



www.agfburner.com

SETTING THE INDUSTRY STANDARD FOR EXCELLENCE SINCE 1878.

Gas Burners for the Glass, Plastic & Metal Industries

Burner Equipment

A few words about AGF Burner Inc.

AGF Burner Inc. was founded in 1878. Our company developed and manufactured the first air-gas fired heating equipment-furnaces, heating machines and burners. Since that time, AGF has supplied equipment for glass working, flame treating plastics and metal heating applications. Our line represents the results of our ongoing effort to improve our products and develop new ones.

Following are a few general comments and some important information about our burners:

Interchangeable... AGF burners of the same model number are all interchangeable -- adherence to rigid specifications and our careful inspection policy assure uniformity of flame.

Adaptable... AGF burners are available in a variety of flame patterns and capacities to suit your glass- and quartz-working machinery. A selection of burners for flame treating plastics and metal joining are also available.

Warranty... AGF Burner Inc. fully warrants that each AGF burner has been tested and meets the specifications listed for the burner in this catalog.

BTU Data... Included in this catalog are complete listings of the various capacities in Btu's per hour for the different types of gases normally used.

Comparisons and Selections... The tabulations and operational ratings included are intended to facilitate comparison of the heat output used with other available burners. This information is also useful in selecting a suitable replacement burner when making a gas change .

Note...AGF burners and appliances are often imitated. Be aware of the inferior products which might have similar model numbers, markings or otherwise appear to be an AGF product. Undependable imitations can be dangerous. Be sure you specify genuine AGF burners and components.

AGF BURNER

1955 Swarthmore Ave., Lakewood, NJ 08701 (tel) 732-730-8090 (fax) 732-730-8060



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SALES POLICIES OF AGF BURNER INC.

Sales Assistance:

The sales staff at AGF will serve the individual on all technical and/or routine sales requirements via the telephone, fax, E-mail, or a personal sales call. Request for personal sales calls are to be made in advance. Sales calls outside the New Jersey/New York Metropolitan area are made during a scheduled sales visit through your area.

Customers are invited to visit our factory and discuss their specific heating applications. A laboratory facility is available. Your samples are welcome.

Service/Installation Supervision:

Our staff is available for a fee to travel to your facility and service an existing AGF Gas Burner or supervise the installation of a new AGF Gas Burner System.

We can train or lecture your manufacturing staff in the correct operation of our Burner Systems.

Repair/Return Policy:

AGF Burner Inc. offers a complete repair service mainly on its Ribbon Burners and Surface-Mix Hydrogen/Oxygen Burners. The repair costs are estimated and customer is advised before proceeding, unless otherwise agreed to.

A "Return Authorization Form" with the exception of repairs must accompany all returns.

All new equipment returned for defects must be returned within 30 days of receiving your order.

Export Policy:

AGF Burner Inc. will ship equipment to any country in the world permitted by the United States Government. Orders are accepted with payment terms "cash in advance" payable in U.S. dollars and drawn on a U.S. bank.

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BURNER INC.

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BURNER
CATALOG

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PRODUCT BULLETIN REFERENCE

Adaptors for Blowpipes.....	610.10, 655
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Air-Gas Burners.....	610.10, 630.20
Air-Gas Venturi Mixers.....	629-T, 630.20
Air-Oxygen-Gas Venturi Mixers.....	Write for in- formation.
Balls.....	612.40, 614.20
Ball Joints.....	612.40, 614.20
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Oxygen-Gas.....	655
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Machlet Tips.....	616.10

PRODUCT BULLETIN REFERENCE

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000-U, 000-UN Universal Blowpipe.....	610.10
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00-S 00-SN Stand Blowpipe	610.10
00-U, 00-UN Universal Blowpipe.....	610.10
0, 0-N Hand Blowpipe.....	610.10
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1-EU, 1-EUN Universal Blowpipe.....	610.10
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17 Series Venturi Mixers	630.20
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63, 63-N, 63-DN, 63-DNA Machlet Tips	616.20
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81-W, 81-WOS, 81-WNS Fishtail Burners	614.20
85-F Burner Tips	612.10
104, 104-OS, 104-NS Fishtail Burners	614.20
228, 228-OS, 228-NS Fishtail Burners	614.20
228-F, 228-FOS, 228-FNS Fishtail Burners	614.20
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420-SNS Fishtail Burner	614.20
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548 Glass Fire	612.10

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552-N Machlet Tip	616.10
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557 Glass Fire	612.10
558 Glass Fire	612.10
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659-N Hand Torch	615.20
659-OX Hand Torch	654
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750-C, 750-D, 750-E, 750-F Ball Joints	612.40
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932-A Burner	655
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1637 Burner Tips	651
1638 Burner Tips	651
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1770, 1770-A, 1770-B, 1770-D Ball Burners	612.40
2281 Burner Tunnel	630.20
2288, 2288-A Burner Tunnels	630.20
2321, 2321-A Burner Tunnels	630.20
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3114 Glass Fire	612.10
3118 Glass Fire	612.10
3131 Glass Fire	612.10
3141 Glass Fire	612.10
3147 Glass Fire	612.10
3151 Glass Fire	612.10
3157 Glass Fire	612.10
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H-2 High Pressure Air Mixer	610.10
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H-4 High Pressure Air Mixer	610.10
H-5 High Pressure Air Mixer	610.10
ZG-1 Zero Governor	630.20
ZG-2 Zero Governor	630.20
ZG-3 Zero Governor	630.20
ZG-4 Zero Governor	630.20
ZG-5 Zero Governor	630.20
ZG-6 Zero Governor	630.20
ZG-7 Zero Governor	630.20

"Super Blowpipes"

Hand Style

Hand Style		Maximum Flame Size Inches		Approximate Maximum Gas Consumption B.T.U. Per Hour†	Approximate Maximum Air Consumption Cu. Ft./Min. at 16 oz. Pressure	Supply Connections Outside Diameter Inches		Rubber Tubing Recommended for Supply Lines, Inside Diameter, Inches	Hand Style Blowpipes		Blowpipe Head Dimensions					
Hand Blowpipe No. For Natural, Bottled or Other Slow Burning Gases	Hand Blowpipe No. For Manufactured Gases	Diameter	Length			Gas	Air		Length, Overall, Inches	Net Weight Pounds	"N" Type For Natural, Bottled and Slow Burning Gases			Manufactured Gas Type		
											Center Hole Drill Size	Inside Diameter of Shell (Head)	Outside Diameter of Shell (Head)	Center Hole Drill Size	Inside Diameter of Shell (Head)	Outside Diameter of Shell (Head)
000-N	000	3/16	4	1,980	.3	5/16	5/16	1/4	11 1/4	1/2	53	31/64"	5/8"	55	21/64"	13/32"
00-N	00	3/8	4	2,520	.4	5/16	5/16	1/4	11 1/4	1/2	48	31/64"	5/8"	50	21/64"	13/32"
0-N	0	1/2	4	5,970	1.0	5/16	5/16	1/4	11 1/4	1/2	29	39/64"	3/4"	30	31/64"	5/8"
1-EN	1-E	3/4	6	12,600	1.0	5/16	5/16	1/4	11 1/4	1/2	18	53/64"	15/16"	18	39/64"	3/4"
1-N	1	3/4	6	12,600	2.0	3/8	3/8	5/16	14	1	18	53/64"	15/16"	18	39/64"	3/4"
2-N	2	1 1/4	9 1/2	31,500	5.2	9/16	9/16	1/2	16	2	19	19/64"	1 1/8"	1 1/4"	19/64"	1 1/16"
3-N	3	2 1/2	15	63,000	10.5	1 1/16	1 1/16	5/8	19	3	35/64"	1 1/2"	1 1/2"	35/64"	1 1/8"	1 3/8"

†Manufactured Gas 525 B.T.U./cu. ft.; Natural Gas 1050 B.T.U./cu. ft.; Propane 2500 B.T.U./cu. ft.

The "N" type blowpipe should be ordered for use with natural, bottled or slow burning mixed or reformed gases.

A.G.F. Hand Style "Super" Blowpipes are designed for operation with gas at from 3" to 8" water column and air at one to three pounds per square inch pressure. If high pressure air is to be used to supply several Blowpipes, suitable pressure reduction equipment as described on page 4 should be employed.

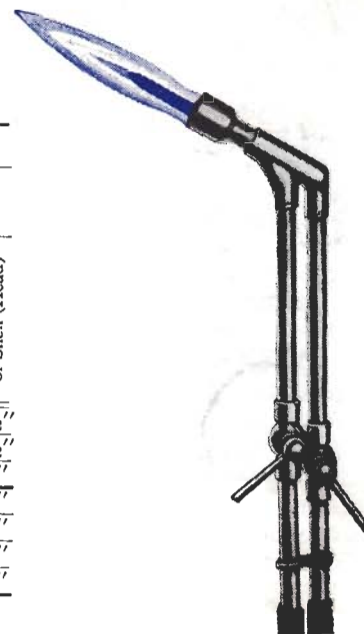
A.G.F. "Super" Blowpipes are of brass construction and are equipped with tapered cocks for easy regulation of the flame setting. An accurately proportioned injector and mixing chamber is built into the blowpipe head, thus mixing of gas and air is completed before it reaches the point where combustion takes place. Adequate piloting assures flame retention. These features permit operation of A.G.F. "Super" Blowpipes at higher velocities and capacities than ordinary nozzle mixing Blowpipes of similar size. These same features also permit a wide range of flame setting—from a relatively short intense focus flame to a large bushy flame.

Excellent operating characteristics and higher effective temperatures are obtained with "N" type Blowpipes on natural, bottled and other slow burning gases.

The No. 000, 00, 0 and 1-E "Super" Blowpipe Heads of both the "N" and manufactured gas types are interchangeable and have the same threaded connections. "N" type Blowpipe Heads are interchangeable with manufactured gas type heads in all sizes. No. 1, 2 and 3 size Blowpipe Heads are *not interchangeable*.

A.G.F. Hand Style "Super" Blowpipes are adaptable to a wide variety of work such as:

- Automotive Radiator Repair and Manufacture:
 - Standard Size—No. 1-N
 - Fine Work—No. 0-N
 - Heavy Duty—No. 2-N
- Silver Brazing:
 - Fine Work such as light stampings, wire, etc.—No. 000-N, 00-N and 0-N.
 - Medium—No. 1-N.
 - Heavy Duty—No. 2-N and 3-N.
- Soft Soldering:
 - Fine Work—No. 0-N operated with soft flame.
 - Medium—No. 1-N operated with soft flame.
 - Large—No. 2-N operated soft.
- Local Hardening and Annealing:
 - Punch and Tool Ends up to 3/8" square—No. 1-N.
 - Tool Ends up to 7/8" diameter—No. 2-N.
 - Tool Ends up to 1 1/4" diameter—No. 3-N.
- Dental Work—No. 1-N and No. 0-N for crucible melting.
- Automobile Body Work—No. 1-N and No. 2-N.
- Repairing Aluminum Castings—No. 1-N and No. 2-N.
- Laboratory Work—No. 0-N and No. 1-N.



Compressed Air Reduction Equipment

A.G.F. Blowpipes, burners, furnaces, etc. are designed for operation with gas at 3" to 8" water column pressure and air at one to three pounds per square inch.

If a suitable supply of low pressure air is not available, pressure reduction devices can be furnished to permit the use of compressed air if it is available. Of course, better results and economy can be obtained by using air furnished in volume at the correct pressure, because such air is clean and dry and the expense of compressing it is avoided.

Under certain conditions the use of compressed air is expedient and in these cases a selection should be made from the devices listed below.

For larger appliances, where the consumption of air is greater, a more economical device as shown in Figure 2 should be employed. Figure 2 High Pressure Air Mixers employ the Venturi principle to entrain approximately 80% additional atmospheric air, thus only 20% of the total air requirement of the appliance or burner is

furnished directly by the compressed air supply. The Figure 2 High Pressure Air Mixer can be connected directly to the Venturi injector on the appliance, or a line from the outlet of the High Pressure Air Mixer can be run to the air connection on the Blowpipe. Regulation of the air output of the High Pressure Mixer is accomplished by means of a needle valve placed at the inlet end of the unit.

Where the pressures in the compressed air line vary, an air pressure regulator should be used with the Figure 2 High Pressure Air Mixer - sizes H-1, H-2 and H-3—to regulate the air



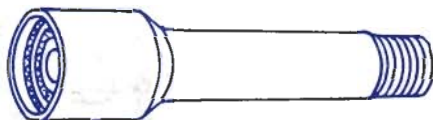
Figure 2 High Pressure Air Mixer equipped with needle valve.

H.P. Air Mixer No.	CONNECTIONS		CAPACITY, CU. FT. PER MIN.	
	Inlet	Outlet	Input Compressed Air 60 Lb./Sq. In.	Output Air at 1 Lb./Sq. In.
H1	1/8	1/8	2	10
H2	1/8	3/8	4	20
H3	1/8	1	6	30
H4	3/8	1 1/4	11	55
H5	1/2	2	22	110

pressure to a point below the lowest fluctuation of the compressor, thus insuring a supply of air to the appliance at a constant pressure.

Open Flame Burners

Retention Type



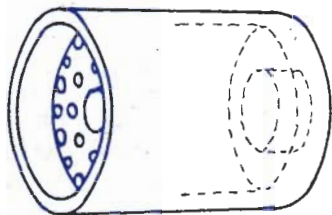
A.G.F. Retention Type Open Flame Burners are fabricated of brass and heat-resisting alloy ribbon and are generally similar in construction to the Blowpipe Heads described in Bulletin 610.10.

A.G.F. Retention Type Open Flame Burners permit a wide range of flame setting—from a relatively short

intense focus flame to a large, bushy flame—to suit the particular application. The flame obtained with the letter suffix "N" natural gas style Open Flame Burners is slightly bushier than that obtained from those carrying no letter suffix "N".

A.G.F. Retention Type Open Flame Burners are used for all types of general heating applications, soft and silver soldering, heating glass and other applications which require burners that can be easily adjusted to give a desired flame setting.

Retention Type Open Flame Burner No.	PHYSICAL CHARACTERISTICS					FLAME SIZE		OPERATIONAL RATINGS								Retention Type Open Flame Burner No.
	Center Hole Drill Size	Inside Dia. of Head	Outside Dia. of Head	Overall Length	Male Pipe Thread Conn.	Diameter	Length	Reformed Natural or Mixed Gases 530—570 B.T.U./Cu. Ft.			Propane 2500 B.T.U./Cu. Ft.		Natural Gas 1050 B.T.U./Cu. Ft.		Approx. Max. Air Required Cu. Ft./Min. When Using 530—570 B.T.U. Gas	
								Capacity B.T.U. Per Hr. at 8" W.C. Mixt. Pressure	Max. Mixt. Press. W.C. at Burner	Max. Capacity B.T.U. Per Hr.	Max. Mixt. Press. W.C. at Burner	Max. Capacity B.T.U. Per Hr.	Max. Mixt. Press. W.C. at Burner	Max. Capacity B.T.U. Per Hr.		
879	53	1 1/4"	1 3/8"	2 1/4"	3/4"	3/16"	4"	1,230	16"	2,800	6"	1,919	6"	1,220	.3	879
879-N	53	1 1/4"	1 3/8"	2 1/4"	3/4"	3/16"	4"	3,360	21"	6,160	6"	3,070	6"	1,980	.6	879-N
871	50	1 1/4"	1 3/8"	2 1/4"	3/4"	3/16"	4"	4,340	14"	7,990	6"	2,800	4"	1,350	.5	871
871-N	48	1 1/4"	1 3/8"	2 1/4"	3/4"	3/8"	4"	4,620	17"	7,000	6"	3,970	6"	2,520	.7	871-N
657	30	1 1/4"	1 3/8"	2 1/4"	3/4"	3/8"	4"	7,560	8"	7,560	1"	3,000	3 1/2"	1,819	.7	657
657-N	29	1 1/4"	1 3/8"	2 1/4"	3/4"	3/2"	4"	10,220	16"	14,560	6"	9,190	6"	5,970	1.4	657-N
626	18	1 1/4"	1 3/8"	2 1/4"	3/4"	3/4"	6"	14,560	16"	19,740	6"	15,380	5"	6,300	1.9	626
626-N	18	1 1/4"	1 3/8"	2 1/4"	3/4"	3/4"	6"	16,240	16"	22,400	8"	17,050	8"	11,080	2.2	626-N
622	15/64"	1 1/4"	1 3/8"	2 1/4"	3/4"	1 1/4"	9 1/2"	34,160	13"	48,800	2"	29,560	2"	11,370	5.3	622
622-N	15/64"	1 1/4"	1 3/8"	2 1/4"	3/4"	1 1/4"	9 1/2"	44,800	11"	53,200	6"	41,160	6"	26,740	6.3	622-N
753	3/4"	1 1/4"	1 3/8"	2 1/4"	3/4"	2 1/2"	15"	100,800	11"	112,000	2"	42,630	2"	27,270	13.3	753
753-N	3/4"	1 1/4"	1 3/8"	2 1/4"	3/4"	2 1/2"	15"	123,200	11"	145,600	2"	43,360	2 1/4"	31,510	17.3	753-N



Open Flame Burners

High Capacity Type

A.G.F. High Capacity Open Flame Burners produce a high velocity, bushy flame suitable for brazing, heating temporary furnaces, pipe bending, as well as for other general heating applications. These burners have a turn-down range which permits adjustment of the flame to suit the particular application.

A.G.F. High Capacity Open Flame Burners are fabricated of ferrous alloy and steel or heat-resisting alloy to give long and trouble-free life under severe operating conditions.

Combustion blocks or burner tunnels are not required

for proper operation of these burners. If the burners are to be used to heat a temporary furnace, they should not be sunk into brick work. A.G.F. High Capacity Open Flame Burners firing into a combustion block or tunnel similar to those shown on page 2 of Bulletin 630.20 should be pulled back away from the block or tunnel opening at least $\frac{3}{4}$ " to 1". The opening into which the burners fire should be slightly larger than the outside diameter of the burner.

A.G.F. High Capacity Open Flame Burners will satisfactorily burn either manufactured, reformed natural, natural or bottled gases when a suitable size air-gas Venturi Mixer is employed.

Refer to Bulletin 616.20 for Round Blast Tips which have similar flame characteristics.

High Capacity Open Flame Burner No.	PHYSICAL CHARACTERISTICS				FLAME SIZE		OPERATIONAL RATINGS		High Capacity Open Flame Burner No.
	Outside Dia. of Head	Inside Dia. of Skirt on Head	Overall Length	Pipe Thread Connection	Diameter	Length	†Approx. Max. B.T.U. Capacity Per Hr. based on 530-570 B.T.U./Cu. Ft. Gas	Approx. Max. Air Required Cu. Ft./Min. at 16 Ounce Pressure	
24	1"	$1\frac{13}{16}$ "	$1\frac{1}{4}$ "	$\frac{1}{4}$ " Fem.	$\frac{7}{8}$ "	8"	33,000	5.5	24
*24E	1"	$1\frac{1}{16}$ "	$1\frac{5}{8}$ "	$\frac{3}{8}$ " Male	$\frac{3}{4}$ "	5"	20,000	2.5	*24E
35D					(OBSOLETE)				35D
35H	$1\frac{1}{4}$ "	$1\frac{1}{16}$ "	$1\frac{15}{32}$ "	$\frac{3}{8}$ " Fem.	$1\frac{1}{4}$ "	13"	45,000	7.5	35H
36					(OBSOLETE)				36
36N	$2\frac{3}{8}$ "	2"	3"	$1\frac{1}{4}$ " Fem.	3"	20"	120,000	20.0	36N
37	$2\frac{1}{8}$ "	$2\frac{1}{2}$ "	$4\frac{1}{8}$ "	$1\frac{1}{2}$ " Fem.	$3\frac{1}{4}$ "	22"	250,000	41.5	37
37S	$2\frac{1}{8}$ "	$2\frac{1}{2}$ "	$4\frac{1}{8}$ "	$1\frac{1}{2}$ " Fem.	$3\frac{1}{4}$ "	26"	410,000	68.0	37S
*37T					(OBSOLETE)				*37T
432A					(OBSOLETE)				432A
*432G					(OBSOLETE)				*432G
432AN	$3\frac{1}{2}$ "	$3\frac{1}{16}$ "	$4\frac{1}{8}$ "	2" Fem.	4"	36"	750,000	125.0	432AN

*Manufactured of heat-resisting alloy.

†Based on mixture ratio of four parts of air to one part of gas—ratings for Blowpipes listed on Bulletin 610-4 were obtained with a reducing or rich flame.

VENTURI MIXER

The use of an A.G.F. Air-Gas Venturi Mixer is recommended to supply a consistently proportioned mixture of air and gas to the burners to permit maximum and efficient operation.

Please specify the following information when

ordering Venturi Mixers for use with Open Flame Burners:

- The amount and model number of burners to be supplied by the Venturi Mixer.
- The type, b.t.u. value, and pressure of gas to be used.

Glass Fires

AGF Burner, Inc.
1955 Swarthmore Ave.
Lakewood, NJ 08701



A.G.F. Improved New Style Glass Fires have superior flame and operational characteristics over Glass Fires previously available. The temperatures that can be obtained with air-gas are several hundred degrees F. higher than those obtained with old style burners. The performance characteristics of New Style Glass Fires permit operation at higher mixture pressures and flame velocities than the old style burners.

The primary function of a Glass Fire is to concentrate heat at a specific point. The larger the diameter of the center hole, the greater the area that is heated. Where a greater amount of heat is required than can be obtained from a single burner, the flames from several Glass Fires can be concentrated at a single focal point by the use of multiple burner manifolds—see Cross Fires described in Bulletin 613.10.

In a Glass Fire, the single focus main heating flame issues from the center hole of the burner. The size of this center hole governs the diameter of the heated area at the focal point of the flame. The lower the number of the center hole drill size, the greater is its diameter and the larger the area that is heated.

The main center-hole flame is supported by many tiny pilot flames which operate at extremely low velocities in comparison to the main flame. The function of these pilot flames is to provide the necessary heat to sustain the combustion reaction of the main flame at higher velocities and to retain the base of the flame at the burner face to achieve greater stability.

Accurate construction and careful testing to rigid specifications insures uniformity of flame and operating characteristics of each size burner, thus tips are interchangeable and need not be matched up.

