

# APPENDIX



## Pipe Size - Inches

Pressure Drop per 100 Feet of Pipe

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Applied Pressure psig	Derived Units = Pressure Drop per 100 Feet of Pipe (CFH)										
	0.125	0.25	0.375	0.5	0.75	1	1.25	1.5	2	2.5	3
5	30	72	162	294	396	780	1,620	2,400	4,800	8,100	14,400
10	48	102	234	462	660	1,260	2,640	3,840	7,500	12,000	22,200
20	78	180	396	780	1,110	2,100	4,500	6,600	12,900	21,000	36,000
40	150	330	720	1,380	2,040	3,720	8,100	12,000	23,100	38,400	66,000
60	210	480	1,080	2,040	3,000	5,580	11,700	17,400	33,600	54,000	96,000
80	282	630	1,380	2,640	3,900	7,200	15,300	23,400	43,200	72,000	126,000
100	348	780	1,740	3,240	4,800	9,000	18,900	28,200	54,000	87,000	156,000
150	516	1,200	2,460	4,800	6,900	13,200	27,600	40,800	81,000	132,000	234,000
200	690	1,560	3,480	6,480	9,300	17,400	37,200	54,600	105,000	168,000	300,000
250	870	1,980	4,380	8,100	12,000	22,200	46,200	69,000	132,000	210,000	3,660,000

10% of Applied Pressure

5% of Applied Pressure

## Acetylene and Oxygen Pressure vs. Temperature

Temp (°F)	Acetylene (PSI)	Oxygen (PSI)
0	85	1782
10	100	1840
20	125	1900
30	150	1960
40	170	2010
50	190	2080
60	225	2140
70	250	2216
80	285	2256
90	320	2317
100	355	2375

Acetylene withdrawal rate is 1/7th-1/10th of cylinder contents for intermittent use.  
 Acetylene withdrawal rate is 1/15th of cylinder contents for continuous use.

## Maximum Withdrawal Rate CFH 100 lb Propane Cylinder

LBS In Cyl.	0°F	20°F	40°F	60°F	70°F
100	44	65	84	108	117
90	41	59	78	96	108
80	37	54	70	84	92
70	32	48	63	78	84
60	29	43	55	69	75
50	25	37	49	60	65
40	21	31	41	51	55
30	18	26	33	42	46
20	14	20	27	32	36
10	11	15	19	23	26

## Heating Tip Oxygen to Fuel Consumption Ratio

Style No.	Tip Size No.	No. of Holes	Drill Size No.	1.1-to 1 Acetylene		4-to-1 Propylene		4-to-1 Propane		2-to-1 Natural Gas	
				CFH	BTU	CFH	BTU	CFH	BTU	CFH	BTU
759	5	7	71	30	44,000	15	35,500	10	24,660	10	10,460
	7	7	67	50	74,000	25	59,200	15	37,000	15	15,700
	8	7	63	70	104,000	35	82,900	25	63,000	30	31,400
	9	7	56	110	163,000	55	130,400	40	100,000	60	63,000
	10	7	55	140	207,000	70	166,000	50	123,000	80	83,700
756 757	12	12	56	175	260,000	100	237,100	70	175,000	140	146,000
756 757	13	12	54	230	340,000	150	355,600	110	276,000	210	220,000
	14	19	55	275	400,000	200	474,200	150	376,000	280	293,000
757	16	27	54	Sizes 16, 17 and 18 are too large for use with acetylene.		300	711,300	250	630,000	475	496,000
	17	27	53			370	877,270	300	750,000	575	600,000
	18	27	1/16			550	1,304,000	350	880,000	675	700,000
FLAME TEMP WITH O <sub>2</sub>				5589°F		5193°F		4579°F		4600°F	
BTU/CU. FT.				1480		2371		2466		1046	

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## Conversion Tables and Factors

Length	Å	CM	FT	IN	M	MICRON	MM	YD
Multiply By								
Å	-----	$1 \times 10^{-8}$	$3.28 \times 10^{-9}$	$3.93 \times 10^{-9}$	$1 \times 10^{-10}$	$1 \times 10^{-4}$	$1 \times 10^{-7}$	$1.09 \times 10^{-10}$
CM	$1 \times 10^8$	-----	$3.28 \times 10^{-2}$	$3.94 \times 10^{-1}$	$1 \times 10^{-2}$	$1 \times 10^4$	10	$1.09 \times 10^{-2}$
FT	$3.04 \times 10^9$	$3.048 \times 10^1$	-----	$1.2 \times 10^1$	$3.04 \times 10^{-1}$	$3.04 \times 10^5$	$3.04 \times 10^2$	$3.33 \times 10^{-1}$
IN	$2.54 \times 10^8$	$2.54 \times 10^0$	$8.33 \times 10^{-2}$	-----	$2.54 \times 10^2$	$2.54 \times 10^4$	$2.54 \times 10^1$	$2.77 \times 10^2$
M	$1 \times 10^{10}$	$1 \times 10^2$	$3.281 \times 10^0$	$3.93 \times 10^1$	-----	$1 \times 10^6$	$1 \times 10^3$	$1.09 \times 10^0$
MICRON	$1 \times 10^4$	$1 \times 10^{-4}$	$3.28 \times 10^{-6}$	$3.93 \times 10^{-5}$	$1 \times 10^{-6}$	-----	$1 \times 10^{-3}$	$1.09 \times 10^{-6}$
MM	$1 \times 10^7$	$1 \times 10^{-3}$	$3.28 \times 10^{-3}$	$3.93 \times 10^{-2}$	$1 \times 10^{-2}$	$1 \times 10^3$	-----	$1.09 \times 10^{-3}$
YD	$9.14 \times 10^9$	$9.14 \times 10^1$	$3 \times 10^0$	$3.6 \times 10^1$	$9.14 \times 10^{-1}$	$9.14 \times 10^5$	$9.14 \times 10^2$	-----

