EXTRAPOLATION

1. Specific Gravity

Other Gases

To convert air flow from chart to another gas flow.

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

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

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

 T_S = standard absolute temperature ${}^{\circ}R$ $({}^{\circ}R = 460 + {}^{\circ}F).$

 T_T = non standard absolute temperature ${}^{\circ}R$.

 $Q_S = \text{flow from chart at } 70^{\circ}\text{F} = 530^{\circ}\text{R}.$

 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

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

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.

$$d_L = .060 \ \sqrt{\frac{Q_L}{Q_{60}}}$$
 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,

 $Q_{60} = 87.4 \text{ SLPM (from chart)}$

 $Q_{I} = 600 \text{ SLPM } @ 50 \text{ psig}$

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

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.

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

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

EXAMPLE:

Flow rate required = .5 GPM @ $\Delta P = 1.0 \text{ psi}$

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

Also, to obtain the C_V

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

 C_{VI} is the C_{V} for the orifice with diameter = d_{I} .

MISCELLANEOUS

Conversion Factors

A. Gas Flow

SCFH - standard cu. ft. per hour

SLPM - standard liters per minute

SCCM - standard cu. cm. per minute

 $SCFH \times .472 = SLPM$

 $SCFH \times 472 = SCCM$

 $SLPM \times 1000 = SCCM$

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

 $GPM \times 3785 = CCM$

GPM x . 1337 = CFM

GPM x 8.021 = CFH

 $CCM \times .001 = LPM$

EXAMPLE:

25 GPM x 3.785 = 94.625 LPM

C. Pressure - Gases or Liquids

PSIG - pounds per sq. in. gage

Kg/CM² - kilograms per sq. cm

KPA - kilo pascals

Bar - unit of pressure equal to 1 atmos.

In-H₂O - pressure produced by $1'' H_2O$

PSIG x $.0703 = \text{Kg/CM}^2$

 $PSIG \times 6.895 = KPA$

PSIG x .0689 = Bars

 $PSIG \times 27.68 = In. H_2O$

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 $C_{\rm v}$ 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:

 $Q = C_{\rm v} \sqrt{\frac{\Delta P}{\rm S.G}}$

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 @ 60°F

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

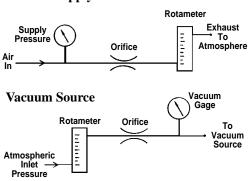
Rotameters for measurement of air or other gas flows must be used for the conditions for which they are calibrated. Typically they are calibrated for the following:

- Air Flow
- Outlet Conditions 14.7 psig @ 70°F

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



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

83		32	2	4	_	_	က	2	0	7	4	0	о	9	2	_	2	2	_	_	_	
2 0.033	33	4 0.025	6.42	14.4	9 21.1	3 26.1	30.3	34.5	39.0	7.74	56.4	0.59 (3 73.9	3 82.6	91.5	101	3 9.15	11.5	12.1	12.1	12.1	
0.032	32	0.024	6.10	13.6	19.9	24.6	28.6	32.6	36.7	44.7	53.0	61.0	69.3	77.8	86.0	94.5	8.73	10.9	11.5	11.5	11.5	
0.031	31	0.022	5.62	12.4	18.3	22.5	26.3	30.1	33.7	41.1	48.5	55.9	63.6	71.2	78.8	86.7	8.01	10.1	10.7	10.7	10.7	
0.029	29	0.019	5.06	11.3	16.6	20.3	23.7	27.1	30.5	37.1	43.9	50.4	57.2	64.0	71.0	78.0	7.23	9.11	9:26	9:26	9:26	
0.028	78	0.018	4.68	10.5	15.2	18.6	21.8	24.8	28.0	34.1	40.3	46.4	52.5	58.7	65.0	71.4	6.70	8.48	8.90	8.90	8.90	
0.027	27	0.017	4.13	9.41	13.6	16.8	19.7	22.7	25.4	31.1	36.7	42.4	48.1	53.6	59.3	65.3	00.9	7.59	8.01	8.01	8.01	
0.026	56	0.016	4.05	9.20	13.0	16.1	18.9	21.6	24.4	29.9	35.2	40.7	46.0	51.3	56.8	62.3	5.81	7.29	7.73	7.73	7.73	
0.025	25	0.014	3.54	8.12	11.8	14.7	17.3	19.9	22.5	27.5	32.6	37.5	42.6	47.7	52.8	58.1	5.25	6.63	7.08	7.08	7.08	
0.024	24	0.013	3.26	7.48	11.0	13.6	16.1	18.3	20.7	25.4	30.1	34.7	39.2	43.9	48.5	53.2	4.87	6.12	6.61	6.61	6.61	
0.023	23	0.012	2.99	6.87	10.1	12.6	14.7	16.8	19.0	23.3	27.5	31.8	36.0	40.3	44.5	48.7	4.45	2.68	6.04	6.04	6.04	
0.022	72	0.011	2.73	6.29	9.17	11.3	13.5	15.5	17.4	21.4	25.2	29.2	33.1	37.1	40.9	44.7	4.03	5.17	5.53	5.53	5.53	
0.021	21	0.0096	2.39	5.62	7.48	9.34	11.1	12.7	14.4	17.8	21.2	24.6	28.0	31.6	35.0	38.1	3.60	4.62	4.92	4.92	4.92	
0.020	70	0.0088	2.22	5.23	6.70	8.50	10.3	11.8	13.4	16.5	19.6	22.7	25.9	29.0	32.2	35.2	3.28	4.15	4.64	4.64	4.64	
0.019	19	0.0080	2.03	4.70	00.9	7.56	9.03	10.4	11.8	14.5	17.3	20.0	22.9	25.6	28.4	31.1	2.99	3.79	4.11	4.11	4.11	
0.018	18	0.0073	1.82	4.20	5.38	6.84	8.18	9.43	10.7	13.2	15.7	18.2	20.7	23.3	25.9	28.4	2.70	3.35	3.71	3.71	3.71	
0.017	17	0.0067	1.64	3.73	4.79	6.04	7.20	8.31	9.39	11.6	13.8	16.0	18.2	20.5	22.7	25.0	2.41	2.99	3.28	3.28	3.28	
0.016	16	0.0055	1.40	3.26	4.26	5.30	6.29	7.25	8.20	10.1	12.1	14.0	16.0	17.9	19.9	21.8	2.07	2.62	2.86	2.86	2.86	
0.015	15	0.0050	1.30	2.99	4.13	5.17	80.9	6.95	7.82	9:26	11.3	13.0	14.7	16.5	18.3	20.0	1.90	2.37	2.59	2.59	2.59	
0.014	14	0.0043	1.11	2.56	3.56	4.45	5.28	90.9	08.9	8.33	9.83	11.3	12.8	14.3	15.9	17.4	1.64	2.06	2.26	2.26	2.26	
0.013	13	0.0038	0.962	2.25	3.14	3.92	4.64	5.30	5.98	7.31	8.62	10.0	11.3	12.6	13.9	15.3	1.40	1.77	1.91	1.91	1.91	
0.012	12	0.0034	0.843	1.94	2.73	3.43	4.07	4.66	5.23	6.44	7.59	8.75	9.92	11.1	12.2	13.4	1.23	1.55	1.68	1.68	1.68	
0.011	1	0.0028	0.653	1.51	2.14	2.67	3.16	3.62	4.09	5.02	5.93	6.84	7.76	8.67	9.56	10.5	0.953	1.20	1.30	1.30	1.30	
0.010	10	0.0025	0.593	1.37	1.97	2.48	2.92	3.37	3.81	4.68	5.55	6.40	7.27	8.12	8.96	9.81	0.860	1.10	1.20	1.20	1.20	
0.009	6	0.0019	0.479	1.10	1.57	1.97	2.33	5.69	3.03	3.75	4.45	5.13	5.83	6.53	7.20	7.88	0.703	0.892	0.964	0.964	0.964	
0.008	80	0.0015	0.360	0.85	1.21	1.53	1.80	2.08	2.37	2.92	3.50	4.05	4.60	5.15	5.70	6.25	0.536	0.687	0.744	0.744	0.744	
0.007	7		0.269	0.64	0.91	1.14	1.38	1.59	1.80	2.22	2.67	3.09	3.54	3.96	4.41	4.83	0.405	0.521	0.568	0.568	0.568	
900.0	9	98000'	0.182	0.45	0.65	0.82	0.97	1.12	1.26	1.56	1.86	2.16	2.46	2.75	3.05	3.35	0.273	0.356	0.392	0.392	0.392	
0.005	2	.00061 0	0.136	0.33	0.47	0.59	0.70	0.82	0.92	1.15	1.37	1.59	1.82	2.04	2.27	2.48	0.203	0.263	0.284	0.284	0.284	
0.004	4	0.00035 0.00061 0.00086 0.0012	0.075	0.18	0.25	0.34	0.40	0.47	0.53	0.64	92.0	0.89	1.02	1.14	1.27	1.40	0.113	0.145	0.158	0.158	0.158	
			1	2	10	15	20	22	30	40	20	99	02		06	00	2	10	2	20	Q	
Orifice Diameter Inches	Size Number	ರೆ			_	_	2	2	c	4	2	9	7	80	0	7	1	_		Ked F		
						6	sd	– ə.	ıns	res	ıy F	ddr	18				ΙĐ	γ ο ν	mı H.		εV	