Improved New Style Glass Fires

New Style Glass Fire No.	PHYSICAL CHARACTERISTICS				Flame Characteristics		Arbitrary Venturi Mixer Selection Capacity B.T.U./Hr.	OPERATIONAL RATINGS					New Style Glass Fire No.
	Center Hole Drill Size	Threaded Connection	Material	Type of Piloting	Maximum Focal Length	Maximum Overall Length		NATURAL GAS 1050 B.T.U./Cu. Ft.				Approx. Max. Air Required Cu. Ft./Min. When Using 1050 B.T.U. Nat. Gas	
								Optimum*		Maximum			
								Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.		
3222	70	1/8" Male	Brass	Pinion	1 1/2"	2"	840	10"	1,075	13"	1,250	.2	3222
3202	60	1/8" Male	Brass	Pinion	2 1/4"	3"	945	10"	1,095	16"	1,350	.2	3202
3182	55	1/8" Male	Brass	Pinion	3"	4"	1,225	9"	1,280	14"	1,615	.25	3182
3171	52	1/8" Male	Brass	Pinion	3 1/2"	4 1/2"	1,550	9"	1,610	12"	2,070	.35	3171
3151	49	1/8" Male	Brass	Pinion	3 1/2"	6"	1,825	6"	1,660	11"	2,660	.45	3151
3141	47	1/8" Male	Brass	Pinion	3 3/4"	6 3/4"	1,850	6"	1,710	11"	2,755	.45	3141
3131	44	1/8" Male	Brass	Pinion	4"	7"	2,750	6"	2,280	10"	3,040	.5	3131
3114	33	1/8" Male	Brass	Pinion	4 1/2"	8"	3,900	4"	2,375	9"	4,035	.65	3114
3228	70	5/16"-27 Fem.	Brass	Pinion	1 1/2"	2"	840	10"	1,075	16"	1,350	.2	3228
3208	60	5/16"-27 Fem.	Brass	Pinion	2 1/4"	3"	945	10"	1,095	16"	1,350	.2	3208
3188	55	5/16"-27 Fem.	Brass	Pinion	3"	4"	1,225	9"	1,280	14"	1,615	.25	3188
3177	52	5/16"-27 Fem.	Brass	Pinion	3 1/2"	4 1/2"	1,550	9"	1,610	12"	2,070	.35	3177
3157	49	5/16"-27 Fem.	Brass	Pinion	3 1/2"	6"	1,825	6"	1,660	11"	2,660	.45	3157
3147	47	5/16"-27 Fem.	Brass	Pinion	3 3/4"	6 3/4"	1,850	6"	1,710	11"	2,755	.45	3147
3137	44	5/16"-27 Fem.	Brass	Pinion	4"	7"	2,750	6"	2,280	10"	3,040	.5	3137
3118	33	5/16"-27 Fem.	Brass	Pinion	4 1/2"	8"	3,900	4"	2,375	9"	4,035	.65	3118

*Optimum—Highest operating capacity which still gives ideal flame characteristics.

NOTE: Male threaded Glass Fires are supplied in various overall lengths from 1" to 5" in increments of 1/4". The first letter suffix indicates the length of the burner. For example: No. 3182 (no letter), 1" long. No. 3182-B, 1 1/4" long. No. 3182-J, 3 1/4" long. The letter "I" is omitted. Standard stock lengths for male threaded Glass Fires are 1" (no letter suffix); 2" suffix "D" and 3 1/4" suffix "J".

Female threaded Glass Fires are supplied in the standard stock length of 1". Special lengths furnished if desired.

Applications

The Model 3222 and 3202 Glass Fires have the smallest diameter center holes and develop extremely fine flames which are suitable for heating applications such as putting constrictions in clinical thermometer tubing, etc.

The larger Model 3182, 3171 and 3151 Glass Fires produce slightly heavier flames which still have a high degree of heat concentration. These Glass Fires can be classified as general all-purpose needle point fires which provide a great range of heat outputs. These burners are extensively used in cross fires for glass blowing, neon lamp manufacture, and also on various types of glass working machinery.

Where relatively heavy cross sections of glass or rod are to be heated and heat concentration is still important, the larger Glass Fires No. 3141, 3131 and 3114 are employed.

When selecting Glass Fires for an application, a factor to consider is that the larger the center hole, the longer the focal and overall length to the flame. If the burner position is relatively fixed and a larger capacity burner is to be employed, it is necessary to employ a physically shorter burner to accommodate the longer focal length flame. Inasmuch as the hottest portion of the flame is immediately beyond the end of the inner focus, proper positioning of burners is of great importance.

Example: The burner location is fixed and Model 3182-J 3 1/4" long burners are being employed. Substantially more heat output is required, therefore a change to the larger size Model 3131 Glass Fire is made. The focal length of the Model 3131 Burner is 4" or approximately 1" longer than the Model 3182 Burner; therefore a change to a Model 3131-D, 2" long Glass Fire is indicated to compensate for the burner's longer focal length.

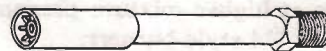
Another factor to consider in Glass Fire selection is that the physically longer burners have a smoother and more stable flame than shorter length burners. Although 1" long burners operate satisfactorily, the "J" 3 1/4" length and the "D" 2" length Glass Fires are preferable in the order given to obtain the best possible results.

The New Style Glass Fires are designed to develop their maximum heat output with air-gas mixtures at medium pressures and flame velocities normally employed in glassworking and glass-forming operations.

Oxygen Addition

When higher operating temperatures are required than can be obtained with air-gas mixtures, an oxygen addition can be made to the fuel mixture. The oxygen addition is usually in the range from 10% to 20% of the mixture being supplied to the burners. Accurate control of the oxygen addition is necessary to prevent flashing back. The use of a factory sized A.G.F. Combination Air-Oxygen-Gas Venturi Mixer provides the exact control required for proper operation.

Copper Inserts



Copper inserts can be supplied in male threaded Glass Fires 2" or more in overall length, as illustrated above. Copper inserts are sufficiently "bendable" to permit adjustment or alignment of the burners. To indicate that a copper insert is desired, a second letter suffix "C" should be added to the burner number. For example: No. 3182-JC indicates the burner is 3 1/4" long and has a copper insert.

Old Style Glass Fires

Although A.G.F. New Style Glass Fires provide superior performance, certain applications require exact replacement of Old Style Glass Fires. Popular size Old Style Glass Fires can be supplied from stock and all other models can be manufactured to order.

The following charts indicate the New Style Glass Fires which are recommended replacements for the Old Style burners.

Replacement Glass Fire Chart

Old Style Glass Fire No.	New Style Glass Fire No.
444	3182
446	3182
448	3114
451	3202
452	3202
463	3182
469	3131
484	3182
526	3182
538	3188
539	3137
540	3118
547	3188
548	3137
549	3188

Old Style Glass Fire No.	New Style Glass Fire No.
550	3182
551	3182
556	3118
557	3114
557X	3114
558	3131
559	3182
561	3151
582	3188
585	3157
755	3137
790	3151
864	3157
882	3151
917	3202

Old Style Glass Fire No.	New Style Glass Fire No.
962	3208
986	3131
1015	3171
1021	3177
1395	3222
1429	3228
1615	3141
3111	3114
3117	3118
3181	3182
3187	3188
3201	3202
3207	3208
3221	3222
3227	3228

Old Style Glass Fire No.	PHYSICAL CHARACTERISTICS				Flame Characteristics		Arbitrary Venturi Mixer Selection Capacity B.T.U./Hr.	OPERATIONAL RATINGS						Old Style Glass Fire No.
	Center Hole Drill Size	Threaded Connection	Material	Type of Piloting	Maximum Focal Length	Maximum Overall Length		NATURAL GAS 1050 B.T.U./Cu. Ft.				Approx. Max. Air Required Cu. Ft./Min. When Using 1050B.T.U. Nat. Gas		
								Optimum*		Maximum				
								Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.			
1395	70	1/8" Male	Brass	Fine Corrugation	1 3/4"	2 1/2"	750	9"	955	12"	1,100	.2	1395	
917	60	1/8" Male	Brass	Fine Corrugation	1 5/8"	5 3/4"	1,000	8"	1,050	14"	1,335	.2	917	
1617	58	1/8" Male	Brass	Fine Corrugation	1 13/16"	2 3/4"	765	13"	955	20"	1,200	.2	1617	
551	55	1/8" Male	Brass	Fine Corrugation	1"	5"	1,025	6"	920	7"	945	.2	551	
†525	55	1/8" Male	Brass	Knurl	1 3/4"	5"	1,025	1.6"	525	2.4"	630	.1	525†	
1015	52	1/8" Male	Brass	Fine Corrugation	2 1/2"	6 1/2"	1,400	8"	1,400	9"	1,575	.25	1015	
790	49	1/8" Male	Brass	Coarse Corrugation	2 1/2"	6 1/2"	1,800	5"	1,575	7"	1,680	.25	790	
1615	47	1/8" Male	Brass	Coarse Corrugation	4 1/2"	5 1/4"	2,250	4"	1,820	7"	2,290	.4	1615	
558	44	1/8" Male	Brass	Coarse Corrugation	2 1/2"	4 1/2"	2,400	2"	1,050	2"	1,050	.2	558	
557	33	1/8" Male	Brass	Coarse Corrugation	3"	5"	3,600	2.5"	1,995	3"	2,205	.35	557	
1429	70	5/16"-27 Fem.	Brass	Fine Corrugation	1 3/4"	2 1/2"	750	9"	955	12"	1,100	.2	1429	
962	60	5/16"-27 Fem.	Brass	Fine Corrugation	1 5/8"	5 3/4"	1,000	8"	1,050	14"	1,335	.2	962	
547	55	5/16"-27 Fem.	Brass	Fine Corrugation	1"	5"	1,025	6"	920	7"	945	.2	547	
†567	55	5/16"-27 Fem.	Brass	Knurl	1 3/4"	5"	1,025	1.6"	525	2.4"	630	.1	567†	
1021	52	5/16"-27 Fem.	Brass	Fine Corrugation	2 1/2"	6 1/2"	1,400	8"	1,400	9"	1,575	.25	1021	
864	49	5/16"-27 Fem.	Brass	Coarse Corrugation	2 1/2"	6 1/2"	1,800	5"	1,575	7"	1,680	.25	864	
548	44	5/16"-27 Fem.	Brass	Coarse Corrugation	2 1/2"	4 1/2"	2,400	2"	1,050	2"	1,050	.2	548	
556	33	5/16"-27 Fem.	Brass	Coarse Corrugation	3"	5"	3,600	2.5"	1,995	3"	2,205	.35	556	

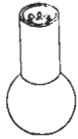
*Optimum—Highest operating capacity which still gives ideal flame characteristics.

†Knurl type piloting suitable only for air-gas-oxygen mixture operation.

NOTE: Male threaded Glass Fires are supplied in various overall lengths from 1" to 5" in increments of 1/4". The first letter suffix indicates the length of the burner. For example: No. 551 (no letter), 1" long. No. 551-B, 1 1/8" long. No. 551-J, 3 1/4" long. The letter "I" is omitted. Standard stock lengths for male threaded Glass Fires are 1" (no letter suffix); 2" suffix "D"; and 3 1/4" suffix "J".

Female threaded Glass Fires are supplied in the standard stock length of 1". Special lengths furnished if desired.

Ball Burners



Series 1770 Ball Burners replace the old style Series 784 Burners. The Series 1770 burners have the improved new style glass fire construction which provides superior operating characteristics. The short overall length of the Series 1770 burner, $1\frac{1}{8}$ " and its $\frac{5}{8}$ " diameter ball permit its use in either a standard ball joint base or swivel base.

Replacement Chart

Old Style Ball Burner No.	New Style Ball Burner No.
784	1770
784A	1770A
784B	1770B
784D	1770D
784F	1770B

Ball Burner No.	PHYSICAL CHARACTERISTICS						Flame Characteristics		Arbitrary Venturi Mixer Selection Capacity B.T.U./Hr.	OPERATIONAL RATINGS					Ball Burner No.
	Center Holes		Diameter of Burner	Diameter of Ball Base	Material	Type of Piloting	Maximum Focal Length	Maximum Overall Length		NATURAL GAS 1050 B.T.U./Cu. Ft.				Approx. Max. Air Required Cu. Ft./Min. When Using 1050 B.T.U. Nat. Gas	
	Number	Drill Size								Optimum*		Maximum			
										Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.		
1770	1	68	13/32"	5/8"	Brass	Pinion	1 3/4"	2 1/2"	860	10"	1,080	13"	1,300	.2	1770
1770A	1	55	13/32"	5/8"	Brass	Pinion	3"	4"	1,225	9"	1,280	14"	1,615	.25	1770A
1770B	1	60	13/32"	5/8"	Brass	Pinion	2 1/4"	3"	945	10"	1,095	13"	1,250	.2	1770B
1770D	1	52	13/32"	5/8"	Brass	Pinion	3 1/2"	4 1/2"	1,550	9"	1,610	12"	2,070	.35	1770D

Optimum—Highest operating capacity which still gives ideal flame characteristics.

Tip Burners

The Tip Burners listed below were designed to operate with manufactured gases that are generally no longer available. These burners can be successfully operated with air-oxygen-natural gas mixtures. If air-natural gas operation is desired, Model 9 Insert Burners with single center holes are recommended replacements.

Burner Tip No.	PHYSICAL CHARACTERISTICS							Flame Characteristics		Arbitrary Venturi Mixer Selection Capacity B.T.U./Hr.	OPERATIONAL RATINGS						Burner Tip No.
	Center Hole Drill Size	Diameter of Burner	Overall Length	Threaded Connection	Material	Type of Piloting	Maximum Focal Length	Maximum Overall Length	Manufactured Gas 525 B.T.U./Cu. Ft.				Approx. Max. Air Required Cu. Ft./ Min. When using 525 B.T.U. Mfd. Gas				
									Optimum*		Maximum						
									Mixture Pressure W.C. at Burner		Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner		Capacity B.T.U. Per Hr.			
85F	58	1/4"	3/4"	1/4"-27 Male	Brass	Fine Corrugation	1 1/8"	2"	910	6"	775	11"	1,050	.12	85F		
412A	70	1/4"	1/2"	1/4"-27 Male	Brass	Knurl	3/4"	1 1/4"	700	2"	290	5"	550	.07	412A		
562	58	1/4"	5/8"	1/4"-27 Male	Brass	Knurl	1"	1 1/2"	1,090	1.25"	445	3"	665	.08	562		

Optimum—Highest operating capacity which still gives ideal flame characteristics.

Special Adapters

Adapters can be supplied to use any of the above Glass Fires in any of the Blowpipes described in Bulletin 610.10.

Venturi Mixer

The use of the A.G.F. Air-Gas Venturi Mixers is recommended to supply a consistently proportioned mixture of air and gas to the burners to permit maximum and efficient operation.

A.G.F. Combination Oxygen-Air-Gas Venturi Mixers which enable admixing of up to 20% oxygen are recom-

mended for applications where the heat produced by air and gas alone is insufficient or where operation of air-gas burners at higher manifold pressures than are obtainable with air-gas mixture only is desired.

Please specify the following information when ordering Venturi Mixers for use with burners:

- The amount and model number of the Glass Fires to be supplied by the Venturi Mixer.
- The type, b.t.u. value and pressure of gas to be used.
- Oxygen pressure if a Combination Oxygen-Air-Gas Venturi Mixer is to be supplied.

Ball Joints and Ball

A.G.F. Ball Joints are used with burners and burner manifolds to obtain precise and accurate adjustment of flame direction. Various models are available with and without filter screens. All component parts including screens are manufactured of brass materials.

The standard Ball Joints incorporate Style "C" Balls which have female threaded connections. Certain

models are also supplied with Style "B" Balls which have a threaded extension with either a male or female threaded connection.

Style "C" Balls and Style "B" Balls with washers are supplied separately for use as replacements in Ball Joints or for use in clamp type holders.



Ball Joints with Style "C" Ball

Ball Joint No.	Equipped with Ball Style "C"		Screen in Ball	Screen in Socket	Socket Threaded Conn. Male i.p.s.	Overall Width	Overall Length
	Ball Dia.	Female Threaded Conn.					
500	9/16"	1/8" i.p.s.			1/8"	7/8"	1 1/16"
500A	9/16"	1/4"-27			1/8"	7/8"	1 1/16"
500C	9/16"	1/4"-28			1/8"	7/8"	1 1/16"
700	9/16"	1/8" i.p.s.	✓	✓	1/8"	7/8"	1 1/16"
700A	9/16"	1/8" i.p.s.	✓		1/8"	7/8"	1 1/16"
800	3/4"	1/4" i.p.s.			1/4"	1 5/32"	1 11/32"
800A	3/4"	1/4" i.p.s.		✓	1/4"	1 5/32"	1 11/32"



Ball Joints with Style "B" Ball having Connector Extension

Ball Joint No.	Equipped with Ball Style "B" having Connector Extension				Screen in Ball	Screen in Socket	Socket Threaded Conn. Male i.p.s.	Overall Width	Overall Length
	Ball Dia.	Connector Length	Connector Thread						
			Male	Female					
750C	3/8"	1 1/2"	5/16"-27		✓		1/8"	5/8"	1 15/32"
750D	3/8"	1 1/2"	5/16"-27		✓		1/4"-27	5/8"	1 1/2"
750E	3/8"	1 1/2"		1/4"-27	✓		1/8"	5/8"	1 15/32"
750F	3/8"	1 1/2"		1/4"-27	✓		1/4"-27	5/8"	1 1/2"
500D	9/16"	1 1/16"	1/8" i.p.s.				1/8"	7/8"	1 3/4"
500E	9/16"	3/8"	5/16"-27				1/8"	7/8"	1 1/4"
700D	9/16"	1 1/16"	1/8" i.p.s.				1/8"	7/8"	1 3/4"
700E	9/16"	3/8"	5/16"-27			✓	1/8"	7/8"	1 1/16"
801	3/4"	5/8"	3/8" i.p.s.	1/4" i.p.s.			3/8"	1 5/32"	1 31/32"



Style "C" Balls

Style "C" Ball No.	Ball Dia.	Female Threaded Conn.	Screen in Ball	Overall Height
500	$\frac{9}{16}$ "	$\frac{1}{8}$ " i.p.s.		$\frac{13}{32}$ "
500A	$\frac{9}{16}$ "	$\frac{1}{4}$ "-27		$\frac{13}{32}$ "
700	$\frac{9}{16}$ "	$\frac{1}{8}$ " i.p.s.	✓	$\frac{3}{8}$ "
1570	$\frac{5}{8}$ "	$\frac{1}{8}$ " i.p.s.		$\frac{15}{32}$ "
1570A	$\frac{5}{8}$ "	$\frac{1}{4}$ "-27		$\frac{15}{32}$ "
1570B	$\frac{5}{8}$ "	$\frac{1}{4}$ "-27		$\frac{17}{32}$ "
1570BS	$\frac{5}{8}$ "	$\frac{1}{4}$ "-27	✓	$\frac{17}{32}$ "
1570C	$\frac{5}{8}$ "	$\frac{1}{8}$ " i.p.s.		$\frac{15}{32}$ "
1570CS	$\frac{5}{8}$ "	$\frac{1}{8}$ " i.p.s.	✓	$\frac{15}{32}$ "
800	$\frac{3}{4}$ "	$\frac{1}{4}$ " i.p.s.		$\frac{9}{16}$ "
1036D	$\frac{3}{4}$ "	$\frac{1}{8}$ " i.p.s.		$\frac{9}{16}$ "
1036E*	$\frac{3}{4}$ "	$\frac{1}{8}$ " i.p.s.		$\frac{11}{16}$ "

*Ball has $\frac{1}{4}$ " dia. inlet at right angle to threaded conn., with $\frac{1}{8}$ " dia. mounting pin for use in holder.

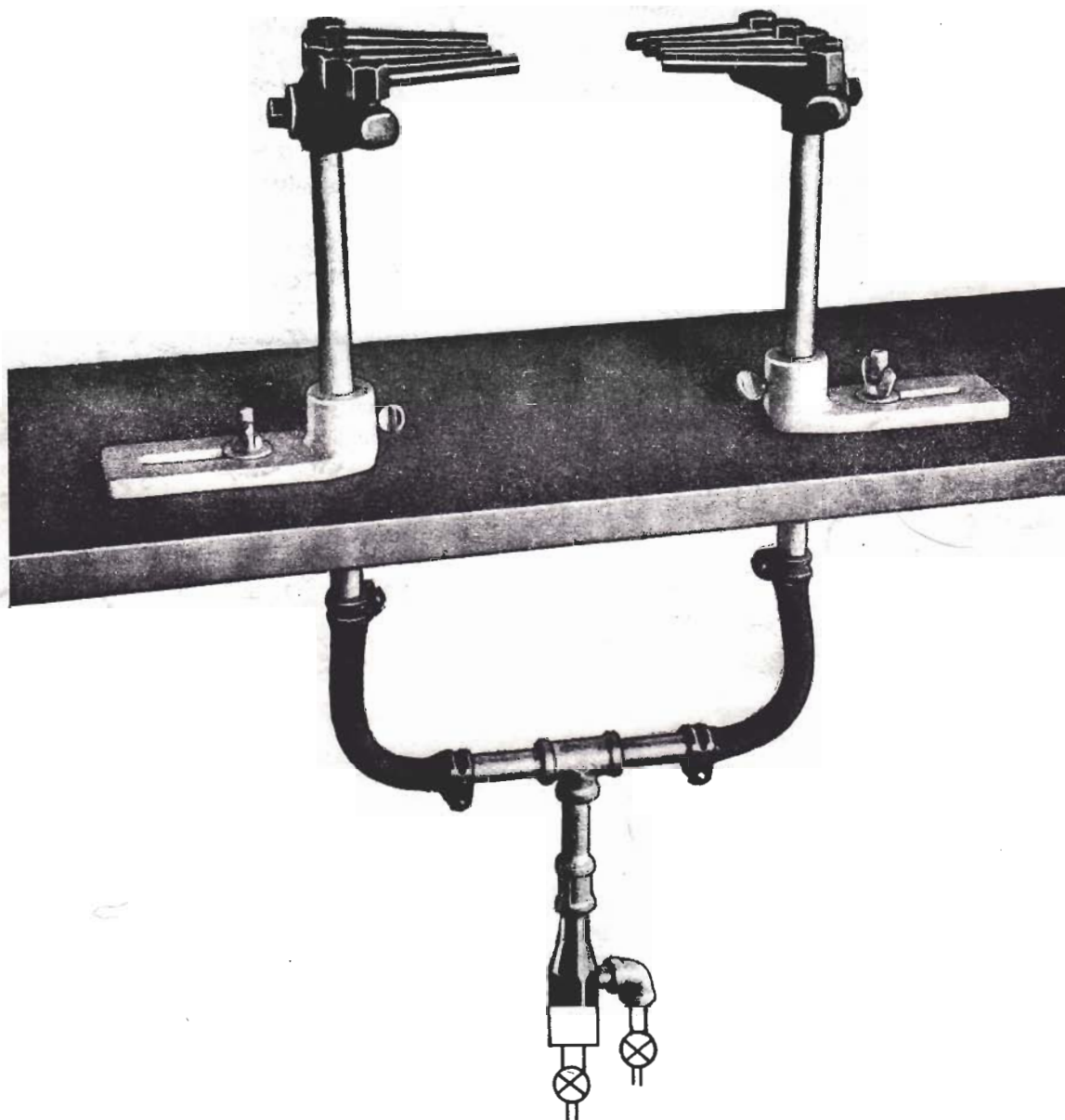


Style "B" Balls with Connector Extension

Style "B" Ball No.	Ball Dia.	Connector Extension Thread		Screen in Ball	Washer Dia.	Overall Length
		Male	Female			
750	$\frac{3}{8}$ "	$\frac{5}{16}$ "-27		✓	$\frac{1}{2}$ "	$\frac{13}{16}$ "
750A	$\frac{3}{8}$ "	$\frac{5}{16}$ "-27		✓	$\frac{1}{2}$ "	$\frac{5}{8}$ "
750B	$\frac{3}{8}$ "		$\frac{1}{4}$ "-27	✓	$\frac{1}{2}$ "	$\frac{25}{32}$ "
650	$\frac{7}{16}$ "	$\frac{5}{16}$ "-27		✓	$\frac{5}{8}$ "	$\frac{27}{32}$ "
650A	$\frac{7}{16}$ "	$\frac{5}{16}$ "-27		✓	$\frac{5}{8}$ "	$\frac{21}{32}$ "

AGF Burner, Inc.
1955 Swarthmore Ave.
Lakewood, NJ 08701

Cross Fires



A.G.F. Air-Gas Cross Fires equipped with the Glass Fires described in Bulletin 612.10 are extensively used on lamp machines for making flares, shaping, sealing-in and pre-heating; as well as for bench work in laboratories, neon sign manufacturing, etc. They can also be used for cracking off and glazing glass edges. A.G.F. Cross Fires are normally supplied with from one to eight No. 3151-J Glass Fires in each opposing manifold unless other standard burners or copper insert burners are specified by customer, or unless Ball Joints are furnished. If Ball Joints are supplied the "D" (2" length) Glass Fires are furnished.

