
Knight General Mixer Sizing Guide



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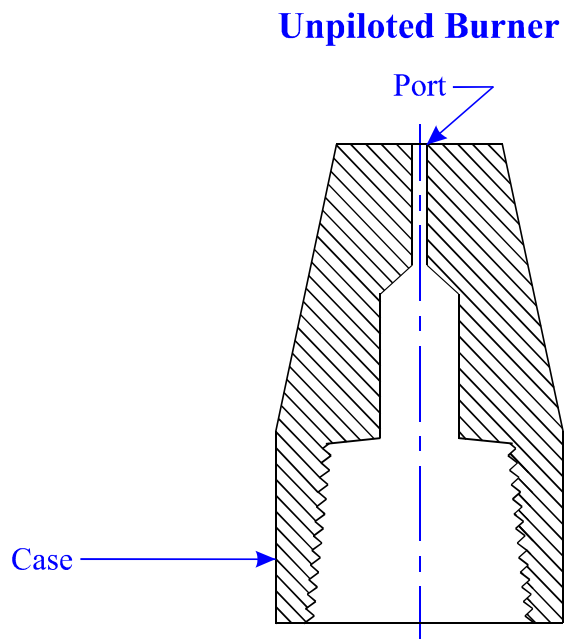
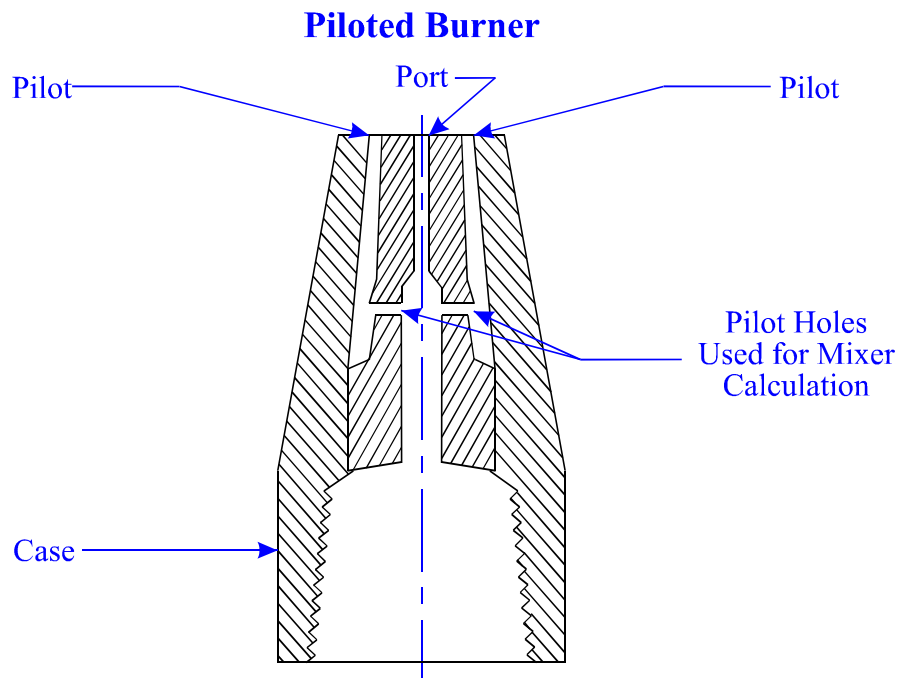
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Terms Used in Sizing Venturi Mixers

- 1). **Jet Area** Area of hole which feeds air or oxygen in the mixer.
- 2). **Pilot** As it relates to gas burners, a pilot is a secondary fire burning to support and stabilize the flame burning from a main port
- 3). **Pilot Area** Area of holes feeding the pilot flame. (Note: Usually internal and not accessible for purposes of calculation.) Also, referred to as leak area or breather area.
- 4). **Port** Orifice through which mixed fuel gas and air (and/or oxygen) exits the burner.
- 5). **PSIG** Pounds of pressure per square inch gauge.
- 6). **Throat Area** Area of hole which permits gas to be drawn from gas cavity into Venturi of mixer ([See RS-5.](#))
- 7). **T.P.A.** Total Port Area, or the area of each port multiplied by the number of ports per burner, multiplied by the number of burners per mixer.
- 8). **Venturi** Taper in mixer between the throat and outlet ([see diagram on RS-5.](#))
With proper sizing and centering of the jet to the throat, this taper utilizes the energy of a high-pressure jet to create a negative pressure in the gas cavity of the mixer. This induces fuel gas into the Venturi of the mixer in exacting proportion. The turbulence created by the Venturi results in a thorough mixing of the two gases prior to their exhaust.
- 9). **Combined Portal Area** Total port area, plus internal pilot hole area.

GENERAL GAS BURNER



KNIGHT STANDARD GAS-AIR FORMULA

GAS-AIR BURNERS WITH AIR PRESSURE AT 2 PSIG

- 1) Take **TOTAL PORT AREA***
- 2) Add internal **PILOT AREA*** (If internal **PILOT AREA** is not known, assign a value of 75%).
- 3) Divide by (4) to determine the **JET AREA***
- 4) Take mixer **JET AREA** and multiply by (1.5) to determine **THROAT AREA***

If known air pressure is more or less than 2 **PSIG***, multiply mixer **JET AREA*** by the **PRESSURE CORRECTION FACTOR**. (Determine this factor from the *CAPACITY MULTIPLIER TABLE ON PAGE RS-17.*)

EXAMPLE:

- 1) TOTAL PORT AREA = 0.05 in^2 and air pressure is 13 PSIG
- 2) TPA divided by (4) = 0.0125 in^2
- 3) THROAT = $0.0125 \times 1.5 = 0.01875 \text{ in}^2$
- 4) Go down KNOWN PRESSURE column on *CAPACITY MULTIPLIER TABLE* to “13” and then across to the “2” column. The multiplier is 0.392.
- 5) Therefore, the JET AREA is equal to $0.0125 \text{ in}^2 \times 0.392 = 0.0049 \text{ in}^2$ JET AREA.
- 6) Convert all final areas to drill sizes. (Refer to Page RS-5 for correct installation.)



* See TERMS USED IN SIZING VENTURI MIXERS, page RS-1.
To convert drill size of burner port holes, see page RS-10.

KNIGHT STANDARD GAS-OXYGEN FORMULA

GAS-OXYGEN BURNERS WITH OXYGEN PRESSURE AT 5 PSIG

- 5) Take **TOTAL PORT AREA***
- 6) Add internal **PILOT AREA*** (If internal **PILOT AREA** is not known, assign a value of 25%.
Note: For Unpiloted burners, use **TPA** only).
- 7) Divide by (4) to determine the **JET AREA***
- 8) Take mixer **JET AREA** and multiply by (4.5) to determine **THROAT AREA***
- 9) Refer to [page RS-5](#) for correct installation.

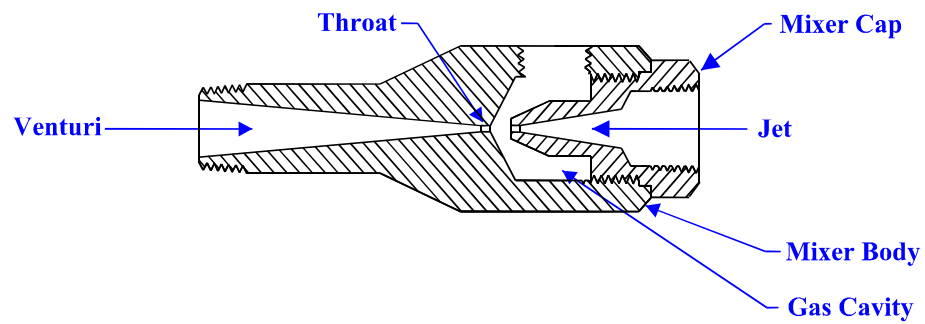
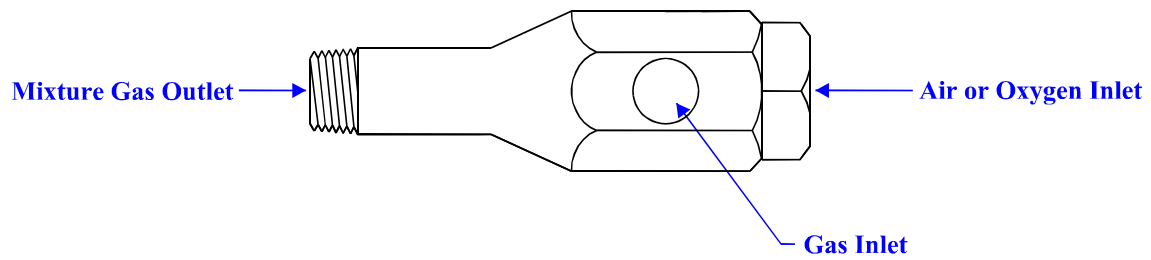
GAS-OXYGEN BURNERS WITH OXYGEN PRESSURES OTHER THAN 5 PSIG

If known oxygen pressure is more or less than 5 PSIG, follow the same procedure as GAS-AIR shown on [page RS-3](#), except come across the KNOWN PRESSURE column to the “5” column.



* See TERMS USED IN SIZING VENTURI MIXERS, page RS-1.
To convert drill size of burner port holes, see page RS-10.

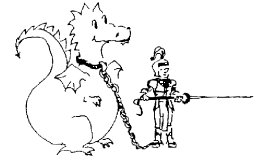
SINGLE VENTURI MIXER



KNIGHT STANDARD GAS-AIR-OXYGEN FORMULA

Although several standard formulas are available, we suggest that you first must define Gas-Air-Oxygen mixtures as having three basic types:

- 1) Gas-Air with Oxygen Bleed
- 2) Gas-Oxygen with Air Bleed
- 3) Gas, burning on a 50/50 (approximate) ratio of mixed air and oxygen



GAS-AIR WITH OXYGEN BLEED

For Gas-Air with Oxygen bleed, where a Gas-Air fire is too cool, Oxygen is added to slightly raise the flame temperature. (Select Gas-Air type burners.)

- 10) Take **TOTAL PORT AREA**
- 11) Add internal **PILOT AREA** (If internal **PILOT AREA** is not known, assign a value of 75%.)
- 12) Divide by (4) to determine the **THROAT AREA** of the First Mixer and **JET SIZE** of the Second Mixer.
- 13) Multiply this area by (1.5) to determine **THROAT SIZE** of the Second Mixer.
- 14) Multiply **THROAT SIZE** of the First Mixer by (0.10) to determine the **JET SIZE** of the First Mixer.

Note: The proper lighting procedure is Gas first, Air second, then Bleed Oxygen last.

[Refer to page RS-8 for correct installation.](#)

[To convert all areas to drill size, see the chart on page RS-10.](#)

GAS-OXYGEN WITH AIR BLEED

For Gas-Oxygen with Air bleed, where a Gas-Oxygen fire is too hot, Air is added to slightly reduce the flame temperature. (Select Gas-Oxygen type burners with minimal piloting.)

- 1) Take **TOTAL PORT AREA**
- 2) Add internal **PILOT AREA**, then divide by (4) to determine the **JET SIZE** of the First Mixer. (If **PILOT AREA** is not known, assign a value of 25%.)
- 3) Multiply this area by (4.5) to determine **THROAT SIZE** of the Second Mixer.
- 4) Multiply this number by (0.30) to determine the first **THROAT SIZE** and second **JET SIZE**.

Note: The proper lighting procedure is Gas first, Oxygen second, then Bleed Air last.