Orifice Diameter	Size	ò	-	5	10	gi 51	50 Sd	- 52	ი S	e91	1 y 1		02 1 S	80	06	100		Геv	ŅH .		юч
	+				٠	10		10	0	0			٠		٠	0			10		
0.035 0	35	0.028 0	7.37	16.3	22.5	27.8	32.4	37.5	42.4	52.5	62.5	72.7	83.1	93		114	, 4.01	13.1	13.8	13.8	
0.037 0	37	0.031	8.12	18.0	25.0	30.7	36.0	41.5	47.0	58.1	69.1	80.5	91.7	103	115	126	11.4	14.4	15.2	15.2	15.2
0.038 0	38	0.032 0	8.75	19.3	26.5		38.4	44.1	50.0	67.2 (73.7	86.0	98.1	110	122	135	12.3	15.4	16.2	16.2	
0.039 0	39	0.033 0	9.45	20.6	28.8	35.4	41.5 4	6.74	54.2	67.0	79.7	92.8	106	119	132	146	13.3	16.6	17.4	17.4	17.4
0.040 0	40	0.036 0	9.75	21.6	30.5	37.5	44.3 4	50.9	57.6	71.2 7	85.0	66	113	127	141	156	14.3	17.6 1	18.3 1	18.3	18.3
0.041 0.	14	0.038 0.	9.90	22.5 2	31.4	38.6 4	45.3 4	52.3 5	59.3	73.3 7	87.5 9	102 1	117 1	131 1	146 1	164 1	14.5	18.0	18.8 2	18.8	18.8
0.042 0.0	42	0.039 0.0	10.6	23.9 2	33.1 3	40.5 4;	47.7 5	54.9 5	62.3 6	76.9 8;	91.7 9	107 1	122 1	137 1	151 1	167 1	15.4 1	19.2	20.02	20.0	
0.043 0.0	43	0.041 0.0	11.4 13	25.6 30	35.6 4	43.2 50	50.9 5	58.5 6	66.3 76	82.0 94	97.5	113 1	129 1	145 1	161 1	177 2	16.3 19	20.3	21.1 2	21.1 24	21.1 24
0.047 0.052	47 5	0.048 0.059	13.6 17.0	30.1 37.3	41.0 51.9	50.0 62.9	58.7 74.2	67.6 85	76.3 96.6	94.3 11	112 14	130 16	148 187	167 21	185 231	203 254	19.2 23	23.6 29.4	24.5 30.5	24.5 30.5	24.5 30.5
52 0.055	52 55	°	.0 19.9	.3 43.0	.9 57.4	7.69 6.7	.2 82.0	85.4 94.5	.6 107	119 132	142 157		37 207	210 231	31 256	54 282	23.9 26.4	.4 32.7	.5 33.7	.5 33.7	
90:00	09	68 0.081	.9 23.7	.0 50.6	.4 68.2	.7 82.6	.0 97.3	.5 112	7 126	2 156	7 185	2 214	7 244		6 303	2 331	4 31.4	.7 38.6	.7 39.4	.7 39.4	
50 0.063	63	°	.7 25.9	6 55.3	2 74.6	6 90.3	3 106	2 122	5 138	5 170	5 202	4 233	4 267	3 298	3 331	1 362	4 36.2	6 44.9	4 46.8	4 46.8	46.8
3 0.067	29	01.0	9 30.1	3 64.2	5 86.2	3 104	3 123		3 160	196	2 233	3 269	7 307	343	379	2 415	2 42.4	9 51.7	8 54.0	8 54.0	54.0
0.070	02	°	33.6	71.6	9.96	117	138	158	179	220	261	301	343	384	424	468	47.7	7 57.6	60.2) 60.2	602
0.073	73	0.12	35.9	76.5	103	125	146	168	190	233	278	320	362	405	447	496	9.09	63.4	66.1	66.1	1 66 1
0.076	92		39.3	83.5	112	136	160	183	206	254	301	347	394	443	489	540	55.1	68.9	71.8	71.8	71.8
0.079	62	0.14	43.0	91.3	121	147	172	198	222	273	324	375	428	481	532	287	0.09	74.8	78.0	78.0	78.0
0.081	25	0.15	46.0	97.5	131	158	185	212	239	295	347	400	458	513	268	627	64.0	79.9	83.5	83.5	83.5
0.086	98	0.17	49.7	108	144	174	203	233	265	324	384	445	209	220	631	269	70.3	87.9	91.7	91.7	91.7
0.089	68	0.18	53.7	116	153	185	216	248	280	343	407	473	538	604	029	739	76.1	94.9	99.0	99.0	0.66
0.094	96	0.20	60.2	131	172	207	242	278	314	384	456	230	604	829	750	831	84.9	106	110	110	110
960.0	96	0.21	63.7	138	181	218	256	292	331	405	481	228	638	716	792	875	88.6	110	115	115	115
0.100	100	0.23	8.69	150	196	235	275	316	356	439	523	909	693	877	860	951	96.1	120	125	125	125
0.104	104	0.25	75.2	162	216	261	305	347	392	483	9/9	299	763	928	947	1047	104	130	135	135	135
0.109	109	0.27	83.9	180	237	286	335	381	432	532	634	735	839	943	1042	1153	114	142	148	148	148
0.113	113	0.31	91.4	195	250	303	354	405	458	999	672	780	892	1000	1106	1225	123	153	160	160	160
0.120	120	0.34	101	216	286	345	403	464	525	648	77.1	894	1021	1146	1267	1403	138	173	180	180	180
0.125	125	0.37	106	229	314	377	445	511	218	714	820	985	1125	1263	1398	1545	150	187	195	195	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.

Metal Orifice Air Flow – SLPM

0	Orifice																												
Dia	Diameter	0.004	0.005	900.0	0.007	0.008	0.009	0.010	0.011	0.012 0	0.013 0.	0.014 0.	0.015 0.0	0.016 0.0	0.017 0.018	0.019	19 0.020	20 0.021	1 0.022	2 0.023	0.024	1 0.025	0.026	0.027	0.028	0.029	0.031	0.032	0.033
п	Inches																												
3,	Size																												
N N	ımper	4	2	9	7	8	6	10	11	12	13	14	15 1	16 1	17 18	8 19	20	21	22	23	54	52	56	27	78	59	31	32	33
	ರೆ	0.00035 0.00061 0.00086 0.0012	.00061	0.00086		0.0015 0	0.0019	0.0025 0	0.0028 0	0.0034 0.	0.0038 0.0	0.0043 0.0	0.0050 0.0	0.0055 0.0	0.0067 0.0073	073 0.0080	80 0.0088	88 0.0096	96 0.011	1 0.012	0.013	3 0.014	0.016	0.017	0.018	0.019	0.022	0.024	0.025
	-	0.035	0.064	0.086	0.127	0.170 (0.226	0.280 (0.308	0.398	0.45 0	0.52 0	0.61 0.	.0 99.0	0.77 0.86	96.0 98	1.05	5 1.13	3 1.29	1.41	1.54	1.67	1.91	1.95	2.21	2.39	2.65	2.88	3.03
	2	60.0	0.16	0.21	0.30	0.40	0.52	9.0	0.71	0.92	1.06 1	1.21	1.41	1.54 1.	1.76 1.98	98 2.22	2 2.47	7 2.65	5 2.97	3.24	3.53	3.83	4.34	4.44	4.94	5.31	5.86	6.42	08.9
	10	0.12	0.22	0.31	0.43	0.57	0.74	0.93	1.01	1.29	1.48 1	1.68	.95 2.	2.01 2.3	2.26 2.54	54 2.83	3 3.16	6 3.53	3 4.33	4.75	5.18	5.55	6.15	6.43	7.18	7.83	8.63	9.40	9.98
6	15	0.16	0.28	0.39	0.54	0.72	0.93	1.17	1.26	1.62	1.85 2	2.10 2	2.44 2.	2.50 2.8	2.85 3.23	23 3.57	7 4.01	1 4.41	1 5.35	5.93	6.43	6.95	7.58	7.95	8.78	9.58	10.6	11.6	12.3
isd	20	0.19	0.33	0.46	0.65	0.85	1.10	1.38	1.49	1.92	2.19 2	2.49 2	2.87 2.	2.97 3.	3.40 3.86	86 4.26	6 4.84	4 5.22	2 6.35	6.95	7.58	8.15	8.90	9.28	10.3	11.2	12.4	13.5	14.3
– ə.	22	0.22	0.39	0.53	0.75	96.0	1.27	1.59	1.71	2.20	2.50 2	2.86 3	3.28 3.	3.42 3.	3.92 4.45	45 4.91	1 5.59	9 6.01	1 7.30	7.95	8.65	9.38	10.2	10.7	11.7	12.8	14.2	15.4	16.3
ıns	30	0.25	0.44	09.0	0.85	1.12	1.43	1.80	1.93	2.47	2.82 3	3.21 3	3.69 3.	3.87 4.	4.43 5.03	03 5.56	6 6.33	3 6.81	8.23	8.98	9.75	10.6	11.5	12.0	13.2	14.4	15.9	17.3	18.4
res	40	0.30	0.54	0.74	1.05	1.38	1.77	2.21	2.37	3.04	3.45 3	3.93 4	4.51 4.	4.78 5.	5.47 6.21	21 6.85	5 7.81	1 8.42	10.1	11.0	12.0	13.0	14.1	14.7	16.1	17.5	19.4	21.1	22.5
4 yl	20	0.36	0.65	0.88	1.26	1.65	2.10	2.62	2.80	3.58 4	4.07	4.64 5	5.31 5.	5.70 6.	6.51 7.40	40 8.15	5 9.26	0.01 9	11.9	13.0	14.2	15.4	16.6	17.3	19.0	20.7	22.9	25.0	26.6
ddı	09	0.42	0.75	1.02	1.46	1.91	2.42	3.02	3.23	4.13 4	4.70 5	5.34 6	6.13 6.	6.61 7.	7.56 8.58	58 9.46	.6 10.7	7 11.6	3 13.8	15.0	16.4	17.7	19.2	20.0	21.9	23.8	26.4	28.8	30.7
าร	2	0.48	98.0	1.16	1.67	2.17	2.75	3.43	3.66	4.68	5.32 6	6.05	6.96 7.	7.53 8.	8.61 9.77	77 10.8	.8 12.2	2 13.2	2 15.6	17.0	18.5	20.1	21.7	22.7	24.8	27.0	30.0	32.7	34.9
	8	0.54	96.0	1.30	1.87	2.43	3.08	3.83	4.09	5.23	5.95	7 22.9	7.79 8.	8.46 9.	9.67 11.0	.0 12.1	.1 13.7	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
	6	09.0	1.07	1.44	2.08	5.69	3.40	4.23	4.51	5.78	6.58 7	7.49 8	8.62 9.	9.38 10	10.7 12.2	.2 13.4	4 15.2	2 16.5	5 19.3	21.0	22.9	24.9	26.8	28.0	30.7	33.5	37.2	40.6	43.2
	100	99.0	1.17	1.58	2.28	2.95	3.72	4.63	4.94	6.33	7.22 8		9.46 10	10.3 11	11.8 13.4	14.7	7 16.6	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
ĮЭ	2	0.053	960.0	0.129	0.191	0.253 (0.332	0.406 (0.450 (0.582 0		0.773 0.	0.899 0.9	0.977 1.	1.14 1.2	1.28 1.41	.1 1.55	5 1.70	1.90	2.10	2.30	2.48	2.74	2.83	3.16	3.41	3.78	4.12	4.32
γeν γ	10	0.069	0.124	0.168	0.246	0.324 (0.421	0.519 (0.564 (0.730 0		0.972	1.12 1.	1.24 1.	1.5	1.58 1.79	9 1.96	6 2.18	3 2.44	2.68	2.89	3.13	3.44	3.58	4.00	4.30	4.77	5.16	5.43
ÌΗ.		0.075	0.134	0.185	0.268	0.351 (0.455	0.566 (0.614 (0.792 0		1.07	.22 1.	.35 1.	.55 1.7	1.75 1.94	4 2.19	9 2.32	2 2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72
uĮ	S Keq 1	0.075	0.134	0.185	0.268	0.351 (0.455	0.566 (0.614 (0.792 0	0.902	1.07	.22 1.	.35 1.	.55 1.7	1.75 1.94	4 2.19	9 2.32	2 2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72
Ī		0.075	0.134	0.185	0.268	0.351 (0.455	0.566 (0.614 (0.792 0		1.07	.22 1.	.35 1.	.55 1.7	1.75 1.94	4 2.19	9 2.32	2 2.61	2.85	3.12	3.34	3.65	3.78	4.20	4.51	5.05	5.45	5.72
	20131-0																												