Manifolds



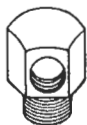
Manifolds are designed for maximum efficiency. Cast with a tapered canal for uniform feeding of each burner, they insure the same flame size from each burner thus providing maximum heat concentration at the focal point.

Connections on top for hex elbows are $\frac{1}{4}$ " pipe thread on $1\frac{1}{8}$ " centers. For feeding, $\frac{3}{8}$ " pipe thread connections are provided bottom and back, either of which may be used and the other plugged. The threaded connection in the back permits a horizontal connection

to be made to the manifold or permits mounting the manifold in the vertical plane for special applications. Manifold radius: $5\frac{11}{16}$ ".

Manifolds are supplied for 3, 4, 5, 6 or 8 tips. For two tips, the center connection on the three tip manifold is plugged. For seven tips, the end connection on the eight tip manifold is plugged.

Hex Elbows



Special machine-made hexagon brass elbows are employed for adjustment and alignment and for convenience, inasmuch as a wrench can be used on them. Connections are for $\frac{1}{4}$ " pipe thread inlet and $\frac{1}{8}$ " pipe thread outlet.

Ball Joints

In lieu of copper insert burners, the various Ball Joints described in Bulletin 612.10 can be supplied to permit adjustment of the direction of firing of burners. The "D" (2" length) Glass Fires are normally supplied in Cross Fires when Ball Joints are supplied unless otherwise specified by customer.

Sliding Bases

A.G.F. Cross Fires are normally supplied without sliding bases. Sliding Bases are recommended for bench work where ease of adjustment is desirable.

Vertical Risers

Vertical Risers 11" long are supplied as standard with all A.G.F. Cross Fires. Longer or shorter risers can be supplied as specified by customer.

Venturi Mixer

An A.G.F. Air-Gas Venturi Mixer to serve the Cross Fire manifolds is regularly supplied. This mixer supplies a consistently proportioned mixture of air and gas to the burners to permit maximum and efficient operation.

For special applications where the heat produced by air and gas alone is insufficient or where operation of air-gas burners at higher manifold pressures than are obtainable with air-gas mixture only is desired, we recommend the use of A.G.F. Combination Oxygen-Air-Gas Venturi Mixers to enable admixture of up to 10% oxygen.

Special Cross Fires

Special Cross Fires can be supplied for your particular application. Oxygen-Gas Cross Fires are also supplied.

Ordering Instructions

Specifying the following information will help us fill your order for Cross Fires promptly and correctly:

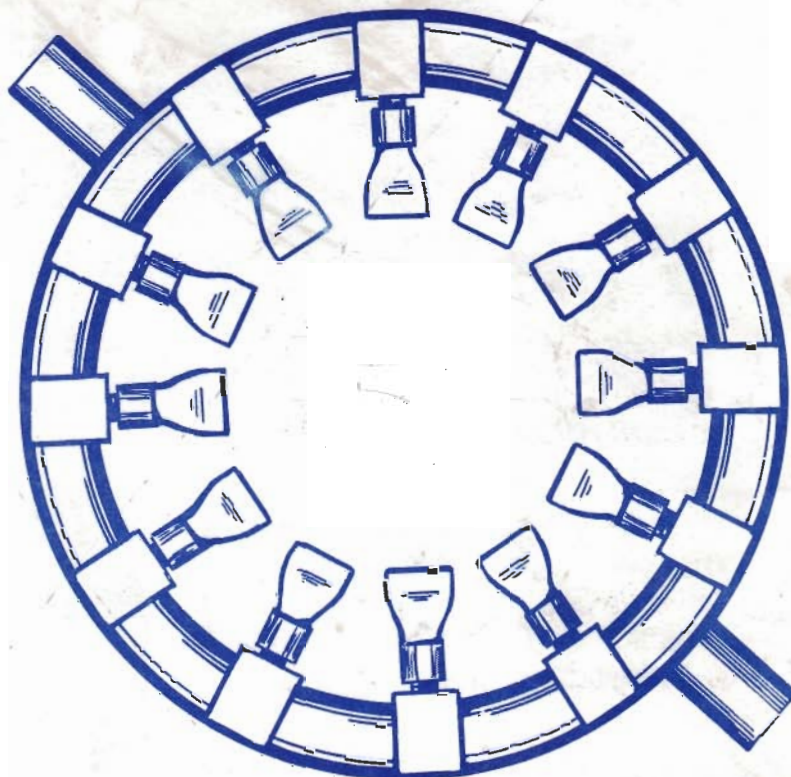
1. For a standard two manifold Cross Fire, specify the amount and model number of the Glass Fires desired in each of the two opposing manifolds. *Example:* A Cross Fire having five No. 3151-J Glass Fires in each of the two opposing manifolds would be designated as a No. 5X5-3151-J. A Cross Fire having three No. 3151-J Glass Fires in both manifolds would be designated as a No. 3X3-3151-J. A Cross Fire having eight No. 3111-JC Copper Insert Glass Fires in each manifold would be designated as a No. 8X8-3111-JC.
2. If only a single manifold Cross Fire is desired, specify the amount and model number of the Glass Fires desired in the following manner. *Example:* A single manifold Cross Fire with five No. 3151-J Glass Fires would be designated as a No. 5X0-3151-J. A single manifold Cross Fire with three No. 3151-J Glass Fires would be designated as a No. 3X0-3151-J. A single manifold Cross Fire with eight No. 3111-JC Copper Insert Glass Fires would be designated as a No. 8X0-3111-JC.
3. If Ball Joints as described in Bulletin 612.10 are desired, please specify "complete with Ball Joints No."
4. If sliding bases are desired, please specify "complete with sliding bases."
5. An A.G.F. Air-Gas Venturi Mixer complete with valves is normally supplied. If an A.G.F. Combination Oxygen-Air-Gas Venturi Mixer is desired, please specify when ordering.
6. *If possible*, please specify the following information with every order.
 - (a) Type, b.t.u. value and pressure of gas to be used.
 - (b) Air pressure that will be available at Venturi Mixer.
 - (c) Oxygen pressure if a Combination Oxygen-Air-Gas Venturi Mixer is to be supplied.

MANIFOLD TYPE RING BURNER

AGF Circular Manifolds can be supplied for flame treating various size containers utilizing the drop chute method. These versatile burners consist of a circular pipe manifold with a series of holes drilled and tapped to accommodate #420-SNS AGF Air-Gas Fishtail Burners (as listed in Bulletin 614.20), mounted on optimum centers to produce a continuous circle of flame. These manifolds are sized for the largest diameter product to be processed. If a range of sizes is to be handled, the manifolds are provided with suitable Ball Joints, listed in Bulletin 612.40, to permit the use of pipe fittings to reduce the size of the flame circle. It may be necessary to remove some burners to adjust burner position to obtain desired uniform flame circle.

AGF Circular Manifolds have two feed connections for even distribution of air-gas mixture to the individual fishtail burners.

When ordering, specify the diameter of the containers to be flame treated.



COMBUSTION SUPPLY

AGF Ring Burners must be supplied by a properly sized Venturi Mixer, needle valve, & Zero Gas Governor System. They are normally used with compressed air and either natural gas or propane. Low pressure air from a blower can also be used but a different type of air valve is supplied. Both diagrams are shown in the "Combustion Equipment" section. When ordering, specify the type of air to be used.

An integral part of the mixing system is the Zero Gas Governor that cancels out pressure variations in the incoming gas line, thus insuring a stable and uniform flame treatment of poly-plastic surfaces. The Venturi Mixer inspirates a consistent amount of fuel gas necessary to properly treat the containers prior to decorating operations.

Combustion systems require fuel gas at an inlet pressure of 8" W.C. to the Zero Gas Governor. Plant gas pressure should be anywhere between 2-5 PSIG to form a pressure differential between flammers. The use of a pressure reducing regulator is necessary prior to the Zero Governor.

AGF Insert Type and Manifold Type Ring Burners can be applied to almost any flame treating application employing the drop chute method and can be supplied for the same range to be processed. They are the best burners available today to provide uniform circular flame coverage.

FISHTAIL BURNERS



A.G.F. Fishtail Burners produce a characteristic hatchet-shape or fishtail type of flame. Adherence to rigid specifications and careful testing of each burner insures uniformity of flame and operating characteristics.

The intense localized heat produced by A.G.F. Fishtail Burners makes them especially desirable for applications where it is necessary to confine heat to a limited area.

The flames from the main center holes of the Fishtail Burners are surrounded and supported by tiny pilots. The pilot holes which burn the air-gas mixture at a low velocity help support and retain the flame from the main center holes.



The "OS" type A.G.F. Fishtail Burner has more piloting than the regular manufactured gas type. The increased piloting enables the "OS" type to operate at higher mixture pressures and deliver a greater heat output than the regular manufactured gas type.

The "NS" type A.G.F. Fishtail Burner has still more output than either the regular manufactured gas type or the "OS" type of Fishtail Burner. "NS" Fishtail Burners operate at higher mixture pressures permitting a greater heat output and are recommended for burning reformed, mixed, bottled, natural or other slow burning gases.

The Regular "OS" and "NS" Fishtail Burners are manufactured of brass.

Alloy Burners

For use under severe operating conditions, "OS" and "NS" type Fishtail Burners can be fabricated of heat-resistant alloy. When fabricated of alloy, the letter suffix "M" is added to the burner designation. *Example:* No. 104-OS Fishtail Burner fabricated of alloy is designated No. 104-OSM. No. 81-ANS burner fabricated of alloy is designated No. 81-ANSM.

Hex Base

A hex base to facilitate adjustment and installation is normally provided on all A.G.F. Fishtail Burners with the exception of the No. 775 series, No. 589 series and special alloy Fishtail Burners.

Special Burners

Special Fishtail Burners or modifications of standard burners can be supplied for your particular requirements. Oxygen-Gas Fishtail Burners are also supplied.

Applications

A.G.F. Fishtail Burners are extensively used on glass working machines in the manufacture of electronic tubes, electric light bulbs, vacuum bottles, etc. The smaller size Fishtail Burners are employed in Hand Torches for sealing-off and welding on glass tubing, making neon signs, sealing ampules, etc.

For localized heating operations or silver soldering of various parts, Fishtail Burners are mounted in either single or opposed manifolds as illustrated. The work may be positioned in front of the burner flames and removed when the heating or soldering is accomplished or the work may be passed through the burner flames by means of a suitable conveyor.

Ball Joints

The various Ball Joints illustrated and described on page 4 of Bulletin 612.10 may be used with A.G.F. Fishtail Burners in addition to those tabulated below. These Ball Joints permit alignment and adjustment of the burner position in fixed locations.

Burners having a $\frac{1}{4}$ " male thread connection can be supplied with a $\frac{1}{8}$ " female thread connection and a $\frac{1}{8}$ " close nipple for use with either the No. 500, 700 or 700-A Ball Joints. All Ball Joints are of brass construction.



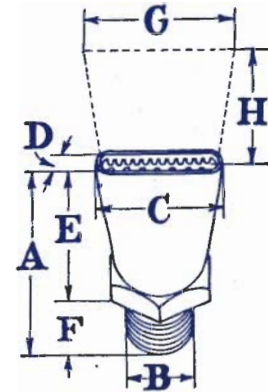
Figure C. No. 800 Ball, ball $\frac{3}{4}$ " in diameter and has a $\frac{1}{4}$ " female thread.



Figure A. No. 800 Ball Joint, for use with $\frac{1}{4}$ " male threaded burners. Ball $\frac{3}{4}$ " in diameter has $\frac{1}{4}$ " female threaded connection. Socket has $\frac{1}{4}$ " male threaded connection. Degree of tilt in any direction approximately 20° . Can be mounted on center distances as close as $1\frac{3}{16}$ ".

Figure A. No. 800-A Ball Joint, identical to No. 800, but with a screen provided in the socket.

No. 801 Ball Joint, for use with $\frac{3}{8}$ " female threaded connections, comprises a No. 800 Ball Joint equipped with $\frac{3}{8}$ " pipe size headless bushing. The ball is equipped with an adapter having both a $\frac{3}{8}$ " male and $\frac{1}{4}$ " female threaded connection.



Fishtail Burner No.	PHYSICAL CHARACTERISTICS							FLAME CHARACTERISTICS					O P E R A -					
	Center-Holes			A	B	C	D	E	F	Width at Max. Focal Length	Maximum Overall Length	Maximum Focal Length	Shape	Manufactured Gas 525 B.T.U./Cu. Ft.		Fishtail Burner No.		
	Number	Drill Size No.	Center to Center Distance Between Outside Holes											Optimum*	Maximum			
										G	H			Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	
228	4	64	7/16"	3/8"	1/4"-27 Male	3/16"	1/4"	3/16"	7/16"	1/2"	2"	1/2"	Divergent	5"	1,840	7"	2,285	228
228-OS	4	64	7/16"	3/8"	1/4"-27 Male	3/16"	1/4"	3/16"	7/16"	1/2"	2"	1/2"	Divergent	7"	2,230	19"	4,430	228-OS
228-NS	4	64	7/16"	3/16"	1/4"-27 Male	3/8"	3/16"	3/4"	7/16"	1/2"	2"	1/2"	Divergent	14"	3,675	20"	5,250	228-NS
228-F					(OBSOLETE)													228-F
228-FOS	5	71	7/16"	3/8"	1/4"-27 Male	3/16"	1/4"	3/16"	7/16"	3/8"	3"	3/8"	Parallel	14"	1,840	49"	4,460	228-FOS
228-FNS	5	71	7/16"	3/16"	1/4"-27 Male	3/8"	3/16"	3/4"	7/16"	3/8"	3"	3/8"	Parallel	14"	1,840	45"	4,720	228-FNS
81-A	9	64	1 1/2"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	1 1/16"	2 1/4"	3/4"	Divergent	7"	3,940	19"	6,820	81-A
81-AOS	9	64	1 1/2"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	1 1/16"	2 1/4"	3/4"	Divergent	14"	7,350	50"	13,640	81-AOS
81-ANS	9	64	1 1/2"	1 3/8"	3/8" Male		3/8"	1 1/16"	3/16"	3/4"	2 1/4"	3/4"	Divergent	7"	5,250	45"	15,750	81-ANS
81-B	7	64	1 1/2"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	1 1/16"	4"	3/4"	Parallel	7"	3,410	15"	5,515	81-B
81-BOS	7	64	1 1/2"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	1 1/16"	4"	3/4"	Parallel	7"	3,800	15"	6,450	81-BOS
81-BNS	7	64	1 1/2"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	1 1/16"	4"	3/4"	Parallel	7"	4,200	15"	7,350	81-BNS
81-QNS	6	59	1 1/2"	1 3/8"	3/8" Male	1 1/16"	3/8"	1 1/16"	3/16"	3/8"	3 1/4"	1 1/4"	Parallel	†	†	†	†	81-QNS
81-W	5	60	3/8"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	3/8"	3 1/2"	1"	Parallel	7"	3,320	15"	4,720	81-W
81-WOS	5	60	3/8"	1 1/16"	3/8" Male	1 1/16"	3/32"	1"	3/16"	3/8"	3 1/2"	1"	Parallel	7"	3,320	15"	4,720	81-WOS
81-WNS	5	60	3/8"	1 3/8"	3/8" Male	1 1/16"	3/8"	1 1/16"	3/16"	3/8"	3 1/2"	1"	Parallel	†	†	†	†	81-WNS
104	7	54	2 1/2"	1 3/8"	1/4" Male	1 1/16"	1/4"	1"	3/8"	1 1/16"	2 1/2"	1"	Divergent	7"	8,920	13"	12,600	104
104-OS	7	54	2 1/2"	1 3/8"	1/4" Male	1 1/16"	1/4"	1"	3/8"	1 1/16"	2 1/2"	1"	Divergent	14"	13,120	24"	17,320	104-OS
104-NS	7	54	2 1/2"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	1 1/16"	2 1/2"	1"	Divergent	28"	19,450	50"	24,675	104-NS
332					(OBSOLETE)													332
332-OS	12	64	3/8"	1 3/8"	1/4" Male	1 1/16"	1/4"	1"	3/8"	1"	2 1/4"	1 1/16"	Divergent	14"	8,400	39"	16,800	332-OS
332-NS	12	64	3/8"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	1"	2 1/4"	1 1/16"	Divergent	†	†	†	†	332-NS
332-DNS	8	60	1/2"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	3/8"	3 1/2"	1"	Parallel	†	†	†	†	332-DNS
332-FNS	10	61	1 1/2"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	1 1/8"	2"	1 1/4"	Divergent	†	†	†	†	332-FNS
420-C					(OBSOLETE)													420-C
420-COS	9	54	2 1/2"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	1 1/4"	2 1/4"	3/8"	Divergent	14"	13,900	22"	17,320	420-COS
420-CNS	9	54	2 1/2"	1 1/2"	1/4" Male	1 1/16"	1 1/8"	3/8"	1 1/4"	2 1/4"	3/8"	3/8"	Divergent	14"	14,180	42"	26,250	420-CNS
420-D					(OBSOLETE)													420-D
420-DOS	14	64	3/4"	1 1/16"	1/4" Male	1 1/16"	3/8"	1 1/16"	3/8"	1 1/4"	2 1/8"	3/8"	Divergent	14"	10,500	38.5"	19,950	420-DOS
420-DNS	14	64	3/4"	1 1/2"	1/4" Male	1 1/16"	1 1/8"	3/8"	1 1/4"	2 1/8"	3/8"	3/8"	Divergent	14"	12,600	48"	22,150	420-DNS
420-RNS	14	68	1 1/2"	1 1/2"	1/4" Male	1 1/16"	1 1/8"	3/8"	1 1/2"	2 1/4"	3/4"	3/4"	Divergent	14"	9,460	49"	16,800	420-RNS
420-SNS	9	53	2 1/2"	1 1/2"	1/4" Male	1 1/16"	1 1/8"	3/8"	1 1/2"	2 1/4"	1 1/2"	1 1/2"	Divergent	†	†	†	†	420-SNS
420-VNSM	7	53	3/8"	1 1/16"	1/4" Male	1 1/16"	1 1/8"	3/8"	1 1/4"	2"	1 1/2"	1 1/2"	Divergent	†	†	†	†	420-VNSM
775(OS)	4	64	7/16"	3/16"	1/4"-27 Male	3/16"	3/32"	3/16"	7/16"	1/2"	1 3/8"	3/8"	Divergent	†	†	†	†	775(OS)
775-F(OS)	5	71	7/16"	3/16"	1/4"-27 Male	3/16"	3/32"	3/16"	7/16"	3/8"	1 1/4"	1 1/2"	Divergent	†	†	†	†	775-F(OS)
1589-A(OS)	4	64	7/16"	1 1/4"	1/4"-27 Male	3/16"	1/4"	1"	1 1/2"	1 3/4"	1 1/2"	1 1/2"	Divergent	†	†	†	†	1589-A(OS)
1589-ANS	4	64	7/16"	1 1/8"	1/4"-27 Male	3/16"	1/4"	1"	1 1/2"	1 3/4"	1 1/2"	1 1/2"	Divergent	†	†	†	†	1589-ANS
1589-B(OS)	4	62	7/16"	1"	3/8" Male	3/16"	3/32"	3/16"	1 1/2"	1 3/4"	1 1/2"	1 1/2"	Divergent	†	†	†	†	1589-B(OS)
1589-BNS	4	62	7/16"	1"	3/8" Male	3/16"	3/32"	3/16"	1 1/2"	1 3/4"	1 1/2"	1 1/2"	Divergent	†	†	†	†	1589-BNS
1581-E(OS)					(OBSOLETE)													1581-E(OS)

† Alloy burners with flame retention baffle.

§ With flame retention baffle.

† Manufactured gas ratings equal or exceed Mixed Natural Gas ratings.

* Optimum—Highest operating capacity which still gives ideal flame characteristics.