Flow	CM3/MIN	CM3/SEC	FT3/HR	FT3/MIN	M3/HR	M3/MIN	L/HR	L/MIN
Multiply By								
CM3/MIN	-----	$1.66 \times 10^{-2}$	$2.12 \times 10^{-3}$	$3.53 \times 10^{-5}$	$6 \times 10^{-5}$	$1 \times 10^{-6}$	$6.0 \times 10^{-2}$	$1 \times 10^{-3}$
CM3/SEC	$6 \times 10^1$	-----	$1.27 \times 10^{-1}$	$2.12 \times 10^{-3}$	$3.6 \times 10^{-3}$	$6 \times 10^{-5}$	$3.6 \times 10^0$	$6 \times 10^{-2}$
FT3/HR	$4.72 \times 10^2$	$7.87 \times 10^1$	-----	$1.67 \times 10^{-2}$	$2.83 \times 10^{-2}$	$4.72 \times 10^{-4}$	$2.83 \times 10^1$	$4.72 \times 10^{-1}$
FT3/MIN	$2.83 \times 10^4$	$4.72 \times 10^2$	$6.0 \times 10^1$	-----	$1.7 \times 10^1$	$2.83 \times 10^{-2}$	$1.7 \times 10^{-2}$	$2.83 \times 10^1$
M3/HR	$1.67 \times 10^4$	$2.78 \times 10^2$	$3.53 \times 10^1$	$5.89 \times 10^{-2}$	-----	$1.67 \times 10^{-2}$	$1 \times 10^3$	$1.67 \times 10^1$
M3/MIN	$1 \times 10^6$	$1.67 \times 10^4$	$2.12 \times 10^3$	$3.53 \times 10^1$	$6.0 \times 10^1$	-----	$6.0 \times 10^4$	$1 \times 10^3$
L/HR	$1.67 \times 10^1$	$2.78 \times 10^{-1}$	$3.53 \times 10^{-2}$	$5.89 \times 10^{-4}$	$1 \times 10^{-3}$	$1.67 \times 10^{-5}$	-----	$1.67 \times 10^{-2}$
L/MIN	$1 \times 10^3$	$1.67 \times 10^1$	$2.12 \times 10^0$	$3.53 \times 10^{-2}$	$6.0 \times 10^{-2}$	$1 \times 10^{-3}$	$6.0 \times 10^1$	-----

Pressure	ATM	BAR	FT OF H2O	IN OF HG	IN OF H2O	KG/CM2	KPA	MM OF HG	PSI
Multiply By									
ATM	-----	1.013	33.932	29.921	407.183	1.033	101.317	760	14.696
BAR	0.987	-----	33.488	29.53	401.859	1.019	100	750.062	14.504
FT. OF H2O	0.029	0.029	-----	0.883	12	0.03	2.989	22.419	0.433
IN OF HG	0.033	0.034	1.134	-----	13.6	0.035	3.377	25.4	0.491
IN OF H2O	0.002	0.002	0.083	0.074	-----	0.003	0.025	1.868	0.036
KG/CM2	0.968	0.981	32.808	28.959	393.701	-----	98.039	735.559	14.223
KPA	0.009	0.01	0.335	0.296	4.015	0.01	-----	7.501	0.145
MM OF HG	0.001	0.001	0.045	0.039	0.535	0.001	0.133	-----	0.019
PSI	0.06805	0.06895	2.3089	2.036	27.7085	0.07031	6.89465	51.175	-----

Weight	GM	KG	MG	OZ	LBS	TON
Multiply By						
GM	-----	0.001	1000	0.035	0.002	$1.1 \times 10^{-6}$
KG	1000	-----	$1 \times 10^6$	$3.53 \times 10^1$	2.205	0.001
MG	0.001	$1 \times 10^{-6}$	-----	$3.53 \times 10^{-4}$	$2.205 \times 10^{-6}$	$1.1 \times 10^{-9}$
OZ	$2.83 \times 10^1$	$2.83 \times 10^{-2}$	$2.83 \times 10^4$	-----	$6.25 \times 10^{-2}$	$3.13 \times 10^{-5}$
LBS	$4.54 \times 10^2$	$4.54 \times 10^1$	$4.54 \times 10^5$	16	-----	$5.0 \times 10^{-4}$
TON	$9.07 \times 10^5$	$9.07 \times 10^2$	$9.07 \times 10^8$	$3.2 \times 10^4$	$2.0 \times 10^3$	-----