[Refer to page RS-8 for correct installation.](#)

[To convert all areas to drill size, see the chart on page RS-10.](#)

KNIGHT STANDARD GAS-AIR-OXYGEN FORMULA

GAS, BURNING ON 50/50 RATIO OF MIXED AIR AND OXYGEN

This type of burner is designed for a flame temperature in the range between Gas-Air and Gas-Oxygen. A general formula for Gas-Air-Oxygen mixers, which require a high percentage of both air and oxygen in the mixture is as follows:

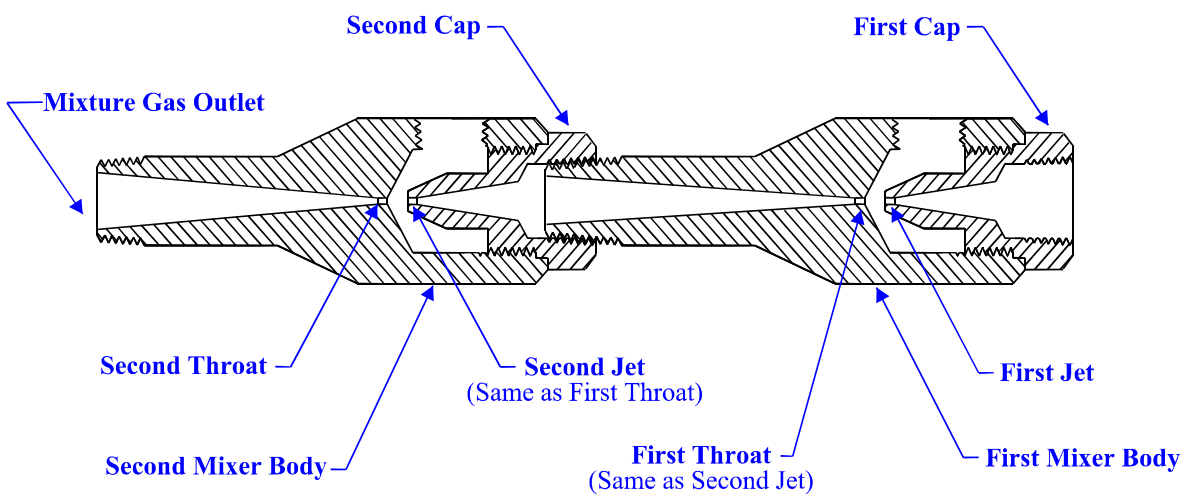
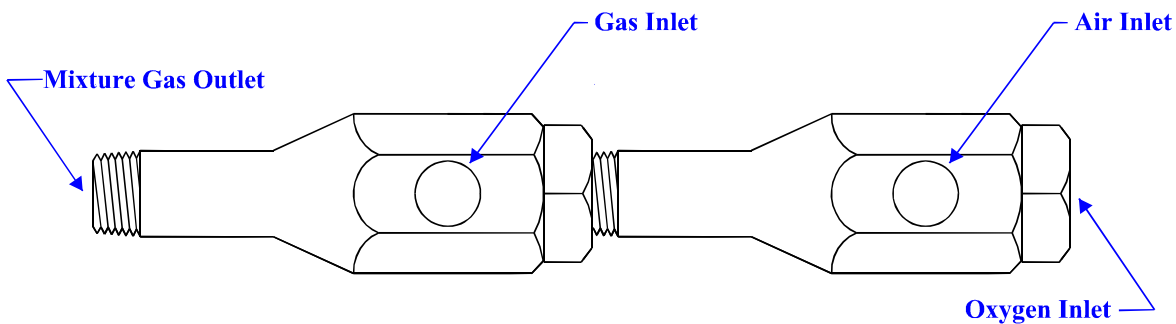
- 15) Take **TOTAL PORT AREA***
- 16) Add internal **PILOT AREA*** (If internal **PILOT AREA** is not known, assign a value of 50%).
- 17) Divide by (4) to determine the **FIRST JET** (Oxygen Inlet.)
- 18) Multiply by (4.5) to determine the **SECOND THROAT AREA**.
- 19) Multiply the **SECOND THROAT AREA** by (65%) to determine the size of both the **FIRST THROAT** and **SECOND JET**.

Note: The proper lighting procedure is Gas first, Air second, then Oxygen, intermittently, until a satisfactory flame has been achieved.

Refer to page RS-8 for correct installation.
To convert all areas to drill size, see the chart on page RS-10.



TYPICAL 3-WAY MIXER



MAXIMUM RECOMMENDED DRILL SIZES FOR STANDARD MIXERS

MIXER NUMBER	INLET		OUTLET	MAXIMUM JET SIZE	MAXIMUM THROAT SIZE
	GAS	AIR/OXYGEN			
K1S	1/4 Tubing	1/4 Tubing	1/4-28-M	#70 Drill (0.0280")	#55 Drill (0.0520")
K11	1/8 NPT-F	1/8 NPT-F	1/8 NPT-M	#55 Drill (0.0520")	#35 Drill (0.1100")
K11S	1/8 NPT-F	1/8 NPT-F	1/4 NPT-M	#55 Drill (0.0520")	#35 Drill (0.1100")
K12	1/4 NPT-F	1/4 NPT-F	1/4 NPT-M	#25 Drill (0.1495")	O Drill (0.3160")
K12S	1/4 NPT-F	1/4 NPT-F	3/8 NPT-M	#25 Drill (0.1495")	O Drill (0.3160")
K13	1/4 NPT-F	1/4 NPT-F	3/8 NPT-M	#20 Drill (0.1610")	R Drill (0.3390")
K14	3/8 NPT-F	3/8 NPT-F	1/2 NPT-M	15/32" (0.4687")	9/16" (0.5625")
K15S	1/2 NPT-F	1/2 NPT-F	3/4 NPT-M	1/2" (0.5000")	5/8" (0.6250")
K15	3/4 NPT-F	3/4 or 1* NPT-F	1-1/4 or 1* NPT-M	9/16" (0.5625")	11/16" (0.6875")
K16	1 NPT-F	1 NPT-F	1-1/2 NPT-M	*	*
K17	1 NPT-F	1-1/4 NPT-F	2	*	*
K18	1-1/4 NPT-F	1-1/2 NPT-F	2-1/2	*	*

***SIZED UPON REQUEST**



Our Customer Service Department is always available to assist you with mixer sizing. We welcome your inquiries and appreciate the opportunity to be of assistance to you.

DIAMETERS AND AREAS OF SMALL DRILLS



NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
		0.10		0.003900	0.0000119
		0.15		0.005900	0.0000273
		0.20		0.007800	0.0000477
		0.25		0.009800	0.0000753
		0.30		0.011800	0.0001091
80				0.013500	0.0001429
		0.35		0.013700	0.0001468
79				0.014500	0.0001650
			1/64	0.015620	0.0001920
		0.40		0.015740	0.0001950
78				0.016000	0.0002010
		0.45		0.017700	0.0002450
77				0.018000	0.0002540
		0.50		0.019680	0.0003040
76				0.020000	0.0003140
75				0.021000	0.0003460
		0.55		0.021600	0.0003650
74				0.022500	0.0003980
		0.60		0.023620	0.0004380
73				0.024000	0.0004520
72				0.025000	0.0004910
		0.65		0.025500	0.0005100
71				0.026000	0.0005310
		0.70		0.027560	0.0005970
70				0.028000	0.0006160
69				0.029250	0.0006720
		0.75		0.029500	0.0006830
68				0.031000	0.0007550
			1/32	0.031250	0.0007670
		0.80		0.031490	0.0007790
67				0.032000	0.0008040
66				0.033000	0.0008550
		0.85		0.033400	0.0008710
65				0.035000	0.0009620
		0.90		0.035430	0.0009860
64				0.036000	0.0010180
63				0.037000	0.0010750
		0.95		0.037400	0.0010910

NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
62				0.038000	0.0011340
61				0.039000	0.0011940
		1.00		0.039370	0.0012170
60				0.040000	0.0012570
59				0.041000	0.0013200
		0.11		0.041300	0.0013510
58				0.042000	0.0013850
57				0.043000	0.0014520
		1.10		0.043300	0.0014730
		1.15		0.045200	0.0016100
56				0.046500	0.0016980
			3/64	0.046870	0.0017260
		1.20		0.047240	0.0017530
		1.25		0.049200	0.0019000
		1.30		0.051181	0.0020570
55				0.052000	0.0021240
		1.35		0.053100	0.0022060
54				0.055000	0.0023760
		1.40		0.055100	0.0023860
		1.45		0.057000	0.0025440
		1.50		0.059000	0.0027390
53				0.059500	0.0027810
		1.55		0.061000	0.0029210
			1/16	0.062500	0.0030680
		1.60		0.062990	0.0031160
52				0.063500	0.0031670
		1.65		0.064900	0.0033060
		1.70		0.066920	0.0035180
51				0.067000	0.0035260
		1.75		0.068800	0.0037140
50				0.070000	0.0038480
		1.80		0.070860	0.0039440
		1.85		0.072800	0.0041620
49				0.073000	0.0041850
		1.90		0.074800	0.0043940
48				0.076000	0.0045360
		1.95		0.076700	0.0046180
			5/64	0.078120	0.0047940

DIAMETERS AND AREAS OF SMALL DRILLS



NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
47				0.078500	0.0048400
		2.00		0.078740	0.0048690
		2.05		0.080700	0.0051120
46				0.081000	0.0051530
45				0.082000	0.0052810
		2.10		0.082670	0.0053690
		2.15		0.084600	0.0056150
44				0.086000	0.0058090
		2.20		0.086610	0.0058910
		2.25		0.088500	0.0061490
43				0.089000	0.0062210
		2.30		0.090550	0.0064400
		2.35		0.092500	0.0067150
42				0.093500	0.0068660
			3/32	0.093750	0.0069030
		2.40		0.094480	0.0070120
41				0.096000	0.0072380
		2.45		0.096400	0.0072960
40				0.098000	0.0075430
		2.50		0.098420	0.0076090
39				0.099500	0.0077760
38				0.101500	0.0080910
		2.60		0.102360	0.0082290
37				0.104000	0.0084960
		2.70		0.106300	0.0088750
36				0.106500	0.0089080
		2.75		0.108200	0.0091890
			7/64	0.109370	0.0093960
35				0.110000	0.0095030
		2.80		0.110240	0.0095450
34				0.111000	0.0096770
33				0.113000	0.0100290
		2.90		0.114170	0.0102380
32				0.116000	0.0105680
		3.00		0.118110	0.0109590
31				0.120000	0.0113100
		3.10		0.122050	0.0116990
			1/8	0.125000	0.0122720

NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
		3.20		0.125980	0.0124660
		3.25		0.127900	0.0128020
30				0.128500	0.0129690
		3.30		0.129920	0.0132570
		3.40		0.133860	0.0140730
29				0.136000	0.0145270
		3.50		0.137800	0.0149130
28				0.140500	0.0155040
			9/64	0.140620	0.0155310
		3.60		0.141730	0.0157770
27				0.144000	0.0162860
		3.70		0.145670	0.0166660
26				0.147000	0.0169720
		3.75		0.147600	0.0171060
25				0.149500	0.0175340
		3.80		0.149610	0.0175790
24				0.152000	0.0181460
		3.90		0.153540	0.0185160
23				0.154000	0.0186270
			5/32	0.156250	0.0191750
22				0.157000	0.0193590
		4.00		0.157480	0.0194780
21				0.159000	0.0198560
20				0.161000	0.0203580
		4.10		0.161420	0.0204640
		4.20		0.165360	0.0214740
19				0.166000	0.0216420
		4.25		0.167300	0.0220560
		4.30		0.169290	0.0225050
18				0.169500	0.0225650
			11/64	0.171875	0.0232020
17				0.173000	0.0235060
		4.40		0.173230	0.0235680
16				0.177000	0.0246060
		4.50		0.177170	0.0246520
15				0.180000	0.0254470
		4.60		0.181100	0.0257600
14				0.182000	0.0260160