TIONAL RATINGS

Fishtail Burner No.	MIXED NATURAL GAS 560 B.T.U./Cu. Ft.				BOTTLED GAS 2500 B.T.U./Cu. Ft.				NATURAL GAS 1050 B.T.U./Cu. Ft.				Approx. Max. Air Required Cu. Ft./Min. when using 525 B.T.U. Mfd. Gas	Fishtail Burner No.
	Optimum*		Maximum		Optimum*		Maximum		Optimum*		Maximum			
	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.		
228	1.5"	655	2.0"	1,050	0	0	.25"	—	0	0	.25"	—	.4	228
228-OS	3.5"	1,400	4.5"	1,650	1.75"	1,135	2.5"	1,365	1.0"	715	1.5"	900	.6	228-OS
228-NS	8.0"	2,000	10.5"	2,400	2.5"	1,240	5.0"	1,735	4.0"	1,280	5.5"	1,575	.7	228-NS
228-F	(OBSOLETE)													228-F
228-FOS	7.0"	1,250	11.0"	1,580	2.0"	680	3.0"	900	0	0	0	0	.6	228-FOS
228-FNS	9.0"	1,800	14.0"	2,300	2.0"	965	5.0"	1,340	2.0"	860	4.0"	1,100	.6	228-FNS
81-A	1.5"	1,575	1.75"	1,835	.75"	500	1.25"	1,000	0	0	.25"	300	.9	81-A
81-AOS	4.0"	2,700	6.0"	3,600	2.0"	2,270	3.0"	2,780	1.5"	1,575	2.0"	1,785	1.7	81-AOS
81-ANS	4.0"	3,300	6.0"	4,200	2.5"	2,835	3.5"	3,520	2.5"	1,815	3.5"	2,865	2.0	81-ANS
81-B	2.0"	1,500	3.0"	1,800	1.0"	500	1.75"	875	0	0	.25"	450	.8	81-B
81-BOS	2.5"	1,800	3.0"	2,200	2.0"	1,985	2.5"	2,270	1.5"	1,385	1.75"	1,480	.8	81-BOS
81-BNS	5.0"	3,000	8.0"	4,250	3.0"	2,600	5.5"	3,860	2.5"	2,100	5.0"	2,900	.9	81-BNS
81-QNS	5.5"	2,700	10.0"	3,700	3.0"	2,600	6.0"	3,520	2.5"	2,100	4.25"	2,625	1.0	81-QNS
81-W	3.5"	2,230	4.0"	2,360	1.75"	625	2.25"	875	0	0	.75"	700	.6	81-W
81-WOS	5.5"	2,500	10.0"	3,900	4.0"	2,715	6.5"	3,405	1.5"	1,240	2.5"	1,680	.6	81-WOS
81-WNS	6.5"	3,200	11.0"	4,400	4.0"	2,835	7.0"	4,085	3.0"	2,000	6.0"	3,050	.85	81-WNS
104	.5"	2,100	5.5"	2,885	.75"	1,000	1.0"	1,125	0	0	.5"	1,000	1.6	104
104-OS	3.0"	4,300	4.0"	5,000	1.0"	2,380	1.5"	2,950	.5"	1,350	1.0"	1,520	2.2	104-OS
104-NS	3.0"	4,400	6.0"	7,000	2.0"	4,030	3.0"	5,390	2.0"	3,430	3.5"	4,575	3.1	104-NS
332	(OBSOLETE)													332
332-OS	2.5"	3,000	3.0"	3,500	1.0"	1,815	1.5"	2,550	0	0	0	0	2.1	332-OS
332-NS	4.0"	4,100	6.0"	5,300	1.0"	3,690	4.0"	4,825	2.0"	2,520	3.0"	3,450	2.25	332-NS
332-DNS	4.0"	3,720	8.0"	5,275	3.0"	4,675	5.0"	6,755	3.0"	2,750	4.0"	3,535	2.0	332-DNS
332-FNS	5.0"	4,100	10.0"	6,400	3.0"	3,400	4.0"	5,450	2.0"	2,380	5.5"	4,510	2.2	332-FNS
420-C	(OBSOLETE)													420-C
420-COS	1.5"	3,500	2.5"	4,600	1.0"	2,950	1.25"	3,860	.5"	1,350	1.0"	2,200	2.2	420-COS
420-CNS	2.0"	4,750	3.5"	6,500	1.0"	3,860	2.0"	5,330	1.5"	3,620	2.75"	5,250	3.3	420-CNS
420-D	(OBSOLETE)													420-D
420-DOS	1.5"	2,400	2.0"	2,800	1.25"	2,270	2.0"	2,835	0	0	0	0	2.5	420-DOS
420-DNS	3.0"	4,000	6.5"	6,300	3.5"	4,300	4.5"	5,675	2.5"	3,450	4.5"	4,730	3.0	420-DNS
420-RNS	6.0"	5,300	10.0"	7,500	4.0"	4,650	7.0"	7,035	3.0"	3,450	5.0"	4,920	2.1	420-RNS
420-SNS	2.0"	4,800	4.0"	7,900	1.0"	4,200	2.0"	5,675	1.0"	3,360	2.25"	5,550	3.4	420-SNS
420-VNSM	—	—	—	—	—	—	—	—	—	—	—	4,800	—	420-VNSM
775(OS)	4.5"	1,650	6.0"	1,950	1.25"	1,135	2.0"	1,365	.25"	575	1.0"	860	.3	775(OS)
775-F(OS)	4.0"	1,150	5.5"	1,330	1.25"	680	2.0"	900	.25"	380	1.0"	575	.2	775-F(OS)
1589-A(OS)	4.0"	1,430	5.5"	1,750	3.0"	1,475	5.5"	1,870	1.0"	810	2.0"	975	.35	1589-A(OS)
1589-ANS	6.0"	2,050	9.5"	2,750	4.0"	1,475	7.0"	2,725	3.0"	1,430	8.5"	2,380	.4	1589-ANS
1589-B(OS)	4.0"	1,550	5.5"	1,850	3.0"	1,475	5.0"	1,850	1.0"	965	4.0"	1,575	.35	1589-B(OS)
1589-BNS	6.0"	2,050	9.5"	2,750	4.0"	1,475	7.0"	2,725	3.0"	1,430	8.5"	2,380	.4	1589-BNS
1581-B(OS)	(OBSOLETE)													1581-B(OS)

Special Adapters

Adapters can be provided to use any of the above A.G.F. Fishtail Burners in any of the Blowpipes as described in Bulletin 610.10.

Venturi Mixer

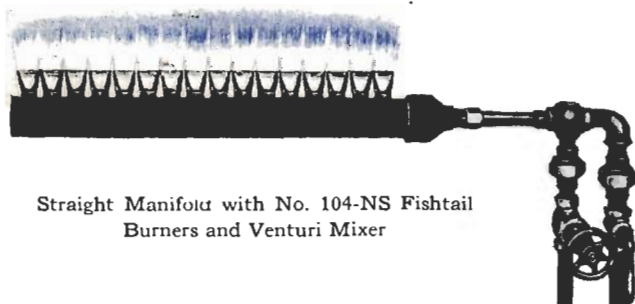
The use of A.G.F. Air-Gas Venturi Mixers is recommended to supply a consistently proportioned mixture of air and gas to the burners to permit maximum and efficient operation.

A.G.F. Combination Oxygen-Air-Gas Venturi Mixers which enable admixing of up to 10% oxygen are recommended for applications where the heat produced by air and gas alone is insufficient or where operation of air-gas burners at higher manifold pressures than are obtainable with air-gas mixture only is desired.

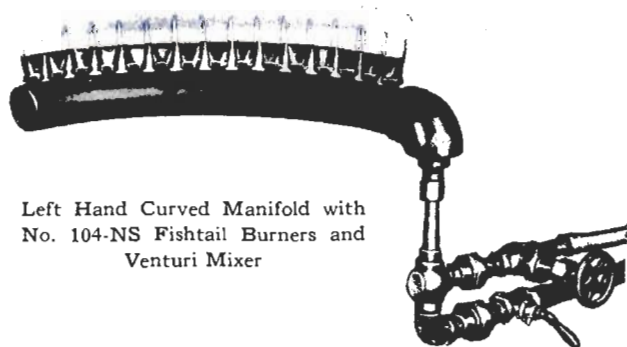
Please specify the following information when ordering Venturi Mixers for use with burners:

- (a) The amount and model number of the Fishtail Burners to be supplied by the Venturi Mixer.
- (b) The type, b.t.u. value and pressure of gas to be used.
- (c) Oxygen pressure if a Combination Oxygen-Air-Gas Venturi Mixer is to be supplied.

Manifolds



Straight Manifold with No. 104-NS Fishtail Burners and Venturi Mixer



Left Hand Curved Manifold with No. 104-NS Fishtail Burners and Venturi Mixer

Curved or straight manifolds equipped with any of the above Fishtail Burners can be supplied for your particular requirements.

The following information will help us fill your order for burner manifolds promptly and correctly:

1. Specify whether the manifold is straight or curved.

If curved, specify the *radius* measured at the focal point of the burners.

2. Specify the model number of the burners with which the manifold should be equipped.

3. For straight manifolds—specify overall length of manifold or flame length desired.

For curved manifolds—specify circumferential length of flame desired at radius.

4. On all manifolds a 3" distance is normally left between the last burner and the plugged end of the manifold. Approximately 3" is also normally left between the first burner and the inlet end of the manifold where the Venturi Mixer connection is mounted.

If dimensions other than those stated above are desired, please specify when ordering.

5. If a curved manifold is being supplied and the burners are to fire in the horizontal plane, specify if the burners are to be mounted on the inside or outside of the curve.

If the burners are to be mounted vertically upward or downward in a curved manifold, specify if curve is left or right hand with respect to venturi mixer connection end.

6. Fishtail Burners in opposing manifolds in the horizontal plane should be tilted upward or downward at an angle of approximately 10° to 15° from the horizontal. Fishtail Burners mounted in the vertical plane should be tilted inward or outward approximately 10° to 15°.

Tilting the burners prevents the opposing burner flames from directly impinging upon the burners themselves which would materially shorten burner life.

7. All Fishtail Burners are mounted in the manifold in such a manner as to produce a continuous type of flame. If specific center to center distances between burners are desired, please specify.

8. Ball Joints as described above can be supplied to enable adjustment and alignment of the Fishtail Burners in the manifold. If Ball Joints are desired, please specify.

9. If Combination Oxygen-Air-Gas Venturi Mixers as described above are desired, please specify when ordering.

M-104-34

AGF BURNER INC.

No. 9 BURNER SERIES

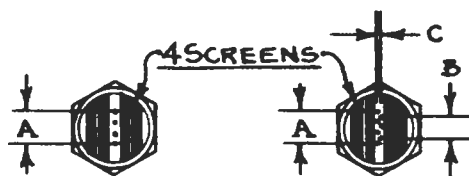


FIG. 1

AIR & GAS

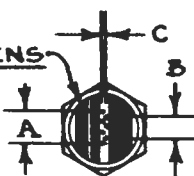


FIG. 2

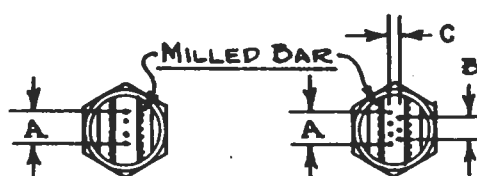


FIG. 3

OXYGEN & GAS

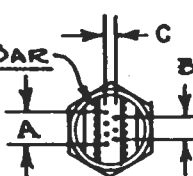
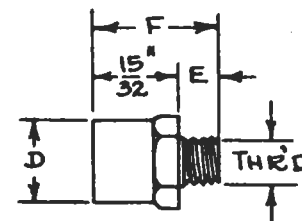


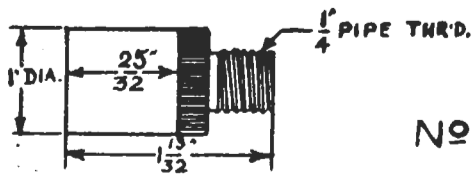
FIG. 4



BURNER NO.	DRILLING DIMENSIONS				SHELL & INSERT DIMENSIONS					
	4 HOLES	PATTERN	A	B	C	D	E	F	THR'D	FIG.
9	4-#75	STRAIGHT	$\frac{3}{16}$ "	—	—	.430	$\frac{7}{32}$ "	$\frac{11}{16}$ "	$\frac{1}{4}$ "-40	1
9A	4-#75	"	"	—	—	"	$\frac{7}{64}$ "	$\frac{37}{64}$ "	$\frac{1}{4}$ "-27	"
9B	4-#69 3-#69	PARALLEL BUT FLARED OUTWARD 5°	$\frac{1}{4}$ "	$\frac{5}{32}$ "	$\frac{1}{32}$ "	"	$\frac{7}{32}$ "	$\frac{11}{16}$ "	"	2
9C	2-#70 2-#69	STRAIGHT	$\frac{3}{16}$ "	—	—	"	$\frac{7}{64}$ "	$\frac{37}{64}$ "	"	1
9D	2-#70 2-#69	"	"	—	—	"	$\frac{7}{32}$ "	$\frac{11}{16}$ "	"	"
9E	1-#75	"	—	—	—	"	"	"	$\frac{1}{4}$ "-32	1
9F	1-#70	"	—	—	—	"	"	"	$\frac{1}{4}$ "-27	"
9G	1-#64	"	—	—	—	"	"	"	"	"
9H	4-#75	"	$\frac{3}{16}$ "	—	—	"	"	"	"	"
9J	3-#65	"	$\frac{1}{8}$ "	—	—	"	"	"	"	"

BURNER NO.	DRILLING DIMENSIONS				SHELL & INSERT DIMENSIONS					
	4 HOLES	PATTERN	A	B	C	D	E	F	THR'D	FIG.
9K	2-#76	STRAIGHT	$\frac{3}{32}$ "	—	—	.430	$\frac{7}{32}$ "	$\frac{11}{16}$ "	$\frac{1}{4}$ "-27	1
9L	1-#55	"	—	—	—	"	"	"	"	"
9M	7-#70	"	$\frac{9}{32}$ "	—	—	"	$\frac{1}{8}$ "	$\frac{19}{32}$ "	$\frac{3}{16}$ "-32	"
9N	4-#70 3-#70	PARALLEL BUT FLARED INWARD 6°	$\frac{3}{16}$ "	$\frac{1}{8}$ "	$\frac{1}{16}$ "	"	$\frac{7}{32}$ "	$\frac{11}{16}$ "	$\frac{1}{4}$ "-40	4
9P	4-#61	STRAIGHT	$\frac{1}{4}$ "	—	—	"	"	"	$\frac{1}{4}$ "-27	1
9Q	2-#65	"	$\frac{1}{8}$ "	—	—	"	"	"	"	"
9R	4-#64	DIVERG. 12° OVERALL	$\frac{7}{32}$ "	—	—	"	"	"	"	"
9S	5-#71	STRAIGHT	"	—	—	"	"	"	"	"
9T	2-#55	"	$\frac{1}{8}$ "	—	—	"	"	"	"	"
9U	4-#57	"	$\frac{3}{16}$ "	—	—	"	"	"	"	"
9V	1-#57	"	—	—	—	"	"	"	"	"
9W	1-#75	"	—	—	—	"	"	"	"	"

No. 9 BURNER SERIES



AGF

BURNER INC.

M-92-34

NO 1374 BURNER SERIES (TWO-PIECE KNURLED SHELL)

BURNER NO	NUMBER OF CENTER HOLES	¢ TO ¢ OUTSIDE HOLES	FLAME PATTERN	CU. FT. PER HR.			MAX. MANIFOLD NAT. GAS	FLAME LENGTH TO FOCUS	FLAME WIDTH AT FOCUS	TOTAL FLAME LENGTH	BURNER NO
				CITY	PROP	NAT'L					
1374 K	1-#54	STRAIGHT		5.25	1.0	1.5	18 1/2"	4"	1/8"	8'-9"	1374 K
1374 KA	1-#64	STRAIGHT									1374 KA
1374 L	2-#55	1/8" STRAIGHT		8.25	1.6	1.7	9 1/2"	2 1/2"	1/4"	5'-6"	1374 L
1374 M	3-#55	1/4" STRAIGHT		10.0	2.0	2.2	9 1/2"	2 1/2"	7/16"	5'-6"	1374 M
1374 N	4-#55	1/16" STRAIGHT		12.5	2.5	2.5	9 1/2"	1 3/4"	7/8"	3'-4"	1374 N
1374 P	5-#55	1/16" STRAIGHT		14.0	2.75	3.0	9 1/2"	1 5/8"	7/8"	3'-4"	1374 P
1374											1374
1374 U	7-#53	.602 STRAIGHT									1374 U
1374 T	9-#56	.602 STRAIGHT									1374 T
1374GD	9-#64	1/2" STRAIGHT		13.0	2.5	5.0	14"	13/16"	7/8"	2 1/2'-3'	1374GD
1374BA	6-#64	5/32" CONVERGING		8.0	1.5	4.0	12"	3/4"	1/4"	2 1/2'-3'	1374BA
1374 J	7-#54	5/8" DIVERGING		26.0	5.5	5.5	7"	1 1/2"	1 1/4"	2 1/2'-3'	1374 J
1374 D	9-#64	31/64" OFF SET DIVERGING		13.0	2.5	5.0	21"	13/16"	1"	2 1/2'-3'	1374 D
1374GA	9-#64	1/2" DIVERGING		13.0	2.5	5.0	14 1/2"	13/16"	1"	2 1/2'-3'	1374GA
1374CA	10-#64	17/32" DIVERGING		14.5	2.75	5.2	14"	13/16"	1 1/8"	2 1/2'-3'	1374CA
1374DX	11-#64	37/64" DIVERGING		16.0	3.2	5.5	14"	13/16"	1 1/8"	2 1/2'-3'	1374DX

Hand Torches

A.G.F. Air-Gas Hand Torches are sturdily constructed of brass tubing to permit bending for adjustment of burner spacing and yet having sufficient strength to withstand shop usage. Suitable insulation or wooden handles are provided to balance the Hand Torches and to minimize hand fatigue.

A.G.F. Air-Gas Hand Torches are regularly supplied with the standard burners listed for each model; however, they may be equipped with any of our standard burners having a suitable threaded connection.

Application

Air-Gas Hand Torches are used for many applications such as:

1. Sealing ampules.
2. Sealing off and welding on tubing for neon signs, laboratory glassware, etc.
3. Soft soldering, silver soldering, brazing of tubing, round pieces, etc.
4. Any application which may be more efficiently done by heating from two sides.

Special Hand Torches

Special Air-Gas Hand Torches can be supplied to your specifications. A.G.F. Hand Torches for oxygen-gas operation are also available.

Rubber Tubing

Suitable rubber tubing can be furnished for connecting the Hand Torch and Venturi Mixer.

Venturi Mixer

For proper and efficient operation of A.G.F. Hand Torches, the use of A.G.F. Air-Gas Venturi Mixers is recommended. A.G.F. Air-Gas Venturi Mixers supply a consistently proportioned mixture of air and gas to the burners of the Hand Torch.

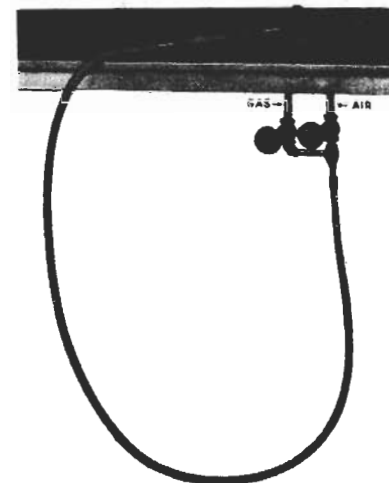
A.G.F. Combination Oxygen-Air-Gas Venturi Mixers can be used to admix up to 10% oxygen. Combination mixers are recommended for applications where the heat produced by air and gas alone is insufficient or where operation of air-gas burners at higher manifold pressures than are obtainable with air-gas mixture only is desired.

Please specify the following information when ordering Venturi Mixers for use with Hand Torches:

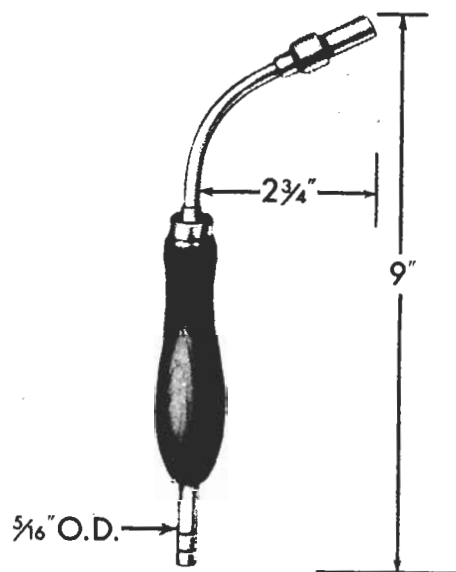
- (a) The model number of the torch and the model number of the burners with which the torch will be equipped.

- (b) The type, b.t.u. value and pressure of gas to be used.
- (c) Oxygen pressure if a Combination Oxygen-Air-Gas Venturi Mixer is to be supplied.

The illustration at right shows a typical bench installation of an A. G. F. Air-Gas Hand Torch. The Venturi Mixer is mounted underneath the bench. Rubber tubing connects the Hand Torch to the outlet of the mixer.

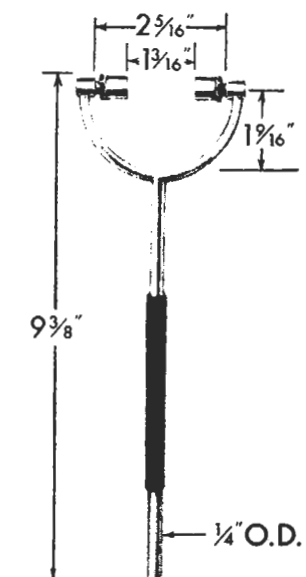


No. 1258-A Hand Torch



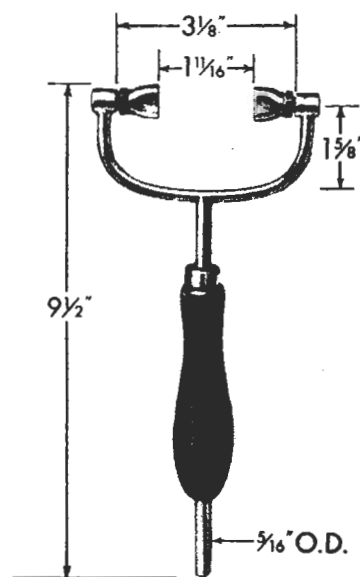
The No. 1258-A Hand Torch is normally supplied with a No. 3182 Glass Fire Tip as described in Bulletin 612.10. The No. 1258-A Hand Torch Frame will accommodate any $\frac{1}{8}$ " male threaded Glass Fire, Fishtail Burner, etc. If a burner other than the No. 3182 is desired, please specify in the following manner: "No. 1258-A Hand Torch Frame complete with Burner No."