0.035 0.037 0.038 0.039 0.040	35 37 38 39 40	8 0.031 0.032 0.033 0	3.48 3.83 4.13 4.46 4.60	7.67 8.48 9.09 9.70 10.2	10.6 11.8 12.5 13.6 14.4	13.1 14.5 15.4 16.7 17.7	15.3 17.0 18.1 19.6 20.9	17.7 19.6 20.8 22.6 24.0	20.0 22.2 23.6 25.6 27.2	24.8 27.4 31.7 31.6 33.6	29.5 32.6 34.8 37.6 40.1	34.3 38.0 40.6 43.8 46.7	39.2 43.3 46.3 50.0 53.3	44.0 48.7 52.1 56.2 60.0	50.0 54.2 57.8 62.4 66.7	53.9 59.6 63.7 68.7 73.5	4.92 5.40 5.81 6.29 6.76	6.18 6.78 7.29 7.85 8.31	6.50 7.17 7.63 8.22 8.66	6.50 7.17 7.63 8.22 8.66	
0.041 0.042	41 42	0.038 0.039	4.67 4.99	10.6 11.3	14.8 15.6	18.2 19.1	21.4 22.5	24.7 25.9	28.0 29.4	34.6 36.3	41.3 43.3	48.1 50.3	55.0 57.4	61.9 64.5	68.9 71.5	77.3 78.6	6.82 7.29	8.50 9.08	8.87 9.46	8.87 9.46	
0.043	43	0.041	5.36 6	12.1	16.8 19	20.4 2:	24.0 27	27.6 3′	31.3 36	38.7 4	46.0 52	53.5 6	61.0 70	68.5	76.0 87	83.5 96	7.67	9.58 1	10.0	10.0	
0.047 0.052	47 52	0.048 0.059	6.43 8.04	14.2 17.6	19.4 24.5	23.6 29.7	27.7 35.0	31.9 40.3	36.0 45.6	44.5 56.3	52.9 66.9	61.5 77.7	70.0 88.4	78.6 99.1	87.2 109	95.8 120	9.08 11.3	11.1 13.9	11.6 14.4	11.6 14.4	
2 0.055	55	0	9.40	20.3	5 27.1	32.9	38.7	44.6	50.4	62.2		82.8	9.76	109	121	133	12.4	15.4	15.9	15.9	
090.0	09	0.081	11.2	23.9	32.2	39.0	45.9	52.8	59.7	73.6	87.4	101	115	129	143	156	14.8	18.2	18.6	18.6	
0.063	63	0.088	12.2	26.1	35.2	42.6	50.1	27.7	65.2	80.3	95.4	110	126	141	156	171	17.1	21.2	22.1	22.1	
0.067	29		14.2	30.3	40.7	49.3	58.0	2.99	75.4	92.7	110	127	145	162	179	196	20.0	24.4	25.5	25.5	
0.070 0.0	02		15.9	33.8 3	45.6 4	55.3 5	65.0 6	74.7 7	84.3 8	104	123 1	142 1	162 1	181 1	200 2	221 2	22.5 23	27.2	28.4 3	28.4 3	
0.073 0.076	73 76	0	16.9 18	36.1 39.4	48.5 52.9	58.8 64.0	69.0 75.3	79.3 86.4	89.5 97.4	110 120	131 142	151 164	171 18	191 20	211 231	234 255	23.9 26.0	29.9 32	31.2 33.9	31.2 33.9	
76 0.079	62		18.5 20.3	.4 43.1	.9 57.3	.0 69.4	.3 81.4	.4 93.5	.4 105	129	153	177	186 202	209 227	11 251	5 277	.0 28.3	32.5 35.3		.9 36.8	
79 0.081	200	0	3 21.7	1 46.0	3 61.6	4 74.5	4 87.3	5 100	5 113	9 139	3 164	7 189	2 216	7 242	1 268	7 296	3 30.2	3 37.7	8 39.4	8 39.4	
1 0.086	86	0	23.5	51.1	62.9	82.1	92.6	110	125	153	181	210	240	569	298	329	33.2	41.5	43.3	43.3	
0.089	68	0.18	25.4	54.9	72.3	87.3	102	117	132	162	192	223	254	285	316	349	35.9	44.8			
9 0.094	95	0	28.4	61.9	3 81.0	97.8	114	131	148	181	215	250	285	320	354	392	40.1	20.0	52.1	52.1	
0.096	96	0.21	30.1	65.0	85.5	103	121	138	156	191	227	264	301	338	374	413	41.8	52.1	54.4	54.4	
0.100	100	0.23	32.9	70.8	92.3	111	130	149	168	207	247	286	327	367	406	449	45.3	9.99	29.0	29.0	
0.104	104	0.25	35.5	9.92	102	123	144	164	185	228	272	315	360	404	447	494	49.0	61.2	63.8	63.8	
0.109	109	0.27	39.6	84.8	112	135	158	180	204	251	299	347	396	445	492	544	53.9	67.2	70.1	70.1	
0.113	13	0.31	43.1	92.1	118	143	167	191	216	267	317	368	421	472	522	218	57.9	72.2	75.3	75.3	
0.120 0.125	120	0.34 0.37	47.8 50.1	102	135	163	190	219	248	306	364	422 465	482 531	541	598	662	65.3 70.9	81.4 88.4	84.9 92.2	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. P.O. BOX Q • TRUMBULL, CONNECTICUT 06611 • CT PHONE (203) 261-6711 • TOLL FREE PHONE (800) 533-3285 • FAX (203) 261-8331

O'Keefe Controls Co.

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Sapphire Orifice Air Flow – SLPM

0252	64	0.013	1.69	4.06	5.58	7.08	8.33	9.55	10.7	13.1	15.5	17.9	20.2	22.6	24.9	27.3	2.61	3.19	3.48	3.48	3.48
0.0134 0.0142 0.0157 0.0173 0.0189 0.0205 0.0213 0.0228 0.0262	28	0.011 0.	1.38 1	3.26 4	4.43 5	5.55 7	6.55 8	7.53 9	8.48	10.4	12.3	14.2	16.0	17.9 2	19.7	21.6 2	2.13 2	2.55 3	2.77 3	2.77 3	2.77 3
0.0213 (54	0.010	1.12	2.57	3.45	4.43	5.31	6.11	06.9	8.50	10.1	11.7	13.3	14.8	16.4	18.0	1.64	2.11	2.39	2.39	2.39
0.0205 (52	0.0091	1.10	2.50	3.32	4.26	90.3	5.81	6.57	8.10	9.63	1.1	12.7	14.3	15.7	17.2	1.61	5.06	2.31	2.31	2.31
0.0189 (84	0.0080	0.965	2.16	2.90	3.69	4.36	5.03	5.69	7.02	8.35	69.6	11.0	12.3	13.7	15.0	1.38	1.80	1.99	1.99	1.99
0.0173	44	0.0067	0.822	1.81	2.43	3.08	3.64	4.19	4.75	5.86	96.9	8.10	9.23	10.4	11.5	12.6	1.16	1.51	1.65	1.65	1.65
0.0157	9	0.0057	0.677	1.51	2.01	2.56	3.04	3.50	3.96	4.89	5.83	6.77	7.71	8.65	9.60	10.6	0.982	1.26	1.39	1.39	1.39
0.0142	36	0.0046	0.499	1.20	1.63	5.09	2.48	2.84	3.19	3.90	4.59	5.29	5.99	69.9	7.41	8.12	0.764	0.955	1.07	1.07	1.07
0.0134	34	0.0040	0.446	1.06	1.45	1.85	2.20	2.52	2.84	3.46	4.08	4.69	5.31	5.93	92.9	7.18	0.673	0.833	0.921	0.921	0.921
0.0126	32	0.0036	0.393	0.933	1.27	1.63	1.95	2.24	2.52	3.07	3.63	4.17	4.72	5.28	5.83	6.38	0.591	0.734	0.818	0.818	0.818
	8	0.0032	0.340	0.800	1.09	1.42	1.70	1.95	2.19	2.67	3.16	3.63	4.12	4.68	2.07	2.57	0.510	0.638	0.711	0.711	0.711
0.0110 0.0118	88	0.0028	0.300	0.695	0.968	1.24	1.48	1.70	1.91	2.35	2.78	3.20	3.62	4.04	4.47	4.89	0.451	0.556	0.626	0.626	0.626
0.0102	56	0.0024	0.275	0.623	0.868	1.11	1.32	1.52	1.69	2.11	2.50	2.89	3.28	3.66	4.05	4.44	0.401	0.503	0.554	0.554	0.554
	24	0.0021	0.259	0.584	0.830	1.05	1.25	1.44	1.63	2.02	2.39	2.77	3.14	3.51	3.89	4.26	0.377	0.482	0.525	0.525	0.525
0.0087 (22	0.0018	0.194	0.430	0.590	0.755	0.910	1.05	1.19	1.47	1.75	2.03	2.31	2.59	2.87	3.15	0.277	0.352	0.390	0.390	0.390
0.0079	20	0.0015	0.161	0.350	0.480	0.613	0.730	0.843	0.958	1.18	1.41	1.64	1.87	5.09	2.32	2.55	0.229	0.292	0.320	0.320	0.320
10.0055 0.0059 0.0063 0.0067 0.0071 0.0079 0.0087 0.0094	8	0.0012	0.139	0.313	0.430	0.535	0.635	0.733	0.838	1.04	1.24	1.45	1.66	1.86	2.06	2.27	0.199	0.253	0.269	0.269	0.269
0.0067	17	0.0011	0.120	0.273	0.382	0.482	0.569	0.654	0.710	0.880	1.05	1.23	1.40	1.57	1.75	1.92	0.169	0.217	0.235	0.235	0.235
0.0063	16	0.00094	0.106	0.256	0.357	0.443	0.525	0.605	0.685	0.845	1.00	1.16	1.32	1.48	1.64	1.80	0.156	0.200	0.214	0.214	0.214
0.0059	15	0.00084	0.095	0.223	0.308	0.386	0.457	0.526	0.595	0.734	0.872	1.01	1.15	1.28	1.42	1.56	0.137	0.175	0.188	0.188	0.188
0.0055	14	12000011	0.080	0.192	0.264	0.329	0.390	0.450	0.511	0.632	0.753	0.875	0.996	1.12	1.24	1.36	0.116	0.149	0.159	0.159	0.159
0.0051	13		0.068	0.159	0.228	0.285	0.337	0.389	0.440	0.543	0.652	0.751	0.855	0.959	1.06	1.17	0.100	0.128	0.138	0.138	0.138
0.0047	12	0.00050	0.058	0.136	0.193	0.240	0.284	0.327	0.370	0.456	0.542	0.630	0.717	0.804	0.891	0.978	0.085	0.109	0.117	0.117	0.117
0.0043	=	5 0.00042	0.050	0.108	0.164	0.205	0.243	0.280	0.317	0.390	0.463	0.536	0.609	0.683	0.757	0.830	0.073	0.093	0.100	0.100	0.100
5 0.0036	5	8 0.0003	0.040	0.093	0.132	0.166	0.197	0.229	0.260	0.321	0.383	0.445	0.507	0.569	0.632	0.692	0.057	0.073	0.079	0.079	0.079
1 0.003€	6	2 0.0002	0.034	920.0	0.107	0.134	0.159	0.184	0.208	0.257	0.306	0.356	0.403	0.453	0.502	0.551	0.047	0.061	0.065	0.065	0.065
8 0.003	∞	7 0.0002	0.025	0.059	5 0.082	2 0.104	9 0.125	5 0.144	2 0.164	3 0.203	5 0.241	0.280	9 0.318	2 0.357	968:0 1	3 0.435	3 0.036	3 0.046	0.050	0.050	0.050
1 0.002	7	2 0.0001	0.020	0.047	0.065	0.082	0.099	0.115	0.132	0.163	0.195	0.227	0.259	0.292	0.324	0.356	0.028	0.036	0.040	0.040	0.040
0.0012 0.0016 0.0020 0.0024 0.0028 0.0031 0.0035 0.0039 0.0043 0.0047 0.00	ဖ	0.00012	0.014	0.036	0.049	0.062	0.074	0.087	0.098	0.122	0.147	0.171	0.195	0.200	0.244	0.269	0.020	0.027	0.030	0.030	0.030
0.0020	25	0.000090	0.010	0.027	0.036	0.046	0.055	0.063	0.072	0.089	0.106	0.123	0.141	0.158	0.175	0.193	0.014	0.018	0.021	0.021	0.021
0.0016	4	0.000053	0.005	0.013	0.016	0.021	0.025	0.030	0.034	0.043	0.052	0.061	0.070	0.080	0.089	0.098	900.0	0.008	0.010	0.010	0.010
0.0012	m	0.0000330 0.000053 0.000090 0.00012 0.00017 0.00022 0.00028 0.00035 0.00042 0.00050 0.00	0.003	600.0	0.010	0.014	0.016	0.019	0.022	0.027	0.032	0.037	0.042	0.047	0.053	0.058	0.003	0.004	9000	900.0	90000
m m	<u>.</u>		-	2	10	15	20	52	30	40	20	09	20	80	06	100	2	10	15	20	30
Orifice Diameter Inches	Size	♂																ء.	_	y pəx	СРО
						6	sd	– ə.	ins	res	A VI	ddı	18				ΙĐ	γ -	mı H.		εV