DIAMETERS AND AREAS OF SMALL DRILLS



NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
13				0.185000	0.0268800
		4.70		0.185040	0.0268920
		4.75		0.187000	0.0274570
			3/16	0.187500	0.0276120
		4.80		0.188980	0.0280480
12				0.189000	0.0280550
11				0.191000	0.0286520
		4.90		0.192910	0.0292290
10				0.193500	0.0294070
9				0.196000	0.0301720
		5.00		0.196850	0.0304340
8				0.199000	0.0311030
		5.10		0.020079	0.0316640
7				0.201000	0.0317310
			13/64	0.203120	0.0324030
6				0.204000	0.0326850
		5.20		0.204730	0.0329180
5				0.205500	0.0331691
		5.25		0.206600	0.0335200
		5.30		0.208600	0.0341960
4				0.209000	0.0343070
		5.40		0.212600	0.0354990
3				0.213000	0.0356330
		5.50		0.216500	0.0368250
			7/32	0.218750	0.0375830
		5.60		0.220470	0.0381770
2				0.221000	0.0383600
		5.70		0.224400	0.0395520
		5.75		0.226300	0.0402430
1				0.228000	0.0408280
		5.80		0.228350	0.0409520
		5.90		0.232280	0.0423770
	A			0.234000	0.0430005
			15/64	0.234370	0.0431410
		6.00		0.236220	0.0438250
	B			0.238000	0.0444880
		6.10		0.240150	0.0452990
	C			0.242000	0.0459960

NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
		6.20		0.244100	0.0467970
	D			0.246000	0.0475290
		6.25		0.246060	0.0475480
		6.30		0.248030	0.0483170
	E		1/4	0.250000	0.0490870
		6.40		0.251970	0.0498630
		6.50		0.255910	0.0514340
	F			0.257000	0.0518750
		6.60		0.259800	0.0530280
	G			0.261000	0.0535020
		6.70		0.263700	0.0546480
			17/64	0.265600	0.0554120
		6.75		0.265700	0.0554140
	H			0.266000	0.0555720
		6.80		0.267720	0.0562910
		6.90		0.271650	0.0579590
	I			0.272000	0.0581070
		7.00		0.275500	0.0596510
	J			0.277000	0.0602630
		7.10		0.279500	0.0613670
	K			0.281000	0.0620160
			9/32	0.281250	0.0621600
		7.20		0.283470	0.0631080
		7.25		0.285400	0.0639730
		7.30		0.287400	0.0648740
	L			0.290000	0.0660520
		7.40		0.291330	0.0666630
	M			0.295000	0.0683490
		7.50		0.295200	0.0684770
			19/64	0.296700	0.0692180
		7.60		0.299220	0.0703150
	N			0.302000	0.0716310
		7.70		0.303140	0.0721780
		7.75		0.305100	0.0730570
		7.80		0.307090	0.0740650
		7.90		0.311020	0.0759760
			5/16	0.312500	0.0766990
		8.00		0.314960	0.0779120

DIAMETERS AND AREAS OF SMALL DRILLS



NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
	O			0.316000	0.0784270
		8.10		0.318890	0.0798720
		8.20		0.322830	0.0818560
	P			0.323000	0.0819400
		8.25		0.324800	0.0827810
		8.30		0.326800	0.0838650
			21/64	0.328120	0.0845580
		8.40		0.330700	0.0858980
	Q			0.332000	0.0865700
		8.50		0.334650	0.0879550
		8.60		0.338580	0.0900370
	R			0.339000	0.0902590
		8.70		0.342500	0.0921430
			11/32	0.343700	0.0928060
		8.75		0.344400	0.0929120
		8.80		0.346400	0.0942740
	S			0.348000	0.0951150
		8.90		0.350400	0.0964280
		9.00		0.354300	0.0986070
	T			0.358000	0.1006600
		9.10		0.358300	0.1008110
			23/64	0.359300	0.1014340
		9.20		0.362200	0.1030390
		9.25		0.364100	0.1039860
		9.30		0.366100	0.1052910
	U			0.368000	0.1063620
		9.40		0.370100	0.1075790
		9.50		0.374020	0.1098680
			3/8	0.375000	0.1104470
	V			0.377000	0.1116280
		9.60		0.377950	0.1121930
		9.70		0.381800	0.1145430
		9.75		0.383800	0.1156890
		9.80		0.385800	0.1169170
	W			0.386000	0.1170210
		9.90		0.389800	0.1193150
			25/64	0.390620	0.1198440
		10.00		0.393700	0.1217380

NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
	X			0.397000	0.1237860
	Y			0.404000	0.1281900
			13/32	0.406200	0.1296220
	Z			0.413000	0.1339650
		10.50		0.413300	0.1342000
			27/64	0.421800	0.1397200
		11.00		0.433000	0.1471800
			7/16	0.437500	0.1503300
		11.50		0.452700	0.1607600
			29/64	0.453100	0.1612400
			15/32	0.468700	0.1727500
		12.00		0.472400	0.1749000
			31/64	0.484300	0.1842500
		12.50		0.492100	0.1901400
			1/2	0.500000	0.1963500
		13.00		0.511800	0.2050700
			33/64	0.515600	0.2087500
			17/32	0.531200	0.2216600
		13.50		0.531400	0.2217900
			35/64	0.546800	0.2341200
		14.00		0.551100	0.2384400
			9/16	0.562500	0.2485000
		14.50		0.570800	0.2560400
			37/64	0.578100	0.2624800
		15.00		0.590500	0.2733900
			19/32	0.593700	0.2768800
			39/64	0.609300	0.2916100
		15.50		0.610200	0.2922400
			5/8	0.625000	0.3068000
		16.00		0.629900	0.3117200
			41/64	0.640600	0.3223200
		16.50		0.649600	0.3308100
			21/32	0.656200	0.3382400
		17.00		0.669200	0.3514200
			43/64	0.671800	0.3645400
			11/16	0.687500	0.3712200
		17.50		0.688900	0.3727400
			45/64	0.703100	0.3882800

DIAMETERS AND AREAS OF SMALL DRILLS



NUMBER	LETTER	METRIC	FRACTION	DIAMETER (Inches)	AREA (Sq. In.)
		18.00		0.708600	0.3943400
			23/32	0.718700	0.4057400
		18.50		0.728300	0.4165700
			47/64	0.734300	0.4235600
		19.00		0.748000	0.4393500
			3/4	0.750000	0.4417900
			49/64	0.765600	0.4587500
		19.50		0.767700	0.4628300
			25/32	0.781200	0.4793700
		20.00		0.787400	0.4868600
			51/64	0.796800	0.4977200
		20.50		0.807000	0.5115800
			13/16	0.812500	0.5184900
		21.00		0.826700	0.5368500
			53/64	0.828100	0.5386100
			27/32	0.843700	0.5591400
		21.50		0.846400	0.5626600
			55/64	0.859300	0.5799200
		22.00		0.866100	0.5892000
			7/8	0.875000	0.6013200
		22.50		0.885800	0.6162900
			57/64	0.890600	0.6229700
		23.00		0.905500	0.6400700
			29/32	0.906200	0.6450400
			59/64	0.921800	0.6674600
		23.50		0.925100	0.6722200
			15/16	0.937500	0.6902900
		24.00		0.944800	0.7011900
			61/64	0.953100	0.7150200
		24.50		0.964500	0.7297900
			31/32	0.968700	0.7370800
		25.00		0.984200	0.7614400
			63/64	0.984300	0.7634500
			1	1.000000	0.7854000
		25.50		1.003000	0.7901200

CHECKLIST FOR GAS-OXYGEN OR GAS-AIR-OXYGEN SYSTEMS

The following precautions should be observed to minimize downtime in the operation of Gas-Oxygen burner equipment:

- 1) Use the correct Gas-Oxygen or Gas-Air-Oxygen Venturi mixer for your burner assembly.
- 2) Install a firecheck of proper size between the mixer and burners.

NOTE: The firecheck does not prevent flashback, but retards combustion back into the mixture line in the event of a backfire (flashback.) The proper selection of a firecheck is based on the pipe size of the mixture line feeding the burners, **NOT** capacity.

- 3) **DO NOT** install any gas valves, gas cocks, check valves or restrictions other than a firecheck between the mixer and burners.
- 4) The Venturi mixer should be placed as close as possible to the burners, or burner manifold, to avoid storing up too large a quantity of an explosive mixture. (From 5 to 10 times the length of the mixer is an average workable maximum.)
- 5) All piping should be of sufficient size. A common error that occurs in burner installations is the use of under or oversized piping. Whenever possible, the mixture supply line to the burners should be equal or slightly larger than the outlet of the Venturi mixer. Improperly sized piping is a common cause of backfire on shutdown.
- 6) The use of copper or brass fittings and piping directly connected to Gas-Oxygen burners will conduct heat away from the burners, thereby preventing overheating.
- 7) Make certain that there is no oil or grease in the fittings, piping, etc., of the Gas-Oxygen burner set-up prior to igniting.
- 8) To minimize the possibility of flashback, the following rule should be observed:
 - a. When lighting Gas-Oxygen burner equipment, turn on the gas first and oxygen second.
 - b. When turning off the equipment, turn off oxygen first and gas last.
- 9) The oxygen and gas should be shut off **IMMEDIATELY** in the event of a flashback.



[\(continued on page RS-16\)](#)

CHECKLIST FOR GAS-OXYGEN OR GAS-AIR-OXYGEN SYSTEMS

(continued from page RS-15)

- 10) The order of supply lines and pressures should be:
 - a. Oxygen at the highest pressure, feeding in a straight line through the mixer farthest from the burner(s). (See the diagrams on pages [RS-5](#) and [RS-8](#).)
 - b. Gas at the lowest pressure, feeding from the side of the mixer closest to the burner(s).
 - c. Air is fed from the center side hole of a three-way mixer, ([See the diagram on page RS-8](#).) at a pressure lower than oxygen, but higher than the gas pressure.
- 11) Fine thread needle valves should be used for all three gases to permit good control over your mixture. Fine control is achieved when the orifice of the valve is sized equal to, or slightly larger than, the orifice to be fed. It is further improved when the valve stem has long needle point to complement the fine threads.
- 12) When in doubt, call your N.M. KNIGHT COMPANY REPRESENTATIVE for information and assistance.