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Volume	CM3 (ML)	FT3	IN3	M3	US GAL.	L
Multiply By						
CM3 (ML)	-----	$3.53 \times 10^{-5}$	$6.10 \times 10^{-2}$	$1 \times 10^{-6}$	$2.56 \times 10^{-3}$	$1 \times 10^{-3}$
FT3	$2.83 \times 10^4$	-----	$1.73 \times 10^3$	$2.83 \times 10^{-2}$	7.48	28.32
IN3	1.64	$5.79 \times 10^{-6}$	-----	$1.64 \times 10^{-5}$	$4.33 \times 10^{-3}$	$1.64 \times 10^{-2}$
M3	$1 \times 10^6$	3.53	$6.10 \times 10^4$	-----	$2.64 \times 10^2$	$1 \times 10^3$
US GAL.	$3.79 \times 10^3$	$1.34 \times 10^{-1}$	$2.31 \times 10^2$	$3.79 \times 10^{-3}$	-----	3.79
L	$1 \times 10^3$	$3.54 \times 10^{-2}$	$6.10 \times 10^1$	$1 \times 10^{-3}$	$2.64 \times 10^{-1}$	-----

Temperature	°C	°F	°K	°R
Multiply By				
°C + 17.78	-----	1.8	-----	-----
°C + 273.16	-----	-----	1	-----
°F - 32	0.55556	-----	-----	-----
°F + 459.72	-----	-----	-----	1
°K + 273.16	1	-----	-----	-----
°R - 459.72	-----	1	-----	-----

Density	GMS/CM <sup>3</sup>	KG/CM <sup>3</sup>	LBS/FT <sup>3</sup>	LBS/IN <sup>3</sup>	LBS/US GAL.
Multiply By					
GMS/CM <sup>3</sup>	-----	1000	$6.24 \times 10^1$	$3.61 \times 10^{-2}$	8.35
KG/CM <sup>3</sup>	$1 \times 10^{-3}$	-----	$6.24 \times 10^{-2}$	$3.61 \times 10^{-3}$	$8.35 \times 10^{-3}$
LBS/FT <sup>3</sup>	$1.60 \times 10^{-2}$	$1.60 \times 10^1$	-----	$3.61 \times 10^{-5}$	$1.33 \times 10^{-1}$
LBS/IN <sup>3</sup>	$2.77 \times 10^1$	$2.77 \times 10^4$	$1.73 \times 10^3$	-----	$2.31 \times 10^2$
LBS/US GAL.	$1.2 \times 10^{-1}$	$1.2 \times 10^2$	7.48	$4.33 \times 10^{-3}$	-----

## Concentration

Concentration	Equivalent
1,000,000 ppm	100%
100,000 ppm	10%
10,000 ppm	1%
1,000 ppm	0.10%
100 ppm	0.01%
10 ppm	0.00%
1 ppm	0.00%
1,000 ppb	1 ppm
100 ppb	0.1 ppm
10 ppb	0.001 ppm

## Scientific Notation

Notation	Equivalent	Notation	Equivalent
$1 \times 10^{10}$	10,000,000,000	$1 \times 10^{-1}$	0.1
$1 \times 10^9$	1,000,000,000	$1 \times 10^{-2}$	0.01
$1 \times 10^8$	100,000,000	$1 \times 10^{-3}$	0.001
$1 \times 10^7$	10,000,000	$1 \times 10^{-4}$	0.0001
$1 \times 10^6$	1,000,000	$1 \times 10^{-5}$	0.00001
$1 \times 10^5$	100,000	$1 \times 10^{-6}$	0.000001
$1 \times 10^4$	10,000	$1 \times 10^{-7}$	0.0000001
$1 \times 10^3$	1,000	$1 \times 10^{-8}$	0.00000001
$1 \times 10^2$	100	$1 \times 10^{-9}$	0.000000001
$1 \times 10^1$	10	$1 \times 10^{-10}$	0.0000000001

## Physical Constants

	Value	Units
Avagadro's Number	$6.022 \times 10^{23}$	molecules/gm-mole
Gas Law Constant	1.98719	cal/(gm-mol)(°K)
	1.98719	Btu/(lbs-mole)(°R)
	82.0568	(cm <sup>3</sup> )(atm)/(gm-mole)(°K)
	0.0820568	(L)(atm)/(gm-mole)(°K)
	10.7314	(ft <sup>3</sup> )(lb)/(in <sup>2</sup> )(lbs-mole)(°R)
	0.730228	(ft <sup>3</sup> )(atm)/(lbs-mole)(°R)