Sapphire Orifice Air Flow – SCFH

Parishes Pari	Diameter Court C	ö	Orifice																															
Simple S	5 6 7 8 9 10 11 12 13 14 15 16 17 18 20 22 24 2 0000000 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00002 0.00001 0.00001 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00012 0.00002	Diar	neter	0.0012	0.0016	0.0020	0.0024	0.0028	3 0.0031	0.0035	0.0039	0.0043	0.0047	0.0051	0.0055	0.0059 (0 6900.	0 2900'	.0071 0.	0.0 6200	0.0 280			0110 0.				142 0.0	157 0.0	173 0.0	189 0.02	205 0.02	0.0213 0.0228 0.0252	8
C, 10000000 0.000000000000000000000000000	0.0001 0.00012 0.00012 0.00022 0.00022 0.00026 0.00026 0.00061 0.00011 0.00014 0.0011 0.0012 0.0015 0.0019 0.0022 0.0023 0.0002 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0023 0.0022 0.0022 0.0022 0.0024 0.0023 0.0022 0.0023 0.0022 0.0022 0.0024 0.0022 0.0023 0.0022 0.0024 0.0024	N N	ze	₆	4	r.	9			6	6	=	12	13	4	15	16	17						78									28	
1 1007 1011 1021 1022 103	1,005 0.042 0.042 0.053 0.042 0.053 0.072 0.053 0.012 0.021 0.226 0.254 0.254 0.254 0.249 0.341 0.140 0.154 0.164 0.154 0.164 0.174 0.164 0.164 <th< th=""><th></th><th>.3</th><th>0.000030</th><th>0.000053</th><th>0.000000</th><th></th><th>0.00017</th><th>1</th><th>0.00028</th><th>0.00035</th><th>0.00042</th><th>0.000050</th><th>).00061</th><th></th><th>0.00084</th><th>0.000094 0</th><th></th><th></th><th></th><th>1</th><th></th><th></th><th>1</th><th></th><th></th><th>1</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>		.3	0.000030	0.000053	0.000000		0.00017	1	0.00028	0.00035	0.00042	0.000050).00061		0.00084	0.000094 0				1			1			1							
	1,0,06 0.075 0.10 0.14 0.15 0.228 0.239 0.397 0.454 0.577 0.663 0.740 0.41 1.24 1.24 1.24 1.24 1.25 1.24 1.25 1.24 1.25 1.24 1.25 0.240 0.347 0.409 0.483 0.559 0.559 0.575 0.663 0.740 0.11 1.22 1.25 1.76 1.75 1.76 1.75 1.76 1.75 1.76 1.75 1.76 1.75 1.75 1.75 1.74 1.25 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.75 1.74 1.		-	0.007	0.011	0.021	0:030	0.042			0.085	0.106		0.144	0.169			1	1															l ω
10 0.021 0.034 0.076 0.079 0.0	1,076 0.144 0.138 0.144 0.227 0.284 0.284 0.589 0.655 0.756 0.809 0.911 1.02 1.25 1.76 1.75 1,037 0.131 0.174 0.220 0.284 0.356 0.434 0.608 0.604 0.689 0.171 1.13 1.30 1.60 2.22 2.20 1.13 1.30 1.60 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 2.22 3.14 1.26 1.78 1.56 1.78 1.56 1.79 1.25 1.79 1.25 1.79 1.75 1.79 1.75 1.79 1.78 1.60 1.78 1.78 1.60 1.88 1.89 1.79 1.79 1.78 1.78 1.76 1.79 1.78 1.78 1.78 1.78 1.78 1.78 1.78 1.78 1.79 1.78 1.78 1.79 1.78 1		2	0.019	0.027	0.056	0.075				0.197	0.228	0.288		0.407																			0
1	1.13 0.157 0.131 0.174 0.220 0.284 0.352 0.434 0.508 0.604 0.697 0.818 0.393 1.02 1.13 1.30 1.60 2.22 2.211 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 1.39 2.65 2.131 0.149 0.208 0.244 0.365 0.390 0.485 0.593 0.693 0.844 0.953 1.11 1.28 1.39 1.55 1.79 2.22 3.05 3.11 0.149 0.258 0.345 0.		10	0.021	0.034	0.076	0.104	0.138						0.483	0.559							ľ												0
8. 1 2 0.004 0.054 0.055 0.117 0.157 0.10 0.266 0.337 0.417 0.516 0.056 0.347 0.417 0.516 0.056 0.347 0.417 0.516 0.056 0.347 0.417 0.516 0.056 0.347 0.417 0.516 0.056 0.347 0.417 0.516 0.056 0.347 0.417 0.516 0.058 0.347 0.417 0.516 0.058 0.347 0.417 0.516 0.058 0.348	2.11 0.15 0.21 0.26 0.33 0.41 0.51 0.26 0.34 0.41 0.51 0.62 0.71 1.28 0.13 1.55 1.53 1.55 1.59 1.55 1.59 2.52 3.05 3.01 3.01 0.62 0.71 1.28 0.13 1.55 1.79 2.22 3.05 3.01 3.02 0.62 0.62 0.74 0.82 0.82 0.82 1.11 1.28 1.56 1.79 1.75 2.22 3.05 3.11 4.28 1.85 1.15 1.76 1.78 2.03 2.84 3.81 4.86 1.86 1.79 1.22 2.62 3.24 4.82 3.14 4.89 6.65 6.52 3.14 4.89 6.65 8.24 8.33 3.14 4.28 4.81 4.83 4.81 4.81 4.83 4.81 4.83 4.81 4.83 6.65 6.53 3.14 4.83 4.84 4.83 4.84 8.84 <th< td=""><th>6</th><td>15</td><td>0:030</td><td>0.044</td><td>0.097</td><td>0.131</td><td>0.174</td><td></td><td></td><td>0.352</td><td></td><td>0.508</td><td></td><td>269.0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>ω</td></th<>	6	15	0:030	0.044	0.097	0.131	0.174			0.352		0.508		269.0																			ω
25 0.040 0.064 0.015 0.015 0.015 0.025	1.133 0.184 0.244 0.305 0.390 0.485 0.593 0.689 0.824 0.953 1.11 1.28 1.39 1.55 1.79 2.22 3.05 3.11 2.20 0.208 0.244 0.305 0.347 0.441 0.551 0.672 0.784 0.935 1.10 1.28 1.56 1.79 1.56 1.79 1.22 3.05 3.11 4.28 4.13 0.258 0.345 0.340 0.544 0.680 0.826 0.986 1.15 1.34 1.56 1.79 1.82 2.20 2.50 3.11 4.28 4.13 0.252 0.341 0.341 0.543 0.441 0.551 0.648 0.841 0.894 1.15 1.34 1.56 1.79 2.22 2.62 2.50 3.11 4.28 4.13 0.252 0.441 0.554 0.648 0.841 0.894 1.15 1.34 1.56 1.79 2.22 2.63 2.99 3.71 5.06 5.12 0.443 0.443 0.549 0.574 0.854 1.07 1.29 1.52 1.81 2.11 2.43 2.80 2.97 3.45 3.94 4.43 5.49 1.44 1.33 1.59 1.85 2.13 2.32 3.94 4.43 5.49 1.44 1.75 1.24 1.45 1.45 1.45 1.45 1.45 1.45 1.45 1.4	sd	20	0.034	0.053	0.117	0.157	0.210					0.602	0.714	0.826																			6
30 0.0046 0.072 0.105	0.15 0.26 0.28 0.24 0.44 0.551 0.67 0.784 0.932 1.08 1.26 1.76 1.78 1.50 1.78 2.03 2.52 3.45 3.44 3.45 3.45 3.45 3.45 3.45 3.45 3.45 3.45 3.45 3.45 3.44	– 	52	0.040	0.064	0.133	0.184	0.244					0.693		0.953	1.11	1.28																	0
80 0.005 0.	1.189 0.258 0.345 0.430 0.544 0.680 0.886 0.986 1.15 1.34 1.56 1.79 1.86 2.20 2.50 3.11 4.28 4. 1.180 0.258 0.345 0.430 0.544 0.680 0.881 0.981 1.15 1.38 1.60 1.85 2.13 2.22 2.63 2.99 3.71 5.06 5. 1.281 0.382 0.441 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. 1.282 0.413 0.549 0.674 0.864 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. 1.283 0.443 0.549 0.674 0.864 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. 1.284 0.443 0.444 0.44	ıns	30	0.046	0.072	0.152	0.208	0.280			0.551	0.672	0.784	0.932	1.08	1.26																		0
 50 60.068 60.079 60.079	1,225 0.31 0.413 0.51 0.624 0.81 0.81 0.15 1.15 1.38 1.60 1.85 2.13 2.22 2.63 2.99 3.71 5.06 5.5 1,220 0.342 0.481 0.584 0.414 1.23 1.59 1.86 2.14 2.46 2.61 307 3.47 4.30 5.87 6.65 5.87 6.67 5.87 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.89 6.65 6.67 9.99 6.89 6.67 9.99	,res	40	0.057	0.091	0.189	0.258	0.345					996.0	1.15	1.34																			0
9 6 0 0.079 0.128 0.261 0.362 0.481 0.593 0.754 0.894 1.4 1.33 1.59 1.85 1.49 1.89 1.49 1.49 1.49 1.49 1.49 1.49 1.49 1.4	1,261 0,362 0,481 0,583 0,742 0,983 1,14 1,33 1,59 1,88 2,14 2,46 2,61 307 3,47 4,30 5,87 6,65 6,57 1,299 0,413 0,549 0,674 0,864 1,07 1,29 1,52 1,41 2,11 2,41 2,43 2,80 2,97 3,52 3,96 4,89 6,65 6,6 6,65 6,6 6,67 8,65 6,67 8,65 6,67 8,65 6,67 8,65 6,67 8,74 4,30 5,87 6,67 8,65 6,67 8,65 6,67 8,65 6,67 8,65 6,67 8,67 8,74 4,30 5,87 6,67 8,67 6,67 8,67 8,67 6,67 8,67 6,67 8,67 8,67 6,67 8,93 8,84 4,43 5,49 6,65 6,67 8,03 8,94 4,43 5,49 4,43 5,49 7,44 7,44 7,44	H VI	20	0.068	0.110	0.225	0.311	0.413					1.15	1.38	1.60																			~
04	1.235 0.441 0.654 0.6574 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. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	ddı	09	0.079	0.129	0.261	0.362	0.481			0.943	1.14	1.33	1.59	1.85																			_
80 0.100 0.168 0.335 0.424 0.619 0.756 0.805 0.121 1.45 1.70 0.203 0.227 0.22 3.13 3.33 3.94 4.45 5.49 7.44 7.75 8.56 8.24 8.59 9.74 1.75 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20	1,335 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. 1,371 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. 1,409 0,570 0,754 0,922 1,17 1,47 1,76 2,07 2,47 2,88 3,30 3,81 4,47 4,81 5,40 6,67 9,03 9, 1,009 0,570 0,754 0,922 1,17 1,47 1,76 2,07 2,47 2,88 3,30 3,81 4,47 4,81 5,40 6,67 9,03 9, 1,009 0,670 0,678 0,076 0,109 0,121 0,154 0,180 0,212 0,246 0,290 0,331 0,358 0,422 0,485 0,587 0,799 0,1 1,004 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, 1,004 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, 1,004 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, 1,004 0,063 0,085 0,107 0,138 0,168 0,212 0,248 0,292 0,377 0,398 0,453 0,498 0,570 0,678 0,826 1,11 1, 1,004 0,063 0,085 0,107 0,138 0,168 0,214 0,248 0,292 0,377 0,398 0,453 0,498 0,570 0,678 0,826 1,11 1, 1,004 0,063 0,085 0,107 0,138 0,168 0,214 0,248 0,292 0,377 0,398 0,453 0,498 0,570 0,678 0,826 1,11 1, 1,004 0,063 0,085 0,107 0,138 0,168 0,214 0,248 0,292 0,377 0,398 0,453 0,498 0,570 0,678 0,826 1,11 1, 1,004 0,063 0,085 0,107 0,138 0,148 0,148 0,292 0,374 0,398 0,453 0,498 0,570 0,678 0,826 1,11 1, 1,004 0,063 0,085 0,107 0,138 0,148 0,148 0,224 0,394 0,495 0,498 0,497	าร	20	0.089	0.149	0.299	0.413	0.549			1.07	1.29	1.52	1.81	2.11																			စ
	1,371 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 1,40 1,43 4,97 4,81 5,40 667 9,03 9 1,40 1,40 4,81 5,40 667 9,03 9 1,40 4,81 5,40 667 9,03 9 1,40 4,81 5,40 667 9,03 9 1,40 4,81 5,40 667 9,03 9 1,90 9 1,40 4,81 5,40 667 9,03 9 1,90 9 1,90 9 <th></th> <td>80</td> <td>0.100</td> <td>0.168</td> <td>0.335</td> <td>0.424</td> <td></td> <td></td> <td></td> <td></td> <td>1.45</td> <td>1.70</td> <td>2.03</td> <td>2.37</td> <td></td> <td>6</td>		80	0.100	0.168	0.335	0.424					1.45	1.70	2.03	2.37																			6
	9.409 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. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9. 9.		06	0.111	0.188	0.371	0.517	0.686			1.34	1.60	1.89	2.25	2.62																			_
	0.043 0.063 0.086 0.107 0.108 0.121 0.154 0.180 0.212 0.246 0.290 0.331 0.358 0.422 0.485 0.587 0.799 0.1089 0.057 0.076 0.098 0.128 0.155 0.197 0.231 0.271 0.346 0.371 0.424 0.460 0.536 0.619 0.746 1.02 1.1045 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 1.1045 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 1.1045 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 1.1048 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 1.1048 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 1.1048 0.0678 0.048 0.240 0.240 0.248 0.240 0.340 0.340 0.570 0.678 0.826 0.111 1.1048 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 1.1049 0.1048 0.1049 0.		100	0.122	0.208	0.409	0.570				1.47	1.76	2.07	2.47	2.88																			ω
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 1.76 1.72 1.39 1.51 1.31 1.51 1.35 1.56 1.76 1.77 1.33 1.51 1.77 1.35 1.56 1.77 1.35 1.56 1.77 1.35 1.56 1.77 1.35 1.57 1.39 1.51 1.77 1.35 1.51 1.77 1.35 1.51 1.77 1.35 1.51 1.35 1.51 1.77 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.51 1.35 1.55 1.5	0.059 0.067 0.076 0.099 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. 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. 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. 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. SCFH - Standard Cu. Ft. Per Hour SLPM - Standard Liters Per Minute	ĮЭ	2	0.007	0.013	0.029	0.043					0.154		0.212				ı	l	l				ľ	ľ		ľ							-
£ 15 0.012 0.020 0.045 0.065 0.045 0.068 0.012 0.292 0.337 0.398 0.453 0.486 0.570 0.678 0.826 1.11 1.17 1.33 1.51 1.73 1.95 2.26 2.95 3.50 4.29 0.337 0.398 0.453 0.486 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 0.598 0.453 0.488 0.598 0.453 0.488 0.579 0.678 0.826 1.11 1.17 1.33 1.51 1.73 1.95 2.26 2.95 3.50 4.29 5.06 3 0 0.012 0.045 0.006 0.045 0.006 0.0107 0.138 0.168 0.292 0.337 0.398 0.459 0.057 0.048 0.592 0.337 0.398 0.450 0.017 0.118 0.118 0.018 0.2	3.045 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. 3.045 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. 3.045 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. 3.047 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. 3.048 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. 3.048 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. 3.048 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. 3.048 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. 3.048 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.		10	0.009	0.018	0.039	0.057	0.076			0.155		0.231	0.271	0.316										_									0
E 3 20 0.012 0.020 0.0337 0.398 0.453 0.488 0.557 0.678 0.678 0.826 1.11 1.13 1.33 1.51 1.73 1.95 2.26 2.95 3.37 0.398 0.453 0.488 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 0.388 0.453 0.398 0.453 0.498 0.579 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	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. SCFH – Standard Cu. Ft. Per Hour SLPM – Standard Liters Per Minute	βH.		0.012	0.020	0.045	0.063	0.085			0.168		0.248		0.337							,			ì									_
S 30 0.012 0.020 0.045 0.063 0.086 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	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. SCFH – Standard Cu. Ft. Per Hour SLPM – Standard Liters Per Minute	uĮ		0.012		0.045	0.063						0.248		0.337	0.398					·	_	_	_	`	`								7
				0.012	0.020	0.045	0.063	0.085		0.138	0.168		0.248	0.292		0.398						`												7

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P.O. BOX Q • TRUMBULL, CONNECTICUT 06611 • CT PHONE (203) 261-6711