CAPACITY MULTIPLIER TABLE

Known Pressure Any Unit	MULTIPLIER TO DETERMINE CAPACITY AT ANY DESIRED PRESSURE BASED ON CAPACITY AT SOME KNOWN PRESSURE																																Known Pressure Any Unit
	1/2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	30	35					
1/2	1.000	1.410	2.000	2.460	2.830	3.160	3.450	3.790	4.000	4.250	4.480	4.690	4.900	5.100	5.300	5.480	5.650	5.830	6.000	6.150	6.330	6.470	6.650	6.800	6.930	7.050	7.750	8.360	1/2				
1	0.710	1.000	1.410	1.730	2.000	2.240	2.450	2.650	2.830	3.000	3.170	3.320	3.430	3.610	3.740	3.880	4.000	4.120	4.250	4.360	4.470	4.580	4.690	4.800	4.900	5.000	5.480	5.910	1				
2	0.500	0.710	1.000	1.250	1.410	1.580	1.730	1.870	2.000	2.120	2.240	2.350	2.450	2.550	2.650	2.740	2.830	2.920	3.000	3.080	3.160	3.240	3.320	3.390	3.460	3.540	3.880	4.180	2				
3	0.408	0.578	0.820	1.000	1.150	1.290	1.410	1.530	1.630	1.730	1.830	1.910	2.000	2.080	2.160	2.240	2.310	2.380	2.450	2.520	2.580	2.650	2.700	2.770	2.830	2.880	3.160	3.420	3				
4	0.354	0.500	0.709	0.860	1.000	1.120	1.230	1.320	1.410	1.500	1.580	1.660	1.730	1.800	1.870	1.930	2.000	2.060	2.120	2.180	2.240	2.290	2.340	2.400	2.450	2.500	2.740	2.960	4				
5	0.316	0.447	0.631	0.775	0.895	1.000	1.090	1.180	1.260	1.340	1.410	1.480	1.550	1.610	1.670	1.730	1.790	1.840	1.890	1.950	2.000	2.040	2.100	2.140	2.190	2.240	2.450	2.640	5				
6	0.288	0.408	0.578	0.706	0.815	0.912	1.000	1.080	1.150	1.220	1.290	1.350	1.410	1.470	1.530	1.580	1.630	1.680	1.730	1.780	1.830	1.870	1.920	1.960	2.000	2.040	2.240	2.420	6				
7	0.268	0.378	0.535	0.655	0.755	0.845	0.925	1.000	1.070	1.130	1.190	1.250	1.310	1.360	1.410	1.460	1.510	1.560	1.600	1.640	1.690	1.730	1.770	1.810	1.850	1.890	2.170	2.240	7				
8	0.250	0.353	0.500	0.613	0.717	0.790	0.865	0.935	1.000	1.060	1.120	1.170	1.220	1.270	1.320	1.370	1.410	1.440	1.500	1.540	1.580	1.620	1.660	1.690	1.730	1.770	1.940	2.090	8				
9	0.236	0.334	0.471	0.577	0.666	0.745	0.817	0.880	0.940	1.000	1.050	1.100	1.150	1.200	1.250	1.290	1.330	1.370	1.410	1.450	1.490	1.530	1.560	1.600	1.630	1.670	1.820	1.970	9				
10	0.224	0.316	0.447	0.548	0.632	0.709	0.775	0.836	0.895	0.950	1.000	1.050	1.090	1.140	1.180	1.220	1.260	1.300	1.340	1.380	1.410	1.450	1.480	1.510	1.550	1.580	1.730	1.870	10				
11	0.213	0.302	0.426	0.521	0.602	0.675	0.739	0.798	0.854	0.905	0.950	1.000	1.040	1.090	1.130	1.170	1.200	1.240	1.280	1.310	1.350	1.380	1.410	1.460	1.470	1.510	1.650	1.780	11				
12	0.204	0.289	0.409	0.500	0.578	0.645	0.706	0.764	0.818	0.865	0.912	0.956	1.000	1.040	1.080	1.120	1.150	1.190	1.220	1.260	1.290	1.320	1.360	1.380	1.410	1.440	1.580	1.710	12				
13	0.196	0.277	0.392	0.480	0.554	0.620	0.680	0.734	0.785	0.832	0.885	0.920	0.960	1.000	1.040	1.070	1.110	1.140	1.170	1.210	1.240	1.270	1.300	1.320	1.360	1.390	1.520	1.640	13				
14	0.189	0.267	0.378	0.462	0.535	0.598	0.655	0.706	0.755	0.800	0.845	0.885	0.925	0.965	1.000	1.030	1.070	1.100	1.130	1.160	1.190	1.220	1.250	1.280	1.310	1.340	1.460	1.580	14				
15	0.183	0.258	0.365	0.447	0.515	0.578	0.633	0.683	0.730	0.775	0.815	0.855	0.895	0.930	0.965	1.000	1.030	1.060	1.090	1.120	1.150	1.180	1.210	1.240	1.260	1.290	1.410	1.530	15				
16	0.178	0.250	0.354	0.433	0.500	0.560	0.612	0.662	0.706	0.750	0.790	0.830	0.865	0.901	0.935	0.970	1.000	1.030	1.060	1.080	1.120	1.140	1.170	1.200	1.220	1.250	1.370	1.480	16				
17	0.171	0.243	0.343	0.420	0.485	0.542	0.594	0.642	0.686	0.729	0.767	0.804	0.840	0.875	0.910	0.940	0.970	1.000	1.030	1.050	1.080	1.110	1.140	1.160	1.190	1.210	1.330	1.430	17				
18	0.167	0.236	0.334	0.409	0.471	0.527	0.578	0.625	0.667	0.706	0.745	0.782	0.815	0.850	0.892	0.913	0.945	0.974	1.000	1.020	1.050	1.080	1.100	1.130	1.150	1.180	1.290	1.390	18				
19	0.162	0.230	0.325	0.398	0.459	0.513	0.562	0.607	0.650	0.689	0.725	0.760	0.795	0.829	0.860	0.890	0.920	0.945	0.974	1.000	1.020	1.050	1.070	1.100	1.120	1.140	1.250	1.360	19				
20	0.158	0.224	0.316	0.388	0.446	0.500	0.548	0.593	0.632	0.670	0.706	0.741	0.775	0.806	0.835	0.875	0.895	0.921	0.940	0.975	1.000	1.020	1.050	1.070	1.090	1.120	1.220	1.320	20				
21	0.154	0.218	0.309	0.378	0.436	0.488	0.535	0.578	0.617	0.655	0.690	0.723	0.755	0.786	0.816	0.845	0.875	0.900	0.926	0.950	0.975	1.000	1.020	1.040	1.070	1.100	1.190	1.290	21				
22	0.151	0.214	0.302	0.370	0.426	0.476	0.523	0.564	0.603	0.640	0.675	0.706	0.739	0.770	0.797	0.825	0.854	0.880	0.905	0.930	0.954	0.978	1.000	1.020	1.040	1.060	1.170	1.260	22				
23	0.147	0.209	0.295	0.361	0.417	0.466	0.511	0.551	0.590	0.625	0.660	0.691	0.721	0.752	0.780	0.807	0.835	0.860	0.885	0.910	0.932	0.955	0.980	1.000	1.020	1.040	1.140	1.230	23				
24	0.144	0.204	0.289	0.354	0.408	0.456	0.500	0.540	0.578	0.612	0.645	0.678	0.706	0.735	0.764	0.790	0.815	0.841	0.866	0.890	0.914	0.935	0.960	0.980	1.000	1.020	1.120	1.210	24				
25	0.141	0.200	0.283	0.346	0.400	0.447	0.490	0.530	0.565	0.600	0.631	0.664	0.793	0.721	0.748	0.775	0.800	0.825	0.850	0.881	0.895	0.915	0.938	0.960	0.980	1.000	1.090	1.180	25				
30	0.129	0.183	0.268	0.316	0.365	0.409	0.446	0.484	0.517	0.548	0.578	0.605	0.632	0.659	0.684	0.707	0.730	0.754	0.785	0.795	0.816	0.836	0.856	0.875	0.895	0.917	1.000	1.070	30				
35	0.119	0.169	0.239	0.293	0.348	0.378	0.414	0.447	0.479	0.507	0.535	0.560	0.585	0.610	0.632	0.654	0.676	0.696	0.718	0.736	0.755	0.784	0.794	0.810	0.829	0.845	0.925	1.000	35				

HIGH PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)



Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN POUNDS PER SQUARE INCH (GAUGE)									
		1#	2#	3#	4#	5#	6#	7#	8#	9#	10#
#80	0.000143	1.45	2.05	2.51	2.90	3.24	3.55	3.82	4.09	4.34	4.58
#79	0.000165	1.67	2.37	2.90	3.35	3.74	4.10	4.43	4.72	5.00	5.30
1/64	0.000191	1.93	2.74	3.36	3.87	4.34	4.73	5.11	5.48	5.80	6.10
#78	0.000201	2.02	2.86	3.51	4.05	4.54	4.96	5.37	5.71	6.05	6.40
#77	0.000254	2.52	3.57	4.39	5.05	5.64	6.18	6.69	7.12	7.55	8.00
#76	0.000314	3.18	4.50	5.50	6.38	7.10	7.80	8.40	9.00	9.50	10.00
#75	0.000346	3.50	4.96	6.04	7.00	7.80	8.60	9.20	9.80	10.50	11.00
#74	0.000398	4.00	5.67	7.00	8.00	9.00	9.80	10.60	11.30	12.00	12.70
#73	0.000452	4.50	6.38	7.80	9.00	10.00	11.00	11.90	12.70	13.50	14.20
#72	0.000491	4.90	6.94	8.50	9.80	11.00	12.00	13.00	13.90	14.70	15.50
#71	0.000531	5.30	7.51	9.20	10.60	11.80	13.00	14.00	15.00	15.80	16.70
#70	0.000616	6.20	8.78	10.80	12.50	14.00	15.20	16.50	17.50	18.60	19.60
#69	0.000670	6.70	9.49	11.70	13.50	15.00	16.50	17.70	19.00	20.10	21.20
#68	0.000755	7.50	10.60	13.00	15.00	16.80	18.30	19.80	21.20	22.30	23.60
1/32	0.000767	7.60	10.80	13.20	15.30	17.00	18.60	20.20	21.50	22.80	24.00
#67	0.000804	8.00	11.30	14.00	16.10	18.00	19.70	21.20	22.60	24.00	25.30
#66	0.000855	8.60	12.20	15.00	17.20	19.20	21.00	22.60	24.20	25.60	27.00
#65	0.000962	9.60	13.60	16.80	19.50	21.70	23.80	25.60	27.40	29.00	30.50
#64	0.001018	10.20	14.40	17.60	20.30	22.60	24.80	26.70	28.50	30.20	31.90
#63	0.001075	10.80	15.30	18.80	21.70	24.20	26.50	28.60	30.50	32.30	34.00
#62	0.001134	11.30	16.00	19.50	22.50	25.20	27.50	29.70	31.80	33.60	35.50
#61	0.001195	11.90	16.90	20.70	23.90	26.60	29.00	31.40	33.50	35.50	37.40
#60	0.001257	12.60	17.90	21.90	25.20	28.10	30.70	33.30	35.40	37.50	39.50
#59	0.001320	13.20	18.70	22.90	26.50	29.50	32.20	34.80	37.00	39.30	41.30
#58	0.001385	13.80	19.70	24.00	27.70	31.00	34.00	36.70	39.00	41.50	43.90
#57	0.001452	14.50	20.50	25.20	29.10	32.60	35.70	38.40	41.00	43.60	46.00
#56	0.001698	17.00	24.10	29.50	34.10	38.00	41.70	45.00	48.00	50.90	53.80
3/64	0.001726	17.40	24.60	30.20	35.00	39.00	42.80	46.00	49.10	52.00	55.00
#55	0.002124	21.10	29.80	36.80	42.30	47.30	51.80	56.00	59.80	63.40	67.00
#54	0.002376	23.40	33.00	40.20	46.40	51.90	56.60	61.00	65.30	69.10	73.00
#53	0.002780	27.10	38.20	46.70	54.00	60.00	66.00	71.00	75.80	80.00	84.10
1/16	0.003068	29.80	42.10	51.60	59.40	66.50	73.00	78.50	84.00	89.10	94.00
#52	0.003167	30.80	43.50	53.50	61.80	69.00	75.00	81.00	87.00	92.00	97.00
#51	0.003526	34.20	48.40	59.30	69.00	76.00	84.00	91.00	97.00	102.00	108.00
#50	0.003848	37.60	53.20	65.30	75.00	84.00	92.00	99.00	107.00	113.00	119.00



HIGH PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)

Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN POUNDS PER SQUARE INCH (GAUGE)									
		1#	2#	3#	4#	5#	6#	7#	8#	9#	10#
#49	0.004185	40.8	57.7	71.0	82.0	91.0	100.0	108.0	115.0	122.0	129.0
#48	0.004536	44.7	63.3	77.0	89.0	99.0	109.0	118.0	126.0	133.0	140.0
5/64	0.004794	47.4	67.0	82.0	95.0	106.0	116.0	125.0	134.0	142.0	150.0
#47	0.004840	47.9	67.7	83.0	96.0	107.0	117.0	127.0	136.0	144.0	152.0
#46	0.005150	51.0	72.2	89.0	102.0	115.0	125.0	136.0	145.0	153.0	162.0
#45	0.005280	52.6	74.5	91.0	106.0	118.0	129.0	140.0	149.0	158.0	166.0
#44	0.005810	57.9	81.9	101.0	116.0	130.0	142.0	153.0	164.0	173.0	183.0
#43	0.006220	61.8	87.4	107.0	124.0	138.0	152.0	163.0	175.0	185.0	195.0
#42	0.006870	68.4	96.7	118.0	137.0	153.0	167.0	181.0	193.0	205.0	215.0
3/32	0.006900	68.5	96.8	119.0	138.0	154.0	168.0	182.0	194.0	206.0	217.0
#41	0.007240	71.0	100.0	123.0	142.0	158.0	173.0	186.0	200.0	211.0	222.0
#40	0.007540	73.6	104.0	127.0	147.0	164.0	180.0	194.0	207.0	219.0	230.0
#39	0.007780	76.3	108.0	133.0	153.0	171.0	187.0	202.0	215.0	227.0	240.0
#38	0.008090	78.9	112.0	137.0	158.0	177.0	193.0	209.0	222.0	236.0	249.0
#37	0.008490	84.2	119.0	146.0	169.0	188.0	206.0	222.0	237.0	251.0	265.0
#36	0.008910	89.5	126.0	154.0	177.0	198.0	217.0	234.0	250.0	265.0	279.0
7/64	0.009400	93.5	132.0	161.0	186.0	207.0	227.0	245.0	262.0	277.0	292.0
#35	0.009500	95.0	135.0	165.0	190.0	212.0	232.0	250.0	267.0	283.0	298.0
#34	0.009680	97.0	138.0	168.0	195.0	217.0	238.0	256.0	274.0	290.0	305.0
#33	0.010030	100.0	141.0	172.0	200.0	222.0	244.0	263.0	281.0	298.0	314.0
#32	0.010570	105.0	149.0	181.0	210.0	234.0	256.0	276.0	295.0	313.0	330.0
#31	0.011310	113.0	160.0	197.0	226.0	253.0	277.0	300.0	320.0	339.0	357.0
1/8	0.012270	124.0	175.0	215.0	248.0	277.0	303.0	327.0	350.0	370.0	390.0
#30	0.012970	131.0	186.0	228.0	263.0	294.0	322.0	347.0	370.0	392.0	413.0
#29	0.014530	145.0	205.0	251.0	290.0	324.0	354.0	383.0	409.0	434.0	457.0
#28	0.015500	155.0	219.0	268.0	309.0	346.0	377.0	406.0	436.0	460.0	488.0
9/64	0.015530	156.0	220.0	270.0	311.0	348.0	380.0	410.0	440.0	464.0	491.0
#27	0.016290	163.0	231.0	283.0	327.0	365.0	400.0	432.0	460.0	489.0	515.0
#26	0.016970	171.0	243.0	295.0	342.0	380.0	418.0	452.0	481.0	510.0	539.0
#25	0.017550	176.0	249.0	306.0	354.0	395.0	433.0	467.0	500.0	530.0	558.0
#24	0.018150	181.0	257.0	314.0	363.0	404.0	444.0	479.0	511.0	541.0	570.0
#23	0.018630	187.0	264.0	325.0	375.0	420.0	458.0	495.0	530.0	560.0	590.0
5/32	0.019170	192.0	271.0	333.0	384.0	430.0	470.0	506.0	540.0	572.0	603.0
#22	0.019360	195.0	275.0	339.0	390.0	438.0	479.0	517.0	552.0	585.0	617.0
#21	0.019860	200.0	283.0	346.0	400.0	450.0	490.0	530.0	565.0	600.0	632.0

HIGH PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)



Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN POUNDS PER SQUARE INCH (GAUGE)									
		1#	2#	3#	4#	5#	6#	7#	8#	9#	10#
#20	0.020360	205	290	355	410	460	502	543	580	613	650
#19	0.021640	218	309	378	438	489	534	576	616	654	690
#18	0.022560	229	323	396	459	512	560	605	649	687	720
11/64	0.023200	234	331	405	469	522	570	618	661	700	740
#17	0.023510	237	335	411	475	532	580	630	672	712	751
#16	0.024610	247	350	430	496	553	606	658	700	742	782
#15	0.025450	255	360	445	512	572	628	680	724	768	810
#14	0.026020	263	372	457	530	590	647	700	747	790	832
#13	0.026880	271	383	470	543	606	666	718	767	810	858
3/16	0.027610	279	394	484	560	624	684	740	790	838	885
#12	0.028060	284	402	493	570	636	697	752	802	850	900
#11	0.028650	290	409	503	581	650	710	770	820	870	920
#10	0.029410	297	421	515	595	665	728	785	840	890	940
#9	0.030170	305	431	530	610	684	748	806	860	913	964
#8	0.031100	313	443	544	630	702	770	830	890	940	990
#7	0.031730	321	454	556	643	718	785	850	908	960	1015
13/64	0.032400	326	462	564	653	730	797	862	920	975	1025
#6	0.032690	332	469	575	665	740	810	879	937	990	1042
#5	0.033170	334	472	579	670	746	816	885	945	1000	1055
#4	0.034310	348	491	600	695	774	850	916	980	1035	1095
#3	0.035630	360	510	625	720	805	884	952	1020	1080	1135
7/32	0.037580	379	535	660	760	850	930	1005	1075	1135	1197
#2	0.038360	390	550	680	783	878	960	1030	1110	1170	1235
#1	0.040830	413	584	718	830	927	1015	1095	1170	1240	1305
A	0.043010	435	614	752	870	969	1068	1148	1225	1300	1370
15/64	0.043140	437	617	758	878	977	1075	1155	1240	1315	1383
B	0.044490	452	640	780	906	1010	1105	1195	1275	1350	1425
C	0.046000	463	657	800	929	1030	1130	1225	1310	1385	1460
D	0.047530	482	684	836	965	1080	1180	1275	1360	1440	1520
1/4 E	0.049090	497	703	862	990	1115	1215	1315	1400	1485	1565
F	0.051870	526	711	912	1050	1175	1285	1385	1480	1570	1650
G	0.053500	545	770	950	1100	1225	1340	1450	1550	1640	1725
17/64	0.055410	560	793	972	1125	1255	1375	1485	1585	1675	1760
H	0.055570	563	795	978	1135	1270	1385	1500	1600	1695	1780
I	0.058110	592	837	1030	1200	1330	1460	1575	1680	1775	1875



HIGH PRESSURE TABLE – GAS CAPACITY

(SPECIFIC GRAVITY 0.60)

[illegible]

LOW PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)



Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN INCHES OF WATER COLUMN																		
		1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	20"	22"	24"	26"	1#
#80	0.000143	0.27	0.38	0.47	0.54	0.61	0.67	0.72	0.77	0.82	0.86	0.94	1.01	1.08	1.15	1.21	1.27	1.33	1.38	1.45
#79	0.000165	0.31	0.44	0.54	0.63	0.70	0.77	0.83	0.89	0.94	0.99	1.08	1.17	1.25	1.33	1.40	1.47	1.53	1.59	1.67
1/64	0.000191	0.36	0.51	0.63	0.72	0.81	0.89	0.96	1.03	1.09	1.15	1.26	1.36	1.45	1.54	1.62	1.70	1.78	1.85	1.93
#78	0.000201	0.38	0.54	0.66	0.76	0.85	0.93	1.01	1.08	1.15	1.21	1.32	1.43	1.52	1.61	1.70	1.79	1.87	1.94	2.02
#77	0.000254	0.48	0.68	0.83	0.96	1.07	1.18	1.27	1.37	1.45	1.53	1.67	1.80	1.93	2.04	2.15	2.26	2.36	2.46	2.52
#76	0.000314	0.59	0.84	1.03	1.19	1.33	1.46	1.58	1.69	1.79	1.89	2.06	2.23	2.38	2.52	2.66	2.79	2.92	3.04	3.18
#75	0.000346	0.66	0.94	1.15	1.33	1.48	1.63	1.76	1.88	2.00	2.10	2.30	2.49	2.66	2.82	2.97	3.12	3.26	3.39	3.50
#74	0.000398	0.76	1.08	1.32	1.52	1.70	1.86	2.01	2.15	2.28	2.41	2.63	2.84	3.04	3.22	3.40	3.56	3.73	3.88	4.00
#73	0.000452	0.85	1.21	1.48	1.71	1.91	2.09	2.26	2.42	2.57	2.71	2.96	3.20	3.42	3.62	3.82	4.01	4.19	4.36	4.50
#72	0.000491	0.93	1.32	1.61	1.86	2.08	2.28	2.46	2.63	2.80	2.95	3.23	3.48	3.73	3.95	4.16	4.36	4.57	4.75	4.90
#71	0.000531	1.00	1.42	1.75	2.01	2.25	2.47	2.67	2.85	3.02	3.19	3.49	3.76	4.03	4.27	4.50	4.72	4.94	5.14	5.30
#70	0.000616	1.18	1.67	2.04	2.36	2.63	2.89	3.12	3.34	3.54	3.73	4.08	4.40	4.71	4.99	5.26	5.52	5.78	6.01	6.20
#69	0.000670	1.27	1.80	2.21	2.54	2.84	3.12	3.37	3.60	3.82	4.03	4.41	4.76	5.09	5.39	5.69	5.96	6.25	6.49	6.70
#68	0.000755	1.42	2.02	2.47	2.85	3.18	3.49	3.77	4.03	4.28	4.51	4.94	5.33	5.70	6.04	6.37	6.68	6.99	7.26	7.50
1/32	0.000767	1.44	2.05	2.50	2.89	3.22	3.54	3.82	4.09	4.34	4.58	5.00	5.40	5.78	6.13	6.45	6.77	7.08	7.36	7.60
#67	0.000804	1.52	2.15	2.63	3.04	3.39	3.73	4.03	4.31	4.57	4.81	5.27	5.68	6.08	6.44	6.79	7.13	7.46	7.75	8.00
#66	0.000855	1.63	2.32	2.83	3.27	3.64	4.01	4.33	4.63	4.91	5.18	5.66	6.11	6.54	6.93	7.30	7.65	8.02	8.33	8.60
#65	0.000962	1.8	2.6	3.2	3.7	4.1	4.5	4.8	5.2	5.5	5.8	6.3	6.8	7.3	7.7	8.2	8.6	9.0	9.3	9.6
#64	0.001018	1.9	2.7	3.4	3.9	4.3	4.8	5.1	5.5	5.8	6.1	6.7	7.3	7.8	8.2	8.7	9.1	9.5	9.9	10.2
#63	0.001075	2.1	2.9	3.6	4.1	4.6	5.0	5.4	5.8	6.2	6.5	7.1	7.7	8.2	8.7	9.2	9.7	10.1	10.5	10.8
#62	0.001134	2.2	3.0	3.7	4.3	4.8	5.3	5.7	6.1	6.5	6.8	7.5	8.0	8.6	9.1	9.6	10.1	10.5	11.0	11.3
#61	0.001195	2.3	3.2	3.9	4.5	5.1	5.6	6.0	6.4	6.8	7.2	7.9	8.5	9.1	9.6	10.1	10.6	11.1	11.5	11.9
#60	0.001257	2.4	3.4	4.2	4.8	5.4	5.9	6.4	6.8	7.2	7.6	8.3	9.0	9.6	10.2	10.7	11.2	11.8	12.2	12.6
#59	0.001320	2.5	3.6	4.4	5.0	5.6	6.2	6.7	7.1	7.6	8.0	8.7	9.4	10.0	10.7	11.2	11.8	12.3	12.8	13.2
#58	0.001385	2.6	3.7	4.6	5.3	5.9	6.4	7.0	7.4	7.9	8.3	9.1	9.8	10.5	11.1	11.7	12.3	12.9	13.4	13.8
#57	0.001452	2.8	3.9	4.8	5.5	6.2	6.8	7.3	7.8	8.3	8.7	9.6	10.3	11.0	11.7	12.3	12.9	13.5	14.1	14.5
#56	0.001698	3.2	4.6	5.6	6.5	7.2	7.9	8.5	9.1	9.7	10.2	11.2	12.1	12.9	13.7	14.5	15.2	15.8	16.5	17.0
3/64	0.001726	3.3	4.7	5.7	6.6	7.4	8.1	8.7	9.3	9.9	10.5	11.4	12.3	13.2	14.0	14.7	15.5	16.1	16.8	17.4
#55	0.002124	4.0	5.7	7.0	8.0	9.0	9.8	10.6	11.3	12.0	12.6	13.8	15.0	16.0	17.0	17.9	18.8	19.6	20.4	21.1
#54	0.002376	4.5	6.3	7.7	8.9	10.0	10.9	11.8	12.6	13.4	14.1	15.4	16.6	17.8	18.9	19.9	20.9	21.8	22.7	23.4
#53	0.002780	5.2	7.3	8.9	10.3	11.5	12.6	13.6	14.6	15.5	16.3	17.8	19.3	20.6	21.8	23.0	24.2	25.2	26.3	27.1
1/16	0.003068	5.6	8.0	9.8	11.3	12.6	13.8	14.9	16.0	17.0	17.9	19.6	21.1	22.6	24.0	25.3	26.5	27.7	28.8	29.8
#52	0.003167	5.8	8.3	10.1	11.7	13.1	14.3	15.5	16.5	17.6	18.5	20.3	21.9	23.4	24.8	26.2	27.4	28.7	29.9	30.8
#51	0.003526	6.5	9.2	11.3	13.0	14.5	15.9	17.2	18.4	19.5	20.6	22.5	24.3	26.0	27.6	29.1	30.5	31.8	33.2	34.2
#50	0.003848	7.1	10.1	12.4	14.3	16.0	17.5	18.9	20.2	21.4	22.6	24.8	26.7	28.6	30.3	32.0	33.5	35.1	36.5	37.6