No. 412-N Hand Torch



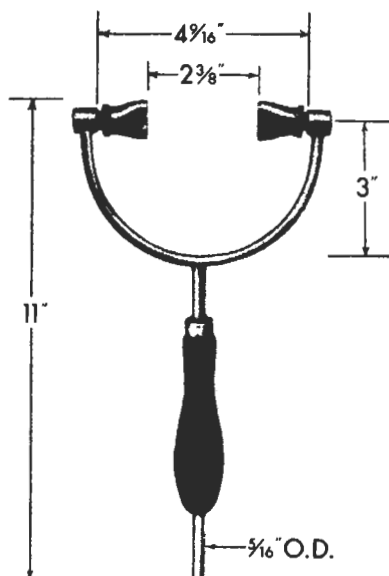
The No. 412-N Hand Torch is normally supplied with two No. 9-F Burners. The No. 412 Hand Torch Frame will accommodate any $\frac{1}{4}$ "-27 male threaded Glass Fire, No. 775(OS) and No. 775-F(OS) Fishtail Burners, etc. If burners other than No. 9-F are desired, please specify in the following manner. "No. 412 Hand Torch Frame complete with Burners No....."

No. 659-N Hand Torch



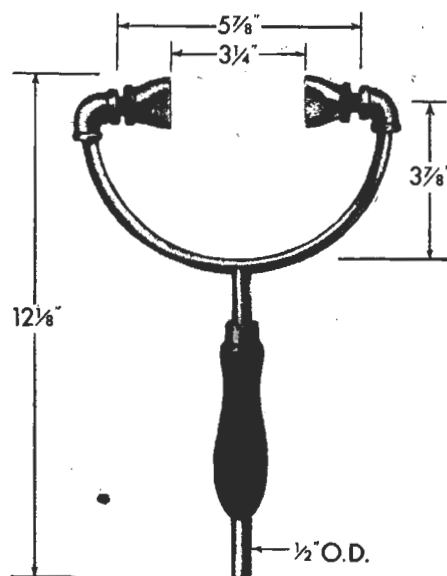
The No. 659-N Hand Torch is normally supplied with two No. 228-NS Fishtail Burners as described in Bulletin 614.20. The No. 659 Hand Torch Frame will accommodate any $\frac{1}{4}$ "-27 male threaded Fishtail Burner, Glass Fire, etc. If burners other than No. 228-NS are desired, please specify in the following manner. "No. 659 Hand Torch Frame complete with Burners No....."

No. 658-N Hand Torch

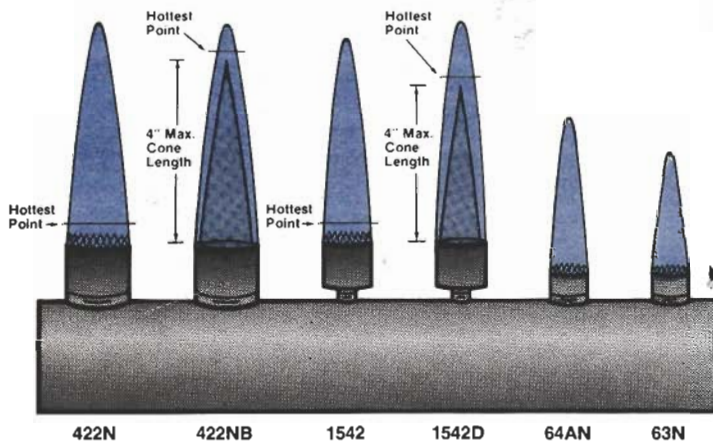


The No. 658-N Hand Torch is normally supplied with two No. 81-ANS Fishtail Burners as described in Bulletin 614.20. The No. 658 Hand Torch Frame will accommodate any $\frac{1}{8}$ " male threaded Fishtail Burner, Glass Fire, etc. If burners other than No. 81-ANS are desired, please specify in the following manner. "No. 658 Hand Torch Frame complete with Burners No....."

No. 1022-N Hand Torch

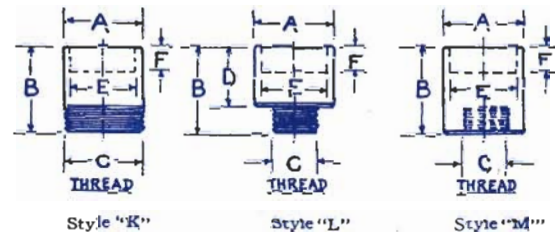


The No. 1022-N Hand Torch is normally supplied with two No. 420-CNS Fishtail Burners as described in Bulletin 614.20. The No. 1022 Hand Torch Frame will accommodate any $\frac{1}{4}$ " male threaded Fishtail Burner, Blast Tip, etc. If burners other than No. 420-CNS are desired, please specify in the following manner. "No. 1022 Hand Torch Frame complete with Burners No....."



SHORT AND LONG FOCUS BURNERS

A.G.F. Machlet Tips are supplied in two different types—Round Blast and Soft Focus—and in three different body styles as illustrated and described below.



Round Blast Type

A.G.F. Round Blast Machlet Tips are fabricated of heat-resistant alloy to give long life under severe operating conditions and are especially intended for burning mixtures of air and natural, reformed natural or bottled gas. Many small, exactly sized ports give these burners a wide turn down range and permit adjustment of flame setting from a relatively mild focus to a hard blast.

A.G.F. Round Blast Machlet Tips are recommended replacements for A.G.F. Soft Focus Machlet Tips when a change is made from a relatively high hydrogen, fast burning gas to a relatively slow burning natural or reformed natural gas.

A.G.F. Round Blast Machlet Tips are suited to all

types of heating applications where an intense focusless flame is desirable. When mounted in suitable manifolds, Round Blast Machlet Tips are used for heating work on continuous soft and silver soldering machines as well as for batch type soldering set-ups. Manifold burners also find application for heating pots, tanks, calender rolls, drums, plates, cylinders, etc.

The No. 1542-D and 422-NB Tips have flames with a center focus. The No. 1542-D Tip develops a spear point flame with a focal length up to 4" and an overall length of 6". The No. 422-NB develops a flame with a focal length of 3" and an overall length of approximately 6".

Round Blast Machlet Tip No.	Body Style	PHYSICAL DIMENSIONS						OPERATIONAL RATINGS										Round Blast Machlet Tip No.
								Manufactured Gas 525 B.T.U./Cu. Ft.		Reformed Nat. Gas 530-570 B.T.U./Cu. Ft.		Bottled Gas 2500 B.T.U./Cu. Ft.		Natural Gas 1050 B.T.U./Cu. Ft.		Approx. Max. Air Required Cu. Ft./Min. When using 525 B.T.U. Mfd. Gas		
		A	B	C	D	E	F	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.	Mixture Pressure W.C. at Burner	Capacity B.T.U. Per Hr.			
377NA	L	9/16"	9/16"	1/8" M.P.T.	3/8"	7/16"	3/16"	1.75"	3,675	1.75"	3,675	.75"	1,750	.25"	1,500	.5	377N	
61N	K	17/32"	5/8"	1/4" M.P.T.	—	1/16"	1/4"	1.75"	3,675	1.75"	3,675	.75"	1,750	.25"	1,500	.5	61N	
(OBSOLETE)																		
552N																		552N
63N	K	1 1/16"	3/4"	3/8" M.P.T.	—	1/2"	5/16"	3.5"	6,300	3.5"	6,300	1.37"	2,500	.37"	2,500	.8	63N	
63DNA	K	1 1/16"	1 1/2"	3/8" M.P.T.	—	1/2"	9/32"	1.75"	4,725	1.75"	4,725	1.25"	3,750	.37"	2,500	.6	63DNA	
63DN	K	1 1/16"	1 1/2"	3/8" M.P.T.	—	1/2"	5/16"	3.5"	6,300	3.5"	6,300	1.63"	2,500	.37"	2,500	.8	63DN	
64AN	K	1 3/16"	1"	1/2" M.P.T.	—	5/8"	3/8"	3.5"	7,875	3.5"	7,875	1.5"	5,000	.75"	4,000	1.0	64AN	
565N	M	1 3/16"	1 1/4"	1/8" F.P.T.	—	2 1/32"	1 1/2"	3.5"	7,875	3.5"	7,875	1.5"	5,000	.75"	4,000	1.0	565N	
1542A	L	1 7/8"	1 7/8"	1/4" M.P.T.	9/16"	3/4"	1 1/4"	10.0"	18,375	10.0"	18,375	4.0"	18,750	1.75"	8,000	1.33	1542A	
1542	L	1 7/8"	1 1/8"	1/4" M.P.T.	13/16"	3/4"	1 1/16"	10.0"	18,375	10.0"	18,375	4.0"	18,750	2.0"	9,000	1.33	1542	
†1542D	L	1 7/8"	1 1/8"	1/4" M.P.T.	13/16"	3/4"	1 1/16"	12.0"	23,500	12.0"	23,500	12.0"	16,000	11.0"	15,000	4.0	1542D†	
422ND	M	1 1/16"	1 1/2"	3/8" F.P.T.	—	7/8"	1 1/2"	3.5"	23,625	3.5"	23,625	6.0"	16,000	2.5"	15,000	3.0	422ND	
422N	K	1 1/16"	1 1/2"	3/4" M.P.T.	—	7/8"	1 1/2"	3.5"	23,625	3.5"	23,625	6.0"	25,000	2.5"	15,000	3.0	422N	
422NA	K	1 1/16"	1 1/4"	3/4" M.P.T.	—	7/8"	1 1/4"	3.5"	23,625	3.5"	23,625	6.0"	25,000	2.5"	15,000	3.0	422NA	
†422NB	K	1 1/16"	1 1/2"	3/4" M.P.T.	—	7/8"	1 1/2"	5.0"	47,800	5.0"	47,800	3.25"	27,500	2.5"	21,000	4.8	†422NB	

†No. 1542-D Burner has = 18 drill center hole.

††No. 422-NB Burner has 3/16" center hole.

Venturi Mixer

For proper and efficient operation of A.G.F. Machlet Tips, the use of an A.G.F. Air-Gas Venturi Mixer is recommended. A.G.F. Venturi Mixers as described on page 3 of Bulletin 630.20 supply a consistently proportioned mixture of air and gas to the burners. Large manifolds equipped with Machlet Tips can be supplied with a Single Valve Ratio Set as described on page 4 of Bulletin 630.20 to permit one valve control of the heat output of the burners.

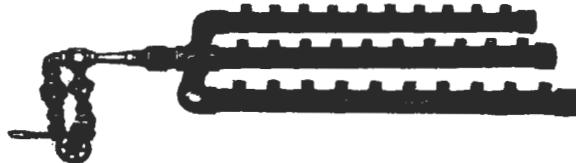
Please specify the following information when ordering Venturi Mixers or Single Valve Ratio Sets for use with A.G.F. Machlet Tips:

- (a) The amount and model number of the Machlet Tips to be supplied by the Venturi Mixer or the Single Valve Ratio Set.
- (b) The type, b.t.u. value and pressure of gas to be used.
- (c) Air pressure. (Recommended air pressure is one pound per square inch.) If only high pressure air is available the use of High Pressure Air Reduction Equipment as described in Bulletin 610.10 is recommended.

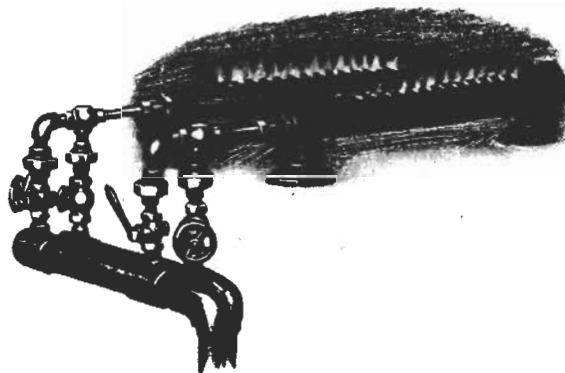
Manifolds

Curved, straight or special manifolds of any desired length equipped with Round Blast or Soft Focus Mach-

let Tips, as illustrated below, can be supplied for your particular requirements.



Three Prong Manifold Burner equipped with Machlet Tips and Venturi Mixer.



Double Row Burner Manifolds, each manifold complete with Venturi Mixer. Burners staggered from the vertical center line of the manifold to give maximum heat output in limited space without overheating.

Ribbon Burners

AGF Drilled Insert Ribbon Burners are especially intended for applications requiring a length of uniform flame. This type of burner has an extremely wide operating range—the flame can be set to provide an intense and concentrated heat or to provide a soft lazy type of fire. An oxidizing, reducing or neutral fire can be set to suit the intended application. Continuous flames from 1" up to 500" long can be supplied.

AGF Ribbon Burners are supplied with either single row, double row, triple row, or five row center hole drilling in various drill sizes to provide the desired heated width and work temperature.

AGF Drilled Insert Ribbon Burners are extensively used in glass forming operations and on various glassworking machines in the lamp, electronic tube, glass ornament and other industries. These same burners are also widely used in the metal fabricating industries for continuous soft and silver soldering of various ferrous and/or nonferrous parts, including variable condensers, electrical connectors, return bends on cooling coils, etc. Ribbon Burners are also used for localized annealing and/or hardening of springs, stampings, saw blades and other similar metal parts. The Figure 11 Flame Insert with triple row center hole drilling is a ribbon burner type that has found extensive application for flame treating various polyolefin plastics as well as singeing textiles such as felt, denim, woollens, and yarns.

CONSTRUCTION

AGF Ribbon Burners are constructed with a special drilled insert bar mounted into a suitable manifold. The flames from the main center-holes are supported by small pilot flames on both sides. The pilot flames burning at a relatively low velocity, support and help retain the flames from the main center holes, enabling the burner to operate at either high or low mixture pressures and flame velocities.



6H2-55 Ribbon Burner; 6" flame length; Figure 2 Insert having #55 drill size center holes.

CENTER - HOLE DRILLING

The various styles of insert bars are available with either of two standard drillings, No. 55 drill size or the smaller No. 64 drill size. The larger size holes, No. 55 drill, are spaced on approximately 1/8" centers; and the smaller No. 64 drill size are spaced on approximately 1/16" centers. For very special applications where an extremely fine flame is required, the Figure 2, 6 and 10 inserts can be supplied with special No. 71 drill size center-holes spaced on approximately 1/16" centers.

The No. 55 drill size center holes provide the highest heat output of the standard burner drillings. In all multi-row drilled inserts, No. 55 is the recommended center hole drilling.

PILOTING

Figure 2, 4 and 11 inserts are available with either single milled piloting or with double milled piloting in which case they are known as Figure 6, 8 and 9. The single milled piloting type of insert operates at medium flame velocities. The double milled piloting provides greater flame retention and permits operating at slightly higher flame velocities than the single milled type piloting.

CENTER - HOLE DRILLING

The center-hole drilling determines the width of the hottest portion of the flame. The larger No. 55 drill size center-hole drilling provides the widest band of heating. In a Figure 2, 6 or 10 insert, No. 55 drill size holes provide a concentrated heated area about 1/8" wide and a total heated area about 1/4" to 5/16" wide. If No. 64 drill size holes are used, the concentrated heated width is slightly more than 1/16" and the overall heated area is about 1/4" wide. If No. 71 drill size holes are used, the concentrated heated width is slightly less than 1/16" and the overall heated width is slightly less than 1/4".

Ribbon Inserts



Figure 2 Insert

Fig. 2-55 Insert has #55 drill size center holes on 1/8" centers and single row of milled piloting; focal length of flame 3/4"; heated width 1/4"; natural gas burning capacity approximately 2700 b.t.u./hour per inch of flame length.

Fig. 2-64 Insert has #64 drill size center holes on 1/16" centers and single row of milled piloting; focal length of flame 5/8"; heated width 1/4"; natural gas burning capacity approximately 2300 b.t.u./hour per inch of flame length.

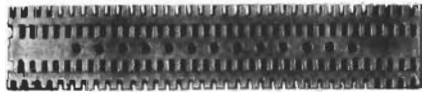


Figure 6 Insert

Fig. 6-55 Insert has #55 drill size center holes on 1/8" centers and double row of milled piloting; focal length of flame 7/8"; heated width 3/8"; natural gas burning capacity approximately 4000 b.t.u./hour per inch of flame length.

Fig. 6-64 Insert has #64 drill size center holes on 1/16" centers and double row milled piloting; focal length of flame 3/4"; heated width 5/16"; natural gas burning capacity approximately 3500 b.t.u./hour per inch of flame length.

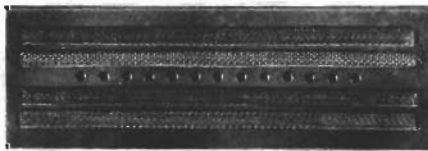


Figure 10 Insert

Fig. 10-55 Insert has #55 drill size center holes on 1/8" centers and double row of milled piloting; focal length 1-3/8"; heated width 5/16"; natural gas burning capacity approximately 8400 b.t.u./hour per inch of flame length.

Fig. 10-64 Insert has #64 drill size center holes on 1/16" centers and double row screen piloting; focal length 1-3/8"; heated width 1/4"; natural gas burning capacity approximately 7350 b.t.u./hour per inch of flame length.



Figure 4 Insert

Fig. 4-55 Insert has two rows of #55 drill size center holes drilled on 1/8" centers with single row milled piloting; focal length 1-1/16"; heated width 7/16"; natural gas burning capacity approximately 7350 b.t.u./hour per inch of flame length.

Fig. 4-64 Insert has two rows of # 64 drill size center holes drilled on 1/16" centers with single row milled piloting; focal length 1"; heated width 7/16"; natural gas burning capacity approximately 6000 b.t.u./hour per inch of flame length.

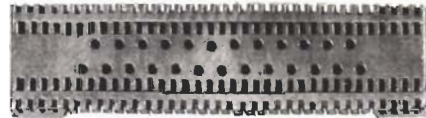


Figure 8 Insert

Fig. 8-55 Insert has two rows of #55 drill size center holes on 1/8" centers with double row milled piloting; focal length 1-1/8"; heated width 3/4"; natural gas burning capacity approximately 9000 b.t.u./hour per inch of flame length.

Fig. 8-64 Insert has two rows of #64 drill size center holes on 1/16" centers with double row milled piloting; focal length 1-1/16"; heated width 5/8"; natural gas burning capacity approximately 7000 b.t.u./hour per inch of flame length.



Figure 9 Insert

Fig. 9-55 Insert has three rows of #55 drill size center holes drilled on 1/8" centers with double row milled piloting; focal length 1"; heated width 1"; natural gas burning capacity 8000 b.t.u./hour per inch of flame length.

The Figure 9 Insert is normally supplied with #55 drill size center holes which we have found to provide optimum performance.

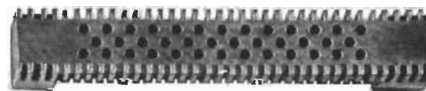


Figure 11 Insert

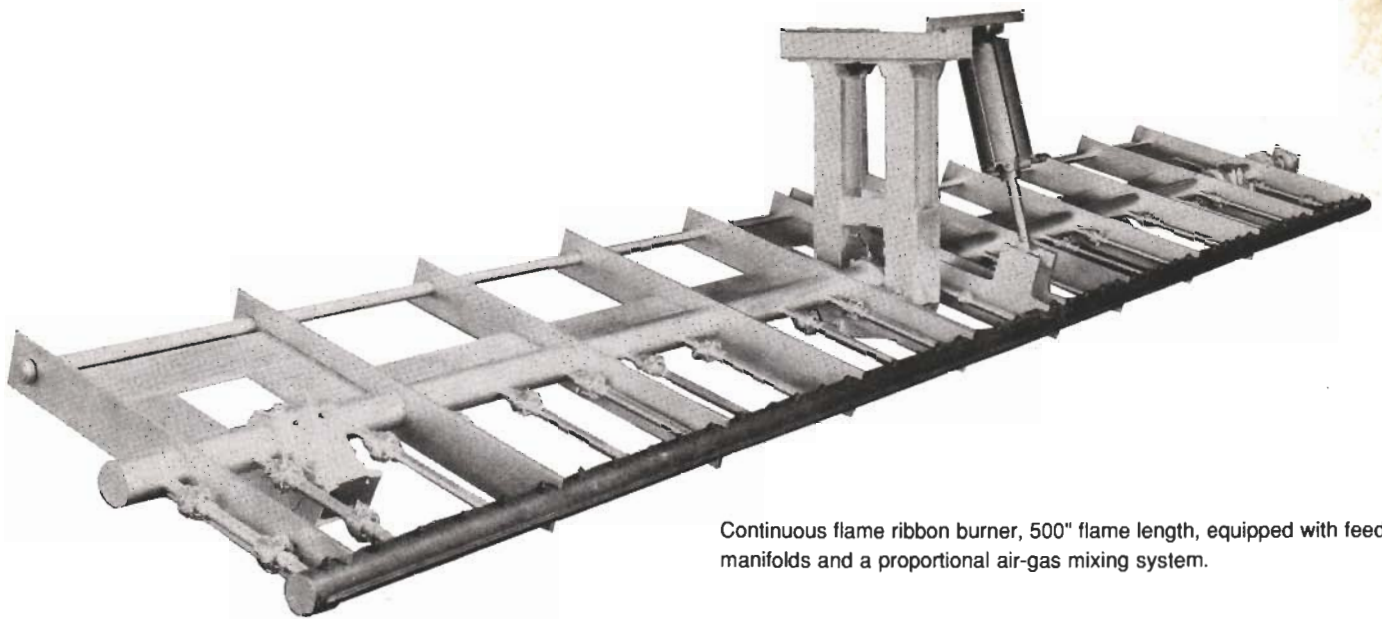
Fig. 11-55 Insert has three rows of #55 drill size center holes on 1/8" centers with single row milled piloting; focal length 7/8"; heated width 5/8"; natural gas burning capacity 7000 b.t.u./hour per inch of flame length.