Metal Orifice Water Flow - Gallons/minute

0.032 0.033	32 33	0.024 0.025	0.024 0.025	0.034 0.035	0.042 0.043	0.048 0.050	0.054 0.056	0.059 0.061	0.063 0.066	0.068 0.071	0.072 0.075	0.076 0.079	0.093 0.097	0.107 0.112	0.131 0.137	0.152 0.158	0.170 0.177	0.186 0.194	0.201 0.209	0.215 0.224	0.228 0.237	0.240 0.250
0.031	ઝ	0.022	0.022	0.031	0.038	0.044	0.049	0.054	0.058	0.062	990.0	0.070	0.085	0.098	0.120	0.139	0.156	0.170	0.184	0.197	0.209	0.220
0.029	53	0.019	0.019	0.027	0.033	0.038	0.042	0.047	0.050	0.054	0.057	0.060	0.074	0.085	0.104	0.120	0.134	0.147	0.159	0.170	0.180	0.190
0.028	88	0.018	0.018	0.025	0.031	0.036	0.040	0.044	0.048	0.051	0.054	0.057	0.070	0.080	0.099	0.114	0.127	0.139	0.151	0.161	0.171	0.180
0.027	27	0.017	0.017	0.024	0.029	0.034	0.038	0.042	0.045	0.048	0.051	0.054	0.066	0.076	0.093	0.108	0.120	0.132	0.142	0.152	0.161	0.170
0.026	79	0.016	0.016	0.023	0.028	0.032	0.036	0.039	0.042	0.045	0.048	0.051	0.062	0.072	0.088	0.101	0.113	0.124	0.134	0.143	0.152	0.160
0.025	52	0.014	0.014	0.020	0.024	0.028	0.031	0.034	0.037	0.040	0.042	0.044	0.054	0.063	0.077	0.089	0.099	0.108	0.117	0.125	0.133	0.140
0.024	24	0.013	0.013	0.018	0.023	0.026	0.029	0.032	0.034	0.037	0.039	0.041	0.050	0.058	0.071	0.082	0.092	0.101	0.109	0.116	0.123	0.130
0.023	82	0.012	0.012	0.017	0.021	0.024	0.027	0.029	0.032	0.034	0.036	0.038	0.046	0.054	0.066	0.076	0.085	0.093	0.100	0.107	0.114	0.120
0.022	22	0.011	0.011	0.016	0.019	0.022	0.025	0.027	0.029	0.031	0.033	0.035	0.043	0.049	0.060	0.070	0.078	0.085	0.092	0.098	0.104	0.110
0.021	24	9 0.010	9 0.010	2 0.014	5 0.017	3 0.019	0.021	2 0.024	3 0.025	5 0.027	3 0.029	3 0.030	1 0.037	9 0.043	3 0.053	3 0.061	2 0.068	3 0.074	0.080	980.0	3 0.091	3 0.096
9 0.020	8	900.0	30 0.009	3 0.012	9 0.015	30 0.018	9 0.020	96 0.022	2 0.023	36 0.025	0.026	3 0.028	0.034	88 0.039	88 0.048	96 0.056	36 0.062	20 0.068	9 0.074	6 0.079	59 0.083	00.088
8 0.019	19	73 0.0080	73 0.0080	3 0.0113	6 0.0139	6 0.0160	3 0.0179	9 0.0196	3 0.0212	0.0226	9 0.0240	11 0.0253	33 0.0310	26 0.0358	0.0438	32 0.0506	0.0566	55 0.0620	1 0.0669	3 0.0716	13 0.0759	00800 0
7 0.018	8	57 0.0073	57 0.0073	35 0.0103	6 0.0126	34 0.0146	50 0.0163	34 0.0179	77 0.0193	90 0.0206	0.0219	2 0.0231	59 0.0283	00 0.0326	37 0.0400	24 0.0462	74 0.0516	9 0.0565	31 0.0611	99 0.0653	36 0.0693	00.0730
6 0.017	11	55 0.0067	55 0.0067	78 0.0095	95 0.0116	10 0.0134	23 0.0150	35 0.0164	16 0.0177	56 0.0190	35 0.0201	74 0.0212	13 0.0259	16 0.0300	0.0367	48 0.0424	39 0.0474	26 0.0519	30 0.0561	92 0.0599	22 0.0636	50 0.0670
5 0.016	91	50 0.0055	50 0.0055	71 0.0078	87 0.0095	00 0.0110	12 0.0123	22 0.0135	32 0.0146	41 0.0156	50 0.0165	58 0.0174	94 0.0213	24 0.0246	74 0.0301	16 0.0348	54 0.0389	87 0.0426	18 0.0460	47 0.0492	74 0.0522	00 0.0550
14 0.015	15	43 0.0050	43 0.0050	61 0.0071	74 0.0087	86 0.0100	96 0.0112	05 0.0122	14 0.0132	22 0.0141	29 0.0150	36 0.0158	67 0.0194	92 0.0224	36 0.0274	72 0.0316	04 0.0354	33 0.0387	60 0.0418	85 0.0447	08 0.0474	30 0.0500
13 0.014	14	38 0.0043	38 0.0043	54 0.0061	66 0.0074	76 0.0086	85 0.0096	93 0.0105	01 0.0114	07 0.0122	14 0.0129	20 0.0136	47 0.0167	70 0.0192	08 0.0236	40 0.0272	69 0.0304	94 0.0333	18 0.0360	40 0.0385	60 0.0408	80 0.0430
12 0.013	12 13	334 0.0038	334 0.0038	0.0048 0.0054	0.0059 0.0066	0.0068 0.0076	0.0076 0.0085	0.0083 0.0093	0.0090 0.0101	96 0.0107	0.0102 0.0114	0.0108 0.0120	132 0.0147	0.0152 0.0170	0.0186 0.0208	0.0215 0.0240	240 0.0269	0.0263 0.0294	0.0284 0.0318	0.0304 0.0340	323 0.0360	340 0.0380
0.011 0.012	11	0.0028 0.0034	0.0028 0.0034	0.0040 0.00	0.0048 0.00	0.0056 0.00	0.0063 0.00	0.0069 0.00	0.0074 0.00	0.0079 0.0096	0.0084 0.0	0.0089 0.0	0.0108 0.0132	0.0125 0.0	0.0153 0.0	0.0177 0.03	0.0198 0.0240	0.0217 0.03	0.0234 0.03	0.0250 0.03	0.0266 0.0323	0.0280 0.0340
0.010 0.0	10 1	0.0025 0.0	0.0025 0.0	0.0035 0.0	0.0043 0.0	0.0050 0.0	0.0056 0.0	0.0061 0.0	0.0066 0.0	0.0071 0.0	0.0075 0.0	0.0079 0.0	0.0097 0.0	0.0112 0.0	0.0137 0.0	0.0158 0.0	0.0177 0.0	0.0194 0.0	0.0209 0.0	0.0224 0.0	0.0237 0.0	0.0250 0.0
0.009 0.0	9	0.0019 0.0	0.0019 0.0	0.0027 0.0	0.0033 0.0	0.0038 0.0	0.0042 0.0	0.0047 0.0	0.0050 0.0	0.0054 0.0	0.0057 0.0	0.0060 0.0	0.0074 0.0	0.0085 0.0	0.0104 0.0	0.0120 0.0	0.0134 0.0	0.0147 0.0	0.0159 0.0	0.0170 0.0	0.0180 0.0	0.0190 0.0
0.008 0.0		0.0015 0.0	0.0015 0.0	0.0021 0.0	0.0026 0.0	0.0030 0.0	0.0034 0.0	0.0037 0.0	0.0040 0.0	0.0042 0.0	0.0045 0.0	0.0047 0.0	0.0058 0.0	0.0067 0.0	0.0082 0.0	0.0095 0.0	0.0106 0.0	0.0116 0.0	0.0125 0.0	0.0134 0.0	0.0142 0.0	0.0150 0.0
0.007 0.	7	0.0012 0.0	0.0012 0.0	0.0017 0.0	0.0021 0.0	0.0024 0.0	0.0027 0.0	0.0029 0.0	0.0032 0.0	0.0034 0.0	0.0036 0.0	0.0038 0.0	0.0046 0.0	0.0054 0.0	0.0066 0.0	0.0076 0.0	0.0085 0.0	0.0093 0.	0.0100 0.0	0.0107 0.0	0.0114 0.0	0.0120 0.0
0.006	9	0.0000	0.0000	0.0012 0.	0.0015 0.	0.0017 0.	0.0019 0.	0.0021 0.	0.0023 0.	0.0024 0.	0.0026 0.	0.0027 0.	0.0033 0.	0.0038 0.	0.0047 0.	0.0054 0.	0.0061 0.	0.0067 0.	0.0072 0.	0.0077 0.	0.0082 0.	0.0086 0.