LOW PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)

Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN INCHES OF WATER COLUMN																		
		1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	20"	22"	24"	26"	1#
#49	0.004185	7.8	11.0	13.4	15.5	17.3	19.0	20.5	21.9	23.3	24.5	26.8	29.0	31.0	32.9	34.6	36.4	38.0	39.5	40.8
#48	0.004536	8.5	12.0	14.6	17.0	19.0	20.8	22.5	24.0	25.5	26.9	29.5	31.8	34.0	36.1	38.0	39.9	41.7	43.4	44.7
5/64	0.004794	9.0	12.7	15.6	18.0	20.2	22.1	23.8	25.5	27.0	28.5	31.2	33.7	36.0	38.2	40.2	42.2	44.1	45.9	47.4
#47	0.004840	9.1	12.9	15.8	18.2	20.3	22.3	24.1	25.7	27.3	28.8	31.6	34.0	36.4	38.6	40.7	42.7	44.6	46.4	47.9
#46	0.005150	9.7	13.7	16.8	19.4	21.7	23.8	25.7	27.4	29.1	30.7	33.6	36.3	38.8	41.1	43.4	45.5	47.5	49.5	51.0
#45	0.005280	10.0	14.1	17.3	20.0	22.4	24.5	26.4	28.3	30.0	31.6	34.6	37.4	40.0	42.4	44.7	46.9	49.0	51.0	52.6
#44	0.005810	11.0	15.6	19.1	22.0	24.6	27.0	29.1	31.2	33.0	34.8	38.1	41.1	44.0	46.7	49.2	51.6	53.9	56.1	57.9
#43	0.006220	11.8	16.6	20.4	23.5	26.3	28.8	31.1	33.2	35.2	37.2	40.7	44.0	47.0	49.8	52.5	55.1	57.5	60.0	61.8
#42	0.006870	13.0	18.4	22.5	26.0	29.0	31.8	34.4	36.8	39.0	41.1	45.0	48.6	52.0	55.1	58.1	61.0	63.7	66.3	68.4
3/32	0.006900	13.0	18.4	22.5	26.0	29.1	31.9	34.5	36.9	39.1	41.2	45.1	48.7	52.1	55.2	58.2	61.1	63.8	66.4	68.5
#41	0.007240	13.5	19.1	23.4	27.0	30.2	33.1	35.7	38.2	40.5	42.7	46.8	50.5	54.0	57.2	60.4	63.4	66.2	68.9	71.0
#40	0.007540	14.0	19.8	24.3	28.0	31.3	34.3	37.0	39.6	42.0	44.3	48.5	52.4	56.0	59.4	62.6	65.6	68.6	71.5	73.6
#39	0.007780	14.5	20.5	25.1	29.0	32.4	35.5	38.3	41.0	43.5	45.9	50.2	54.2	58.0	61.5	64.8	68.0	71.0	74.0	76.3
#38	0.008090	15.0	21.2	26.0	30.0	33.5	36.8	39.7	42.4	45.0	47.4	52.0	56.1	60.0	63.6	67.0	70.4	73.5	76.5	78.9
#37	0.008490	16.0	22.6	27.7	32.0	35.8	39.2	42.4	45.2	48.0	50.6	55.5	59.8	64.0	67.9	71.5	75.1	78.4	81.6	84.2
#36	0.008910	17.0	24.1	29.5	34.0	38.0	41.6	45.0	48.1	51.0	53.8	58.9	63.6	68.0	72.1	76.0	79.7	83.4	86.7	89.5
7/64	0.009400	17.8	24.9	30.8	35.5	39.7	43.5	47.0	50.2	53.3	56.2	61.5	66.4	71.0	75.3	79.4	83.3	87.0	90.6	93.5
#35	0.009500	18	25	31	36	40	45	48	51	55	57	63	68	73	77	81	85	89	92	95
#34	0.009680	19	26	32	37	41	45	49	52	56	59	64	69	74	78	83	87	91	94	97
#33	0.010030	19	27	33	38	43	47	51	54	57	60	66	71	76	81	85	89	93	97	100
#32	0.010570	20	28	35	40	45	50	54	57	61	64	69	75	80	85	89	94	98	102	105
#31	0.011310	22	30	37	43	48	53	57	61	65	68	74	80	86	91	96	101	105	110	113
1/8	0.012270	24	33	41	47	53	58	62	67	71	74	81	88	94	100	105	110	115	120	124
#30	0.012970	25	35	43	50	56	61	66	70	75	79	86	93	100	106	112	117	122	127	131
#29	0.014530	28	39	48	55	62	68	73	79	83	88	95	103	110	117	123	129	135	140	145
#28	0.015500	30	42	51	59	66	72	78	84	88	94	102	110	118	125	132	138	144	150	155
9/64	0.015530	30	42	51	59	67	73	79	85	89	95	103	111	119	126	133	139	145	151	155
#27	0.016290	31	44	54	62	70	76	83	88	94	99	107	116	124	131	138	145	151	158	163
#26	0.016970	33	46	56	65	73	80	86	92	98	103	112	121	130	138	145	152	159	166	171
#25	0.017550	34	47	58	67	75	82	89	95	101	106	116	125	134	142	150	157	164	171	176
#24	0.018150	35	49	60	69	78	85	92	98	104	110	119	129	138	146	154	162	169	176	181
#23	0.018630	36	50	62	71	80	87	94	101	107	113	123	133	142	150	159	166	174	181	187
5/32	0.019170	37	52	63	73	82	89	97	103	110	115	126	136	146	155	163	171	178	186	192
#22	0.019360	37	52	64	74	83	91	98	105	111	117	128	138	148	157	165	173	181	189	195
#21	0.019860	38	54	66	76	85	93	100	107	114	120	132	142	152	161	170	178	186	194	200

LOW PRESSURE TABLE – GAS CAPACITY

GAS CAPACITY OF INSPIRATOR ORIFICES – (CFH)

(SPECIFIC GRAVITY 0.60)



Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN INCHES OF WATER COLUMN																		
		1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	20"	22"	24"	26"	1#
#20	0.020360	39	55	67	78	87	95	103	110	117	123	135	146	156	165	174	183	190	198	205
#19	0.021640	41	58	72	83	93	101	110	117	124	131	144	155	166	176	186	195	204	212	218
#18	0.022560	42	61	75	87	97	106	115	123	130	137	151	162	174	184	194	204	213	222	229
11/64	0.023200	43	63	77	89	99	109	118	126	134	141	154	166	178	189	199	209	218	227	234
#17	0.023510	44	64	78	90	101	110	119	128	135	143	156	168	180	191	201	211	220	230	237
#16	0.024610	45	67	82	94	105	116	125	134	142	149	162	176	188	199	210	220	230	239	247
#15	0.025450	47	69	84	97	109	119	129	138	146	154	168	181	194	206	218	227	237	247	255
#14	0.026020	48	70	86	100	112	122	132	141	150	158	173	187	200	212	224	234	245	255	263
#13	0.026880	50	73	89	103	115	126	137	145	155	163	178	192	206	218	230	242	252	263	271
3/16	0.027610	51	75	92	106	118	130	140	150	159	168	183	198	212	225	237	249	260	270	279
#12	0.028060	52	76	93	108	121	132	143	153	162	171	187	202	216	229	241	253	265	275	284
#11	0.028650	54	78	95	110	123	135	146	156	165	174	190	206	220	233	246	258	270	280	290
#10	0.029410	55	79	97	113	126	138	149	159	169	178	196	211	226	240	253	265	277	288	297
#9	0.030170	56	82	100	116	130	142	153	164	174	184	201	217	232	246	259	272	284	296	305
#8	0.031100	58	84	103	119	133	146	158	169	179	189	206	226	238	252	266	279	292	304	313
#7	0.031730	60	86	105	122	136	149	161	172	183	193	211	228	244	259	272	286	299	311	321
13/64	0.032400	61	88	108	124	139	152	165	176	187	197	215	232	248	263	277	291	304	317	326
#6	0.032690	62	89	109	126	140	154	166	178	189	199	218	236	252	267	282	296	309	321	332
#5	0.033170	63	89	110	127	142	155	168	179	190	201	220	238	254	269	284	298	311	324	334
#4	0.034310	65	93	114	132	147	161	174	186	198	208	228	247	264	280	296	310	323	337	348
#3	0.035630	66	97	118	137	153	168	181	194	205	216	237	256	274	290	306	321	336	349	360
7/32	0.037580	70	102	125	144	161	176	191	204	216	228	249	269	288	305	322	338	353	367	379
#2	0.038360	72	104	128	148	165	181	195	209	221	233	256	277	296	314	331	347	363	378	390
#1	0.040830	76	111	136	157	175	192	207	222	235	248	272	294	314	333	351	368	385	400	413
A	0.043010	80	115	143	165	185	202	220	234	247	260	286	309	330	350	369	387	405	421	435
15/64	0.043140	81	117	144	166	186	204	222	237	250	263	287	311	332	352	371	390	407	424	437
B	0.044490	85	120	148	172	192	210	226	242	255	270	298	322	344	365	385	404	421	439	452
C	0.046000	87	125	153	176	200	216	235	252	265	280	305	329	352	373	393	413	432	449	463
D	0.047530	91	129	159	183	205	224	242	259	275	290	317	342	366	388	410	430	449	467	482
1/4 E	0.049090	94	133	163	189	211	231	250	267	283	299	327	354	378	401	423	444	464	482	497
F	0.051870	99	140	172	200	225	245	264	285	299	315	346	374	400	424	447	469	490	510	526
G	0.053500	102	145	176	207	230	253	272	293	308	325	358	387	414	439	463	485	508	528	545
17/64	0.055410	105	151	184	213	238	261	282	301	320	337	369	398	426	452	476	500	522	544	560
H	0.055570	106	152	185	214	239	262	283	303	321	338	370	400	428	453	478	502	524	545	563
I	0.058110	111	156	190	225	250	275	295	318	334	353	389	421	450	477	503	527	551	574	592