The Figure 11 Insert is usually supplied only with #55 drill size center holes, which we have found to provide optimum performance.



Figure 12 Insert

Fig. 12-55 Insert has five rows of #55 drill size center holes drilled on 1/8" centers with single row milled piloting; focal length 7/8"; heated width 1-1/2"; natural gas burning capacity approx 11,000 btu/hour per inch of flame length.



Continuous flame ribbon burner, 500" flame length, equipped with feed manifolds and a proportional air-gas mixing system.

MANIFOLDS

Any of the various drilled inserts can be supplied to provide flame lengths up to 12-1/2" in the cast bronze fishtail type manifolds listed on page 4. Flame lengths up to 36" can be accommodated in Style "X" fabricated tubular brass manifolds as described on page 4. The cast bronze tubular manifold Style "Y" can be employed for flame lengths up to 60".

Ribbon Burners with flame lengths up to 30' long can be supplied. The construction of these long Ribbon Burners incorporates the use of a feed manifold supplying the actual burner manifold as shown in the illustration on page 3.

ORDERING INSTRUCTIONS

To order an AGF Sharp Flame Ribbon Burner, specify the assembly number as follows:

First. Specify by the first number before the manifold designation letter, the flame length desired. *Example:* In assembly 4.5G2-55, the 4.5 designates a 4-1/2" flame length.

Second. Select the proper type manifold from the tabulation on page 4 to suit the flame length and specify the manifold type letter designation after the flame length number. *Example:* In assembly 4.5G2-55, the letter "G" denotes the manifold type.

For burner flame lengths greater than those that can be obtained in cast fishtail manifolds, cast and fabricated tubular type manifolds as illustrated are supplied. To specify a tubular manifold, list the manifold letter designation after the flame length number. *Example:* 24X2-55 designates a 24" flame length ribbon burner with a fabricated tubular brass manifold.

Third. Select the style insert that is desired from the illustration and specify the style number by digits immediately following the manifold letter designation. *Example:* In assembly 4.5G2-55, "2" denotes the Style 2 insert which has a single row of main center-holes and a single row of milled piloting.

Fourth. Specify the size center-holes desired by a hyphen and the drill size number following the insert style number. *Example:* In assembly 4.5G2-55, "-55" denotes that the burner insert has No. 55 drill size center-holes.

TYPICAL ILLUSTRATION OF ASSEMBLY NUMBER:

Assembly 8J6-64 Sharp Flame Ribbon Burner consists of:

- 8— The first number preceding the manifold designation letter signifies the flame length desired in inches.
- J— The letter following the first number of the assembly specifies the manifold type which accommodates the insert.
- 6— The number following the manifold designation letter denotes the style insert desired.
- 64— The number following the hyphen and the insert style number designates the drill size desired for the main center-holes of the burner.

VENTURI MIXERS

The use of an A G F Air-Gas Venturi Mixer is recommended to supply a consistently proportioned mixture of air and gas to the burner.

AGF Combination Air-Oxygen-Gas Venturi Mixers which enable admixing of up to 10% oxygen can be supplied to serve the various style Sharp Flame Ribbon Burners. The use of an A.G.F. Combination Venturi Mixer is recommended where the heat produced by an air-gas flame is insufficient.

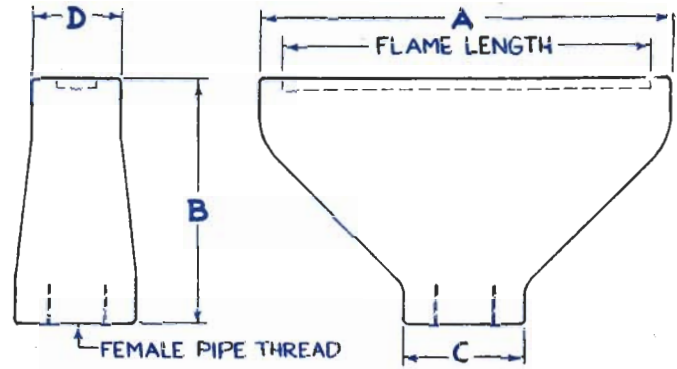
SPECIAL BURNERS

Special Sharp Flame Ribbon Burners can be supplied to suit your particular requirement.

Soft Flame Ribbon Burners with corrugated style inserts can be supplied in any of the flame lengths and manifolds specified for drilled insert type ribbon burners. The standard flame width is approximately 7/16" wide.

Where temperatures achieved with air-gas or air-gas-oxygen fuel mixtures are insufficient, special ribbon burners can be supplied for oxygen-gas or oxygen-hydrogen operation.

Cast Bronze Fishtail Manifolds

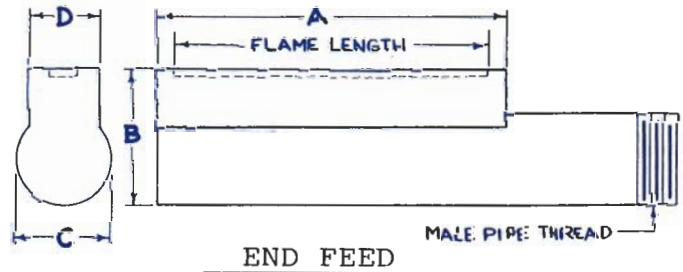


Manifold Type	Max. Flame Length	Takes Insert Style	PHYSICAL DIMENSIONS					Fem. Pipe Thd. Conn.
			A	B	C	D		
A	1 3/4"	2	2"	1 3/4"	1 5/16"	5/8"	1/4"	
B	1 3/4"	All	2 1/4"	1 3/4"	1 1/8"	1 1/16"	3/8"	
C	2"	All	2 1/4"	2"	1 1/8"	7/8"	3/8"	
D	2 7/16"	All	2 7/8"	2"	1 1/4"	7/8"	3/8"	
E	2 3/4"	All	3 1/8"	2"	1 1/4"	7/8"	3/8"	
F	3 1/2"	All	4"	2 1/2"	1 1/2"	1"	1/2"	

Manifold Type	Max. Flame Length	Takes Insert Style	PHYSICAL DIMENSIONS					Fem. Pipe Thd. Conn.
			A	B	C	D		
G	4½"	All	5"	3"	1½"	1⅞"	½"	
H	6¾"	All	7¼"	3½"	1⅞"	1"	¾"	
J	8½"	All	9"	3½"	1⅞"	⅞"	¾"	
K	9½"	All	10"	4⅝"	2⅜"	1⅞"	1¼"	
L	12½"	All	13⅜"	4⅝"	2¼"	1"	1¼"	

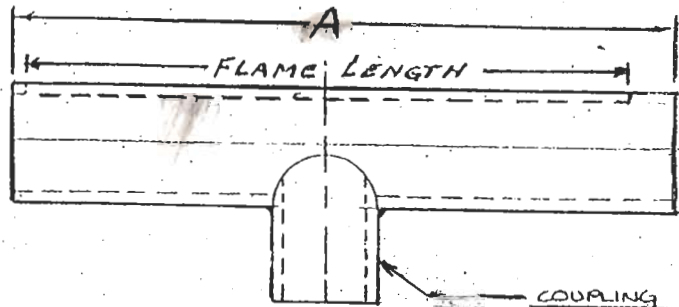
Style "X" Fabricated Tubular Brass Manifolds

(Take all insert styles)

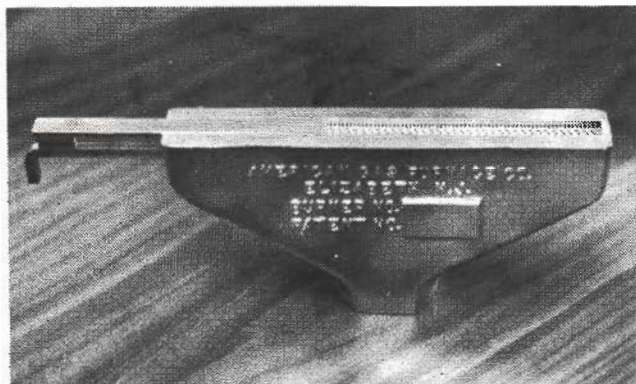


For Burner Flame Lengths	PHYSICAL DIMENSIONS				
	A	B	C	D	Male Pipe Thd. Conn.
Up to 24"	Flame Length plus $\frac{3}{4}"$	2"	$1\frac{5}{16}"$	1"	1"
24" to 30"	Flame Length plus $\frac{3}{4}"$	$2\frac{1}{4}"$	$1\frac{1}{2}"$	1"	$1\frac{1}{4}"$

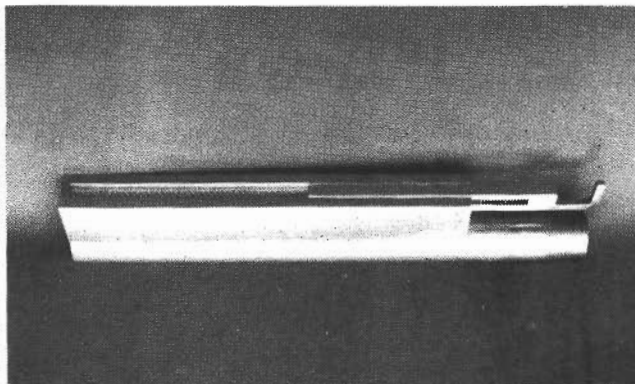
CENTER FEED



ADJUSTABLE FLAME RIBBON BURNERS



Cast Bronze Fishtail Manifold



Style "X" Tubular Brass Manifold

AGF Adjustable Flame Ribbon Burners have been developed primarily for use in flame treating. Products of poly-plastic and other materials, in various sizes and shapes, can be conveyed past the burners to accomplish the flame treatment. The adjustable flame ribbon burners offer the same design features and physical dimensions as the standard AGF ribbon burners (as described in Bulletin BX-1), but incorporate a special adjustable slide designed to cut off flame both below and on top of the brass insert.

The slide supplied is designed to cut off 50% of the flame. Longer slides can be furnished as a special order. The slide itself can be easily locked in any position by the use of a thumb screw built into the burner.

AGF Adjustable Flame Ribbon Burners are available in standard flame lengths of 4", 6", 8", 10" and 12", and can be supplied in both the cast bronze fishtail manifold and the Style "X" tubular brass manifold, as described on page 3 of Bulletin BX-1. The Style "X" tubular brass manifold is usually supplied with an end feed connection. A center feed design is available at a small additional charge. Longer flame lengths can also be supplied.

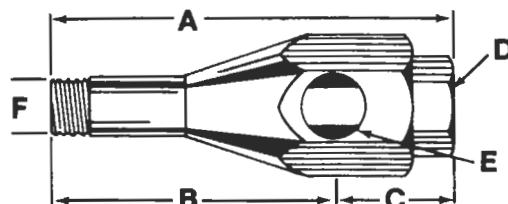
The Figure 11-55 style insert is most often used for flame treating of poly-plastic surfaces.

When making an inquiry, or ordering, please specify the following:

1. Adjustable Flame Ribbon Burner
2. Manifold style (Tubular Brass or Cast Bronze Fishtail)
3. Flame length range

Example: "Adjustable Flame Ribbon Burner, cast bronze fishtail manifold, 6" to 3" flame length."

No. 11 & 12 Air/Gas Venturi Mixers



Venturi Mixer No.	DIMENSIONS			PIPE SIZE			Material
	A	B	C	Air	Gas	Outlet	
11	2-5/8"	1-13/16"	13/16"	1/8"	1/8"	1/8"	BRASS
12	3-7/16"	2-11/32"	1-3/32"	1/4"	1/4"	3/8"	BRASS

Procedure for Selection of Correct Size Venturi Mixers

1. Determine for the particular model burner, its total hourly B.t.u. requirement either from the Venturi Mixer Selection Rating or from the rated B.t.u. capacity for the burner at 8" water column mixture pressure as listed in the various burner bulletin pages.
2. Multiply the obtained B.t.u. rating for the individual burner by the number of burners that will be supplied by the Venturi Mixer.
3. Select the proper Venturi Mixer from the table below. If the total B.t.u. rating obtained in Step 2 falls in between two mixer sizes, choose the smaller Venturi Mixer model.

Air-Gas Venturi Mixer Model No.	Hourly Capacity Rating with air at 1 lb./sq. in.		Air-Gas Venturi Mixer Model No.	Hourly Capacity Rating with air at 1 lb./sq. in.	
	B.t.u.	1050 B.t.u. gas cu.ft./hr.		B.t.u.	1050 B.t.u. gas cu.ft./hr.
11-70-65	525	0.5	12-44-35	5,880	5.6
11-69-63	580	0.55	12-43-34	6,405	6.1
11-68-61	630	0.6	12-42-32	6,825	6.5
11-67-60	735	0.7	12-41-31	7,455	7.1
11-66-59	840	0.8	12-40-31	7,700	7.4
11-65-57	945	0.9	12-39-31	7,875	7.5
11-64-57	1,050	1.0	12-38-30	8,295	7.9
11-63-56	1,050	1.0	12-37-30	8,770	8.35
11-61-56	1,210	1.15	12-36-29	9,190	8.75
11-60-55	1,265	1.2	12-35-29	9,820	9.35
11-59-55	1,315	1.25	12-34-29	9,975	9.5
11-58-55	1,365	1.3	12-33-28	10,500	10.0
11-57-54	1,420	1.35	12-32-27	10,870	10.35
11-56-53	1,725	1.65	12-31-25	12,075	11.5
11-55-52	2,200	2.1	12-30-19	13,125	12.5
11-54-51	2,470	2.35	12-29-18	14,700	14.0
11-53-48	2,890	2.75	12-28-16	15,750	15.0
11-52-47	3,255	3.1	12-27-15	16,800	16.0
11-51-45	3,675	3.5	12-26-14	17,325	16.5
11-50-43	3,940	3.75	12-25-12	17,850	17.0
11-49-42	4,300	4.1	12-24-11	18,375	17.5
11-48-41	4,725	4.5	12-23-10	19,165	18.25
11-47-39	4,990	4.75	12-22-9	19,950	19.0
11-46-38	5,250	5.0	12-21-8	20,450	19.5
11-45-38	5,355	5.1	12-20-7	21,000	20.0

Furnace Burners and Mixing Equipment

For those who wish to design and build their own furnaces we offer burners, burner tunnels and mixing equipment, as shown on the following pages.

This equipment generally corresponds with that which we install on furnaces and heating machines manufactured complete by us and found to be most satisfactory through our many years of experience.

That experience has taught us that numerous small burners, each of limited capacity, give more uniform heating and greater uniformity than can be obtained by heating the same furnace with a few larger burners.

The furnace burners are of heat-resisting alloy to give long life with freedom from repairs and replacement such as may occur where cast iron burners are used because they oxidize and grow in service, not only changing input characteristics, but also interfering with the proper functioning of the mixing equipment.

The mixing units, namely, our single valve ratio sets, have been carefully designed and manufactured to give one valve regulation with a turndown ratio of 6 to 1 without appreciable change in the ratio of air to gas, this being an unusually wide operating range.

If burners, burner tunnels, and single valve ratio set or mixers are carefully selected and installed, excellent results will be obtained. Pages 3 and 4 have been included to assist you in making this selection.

Note: When complete sets of furnace burners are selected, capacities chosen may fall into two different diameter burners. If specified by customer, smaller capacity burners can be supplied in the same physical size (diameter and length) as the larger capacity burners, thus standardizing burner tunnel sizes, piping, etc.

Type A Furnace Burners



Single Center Hole—No Pilots

Type A—Heat Resisting Alloy—For use only in melting furnace and small cylindrical furnaces where the tangential firing of one burner tends to keep the next burner ignited, etc., etc. Recommended for operation at temperatures of 1350°F. or above.

Type A Furnace Burners can be turned down to approximately 25% of maximum input without back firing, provided the burners are properly installed in combustion tunnels no larger in diameter than the outside of the burner and not less than 3" long.

Burner No.	Center Hole Drill Size	Dimensions			Max. Cap. B.T.U./hr. 8" Manifold Pressure
		Dia.	Overall Length	Male Pipe Thread	
A-7-20	3/4"	1 1/2"	2"	1 1/2"	25,000
A-7-22	1 1/2"	1 1/2"	2"	1 1/2"	31,000
A-7-24	3/4"	1 1/2"	2"	1 1/2"	36,000
A-7-26	1 1/2"	1 1/2"	2"	1 1/2"	43,000
A-9-28	7/8"	1 1/2"	2"	3/4"	50,000
A-9-30	1 1/2"	1 1/2"	2"	3/4"	57,000
A-9-32	1 1/2"	1 1/2"	2"	3/4"	65,000
A-9-34	1 1/2"	1 1/2"	2"	3/4"	73,000
A-9-36	1 1/2"	1 1/2"	2"	3/4"	82,000
A-9-38	1 1/2"	1 1/2"	2"	3/4"	91,000
A-11-40	5/8"	1 3/8"	2 1/2"	1"	101,000
A-11-42	1 1/2"	1 3/8"	2 1/2"	1"	111,000
A-11-44	1 1/2"	1 3/8"	2 1/2"	1"	122,000
A-11-46	1 1/2"	1 3/8"	2 1/2"	1"	134,000
A-11-48	1 1/2"	1 3/8"	2 1/2"	1"	145,000
A-11-50	1 1/2"	1 3/8"	2 1/2"	1"	157,000
A-11-52	1 1/2"	1 3/8"	2 1/2"	1"	171,000

Type B Furnace Burners



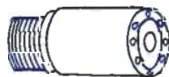
Single Center Hole—Four Pilots

Type B—Heat Resisting Alloy—For use with high hydrogen, fast burning manufactured gases. Replaced by Type F Furnace Burners for slow burning natural gas, reformed natural gas, Butane or Propane as well as for better operational characteristics on manufactured gas.

Type B Furnace Burners can be turned down to approximately 20% of their maximum input when burning manufactured gas without back firing, provided the burners are properly installed in combustion tunnels no larger in diameter than the outside of the burner and not less than 3" long.

Burner No.	Center Hole Drill Size	Dimensions			Max. Cap. B.T.U./hr.	
		Dia.	Overall Length	Male Pipe Thread	8" Man. Pressure	6" Man. Pressure
B-7-45	45	7/8"	2"	1 1/2"	9,000	8,000
B-7-35	35	7/8"	2"	1 1/2"	10,000	9,000
B-7-10	3 1/2"	7/8"	2"	1 1/2"	13,000	11,000
B-7-12	3 1/2"	7/8"	2"	1 1/2"	16,000	14,000
B-7-14	7/8"	7/8"	2"	1 1/2"	19,000	16,000
B-7-16	3 1/2"	7/8"	2"	1 1/2"	23,000	20,000
B-7-18	9/16"	7/8"	2"	1 1/2"	27,000	23,000
B-7-20	3 1/2"	7/8"	2"	1 1/2"	32,000	28,000
B-7-22	1 1/2"	7/8"	2"	1 1/2"	37,000	32,000
B-7-24	3 1/2"	7/8"	2"	1 1/2"	43,000	37,000
B-9-26	1 1/2"	1 1/8"	2"	3/4"	50,000	43,000
B-9-28	7/8"	1 1/8"	2"	3/4"	56,000	49,000
B-9-30	1 1/2"	1 1/8"	2"	3/4"	64,000	55,000
B-9-32	1 1/2"	1 1/8"	2"	3/4"	72,000	62,000
B-9-34	1 1/2"	1 1/8"	2"	3/4"	80,000	69,000
B-9-36	9/16"	1 1/8"	2"	3/4"	89,000	77,000
B-11-38	1 1/2"	1 3/8"	2 1/2"	1"	98,000	85,000
B-11-40	5/8"	1 3/8"	2 1/2"	1"	108,000	94,000
B-11-42	1 1/2"	1 3/8"	2 1/2"	1"	118,000	102,000
B-11-44	1 1/2"	1 3/8"	2 1/2"	1"	129,000	112,000
B-11-46	1 1/2"	1 3/8"	2 1/2"	1"	140,000	121,000
B-11-48	3/4"	1 3/8"	2 1/2"	1"	152,000	132,000
B-11-50	1 1/2"	1 3/8"	2 1/2"	1"	165,000	143,000
B-11-52	1 1/2"	1 3/8"	2 1/2"	1"	177,000	153,000

Type F Furnace Burners



Single Center Hole

7/8" diameter size—8 pilots

1 1/8" diameter size—10 pilots

1 3/8" diameter size—12 pilots

Type F—Heat Resisting Alloy—For use with manufactured, reformed natural, natural, Propane or Butane gases. The Type F Furnace Burner is the most versatile of A.G.F. Furnace Burners. It lights readily and retains the flame without difficulty burning any type of gas.

Type F Furnace Burners can be turned down to approximately 15% of their maximum input when burning natural and bottled gases and approximately 20% of maximum input when burning manufactured gas without back firing, provided the burners are properly installed in combustion tunnels no larger in diameter than the outside of the burner and not less than 3" long.

Burner No.	Center Hole Drill Size	Dimensions			Max. Cap. B.T.U./hr.	
		Dia.	Overall Length	Male Pipe Thread	8" Man. Pressure	6" Man. Pressure
F-7-50	50	7/8"	2"	1 1/2"	10,800	9,400
F-7-45	45	7/8"	2"	1 1/2"	11,300	9,800
F-7-35	35	7/8"	2"	1 1/2"	12,600	10,900
F-7-10	3 1/2"	7/8"	2"	1 1/2"	16,000	14,000
F-7-12	3 1/2"	7/8"	2"	1 1/2"	18,900	16,500
F-7-14	7/8"	7/8"	2"	1 1/2"	22,500	19,600
F-7-16	1 1/4"	7/8"	2"	1 1/2"	26,200	22,800
F-7-18	9/16"	7/8"	2"	1 1/2"	30,700	26,800
F-7-20	5/8"	7/8"	2"	1 1/2"	35,900	31,200
F-7-22	1 1/2"	7/8"	2"	1 1/2"	41,500	36,100
F-7-24	3 1/2"	7/8"	2"	1 1/2"	47,800	41,500
F-9-26	1 1/2"	1 1/8"	2"	3/4"	57,200	49,700
F-9-28	7/8"	1 1/8"	2"	3/4"	64,400	56,000
F-9-30	1 1/2"	1 1/8"	2"	3/4"	71,900	62,500
F-9-32	1 1/2"	1 1/8"	2"	3/4"	81,200	70,600
F-9-34	1 1/2"	1 1/8"	2"	3/4"	90,000	78,200
F-9-36	9/16"	1 1/8"	2"	3/4"	99,300	86,300
F-11-38	1 1/2"	1 3/8"	2 1/2"	1"	111,600	97,100
F-11-40	5/8"	1 3/8"	2 1/2"	1"	122,100	106,100
F-11-42	1 1/2"	1 3/8"	2 1/2"	1"	134,300	116,800
F-11-44	1 1/2"	1 3/8"	2 1/2"	1"	146,900	127,700
F-11-46	3/4"	1 3/8"	2 1/2"	1"	160,900	139,900
F-11-48	3/4"	1 3/8"	2 1/2"	1"	174,900	152,100
F-11-50	1 1/2"	1 3/8"	2 1/2"	1"	188,500	163,900
F-11-52	1 1/2"	1 3/8"	2 1/2"	1"	202,900	176,100

Type G Furnace Burners



Four Center Holes

$\frac{7}{8}$ " diameter size—8 pilots
 $1\frac{1}{8}$ " diameter size—10 pilots
 $1\frac{3}{8}$ " diameter size—12 pilots

Type G—Heat Resisting Alloy—For use with manufactured, reformed natural, natural, Propane or Butane gases. The Type G Furnace Burner replaces the five center hole Type C Furnace Burner previously supplied. The Type G Furnace Burner has a shorter and bushier flame than the single center hole Type F Furnace Burner and is recommended for use where combustion space is limited.