0.005	2	0 9000'	0.00000		0.0011 0	0.0012 0	0.0014 0	0.0015 0	0.0016 0	0.0017 0	0.0018 0	0.0019 0	0.0024 0	0.0027 0	0.0033 0	0.0039 0	0.0043 0	0.0047 0		0.0055 0	0.0058 0	0.0061 0
0.004	4	0.00035 0.0006	0.00035 0	0.00049 0.0009	0.00061 0	0.000070	0.00078 0	0.00086 0	0.00003 0	0.000099	0.00105 0	0.00111 0	0.00136 0	0.00157 0	0.00192 0	0.00221 0	0.00247 0	0.00271 0	0.00293 0.0051	0.00313 0	0.00332 0	0.00350 0
Orifice Diameter Inches	Size Number	ें	-	2	က	4	2	9	7	∞	တ	10	15	20	30	40	20	09	70	80	06	100
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	0.125		125	0.370	0.370	0.523	0.641	0.740	0.827	906.0	0.979	1.047	1.110	1.170	1.433	1.655	2.027	2.340	2.616	2.866	3.096	3.309	3.510	3.700
	0.12		120	0.340	0.340	0.481	0.589	0.680	0.760	0.833	0.900	0.962	1.020	1.075	1.317	1.521	1.862	2.150	2.404	2.634	2.845	3.041	3.226	3.400
	0.113		113	0.310	0.310	0.438	0.537	0.620	0.693	0.759	0.820	0.877	0.930	0.980	1.201	1.386	1.698	1.961	2.192	2.401	2.594	2.773	2.941	3.100
	0.109		109	0.270	0.270	0.382	0.468	0.540	0.604	0.661	0.714	0.764	0.810	0.854	1.046	1.207	1.479	1.708	1.909	2.091	2.259	2.415	2.561	2.700
	0.104		104	0.250	0.250	0.354	0.433	0.500	0.559	0.612	0.661	0.707	0.750	0.791	0.968	1.118	1.369	1.581	1.768	1.936	2.092	2.236	2.372	2.500
	0.1		100	0.230	0.230	0.325	0.398	0.460	0.514	0.563	0.609	0.651	0.690	0.727	0.891	1.029	1.260	1.455	1.626	1.782	1.924	2.057	2.182	2.300
	0.096		96	0.210	0.210	0.297	0.364	0.420	0.470	0.514	0.556	0.594	0.630	0.664	0.813	0.939	1.150	1.328	1.485	1.627	1.757	1.878	1.992	2.100
	0.094		94	0.200	0.200	0.283	0.346	0.400	0.447	0.490	0.529	0.566	0.600	0.632	0.775	0.894	1.095	1.265	1.414	1.549	1.673	1.789	1.897	2.000
	0.089		88	0.180	0.180	0.255	0.312	0.360	0.402	0.441	0.476	0.509	0.540	0.569	0.697	0.805	0.986	1.138	1.273	1.394	1.506	1.610	1.708	1.800
	0.086		98	0.170	0.170	0.240	0.294	0.340	0.380	0.416	0.450	0.481	0.510	0.538	0.658	0.760	0.931	1.075	1.202	1.317	1.422	1.521	1.613	1.700
	0.081		8	0.150	0.150	0.212	0.260	0.300	0.335	0.367	0.397	0.424	0.450	0.474	0.581	0.671	0.822	0.949	1.061	1.162	1.255	1.342	1.423	1.500
	0.079		62	0.140	0.140	0.198	0.242	0.280	0.313	0.343	0.370	0.396	0.420	0.443	0.542	0.626	0.767	0.885	0.990	1.084	1.171	1.252	1.328	1.400
	0.076		92	0.130	0.130	0.184	0.225	0.260	0.291	0.318	0.344	0.368	0.390	0.411	0.503	0.581	0.712	0.822	0.919	1.007	1.088	1.163	1.233	1.300
	0.073		73	0.120	0.120	0.170	0.208	0.240	0.268	0.294	0.317	0.339	0.360	0.379	0.465	0.537	0.657	0.759	0.849	0.930	1.004	1.073	1.138	1.200
	0.07		20	0.110	0.110	0.156	0.191	0.220	0.246	0.269	0.291	0.311	0.330	0.348	0.426	0.492	0.602	969.0	0.778	0.852	0.920	0.984	1.044	1.100
	0.067		29	0.100	0.100	0.141	0.173	0.200	0.224	0.245	0.265	0.283	0.300	0.316	0.387	0.447	0.548	0.632	0.707	0.775	0.837	0.894	0.949	1.000
	0.063		63	0.088	0.088	0.124	0.152	0.176	0.197	0.216	0.233	0.249	0.264	0.278	0.341	0.394	0.482	0.557	0.622	0.682	0.736	0.787	0.835	0.880
	90:00		09	0.081	0.081	0.115	0.140	0.162	0.181	0.198	0.214	0.229	0.243	0.256	0.314	0.362	0.444	0.512	0.573	0.627	0.678	0.724	0.768	0.810
	0.055		22	0.068	0.068	0.096	0.118	0.136	0.152	0.167	0.180	0.192	0.204	0.215	0.263	0.304	0.372	0.430	0.481		0.569	909.0	0.645	0.680
	0.052		52	0.059	0.059	0.083	0.102	0.118	0.132	0.145	0.156	0.167	0.177	0.187	0.229	0.264	0.323	0.373	0.417	0.457	0.494	0.528	0.560	0.290
	0.047		47	0.048	0.048	990.0	0.083	960.0	0.107	0.118	3 0.127	0.136	3 0.144	0.152	0.186	3 0.215	0.263	0.304	0.339	3 0.372	3 0.402	0.429	0.455	0.480
	0.043		43	0.041	0.041	0.058	3 0.071	3 0.082	0.092	3 0.100	3 0.108	0.116	0.123	3 0.130	0.159	1 0.183	1 0.225	7 0.259	3 0.290	2 0.318	3 0.343	9 0.367	0.389	0.410
	1 0.042		45	8 0.039	8 0.039	4 0.055	90.0	870.0 9	5 0.087	3 0.096	1 0.103	7 0.110	4 0.117	0 0.123	7 0.151	0 0.174	8 0.214	0 0.247	9 0.276	4 0.302	8 0.326	0 0.349	0 0.370	0 0.390
	0.041		4	6 0.038	6 0.038	1 0.054	2 0.066	2 0.076	0 0.085	8 0.093	5 0.101	2 0.107	8 0.114	4 0.120	9 0.147	1 0.170	7 0.208	8 0.240	5 0.269	9 0.294	1 0.318	2 0.340	2 0.360	0 0.380
	9 0.04		40	3 0.036	3 0.036	7 0.051	7 0.062	6 0.072	4 0.080	1 0.088	7 0.095	3 0.102	9 0.108	4 0.114	8 0.139	8 0.161	1 0.197	9 0.228	3 0.255	6 0.279	6 0.301	5 0.322	3 0.342	0.360
	8 0.039		39	2 0.033	2 0.033	5 0.047	5 0.057	4 0.066	2 0.074	8 0.081	5 0.087	1 0.093	660.0 9	1 0.104	4 0.128	3 0.148	5 0.181	2 0.209	6 0.233	8 0.256	8 0.276	6 0.295	4 0.313	0.330
	37 0.038		88	1 0.032	1 0.032	0.045	54 0.055	2 0.064	39 0.072	6 0.078	32 0.085	38 0.091	93 0.096	98 0.101	20 0.124	39 0.143	70 0.175	96 0.202	9 0.226	10 0.248	59 0.268	7 0.286	94 0.304	0.320
	5 0.037		37	8 0.031	8 0.031	0.044	8 0.054	6 0.062	3 0.069	920.0 69	74 0.082	9 0.088	14 0.093	960.0	0.120	5 0.139	3 0.170	7 0.196	0.219	7 0.240	4 0.259	0.277	6 0.294	0.310
	0.035		35	0.028	0.028	0.040	0.048	0.056	0.063	0.069	0.074	0.079	0.084	0.089	0.108	0.125	0.153	0.177	0.198	0.217	0.234	0.250	0.266	0.280
Orifice	Diameter Inches	Size	Number	ਹ <mark>ੰ</mark>	-	2	က	4	2	9	7	00	6	10	15	20	30	40	20	09	70	80	06	100
											6	isd	- e	uns	sə.	IG /	ldd	ng						