LOW PRESSURE TABLE – GAS CAPACITY

Orifice Size	Orifice Area	PRESSURE AT ORIFICE IN INCHES OF WATER COLUMN																		
		1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"	16"	18"	20"	22"	24"	26"	1#
J	0.060260	115	162	200	234	260	285	305	330	345	365	405	437	468	496	523	549	574	596	615
K	0.062020	118	168	206	238	266	292	315	337	356	376	412	445	476	505	532	559	584	607	626
9/32	0.062130	118	169	207	239	267	293	316	338	358	378	414	447	478	507	534	561	586	610	630
L	0.066050	126	179	219	253	285	312	336	360	380	403	438	473	506	536	566	593	620	645	665
M	0.068350	130	185	226	262	294	322	347	373	392	416	454	490	524	555	585	614	642	669	669
19/64	0.069220	132	188	230	266	298	326	352	377	399	421	460	497	532	564	595	624	652	679	700
N	0.071630	137	195	236	275	307	337	365	390	412	437	475	514	550	583	615	645	674	701	723
5/16	0.076700	146	209	255	295	330	361	390	417	443	467	510	552	590	625	660	691	723	752	776
O	0.078430	150	213	260	300	335	369	400	427	452	475	519	561	600	636	670	704	735	765	790
P	0.081940	157	223	272	315	350	385	415	447	473	497	545	589	630	668	705	739	772	805	829
21/64	0.084560	163	230	281	325	363	398	430	460	488	514	563	608	650	689	726	762	796	829	855
Q	0.086570	166	235	289	333	370	406	439	471	498	525	576	622	666	705	744	780	815	850	875
R	0.090260	175	245	300	347	386	425	458	490	520	550	600	649	694	736	775	813	850	885	913
11/32	0.092810	178	252	309	357	399	437	472	505	536	565	618	668	714	757	798	837	875	911	940
S	0.095110	183	259	318	365	408	445	482	516	547	578	632	682	730	774	815	856	895	931	960
T	0.100660	193	274	336	386	432	473	510	546	580	611	668	722	772	818	863	905	945	985	1014
23/64	0.101400	195	276	338	390	436	478	516	552	586	617	675	729	780	827	872	914	955	994	1025
U	0.106360	205	290	356	410	458	500	540	575	615	647	709	767	820	869	917	961	1005	1045	1077
3/8	0.110450	214	303	371	428	478	524	566	605	641	676	740	800	855	907	956	1003	1048	1090	1125
V	0.111630	215	303	373	430	480	525	568	607	645	680	745	804	860	912	961	1008	1054	1097	1130
W	0.117020	225	319	390	450	503	550	595	635	675	712	779	842	900	955	1007	1055	1103	1148	1183
25/64	0.119800	230	326	399	461	515	565	610	652	692	729	797	862	921	976	1030	1080	1129	1175	1212
X	0.123790	23																		

PRESSURE CORRECTION FACTORS FOR CHANGE IN SPECIFIC GRAVITY



To find the capacity of orifices with a gas of different specific gravity, multiply capacity by these factors:

Specific Gravity	Correction Factor
1.10	0.7327
1.00	0.7746
0.95	0.7947
0.90	0.8165
0.88	0.8260
0.86	0.8360
0.84	0.8460
0.82	0.8560
0.80	0.8660
0.78	0.8780
0.76	0.8890
0.74	0.9020
0.72	0.9140
0.70	0.9258
0.68	0.9410
0.66	0.9540
0.64	0.9690
0.62	0.9850
0.60	1.0000
0.58	1.0170
0.56	1.0340
0.54	1.0540
0.52	1.0740
0.50	1.0954
0.48	1.1200
0.46	1.1430
0.44	1.1700
0.42	1.1970
0.40	1.2251
0.30	1.4142
0.20	1.7330
0.10	2.4500
0.05	3.4700

Correction factor for any other specific gravity:

$$\frac{\sqrt{0.60}}{\text{Specific Gravity of Gas}}$$

SPECIFIC GRAVITY – COMMON GASES



Name	Specific Gravity
Ammonia	0.60
Dissolved Ammonia	0.29
Argon	1.38
Air	1.00
Butane	2.08
Carbon Dioxide	1.52
Carbon Monoxide	0.97
Chlorine	2.49
Ethane	1.05
Ethylene	0.97
Helium	0.14
Hydrogen	0.07
Methane	0.55
Natural Gas	0.60
Nitrogen	0.97
Oxygen	1.10
Propane	1.55
Sulfur Dioxide	2.26

GAS CONVERSION FACTORS – METERED GAS

Flowmeter Calibrated for:	Air	Dissolved Ammonia	Argon	Ammonia	Helium	Hydrogen	Natural Gas	Nitrogen	Oxygen	Propane
Air	1.000	1.841	0.851	1.302	2.692	3.793	1.240	1.021	0.951	0.811
Dissolved Ammonia	0.543	1.000	0.462	0.707	1.462	2.060	0.674	0.554	0.517	0.440
Argon	1.175	2.163	1.000	1.529	3.162	4.456	1.457	1.199	1.118	0.952
Ammonia	0.768	1.414	0.654	1.000	2.068	2.914	0.953	0.784	0.731	0.623
Helium	0.371	0.684	0.316	0.484	1.000	1.409	0.461	0.379	0.353	0.301
Hydrogen	0.2640	0.485	0.224	0.343	0.710	1.000	0.387	0.269	0.251	0.214
Natural Gas	0.806	1.484	0.686	1.050	2.170	3.058	1.000	0.823	0.767	0.654
Nitrogen	0.980	1.804	0.834	1.276	2.638	3.717	1.215	1.000	0.932	0.794
Oxygen	1.051	1.935	0.895	1.369	2.830	3.987	1.304	1.073	1.000	0.852
Propane	1.023	2.271	1.050	1.606	3.321	4.680	1.530	1.259	1.174	1.000

EXAMPLE: If the flowmeter is calibrated for oxygen, and propane is being measured, multiply the reading by 0.852 to get the actual propane flow. If the actual pressure is different from the calibration, use the correction factor below:



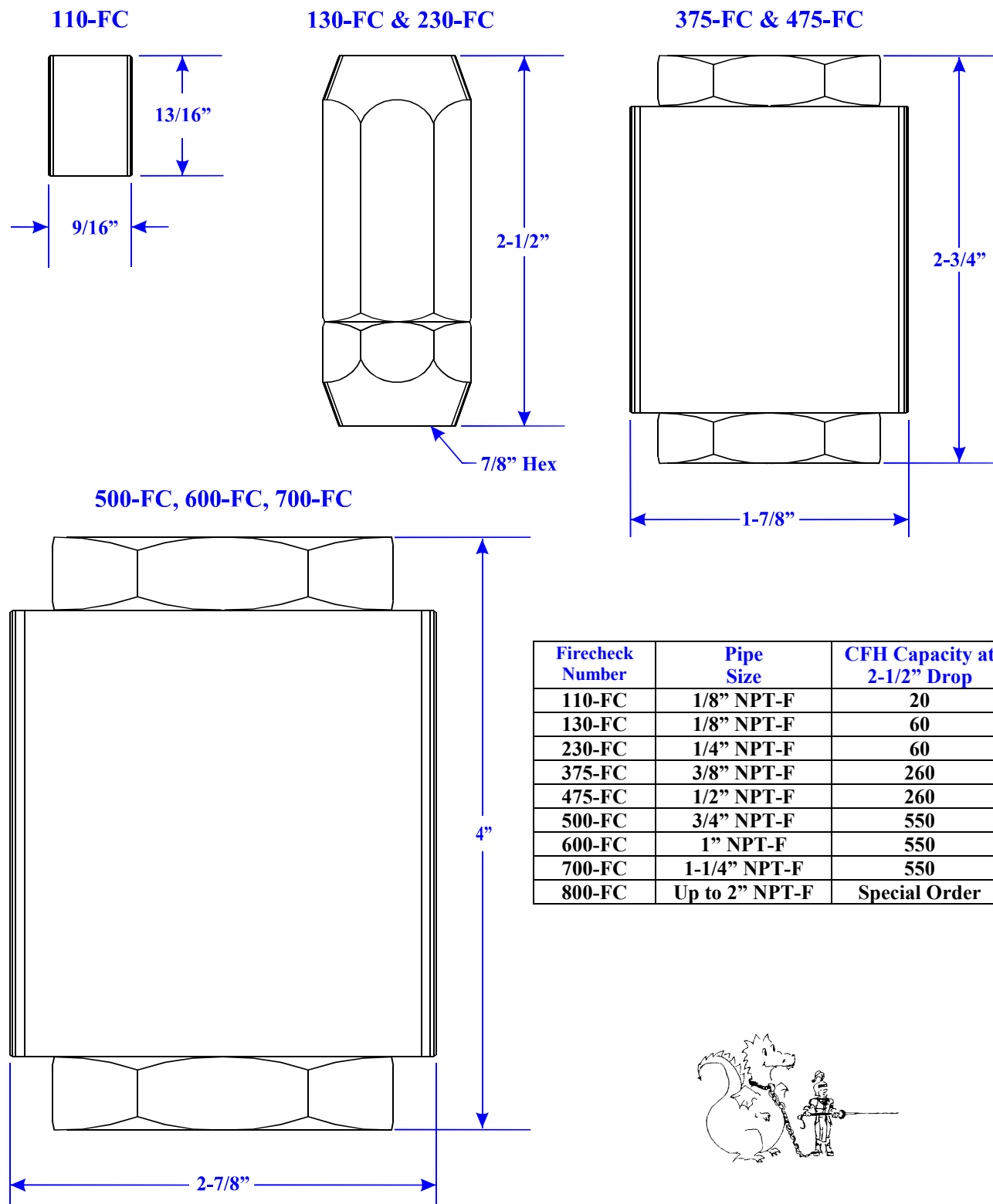
CALIBRATED FLOW METER PRESSURE CORRECTION FACTORS

Actual Pressure (PSIG)	Calibration Pressure												
	0	0.5	1	2	3	4	5	10	15	20	30	40	50
0.5	1.01	1.00	0.98	0.95	0.93	0.90	0.88	0.78	0.71	0.66	0.58	0.53	0.48
1	1.03	1.02	1.00	0.97	0.94	0.92	0.89	0.80	0.73	0.67	0.59	0.54	0.49
2	1.06	1.05	1.03	1.00	0.97	0.94	0.92	0.82	0.75	0.69	0.61	0.55	0.51
3	1.10	1.08	1.06	1.03	1.00	0.97	0.95	0.85	0.77	0.71	0.63	0.57	0.52
4	1.13	1.11	1.09	1.06	1.03	1.00	0.97	0.87	0.79	0.73	0.65	0.58	0.54
5	1.16	1.14	1.12	1.09	1.05	1.03	1.00	0.89	0.81	0.75	0.66	0.60	0.55
10	1.30	1.27	1.25	1.22	1.18	1.15	1.12	1.00	0.91	0.84	0.74	0.67	0.62
15	1.42	1.40	1.38	1.33	1.29	1.26	1.23	1.10	1.00	0.92	0.82	0.74	0.68
20	1.53	1.51	1.49	1.44	1.40	1.36	1.33	1.18	1.08	1.00	0.88	0.80	0.73
30	1.75	1.71	1.69	1.64	1.59	1.55	1.51	1.34	1.22	1.13	1.00	0.90	0.83
40	1.93	1.90	1.87	1.81	1.76	1.71	1.67	1.49	1.36	1.25	1.11	1.00	0.92
50	2.10	2.06	2.03	1.97	1.91	1.86	1.81	1.62	1.47	1.36	1.20	1.09	1.00

EXAMPLE: If the flowmeter is calibrated for 10 PSIG, and the actual pressure is 40 PSIG, multiply the reading by 1.49 to get the actual flow. Also, if the flowmeter is calibrated for a different gas than the gas being measured, multiply this number with the correction factor from the above chart.