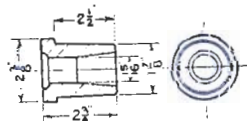
Type G Furnace Burners can be turned down to approximately 15% of their maximum input when burning the natural and bottled gases and approximately 18% of maximum input when burning manufactured gas without back firing, provided the burners are properly installed in combustion tunnels no larger in diameter than the outside of the burner and not less than 3" long.

Burner No.	Center Hole Drill Size	Dimensions			Max. Cap. B.T.U./hr.	
		Dia.	Overall Length	Male Pipe Thread	8" Man. Pressure	6" Man. Pressure
G-7-50	50	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	14,400	12,500
G-7-45	45	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	16,200	14,100
G-7-43	43	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	17,400	15,100
G-7-41	41	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	18,700	16,300
G-7-39	39	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	19,400	16,800
G-7-37	37	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	20,200	17,600
G-7-35	35	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	21,500	18,700
G-7-33	33	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	22,200	19,300
G-7-31	31	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	23,700	20,600
G-7-30	30	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	25,900	22,500
G-7-9	$\frac{3}{4}$ "	$\frac{7}{8}$ "	2"	$\frac{1}{2}$ "	29,000	25,200
G-9-10	$\frac{5}{8}$ "	$1\frac{1}{8}$ "	2"	$\frac{3}{4}$ "	37,100	32,300
G-9-11	$\frac{11}{16}$ "	$1\frac{1}{8}$ "	2"	$\frac{3}{4}$ "	42,400	36,800
G-9-12	$\frac{3}{4}$ "	$1\frac{1}{8}$ "	2"	$\frac{3}{4}$ "	48,000	41,700
G-9-13	$\frac{13}{16}$ "	$1\frac{1}{8}$ "	2"	$\frac{3}{4}$ "	54,200	47,200
G-11-14	$\frac{7}{8}$ "	$1\frac{3}{8}$ "	2 $\frac{1}{2}$ "	1"	65,600	57,100
G-11-15	$\frac{15}{16}$ "	$1\frac{3}{8}$ "	2 $\frac{1}{2}$ "	1"	73,000	63,500
G-11-16	$\frac{1}{2}$ "	$1\frac{3}{8}$ "	2 $\frac{1}{2}$ "	1"	80,900	70,400
G-11-17	$\frac{17}{16}$ "	$1\frac{3}{8}$ "	2 $\frac{1}{2}$ "	1"	89,400	77,700
G-11-18	$\frac{3}{2}$ "	$1\frac{3}{8}$ "	2 $\frac{1}{2}$ "	1"	99,200	86,200

Burner Tunnels

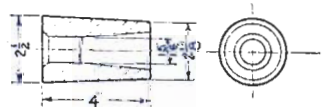
For use with our furnace burners, super refractory burner tunnels are especially recommended as this material will withstand temperatures in excess of 3100°F. and consequently there is no difficulty with it softening up and thus partially closing the burner tunnel. Their life is extremely long.

These tunnels can be installed simply and easily from outside of the furnace at nominal expense and they can also be replaced readily when and if this is necessary. The price is low and consequently it is more economical to use them than to ram up burner tunnels from a refractory material except where the burners are quite large in size.



No. 2281 Tunnel. Supplied only for use in small furnaces with thin walls. The inner end of the tunnel should be approximately flush with the inside of the furnace wall.

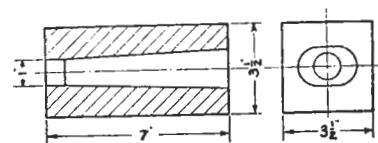
No. 2288 Tunnel. For use with $\frac{1}{2}$ " O. D. burners. Most extensively used. The required size of hole can be reamed into the brick and the burner tunnel is then cemented in place with its inner end approximately flush with the inside of the furnace wall. For additional details on installation, see page 3.



Burner Tunnels (cont'd.)

No. 2288A Tunnel. For use with $1\frac{1}{8}$ " O. D. burners. (See 2288 above)

No. 2321 Tunnel



No. 2321 Tunnel. For use with $\frac{1}{8}$ " O. D. burners. This burner tunnel is especially convenient where tunnels can be installed while bricking is in progress.

No. 2321A. For use with $1\frac{1}{8}$ " O. D. burners. (See 2321 above)

No. 2431—For $\frac{1}{8}$ " O. D. burners. Similar to No. 2288, above, but 6" long and tapering from 3" to 2 $\frac{1}{2}$ " O. D.

No. 2431A—For $1\frac{1}{8}$ " O. D. burners. Other dimensions same as No. 2431.

No. 2508 Tunnel. For use with $1\frac{1}{8}$ " O. D. burners. Made of sillimanite 4 $\frac{1}{2}$ " sq. x 7" long. (Not illustrated)

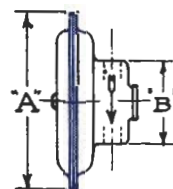
No. 2508A Tunnel. For use with $1\frac{3}{8}$ " O. D. burners. Other dimensions same as No. 2508.

An assembly comprising hard burned sillimanite burner tunnel with sheet metal casing, outer cast iron housing for attaching to the furnace wall, and burner tip can also be supplied. Details upon request.

Zero Governors.

This zero pressure valve cancels variations in the gas line pressure and reduces it to atmospheric, thus allowing the Venturi Mixer to entrain gas in constant ratio to the amount of air passing through.

Our wide experience in the use and manufacture of burner equipment has resulted in this sensitive but rugged governor, an important component of our Single Valve Ratio Set, which is described on page 4.



The valve is designed to deliver gas at atmospheric pressure (plus or minus .1" water column pressure) to the mixer and yet have a minimum leakage. (All governors of the "zero" type have a slight leakage and are not intended for use as shut-off valves).

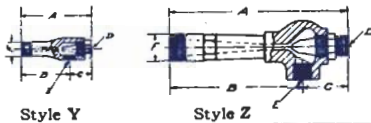
One zero governor may be used with two, three or even more Venturi Mixers, provided only that the distance between the zero governor and the mixers is kept to a minimum and does not exceed about 5' and that the line between them is of adequate size with a minimum number of bends. See page 4.

They are designed to operate satisfactorily with the gas supply at a pressure of 2" to 8" water column pressure. If the pressure is too high, the valve will tend to close, and the venturi mixer will be unable to entrain enough gas. A removable plug is provided in the valve body to permit checking of the suction exerted by the mixer.

No.	Connections Pipe Size	Capacity Cu. Ft. Gas/Hr.	Dimension A	Dimension B
ZG1	$\frac{3}{4}$ "	125	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
ZG2	$\frac{3}{4}$ "	175	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
ZG3	$\frac{3}{4}$ "	300	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
ZG4	$\frac{3}{4}$ "	400	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "
ZG5	1"	900	11 $\frac{3}{4}$ "	7"
ZG6	1 $\frac{1}{4}$ "	1300	11 $\frac{3}{4}$ "	7"
ZG7	1 $\frac{1}{2}$ "	1800	11 $\frac{3}{4}$ "	7"

NOTE: It is absolutely necessary to specify the kind of gas when ordering.

Venturi Mixers



Venturi Mixer No. †	DIMENSIONS			PIPE SIZE			Style
	A	B	C	Air D	Gas E	Outlet F	
11	2 3/4"	1 1/8"	1 3/8"	1 1/2"	1 1/4"	1 1/2"	Y
12	3 1/4"	2 1/8"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	Y
13	5 1/8"	3 1/8"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	Z
14	6 1/8"	5"	1 3/4"	1 3/4"	1 3/4"	1 3/4"	Z
15	9 3/8"	7 3/8"	2 1/4"	1 3/4"	1 3/4"	1 3/4"	Z
16	12 1/4"	9 1/4"	2 1/4"	1 3/4"	1 3/4"	1 3/4"	Z
17	15 1/8"	12 1/8"	3"	1 3/4"	1 3/4"	2"	Z
18	18"	14 1/8"	3 3/8"	1 3/4"	1 3/4"	2 1/2"	Z

† This No. indicates the body size only. When ordering select according to capacity from table at right.

These Venturi Mixers are supplied to use air at from 12 ounces to 24 ounces per square inch pressure at the mixer with gas at 2" to 8" water column pressure, the air entraining the gas as it passes through the Venturi throat of the mixer. A gas booster is unnecessary unless pipe lines are undersize.

Careful design and manufacture insures maximum operating efficiency, that is, maximum suction on the gas, thorough mixing of the air and gas, and proportioning of the air and gas within limits. If, however, there is considerable variation in the gas line pressure, it will be reflected in the proportions of air and gas in the mixture going to the burners.

These Venturi Mixers form an important part of our Single Valve Ratio Sets where the gas pressure is reduced to atmospheric by means of the Zero Governor, per the preceding page, thus giving with them the maximum operating range with one valve control.

On equipment where a Single Valve Ratio Set is desired (see page 4) and the burners are subdivided into two or more sections, one Venturi Mixer may be used on each section of burners with only one zero governor in the main gas line.

The capacity figures are based on one cubic foot of air per 130 B.T.U.'s, which is slightly on the reducing side and are based on

Venturi Mixers (cont'd.)

using air at the pressures indicated to deliver an air-gas mixture at a manifold pressure of 8" water column.

Note: To find air capacity in cu. ft. per min., divide number below by 7800.

Mixer No.		GAS CAPACITY IN B.T.U. PER HR. at Various Air Pressures at Mixer				
Body No.	Inject- or No.	12 oz.	16 oz.		20 oz.	24 oz.
			B.T.U.	Equiv. C.F.H. Nat. Gas		
No. 11 and 12 Venturi Mixer sizes are critical, specify hourly b.t.u. consumption required. If b.t.u. consumption is unknown, specify total amount and model number of burners each mixer is to serve. (Refer to Bulletin 629 for listing of mixer sizes.)						
11	12	11,200	13,000	12	14,500	15,900
13-10		17,700	20,500	20	23,000	24,900
13-12		25,500	29,500	28	32,800	36,000
*13-14		34,700	40,000	38	44,700	48,900
*13-16		45,200	52,200	51	58,300	63,900
*13-18		57,300	66,000	63	73,800	80,900
14-14		34,700	40,000	38	44,700	48,900
14-16		45,200	52,200	51	58,300	63,900
14-18		57,300	66,000	63	73,800	80,900
14-20		70,600	81,500	77	91,100	99,800
*14-22		85,400	98,500	94	110,100	120,600
*14-24		102,000	117,500	112	131,200	143,700
15-22		85,400	98,500	94	110,100	120,600
15-24		102,000	117,500	112	131,200	143,700
15-26		119,200	137,600	130	153,800	168,500
15-28		138,600	160,000	152	178,800	195,900
*15-30		159,100	183,600	175	205,200	224,800
16-30		159,100	183,600	175	205,200	224,800
16-32		180,800	208,700	198	233,300	255,600
16-34		204,100	235,600	224	263,400	288,500
16-36		229,100	264,400	251	295,500	323,800
*16-38		255,300	294,600	280	329,300	360,800
*16-40		282,800	326,400	310	364,900	399,700
17-38		255,300	294,600	280	329,300	360,800
17-40		282,800	326,400	310	364,900	399,700
17-42		311,900	360,000	342	402,400	440,900
17-44		342,100	394,800	375	441,300	483,500
17-46		373,400	430,900	409	481,700	527,700
*17-48		406,600	469,200	446	524,500	574,600
*17-52		477,800	551,400	524	616,400	675,300
18-48		406,600	469,200	446	524,500	574,600
18-52		477,800	551,400	524	616,400	675,300
18-56		554,600	640,000	608	715,500	783,800
18-60		635,700	733,600	697	820,100	898,500
18-64		723,500	834,900	793	933,400	1,022,500

*For maximum efficiency, next larger mixer body with same injector size should be selected.

Burner and S. V. R. Set Selection & Installation

The following should prove helpful in selecting suitable burners, tunnels and Single Valve Ratio Sets; however, it is not intended as a treatise on this subject.

1. Establish Holding Consumption from chart below:

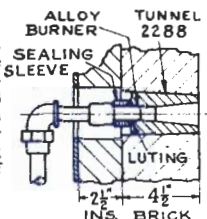
Kind of Lining	HOLDING GAS CONSUMPTION IN B.T.U./SQ. FT./HR. FOR DIFFERENT TYPES OF FURNACE WALLS AT VARIOUS TEMPS.			
	1000°F.	1500°F.	1700°F.	2300°F.
4 1/2" Fire Brick	1320	2750	3550	8000
4 1/2" Fire Brick 2 1/2" Silocel	315	730	930	2050
4 1/2" Insulating Refractory	330	790	1070	2500
4 1/2" Ins. Ref. 2 1/2" Block Ins.	170	365	445	1080
4 1/2" Ins. Ref. 2 1/2" Block Ins.	—	250	310	720

Note: The figures in the table above take into consideration the "Available Heat" in gas at various temperatures i.e. allowing for the heat loss in the flue gases. Factors used were as follows: 70% available at 1000°F., 60% at 1500°F., 56% at 1700°F., and 42% at 2300°F.

The outside furnace area in square feet times the above figure corresponding closest to your conditions plus an estimated figure for door losses etc., gives the holding gas consumption in B.T.U. per hour.

To select burners and mixing equipment, the maximum is usually fixed at three to four times the holding consumption. Using this figure, the number and sizes of burners may be determined from the data on pages 1 and 2.

Typical illustration of burner setting in furnace wall. Machlet Furnace Cement should be used around the burner at the coupling before it is positioned. A sealing sleeve held in by the burner coupling is used to hold the cement luting in place. Burner well should be open and of sufficient diameter for installing the burner tunnel. By allowing it to remain open, overheating of the burner is prevented. A union elbow in back of the burner facilitates installation.



2. To Establish Size and Number of Burners

Locate burners on 5" to 6" centers on small furnaces up to one foot centers on large furnaces firing from both sides of the furnace and staggered, end burners to be close to the end walls and stronger to compensate for radiation losses. Subdivide burners into suitable sections for manifolding and providing Single Valve Ratio Sets.

3. Selection of Single Valve Ratio Sets

In selecting S. V. R. Set, use maximum B. T. U. figures for both burners and S. V. R. Sets as given in preceding tabulations. If to be arranged as shown in the following illustration, Venturi Mixers should be selected according to the maximum gas consumption of

Burner and S. V. R. Set Burner Selection and Installation (Cont'd.)

each section of burners and the zero governor according to the maximum consumption for the entire furnace.

4. Tunnels

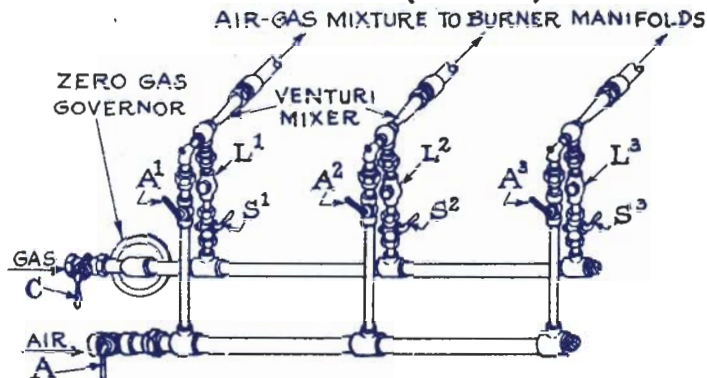
The correct tunnel for the burner selected will be obvious from the data on page 2. Under special circumstances, tunnels should be rammed up from a suitable refractory using a mandrel of the proper diameter.

5. Vents

Allow 1 square inch of vent per 30,000 B.T.U.'s maximum input.

6. Observation and Lighting Holes

These should be conveniently located to serve their purpose and provided with suitable plugs or closures.



Typical piping diagram for furnace with burners in three sections. Two cocks are provided in the gas line to each mixer, one for establishing the air-gas ratio which should be positioned and not changed thereafter. The A prime and S prime cocks may be used for shutting off their respective burner sections if this is desired for any reason. The A prime valves may also be used for establishing the input to each section.

Single Valve Ratio Sets

These sets comprise a Venturi Mixer as described on page 3, a zero governor as described on page 2, with the necessary fittings and valves, all sized according to the number and size of burners on the appliance where it is to be used.

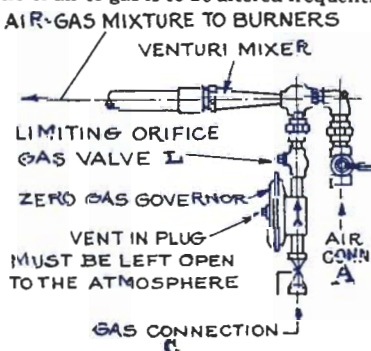
They give one valve adjustment of the gas and air input over an unusually wide operating range with advantages as follows:

1. Assurance of the same furnace atmosphere at all times.
2. Higher efficiency.
3. Greater ease in hand regulation of the temperature.
4. Ease of adjustment to meet various furnace atmosphere requirements and maintenance of such atmosphere over the operating range.
5. Readily installed either on new or existing equipment and inexpensive to maintain.

Adjustment of the air to gas ratio is by means of the ratio cock (or

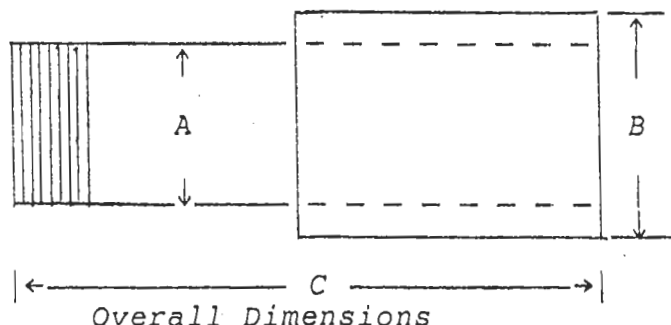
valve when used with bottled gas) when equipment is first placed in operation. Unless the ratio of air to gas is to be altered frequently, we recommend removal of the handle of this cock after adjustment has been made.

Where automatic temperature control is employed, a control valve in the air line only is required, thus simplifying this feature. Any possibility of incorrectly opening or closing the air or gas ports (both necessary with two valve control) relative to each other is avoided. Air and Gas Mixture from Venturi is piped to burners.



SINGLE VALVE RATIO SET NUMBER			GAS CAPACITY IN B.T.U. PER HR. at Various Air Pressures at Mixer						Air Conn.	GAS CONNECTION			Outlet Conn.
City Gas 500-600 B.T.U.	Mixed & Nat. Gas 800-1200 B.T.U.	Bottled Gas 2400-3200 B.T.U.	12 oz. B.T.U.	16 oz.		20 oz. B.T.U.	24 oz. B.T.U.	City Gas		Mixed & Nat. Gas	Bottled Gas		
				B.T.U.	Equiv C.F.H. Nat. Gas	Air Req'd. C.F.M.							
13- 8- $\frac{1}{4}$	13- 8- $\frac{1}{4}$	13- 8- $\frac{1}{4}$	11,200	13,000	12	2	14,500	15,900	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "
13-10- $\frac{1}{4}$	13-10- $\frac{1}{4}$	13-10- $\frac{1}{4}$	17,700	20,500	20	3	23,000	24,900	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "
13-12- $\frac{1}{4}$	13-12- $\frac{1}{4}$	13-12- $\frac{1}{4}$	25,500	29,500	28	4	32,800	36,000	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "
*14-14- $\frac{1}{4}$	*14-14- $\frac{1}{4}$	*14-14- $\frac{1}{4}$	34,700	40,000	38	5	44,700	48,900	$\frac{3}{4}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
*14-16- $\frac{1}{4}$	*14-16- $\frac{1}{4}$	*14-16- $\frac{1}{4}$	45,200	52,200	51	7	58,300	63,900	$\frac{3}{4}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
*14-18- $\frac{3}{8}$	*14-18- $\frac{1}{4}$	*14-18- $\frac{1}{4}$	57,300	66,000	63	9	73,800	80,900	$\frac{3}{4}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
14-20- $\frac{3}{8}$	14-20- $\frac{1}{4}$	14-20- $\frac{1}{4}$	70,600	81,500	77	11	91,100	99,800	$\frac{3}{4}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
*15-22- $\frac{1}{2}$	*15-22- $\frac{3}{8}$	*15-22- $\frac{1}{4}$	85,400	98,500	94	13	110,100	120,600	1"	$\frac{1}{2}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ "	1 $\frac{1}{4}$ "
*15-24- $\frac{1}{2}$	*15-24- $\frac{1}{2}$	*15-24- $\frac{1}{2}$	102,000	117,500	112	15	131,200	143,700	1"	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1 $\frac{1}{4}$ "
15-26- $\frac{1}{2}$	15-26- $\frac{3}{8}$	15-26- $\frac{1}{4}$	119,200	137,600	130	18	153,800	168,500	1"	$\frac{1}{2}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1 $\frac{1}{4}$ "
15-28- $\frac{3}{4}$	15-28- $\frac{1}{2}$	15-28- $\frac{1}{4}$	138,600	160,000	152	21	178,800	195,900	1"	$\frac{3}{4}$ "	$\frac{1}{2}$ "	$\frac{3}{8}$ "	1 $\frac{1}{4}$ "
*16-30- $\frac{3}{4}$	*16-30- $\frac{1}{2}$	*16-30- $\frac{1}{4}$	159,100	183,600	175	24	205,200	224,800	1 $\frac{1}{4}$ "	$\frac{3}{4}$ "	1"	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "
16-32- $\frac{3}{4}$	16-32- $\frac{1}{2}$	16-32- $\frac{1}{4}$	180,800	208,700	198	27	233,300	255,600	1 $\frac{1}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{4}$ "	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "
16-34-1	16-34- $\frac{1}{2}$	16-34- $\frac{1}{4}$	204,100	235,600	224	31	263,400	288,500	1 $\frac{1}{4}$ "	1"	$\frac{3}{4}$ "	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "
16-36-1	16-36- $\frac{3}{4}$	16-36- $\frac{1}{4}$	229,100	264,400	251	34	295,500	323,800	1 $\frac{1}{4}$ "	1"	$\frac{3}{4}$ "	$\frac{3}{8}$ "	1 $\frac{1}{2}$ "
*17-38-1	*17-38- $\frac{3}{4}$	*17-38- $\frac{3}{8}$	255,300	294,600	280	38	329,300	360,800	1 $\frac{1}{2}$ "	1"	$\frac{3}{4}$ "	1"	2"
*17-40-1	*17-40- $\frac{3}{4}$	*17-40- $\frac{3}{8}$	282,800	326,400	310	42	364,900	399,700	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1"	1"	2"
17-42-1	17-42-1	17-42- $\frac{1}{2}$	311,900	360,000	342	47	402,400	440,900	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1"	1"	2"
17-44-1	17-44-1	17-44- $\frac{1}{2}$	342,100	394,800	375	51	441,300	483,600	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1"	1"	2"
17-46-1	17-46-1	17-46- $\frac{1}{2}$	373,400	430,900	409	56	481,700	527,700	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1"	1"	2"
*18-48-1	*18-48-1	*18-48- $\frac{1}{2}$	406,600	469,200	446	61	524,500	574,600	2"	1 $\frac{1}{4}$ "	1"	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
18-52-1	18-52-1	18-52- $\frac{1}{2}$	477,800	551,400	524	71	616,400	675,300	2"	1 $\frac{1}{4}$ "	1"	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
18-56-1	18-56-1	18-56- $\frac{1}{2}$	554,600	640,000	608	82	715,500	783,800	2"	1 $\frac{1}{4}$ "	1"	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
18-60-1	18-60- $\frac{1}{2}$	18-60- $\frac{1}{2}$	635,700	733,600	697	95	820,100	898,500	2"	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
18-64-1	18-64-1	18-64- $\frac{1}{2}$	723,500	834,900	793	107	933,400	1,022,500	2"	1 $\frac{1}{2}$ "	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "

The Set Number consists of the mixer body number, the injector number, and the zero governor size. Sets marked with an asterisk can be supplied with the next smaller number mixer body and correspondingly smaller outlet connection and air connection.