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

O. Diar	S IN								6	iisd	– e	ns	sə	ıA y	jdd	ng						
Orifice Diameter Inches	Size Number	ر ک	-	2	က	4	2	9	7	∞	တ	10	15	20	30	40	20	09	20	80	06	100
	4	0.00035	0.0013	0.0019	0.0023	0.0026	0.0030	0.0032	0.0035	0.0037	0.0040	0.0042	0.0051	0.0059	0.0073	0.0084	0.0094	0.0103	0.0111	0.0119	0.0126	0.0132
0.005	5	5 0.0006	0.0023	0.0033	0.0040	0.0046	0.0052	0.0057	0.0061	0.0065	6900.0	0.0073	0.0089	0.0103	0.0126	0.0146	0.0163	0.0179	0.0193	0.0207	0.0219	0.0231
0.006	9	0.0009	0.0033	0.0046	0.0056	0.0065	0.0073	0.0080	0.0086	0.0092	0.0098	0.0103	0.0126	0.0146	0.0178	0.0206	0.0230	0.0252	0.0272	0.0291	0.0309	0.0326
0.007	7	0.0012	0.0045	0.0064	0.0079	0.0091	0.0102	0.0111	0.0120	0.0128	0.0136	0.0144	0.0176	0.0203	0.0249	0.0287	0.0321	0.0352	0.0380	0.0406	0.0431	0.0454
0.008	∞	0.0015	0.0057	0.0080	0.0098	0.0114	0.0127	0.0139	0.0150	0.0161	0.0170	0.0180	0.0220	0.0254	0.0311	0.0359	0.0402	0.0440	0.0475	0.0508	0.0539	0.0568
0.009	6	0.0019	0.0072	0.0102	0.0125	0.0144	0.0161	0.0176	0.0190	0.0203	0.0216	0.0227	0.0279	0.0322	0.0394	0.0455	0.0509	0.0557	0.0602	0.0643	0.0682	0.0719
0.010	6	0.0025	0.0095	0.0134	0.0164	0.0189	0.0212	0.0232	0.0250	0.0268	0.0284	0.0299	0.0367	0.0423	0.0518	0.0599	0.0669	0.0733	0.0792	0.0846	0.0898	0.0946
0.011	7	0.0028	0.0106	0.0150	0.0184	0.0212	0.0237	0.0260	0.0280	0.0300	0.0318	0.0335	0.0411	0.0474	0.0581	0.0670	0.0749	0.0821	0.0887	0.0948	0.1006	0.1060
0.012	12	0.0034	0.0129	0.0182	0.0223	0.0257	0.0288	0.0315	0.0341	0.0364	0.0386	0.0407	0.0498	0.0576	0.0705	0.0814	0.0910	0.0997	0.1077	0.1151	0.1221	0.1287
0.013	13	0.0038	0.0144	0.0203	0.0249	0.0288	0.0322	0.0352	0.0381	0.0407	0.0432	0.0455	0.0557	0.0643	0.0788	0.0910	0.1017	0.1114	0.1203	0.1287	0.1365	0.1438
0.014	4	0.0043	0.0163	0.0230	0.0282	0.0326	0.0364	0.0399	0.0431	0.0460	0.0488	0.0515	0.0630	0.0728	0.0892	0.1029	0.1151	0.1261	0.1362	0.1456	0.1544	0.1628
0.015	15	0.0050	0.0189	0.0268	0.0328	0.0379	0.0423	0.0464	0.0501	0.0535	0.0568	0.0599	0.0733	0.0846	0.1037	0.1197	0.1338	0.1466	0.1584	0.1693	0.1796	0.1893
0.016	16	0.0055 (0.0208	0.0294 (0.0361	0.0416 (0.0466 (0.0510 (0.0551 (0.0589	0.0625 (0.0658 (0.0806	0.0931	0.1140 (0.1317 (0.1472 (0.1613 (0.1742 (0.1862 (0.1975 (0.2082 (
0.017	11	0.0067	0.0254 (0.0359 (0.0439 (0.0507	0.0567	0.0621 (0.0671	0.0717 (0.0761	0.0802	0.0982	0.1134 0	0.1389 (0.1604 (0.1793 (0.1965 (0.2122 (0.2268 (0.2406 (0.2536 (
0.018	18	0.0073 0	0.0276 0	0.0391 0	0.0479 0	0.0553 0	0.0618 0	0.0677 0	0.0731 0	0.0782 0	0.0829 0	0.0874 0	0.1070 0	0.1236 0	0.1514 0	0.1748 0	0.1954 0	0.2140 0	0.2312 0	0.2472 0	0.2622 0	0.2763 0
0.019	19	0.0080 0	0.0303 0	0.0428 0	0.0525 0	0.0606 0	0.0677 0	0.0742 0	0.0801 0	0.0857 0	0.0908 0	0.0958 0	0.1173 0	0.1354 0	0.1659 0	0.1915 0	0.2141 0	0.2346 0	0.2534 0	0.2709 0	0.2873 0	0.3028 0
0.02 0.	20	0 600.0	0.033 0.	0.047 0.	0.058 0.	0.067	0.074 0.	0.082 0.	0.088 0.	0.094 0.	0.100 0.	0.105 0.	0.129 0.	0.149 0.	0.182 0.	0.211 0.	0.236 0.	0.258 0.	0.279 0.	0.298 0.	0.316 0.	0.333 0.
0.021	21	0.010 0	0.036	0.051	0.063	0.073	0.081	0.089	0.096	0.103 0	0.109	0.115 0	0.141 0	0.163	0.199 0	0.230	0.257 0	0.281 C	0.304 0	0.325 0	0.345	0.363
0.022	22	0.011 (0.042 (0.059	0.072	0.083	0.093	0.102	0.110 (0.118 (0.125 (0.132 (0.161 (0.186 (0.228	0.263 (0.294 (0.323 (0.348 (0.372 (0.395 (0.416 (
0.023	23	0.012	0.045	0.064	0.079	0.091	0.102	0.111	0.120	0.128	0.136	0.144	0.176	0.203	0.249	0.287	0.321	0.352	0.380	0.406	0.431	0.454
0.024	24	0.013	0.049	0.070	0.085	0.098	0.110	0.121	0.130	0.139	0.148	0.156	0.191	0.220	0.270	0.311	0.348	0.381	0.412	0.440	0.467	0.492
0.025	52	0.014	0.053	0.075	0.092	0.106	0.119	0.130	0.140	0.150	0.159	0.168	0.205	0.237	0.290	0.335	0.375	0.411	0.443	0.474	0.503	0.530
0.026	26	0.016	0.061	980.0	0.105	0.121	0.135	0.148	0.160	0.171	0.182	0.192	0.235	0.271	0.332	0.383	0.428	0.469	0.507	0.542	0.575	909.0
0.027	27	0.017	0.064	0.091	0.111	0.129	0.144	0.158	0.170	0.182	0.193	0.203	0.249	0.288	0.352	0.407	0.455	0.498	0.538	0.576	0.610	0.644
0.028	78	0.018	0.068	0.096	0.118 0	0.136	0.152 0	0.167 0	0.180 C	0.193 0	0.204 0	0.215 0	0.264 0	0.305	0.373 0	0.431 0	0.482 0	0.528	0.570 0	0.609	0.646 0	0.681
0.029 0.	59	0.019 0.	0.072 0.	0.102 0.	0.125 0.	0.144 0.	0.161 0.	0.176 0.	0.190 0.	0.203 0.	0.216 0.	0.227 0.	0.279 0.	0.322 0.	0.394 0.	0.455 0.	0.509 0.	0.557 0.	0.602 0.	0.643 0.	0.682 0.	0.719 0.
0.031 0.	34	0.022 0.	0.083 0.	0.118 0.	0.144 0.	0.167 0.	0.186 0.	0.204 0.	0.220 0.	0.236 0.	0.250 0.	0.263 0.	0.323 0.	0.372 0.	0.456 0.	0.527 0.	0.589 0.	0.645 0.	0.697 0.	0.745 0.	0.790 0.	0.833 0.
0.032 0.033	32 33	0.024 0.025	0.091 0.095	0.128 0.134	0.157 0.164	0.182 0.189	0.203 0.212	0.223 0.232	0.240 0.250	0.257 0.268	0.273 0.284	0.287 0.299	0.352 0.367	0.406 0.423	0.498 0.518	0.575 0.599	0.642 0.669	0.704 0.733	0.760 0.792	0.813 0.846	0.862 0.898	0.908 0.946