KNIGHT FIRECHECKS

Firechecks are a necessary line component in all premix burner installations where oxygen is being used, or where a possibility of flashback (backfire) is considered a hazard.



FIRECHECKS

DEFINITION

Firechecks are a necessary component in all burner installations, where oxygen is being used, or where the possibility of flashback (backfire) is considered a hazard. Firechecks do not prevent flashback, nor do they stop the resulting concussion.

EXPLANATION

When a flashback occurs, the flame burns at an explosive rate through the mixture line, unobstructed until it reaches the firecheck. At this point, the flame enters the cavity of the firecheck and experiences a pressure drop as it comes into contact with the first coil of stainless steel ribbon. The flame front is forced to burn through the grating formed by the coils, and this action retards the flame speed of the burning mixture. This reoccurs at each successive coil. A considerable amount of heat is absorbed by the coils, which helps to cool the fire. The subsequent expansion of each coil serves to further restrict the passage of flame through the firecheck until the flame speed is exceeded by the outgoing velocity of the mixture, and the fire is extinguished.

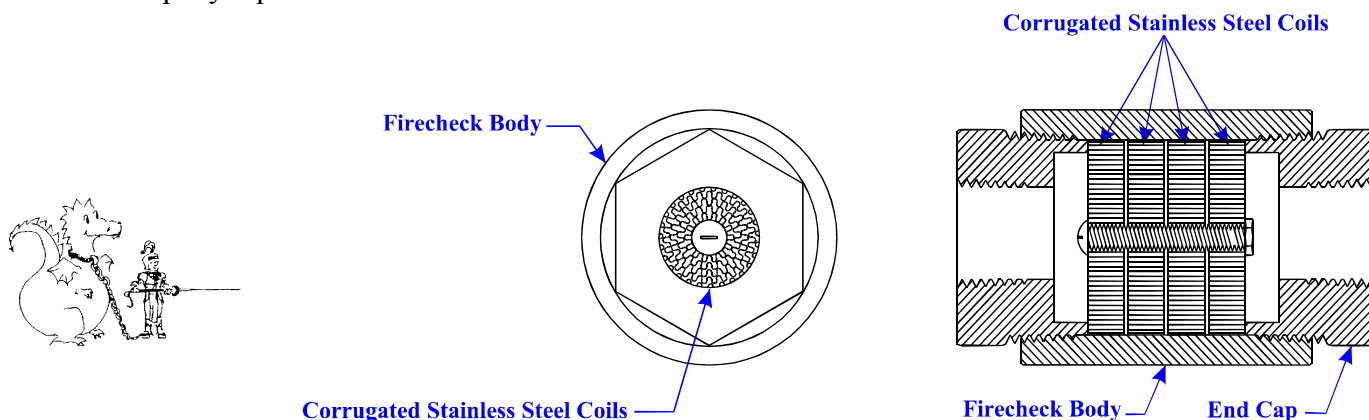
SELECTION AND USE

Proper selection of firechecks is simple. Firechecks should be of equal pipe size to the outlet pipe of the mixer. Firechecks are **NOT** selected on the basis of capacity. Most standard capacity charts in common use are intended to serve as an engineering guide to establish maximum flow at a specific pressure drop. They are not designed to limit or define maximum flow conditions, as has been the common misinterpretation; overflow conditions in excess of rated capacities will simply result in greater pressure drop with the increased volume. The use of oversized firechecks, undersized firechecks, or tandem firechecks is not recommended. Do not install any valves, gas cocks, or other line restrictions, except a firecheck between the mixer and burners.

INSTALLATION AND MAINTENANCE

Firechecks can be installed from either direction. Maintenance involves inspection following any major backfire to be sure that the coils have not been damaged, which would restrict the normal flow of gases to the burners. To do this, remove the firecheck from the line and hold it up to a light source to view the coils and to check the passage of light. The coils closest to the burner are the ones to inspect first. In severe enough cases, the stainless steel will actually be burned to where it no longer resembles a coil. When this happens, the firecheck should be replaced. Continued operation of firechecks damaged to this degree constitutes a serious safety hazard. To facilitate removal, a union can be installed at the firecheck. Refer to the **KNIGHT MIXER SIZING GUIDE** [CHECKLIST FOR GAS-OXYGEN SYSTEMS](#) for additional troubleshooting assistance.

Should there be any questions, or any additional information required, please contact a Knight Gas Burner Company representative.

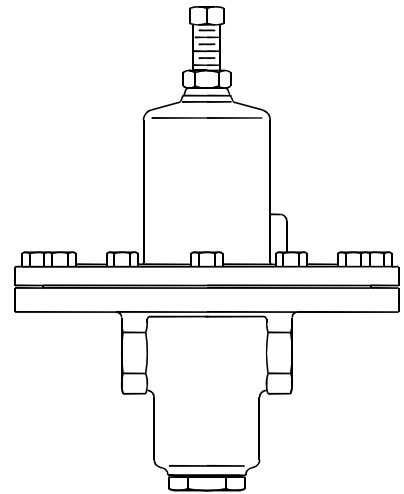
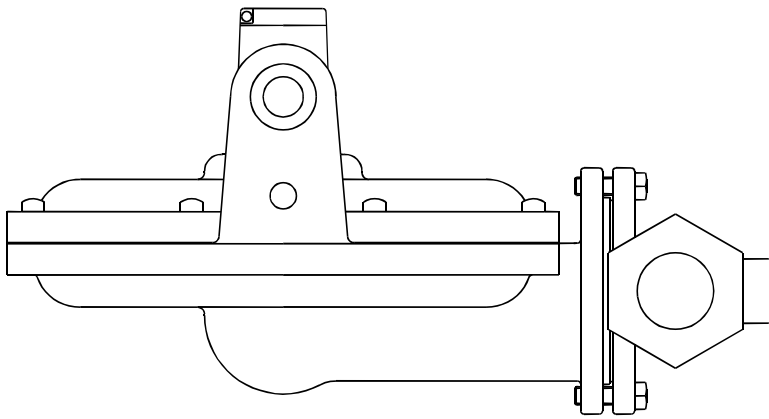


REGULATORS

For most combustion systems..."Simpler is better." Proper selection and use of industrial regulators are the keys to process stability. Adequate control of any combustion system begins with the two basic requirements of good regulation:

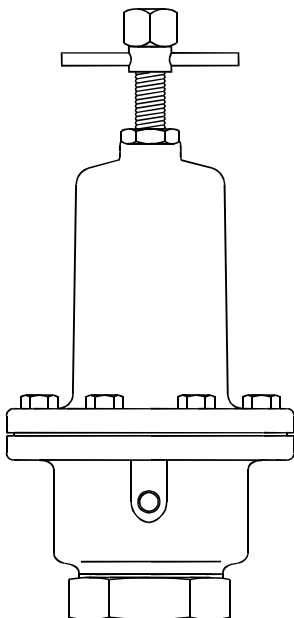
1. Supply a specific volume of gas to the system.
2. Supply that volume at a controlled pressure.

At Knight, our technical staff is prepared to discuss your regulation requirements and supply the correct regulator for your combustion application.



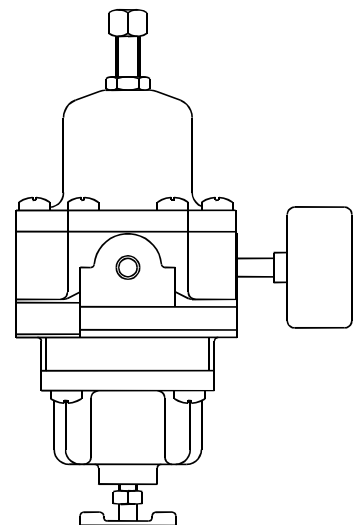
Regulators available:

- Air
- Oxygen
- Natural Gas
- Methane
- LP Gas
- Hydrogen
- Other fuel and process gases



Information required:

- Gas type
- Incoming pressure
- Output pressure
- Volume of gas required
- Burner information
- Desired pipe size



REGULATION AND COMBUSTION SERVICES

In addition to the specification and supply of regulation hardware, N.M. Knight Co., Inc. can provide problem solving and troubleshooting services for the combustion systems at your production facility. Let us review some the common operational issues that can be related to regulation.

- Fluctuating fires
- Changing line pressures
- Changes in fire temperatures
- Inadequate control in firesetting
- Insufficient volume of gas or gases
- Fire changes at different times of day or season
- Pressure changes when other equipment is turned on or off

Our services cover not only regulation hardware and operation, but may also include the following topics as part of our **Combustion Seminar**:

- Use of different fuel gases
- Proper plumbing and sizing
- Placement and sizing of system hardware (Valves, mixers, manifolds, check valves, etc.)
- Burner selection
- Burner maintenance
- Firesetting
- Flame safety
- Troubleshooting techniques

Contact N.M. Knight Co., Inc. to discuss your combustion situation and needs. We will be glad to provide a quotation for consulting and troubleshooting services – or for our Combustion Seminar, which can be used a general training tool, as well as a vehicle to better understand specific operational issues.





KNIGHT GAS BURNER DIVISION

A complete line of Knight quality gas burners, custom and specialty burners (premixed – surface mixed – nozzle mixed); Lathe burners, ribbon burners, ring burners, bench burners, stainless steel burners, water-cooled burners, hand torches and tips, regulators, venturi mixers, pressure gauges, fire checks, check valves, inspirators, precision needle valves, shut-off valves, ball valves, solenoid valves, butterfly valves, plastic flame treating burners, glass blowing equipment. Representing most major burner manufacturers nationwide; burner rebuild and cleaning services...

KNIGHT MACHINE DIVISION

Continuous belt annealing lehrs; annealing ovens, gas and electric; glass thermal shock cutting machines; fire polishing machines; flame treating machinery for the plastics industry, custom machinery.

ALBLACK

An automatic, dry carbon deposition process for mold lubrication...

KNIGHT INSTRUMENT DIVISION

Knight Gas-Air Combustion Analyzer; gas-savers and economizers; flowmeters; ignition equipment; flame monitoring and controlling equipment; thermocouples; combustion control panels and cabinets...

POLARIZING INSTRUMENTS

Offering a complete line of polariscopes to determine stress in glass products, we manufacture polariscopes in a wide range of sizes to fit your particular application. Our line of polarimeters makes it possible for the operator to actually measure the level of stress in glass. In addition to our many standard instruments, our engineers can design custom units adapted to your specific application. All of our Polarizing Instruments are designed to meet A.S.T.M. standards. Other options available for use with our Polarizing Instruments include: analyzing goggles, standard strain discs, platform stages, circular stages and immersion tanks...

FLETCHER-TERRY PRODUCTS DIVISION

Knight/Fletcher-Terry Tube and Rod Cutting Machine; transfer and glazing equipment; packing and inspection stations; carbide wheels and axles; carbide wheel rehoning service...

INDUSTRIAL DIAMOND PRODUCTS

Diamond impregnated core drills; diamond plated core drills; state-of-the-art PULSEMATIC drill press, ultra-sensitive mini drill press, fully-automatic or manual precision production run drill press, fully-automatic or manual heavy-duty drill press; diamond wheels; diamond tools, scribes, points and reamers...

MISCELLANEOUS PRODUCTS

Heathway quartz and glass working lathes & accessories; wet-cut saws; abrasive wheels; wet-belt sanders, abrasive and cork polishing belts; stainless steel-braided Teflon lined hose; ceramic wool insulation...