1.178	1.285	1.392	1.499	1.606	1.820	1.927	2.141	2.248	2.463	2.677	2.891	3.319	3.640	3.961
	9	0.318	0.352	0.363	0.375	0.409	0.432	0.443	0.466	0.545	0.670	0.772	0.920	0.999	1.136	1.249	1.363	1.476	1.590	1.703	1.931	2.044	2.271	2.385	2.612	2.839	3.066	3.520	3.861	4.202
	10	0.335	0.371	0.383	0.395	0.431	0.455	0.467	0.491	0.575	0.706	0.814	0.970	1.053	1.197	1.317	1.436	1.556	1.676	1.796	2.035	2.155	2.394	2.514	2.753	2.993	3.232	3.711	4.070	4.429
	15	0.411	0.454	0.469	0.484	0.528	0.557	0.572	0.601	0.704	0.865	0.997	1.188	1.290	1.466	1.613	1.759	1.906	2.053	2.199	2.492	2.639	2.932	3.079	3.372	3.665	3.958	4.545	4.985	5.424
	20	0.474	0.525	0.542	0.559	0.609	0.643	0.660	0.694	0.813	0.999	1.151	1.371	1.490	1.693	1.862	2.031	2.201	2.370	2.539	2.878	3.047	3.386	3.555	3.894	4.232	4.571	5.248	5.756	6.264
	30	0.581	0.643	0.663	0.684	0.746	0.788	0.809	0.850	0.995	1.223	1.410	1.679	1.825	2.073	2.281	2.488	2.695	2.903	3.110	3.525	3.732	4.147	4.354	4.769	5.183	5.598	6.427	7.049	7.671
	40	0.670	0.742	0.766	0.790	0.862	0.910	0.934	0.982	1.149	1.413	1.628	1.939	2.107	2.394	2.634	2.873	3.112	3.352	3.591	4.070	4.309	4.788	5.028	5.506	5.985	6.464	7.422	8.140	8.858
	50	0.749	0.830	0.857	0.883	0.964	1.017	1.044	1.097	1.285	1.579	1.820	2.168	2.355	2.677	2.944	3.212	3.480	3.747	4.015	4.550	4.818	5.353	5.621	6.156	6.692	7.227	8.298	9.101	9.904
	60	0.821	0.909	0.938	0.968	1.056	1.114	1.144	1.202	1.407	1.730	1.994	2.375	2.580	2.932	3.225	3.519	3.812	4.105	4.398	4.985	5.278	5.864	6.158	6.744	7.330	7.917	9.090	9.969	10.849
	70	0.887	0.982	1.013	1.045	1.140	1.203	1.235	1.299	1.520	1.869	2.154	2.565	2.787	3.167	3.484	3.801	4.117	4.434	4.751	5.384	5.701	6.334	6.651	7.284	7.918	8.551	9.818	10.768	11.718
	80	0.948	1.050	1.083	1.117	1.219	1.287	1.320	1.388	1.625	1.998	2.302	2.742	2.979	3.386	3.724	4.063	4.401	4.740	5.079	5.756	6.094	6.772	7.110	7.787	8.464	9.142	10.496	11.512	12.527
	90	1.006	1.113	1.149	1.185	1.293	1.365	1.401	1.472	1.724	2.119	2.442	2.909	3.160	3.591	3.950	4.309	4.668	5.028	5.387	6.105	6.464	7.182	7.541	8.260	8.978	9.696	11.133	12.210	13.287
	100	1.060	1.173	1.211	1.249	1.363	1.438	1.476	1.552	1.817	2.233	2.574	3.066	3.331	3.785	4.164	4.542	4.921	5.300	5.678	6.435	6.814	7.571	7.949	8.706	9.464	10.221	11.735	12.870	14.006

Above chart data calculated based on the C_V for each orifice. Flow = 3.875 $C_V \sqrt{\Delta P}$. ΔP = differential pressure in psid. It is assumed that the region on either side of the orifice is fully flooded with no air pockets.

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