	0.12 0.125		120 125	0.340 0.370	1.287 1.401	1.820 1.981	2.229 2.426	2.574 2.801	2.878 3.132	3.153 3.431	3.405 3.706	3.640 3.961	3.861 4.202	4.070 4.429	4.985 5.424	5.756 6.264	7.049 7.671	8.140 8.858	9.101 9.904	9.969 10.849	10.768 11.718	11.512 12.527	12.210 13.287	12.870 14.006
	0.113		113	0.310	1.173	1.660	2.033	2.347	2.624	2.874	3.105	3.319	3.520	3.711	4.545	5.248	6.427	7.422	8.298	060.6	9.818	10.496	11.133	11.735
	0.109		109	0.270	1.022	1.445	1.770	2.044	2.285	2.504	2.704	2.891	3.066	3.232	3.958	4.571	5.598	6.464	7.227	7.917	8.551	9.142	969.6	10.221
	0.104		104	0.250	0.946	1.338	1.639	1.893	2.116	2.318	2.504	2.677	2.839	2.993	3.665	4.232	5.183	5.985	6.692	7.330	7.918	8.464	8.978	9.464
	0.1		100	0.230	0.871	1.231	1.508	1.741	1.947	2.133	2.304	2.463	2.612	2.753	3.372	3.894	4.769	5.506	6.156	6.744	7.284	7.787	8.260	8.706
	960.0		96	0.210	0.795	1.124	1.377	1.590	1.778	1.947	2.103	2.248	2.385	2.514	3.079	3.555	4.354	5.028	5.621	6.158	6.651	7.110	7.541	7.949
	0.094		96	0.200	0.757	1.071	1.311	1.514	1.693	1.854	2.003	2.141	2.271	2.394	2.932	3.386	4.147	4.788	5.353	5.864	6.334	6.772	7.182	7.571
	0.089		88	0.180	0.681	0.964	1.180	1.363	1.524	1.669	1.803	1.927	2.044	2.155	2.639	3.047	3.732	4.309	4.818	5.278	5.701	6.094	6.464	6.814
	0.086		98	0.170	0.644	0.910	1.115	1.287	1.439	1.576	1.703	1.820	1.931	2.035	2.492	2.878	3.525	4.070	4.550	4.985	5.384	5.756	6.105	6.435
	0.081		28	0.150	0.568	0.803	0.983	1.136	1.270	1.391	1.502	1.606	1.703	1.796	2.199	2.539	3.110	3.591	4.015	4.398	4.751	5.079	5.387	5.678
	0.079		62	0.140	0.530	0.749	0.918	1.060	1.185	1.298	1.402	1.499	1.590	1.676	2.053	2.370	2.903	3.352	3.747	4.105	4.434	4.740	5.028	5.300
	0.076		92	0.130	0.492	969.0	0.852	0.984	1.100	1.205	1.302	1.392	1.476	1.556	1.906	2.201	2.695	3.112	3.480	3.812	4.117	4.401	4.668	4.921
	0.073		23	0.120	0.454	0.642	0.787	0.908	1.016	1.113	1.202	1.285	1.363	1.436	1.759	2.031	2.488	2.873	3.212	3.519	3.801	4.063	4.309	4.542
	0.07		2	0.110	0.416	0.589	0.721	0.833	0.931	1.020	1.102	1.178	1.249	1.317	1.613	1.862	2.281	2.634	2.944	3.225	3.484	3.724	3.950	4.164
	0.067		29	0.100	0.379	0.535	0.656	0.757	0.846	0.927	1.002	1.071	1.136	1.197	1.466	1.693	2.073	2.394	2.677	2.932	3.167	3.386	3.591	3.785
	0.063		83	0.088	0.333	0.471	0.577	999.0	0.745	0.816	0.881	0.942	0.999	1.053	1.290	1.490	1.825	2.107	2.355	2.580	2.787	2.979	3.160	3.331
	90.0		9	0.081	0.307	0.434	0.531	0.613	0.686	0.751	0.811	0.867	0.920	0.970	1.188	1.371	1.679	1.939	2.168	2.375	2.565	2.742	2.909	3.066
	0.055		22	0.068	0.257	0.364	0.446	0.515	0.576	0.631	0.681	0.728	0.772	0.814	0.997	1.151	1.410	1.628	1.820	1.994	2.154	2.302	2.442	2.574
	0.052		25	0.059	0.223	0.316	0.387	0.447	0.499	0.547	0.591	0.632	0.670	0.706	0.865	0.999	1.223	1.413	1.579	1.730	1.869	1.998	2.119	2.233
	0.047		47	0.048	0.182	0.257	0.315	0.363	0.406	0.445	0.481	0.514	0.545	0.575	0.704	0.813	0.995	1.149	1.285	1.407	1.520	1.625	1.724	1.817
	0.043		43	0.041	0.155	0.219	0.269	0.310	0.347	0.380	0.411	0.439	0.466	0.491	0.601	0.694	0.850	0.982	1.097	1.202	1.299	1.388	1.472	1.552
	0.042		42	0.039	0.148	0.209	0.256	0.295	0.330	0.362	0.391	0.418	0.443	0.467	0.572	0.660	0.809	0.934	1.044	1.144	1.235	1.320	1.401	1.476
	0.041		4	0.038	0.144	0.203	0.249	0.288	0.322	0.352	0.381	0.407	0.432	0.455	0.557	0.643	0.788	0.910	1.017	1.114	1.203	1.287	1.365	1.438
	0.04		40	0.036	0.136	0.193	0.236	0.273	0.305	0.334	0.361	0.385	0.409	0.431	0.528	0.609	0.746	0.862	0.964	1.056	1.140	1.219	1.293	1.363
	0.039		39	0.033	0.125	0.177	0.216	0.250	0.279	0.306	0.331	0.353	0.375	0.395	0.484	0.559	0.684	0.790	0.883	0.968	1.045	1.117	1.185	1.249
	0.038		88	0.032	0.121	0.171	0.210	0.242	0.271	0.297	0.320	0.343	0.363	0.383	0.469	0.542	0.663	0.766	0.857	0.938	1.013	1.083	1.149	1.211
	0.037		37	0	0.117	0.166	0.203	0.235	0.262	0.287	0.310	0.332	0.352	0.371	0.454	0.525	0.643	0.742	0.830	0.909	0.982	1.050	1.113	1.173
	0.035		35	0.028	0.106	0.150	0.184	0.212	0.237	0.260	0.280	0.300	0.318	0.335	0.411	0.474	0.581	0.670	0.749	0.821	0.887	0.948	1.006	1.060
9.	iter	3	, ie		-	2	က	4	2	9	7	œ	တ	10	15	20	30	40	20	09	20	80	06	100
Orifice	Diamete	Size	Number	♂							6	isd	- 6	uns	ssa	A 6	ijdd	ne						

Above chart data calculated based on the C_v for each orifice. Flow = 3.875 C_v VAP. ΔP = differential pressure in psid. It is assumed that the region on either side of the orifice is fully flooded with no air pockets.