FURNACE BURNERS WITH ALLOY SLEEVE

Burner Type	Dia. of Burner "A"	Dia. of Sleeve "B"	Overall Length "C"	Male Thread Conn.
FA-7 GA-7	7/8"	1-3/64"	3"	1/2"
FA-9 GA-9	1-1/8"	1-5/16"	3"	3/4"
FA-11 GA-11	1-3/8"	1-21/32"	4-1/2"	1"

The Type "F" and Type "G" Furnace Burners can be supplied with alloy sleeves to permit operation as High Velocity Open Flame Burners, or as Furnace Burners suited for external firing into a burner tunnel. When employed as external Furnace Burners, the tunnel or opening into which the burner fires should be at least 1/2" larger in inside diameter than the outside diameter of the burner. External burner operation provides a greater turndown range 7 or 8 to 1--than can be obtained with a conventional burner mounted in the tunnel.

The Type "FA" Sleeve Burners develop a spear point or focused flame, while the "GA" Sleeve Burners develop a more or less focus less high intensity flame. The ratings of the various size burners are the same as those of the equivalent Type "F" and Type "G" Furnace Burners listed on pages 1 and 2 of Bulletin 630.20. All sizes will operate at mixture pressures of 8" W.C. and above.

The Type "FA" and Type "GA" Sleeve Burners are manufactured completely of heat resisting alloy to provide a long life under the most adverse operating conditions.

AGF BURNER INC.

1955 Swarthmore Ave., Lakewood, NJ 08701

732-730-8090 (fax) 732-730-8060

www.agfburner.com

Oxygen-Gas Burner Equipment



The glass neck section of a television picture tube is bonded to the metal cone on a high-speed production rotary machine employing Type "B" Oxygen-Gas Tips at the Lancaster Tube Plant of the Radio Corporation of America. As the machine indexes, glass and metal are sealed together in progressive steps from preheating to final annealing.

Oxygen-Gas Burner Equipment is used where the temperature, heat intensity or flame concentration obtainable with Air-Gas Burner Equipment is insufficient to produce satisfactory results. Round and rectangular television tube manufacturing, electronic tube manufacturing, glass working, silver soldering, copper brazing, localized hardening and annealing are but a few of the many applications for which A.G.F. Oxygen-Gas Burner Equipment is used.

A.G.F. Oxygen-Gas Burner Equipment has been approved by the New York City Board of Standards and Appeals, Cal. No. 391-43SA.

Principle of Operation:

A.G.F. Oxygen-Gas Burner Equipment is designed for use with oxygen at a pressure of approximately 5 pounds per square inch and manufactured, natural or bottled gases at pressures ranging from 3" to 8"

water column. On larger appliances such as complicated glass working machines it is customary to use a Gas Booster to obtain gas pressures up to approximately 1 pound per square inch to help eliminate the possibility of marginal difficulties. Higher oxygen pressures can be used to obtain greater heat intensities if they are required.

A proper size A.G.F. Oxygen-Gas or Combination Oxygen-Air-Gas Venturi Mixer must be used to obtain maximum burner efficiency under all operating conditions. The use of an improper mixer can cause any one or all of the following conditions:

1. Inability to secure a proper mixture.
2. Flashbacks.
3. Oxygen in the gas line.
4. Mixture variations due to fluctuations in supply line pressures. This is especially true when operating with natural gas.

For fine adjustment of burner settings, we recommend the use of needle valves as described in Bulletin 670. A.G.F. Flow Meters, Bulletin 702, give a visual indication of various gas flows to the mixer and facilitate duplication of previously determined fire settings.

Operating and Installation Precautions:

The following precautions must be observed to obtain trouble-free operation of Oxygen-Gas Burner Equipment:

1. Use the correct A.G.F. Oxygen-Gas or Combination Oxygen-Air-Gas Venturi Mixer for each burner set-up.
2. Install a Fire Check of suitable capacity between the Venturi Mixer and the burners. The Fire Check does not prevent a flashback but retards combustion back into the mixture line in the event of a flashback. These Fire Checks must be used in oxygen-gas burner installations in New York City and certain other municipalities.
3. Do not install any valves, cocks or restrictions other than a Fire Check between the Venturi Mixer and the 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.
5. All piping should be of sufficient size. A common error that is made in burner installations is the use of under-size piping. Wherever possible the mixture supply line to the burners should be of equal or larger size than the outlet of the Venturi Mixer.
6. Wherever possible, all fittings and piping directly connected to oxygen-gas burners should be of copper or brass material to conduct heat away from the burners, thereby preventing over-heating.
7. Make certain that there is no oil or grease in the fittings, piping, etc. of the oxygen-gas burner set-up.

8. To minimize the possibility of flashing-back, the following rule should be observed: *When lighting Oxygen-Gas Burner Equipment, turn on gas first, oxygen second; when turning off the equipment, turn off oxygen first, gas last.*
9. The gas and oxygen should be shut-off immediately in the event of a flashback.

Instructions for Ordering Venturi Mixers and Fire Checks:

The following information will help us fill your order for Oxygen-Gas Burner Equipment promptly and correctly.

Venturi Mixers:

1. The b.t.u. capacity or cubic foot capacity per hour of the burners to be supplied by the Oxygen-Gas Venturi Mixer. If this information is not available, specify the amount and model number of the Oxygen-Gas Burners to be supplied by the mixer. If the burner model number is unknown, specify the amount of burners, the amount and drill size of the center-holes in each burner, and whether or not the burners are of the piloted type.
2. If the burners are to be operated on a combination oxygen-air-gas mixture, refer to Bulletin 670 for complete details and ordering instructions.
3. The type, b.t.u. value and pressure of gas to be used.
4. The oxygen pressure that is to be used (minimum recommended pressure 5 lbs. per square inch).
5. If the Oxygen-Gas Venturi Mixer is to be supplied complete with needle valves.

Fire Checks:

Specify the total amount of mixture to be passed through the Fire Check. If this information is not available, refer to Bulletin 669 for complete ordering instructions.

Oxygen-Gas Tips

The patented construction of A.G.F. Oxygen-Gas Tips permits operation through a wide range of flame setting without experiencing back-firing or blow-offs. For proper operation of these tips a correctly sized A.G.F. Oxygen-Gas Venturi Mixer should be employed.

A.G.F. Oxygen-Gas Tips are supplied with two dif-

ferent types of head construction—Type "B" Broached and Type "K" Knurled—and in two different body styles—Round Style "P" and Hexagon Style "Q".



Style P



Style Q

Type "B" Tips

A.G.F. Type "B" Oxygen-Gas Tips have broached heads. The orifices or ports of these tips are specially constructed to yield a very sharp fire without turbulence or raggedness, resulting in smooth and quiet operation. It is not unusual for a No. 1300-A Tip to give a flame of uniform diameter as far out from the face of the burner as 10" to 12". Type "B" Tips are primarily intended

for burning oxygen and gas; however, oxygen and hydrogen mixtures can be used when necessary. If a lengthened focus or reduced heat intensity is desired, a very small amount of air may be added to the mixture by the use of an A.G.F. Combination Oxygen-Air-Gas Venturi Mixer as described in Bulletin 670.

Oxygen Gas Type "B" Tip No.	Physical Characteristics						Flame Characteristics		Operational Ratings (11 1/4" W. C. Mixture Pressure)					Oxygen Gas Type "B" Tip No.
	Center Hole Drill Size	Burner Body Size	Burner Length	Threaded Connection	Body Style	Material	Focal Length	Overall Length	Venturi Mixer Selection Rating B.T.U. Capacity Per Hr. (1050 B.T.U. Natural Gas)	B.T.U. Capacity Per Hr. (525 B.T.U. Mfd. Gas)	B.T.U. Capacity Per Hr. (3500 B.T.U. Bottled Gas)	Oxygen Consumption Cu. Ft./Hr. at 5 lbs. per sq. in.		
8M	80	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/8"	2"	265	205	280	.5	8M	
8K	79	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/8"	2"	265	205	280	.5	8K	
8L	79	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/8"	2"	265	205	280	.5	8L	
8F	75	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/4"	2 3/4"	795	620	845	1.6	8F	
8C	75	15/64" Dia.	1/2"	# 6-32 Fem.	P	Alloy	1 1/4"	2 3/4"	795	620	845	1.6	8C	
†8A	70	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/4"	3"	1,050	820	1,120	2.1	†8A	
8B	70	15/64" Dia.	1/2"	# 6-32 Fem.	P	Alloy	1 1/4"	3"	1,050	820	1,120	2.1	8B	
8D	68	15/64" Dia.	1/2"	# 6-32 Fem.	P	Alloy	1 1/4"	4"	1,575	1,230	1,675	3.2	8D	
8E	68	15/64" Dia.	1/2"	# 6-32 Fem.	P	Alloy	1 1/4"	5"	2,100	1,640	2,240	4.25	8E	
8G	68	15/64" Dia.	1/2"	# 6-32 Fem.	P	Alloy	1 1/4"	5"	1,890	1,475	2,010	4.1	8G	
8H	68	1/4" Hex.	63/64"	1/4"-27 Male	Q	Alloy	1 1/4"	6"	1,890	1,475	2,010	4.1	8H	
8N	68	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/4"	6"	2,100	1,640	2,240	4.25	8N	
8P	65	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	1 1/4"	7"	2,310	1,800	2,310	4.7	8P	
8DX	58	1/4" Hex.	1/2"	1/4"-27 Male	Q	Alloy	3/8"	3 1/2"	3,675	2,865	3,900	7.4	8DX	
†1142A	58	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	3/8"	7"	3,675	2,865	3,900	7.4	†1142A	
1142C	58	1/2" Hex.	1"	1/8" F.P.T.	Q	Brass	3/8"	7"	3,675	2,865	3,900	7.4	1142C	
1142D	58	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	3/8"	7"	3,150	2,460	3,350	6.4	1142D	
1300B	56	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	3/8"	7"	3,885	3,150	4,110	7.8	1300B	
†1300A	55	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	3/8"	7"	5,250	4,100	5,600	10.6	†1300A	
1300AX	52	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/2"	7"	6,090	4,750	6,480	12.3	1300AX	
†1301A	49	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/2"	4 1/2"	7,875	6,140	8,390	16.0	†1301A	
1301C	49	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/2"	5"	6,510	5,080	6,930	13.3	1301C	
1301F	34	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/2"	5"	13,965	10,900	14,860	29.8	1301F	
†1301B	31	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/2"	4 1/2"	20,055	15,640	21,350	38.2	†1301B	
1300AB	4-70	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/4"	8"	5,460	4,260	5,810	11.1	1300AB	
†1301G	*4-63	1/16" Hex.	1 1/4"	1/8" M.P.T.	Q	Brass	1/4"	5"	7,875	6,180	8,400	16.0	†1301G	

†Standard burners normally stocked.

*Four center hole burners recommended for brazing, soldering and applications requiring a short, bushy fire.

Type "K" Tips

A.G.F. Type "K" Oxygen-Gas Tips have knurled heads and are of alloy construction. Type "K" Tips have a tendency to operate hotter than Type "B" Tips and their construction permits a greater proportion of

air to be admixed if desired by using an A.G.F. Combination Oxygen-Air-Gas Venturi Mixer as described in Bulletin 670.

Oxygen-Gas Type "K" Tip No.	Physical Characteristics					Material	Flame Characteristics		Operational Ratings (11 1/2" W. C. Mixture Pressure)				Oxygen-Gas Type "K" Tip No.
	Center Hole Drill Size	Burner Body Size	Burner Length	Threaded Connection	Body Style		Focal Length	Overall Length	Venturi Mixer Selection Rating B.T.U. Capacity Per Hr. (1050 B.T.U. Natural Gas)	B.T.U. Capacity Per Hr. (525 B.T.U. Mfd. Gas)	B.T.U. Capacity Per Hr. (350 B.T.U. Bottled Gas)	Oxygen Consumption Cu. Ft./Hr. at 5 lbs. per sq. in.	
960	76	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	1/8"	2"	360	285	380	.75	960
8	70	1/4" Dia.	1/2"	1/4"-27 Male	P	Alloy	1/8"	2 1/2"	1,050	825	1,120	2.1	8
1639	60	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	1/4"	5"	1,575	1,240	1,675	3.2	1639
693	55	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	6 1/2"	3,675	2,885	3,910	7.5	693
1638	50	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	5 1/2"	6,300	4,940	6,710	12.8	1638
814	49	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	4 1/2"	6,500	5,100	6,925	13.0	814
1637	44	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	4"	9,925	7,795	10,600	20.8	1637
1636	33	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	4 1/2"	16,000	12,550	17,050	34.4	1636
1635	30	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	3 1/2"	20,000	15,700	21,300	43.0	1635
1640	*3-58	13/32" Dia.	†	1/8" M.P.T.	P	Alloy	3/8"	6"	6,825	5,355	7,275	13.4	1640

†Standard and stock lengths are 1" (no letter suffix), 2" (letter suffix "D"). Special lengths can be supplied.

*Three center holes drilled in line.

Applications

A.G.F. Oxygen-Gas Tips, particularly the No. 1142, 1300 and 1301 series are extensively used in the television tube industry for sealing the face plate to the tube body, the tube body to the neck section and for many other applications. The No. 8 series of Oxygen-Gas Tips are used for piercing operations, fine local heating and tubulating. The No. 693-D and No. 814-D Oxygen-Gas Tips are used for cross fire set-ups, glass lathes, etc. Other Type "K" Tips are used in Oxygen-Gas Blowpipes.

When supplied with a suitable adapter any of the above Oxygen-Gas Tips may be used in a suitable Hand Blowpipe Frame as described in Bulletin 655. For localized heating operations, Oxygen-Gas Tips can be mounted in Opposed Flame Hand Torches as described in Bulletin 654.

For glass working applications requiring more heat intensity and concentration than is obtainable with air-gas burners, Oxygen-Gas Cross Fires—per Bulletin 652—employing either Type "B" or Type "K" Oxygen-Gas Tips are recommended.

Ball Joints



Various Ball Joints as described on page 4 of Bulletin 612 may be used with the above listed Oxygen-Gas Tips.

Special Burners

A.G.F. Type "B" and Type "K" Oxygen-Gas Tips can be supplied with special center-hole drilling to suit your special requirements.

Venturi Mixers

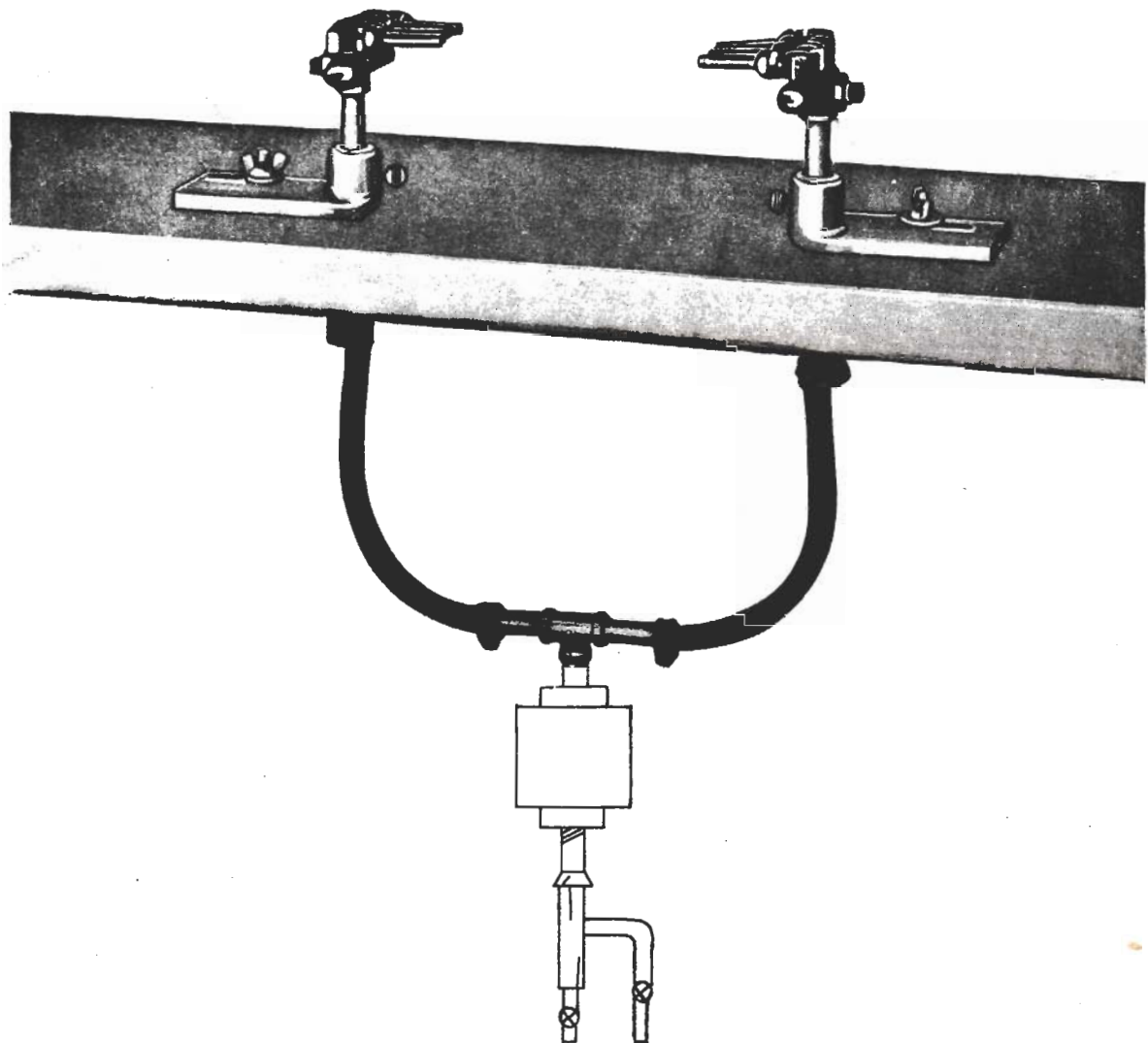
The use of an A.G.F. Oxygen-Gas Venturi Mixer as described in Bulletin 670 is recommended to supply a consistently proportioned mixture of oxygen and gas to the burners to permit maximum and efficient operation.

A.G.F. Combination Oxygen-Air-Gas Venturi Mixers can be furnished to admix a very small percentage of air when desired.

Please specify the following information when ordering Oxygen-Gas Venturi Mixers for use with Type "B" and Type "K" Oxygen Gas Tips:

- The amount and model number of the Oxygen-Gas Tips to be supplied by the Venturi Mixer.
- The type, b.t.u. value and pressure of gas to be used.
- The oxygen pressure that is to be used. (Minimum recommended pressure is 5 lbs. per square inch.)
- If the Oxygen-Gas Venturi Mixer is to be supplied complete with needle valves and Fire Check.

Oxygen-Gas Cross Fires



A.G.F. Oxygen-Gas Cross Fires equipped with the Oxygen-Gas Tips described in Bulletin 651 are used for all types of glass working and for applications which require more heat intensity and concentration than is obtainable with Air-Gas Cross Fires as described in Bulletin 613.

A.G.F. Oxygen-Gas Cross Fires are supplied with from one to eight Oxygen-Gas Tips in each opposing manifold. Oxygen-Gas Cross Fires are supplied complete with hex elbows, No. 700 Ball Joints as described in Bulletin 612, Sliding Bases, Fire Check and an Oxygen-Gas Venturi Mixer with needle valves.

Manifolds



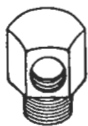
Manifolds are designed for maximum efficiency. Cast with a tapered canal for uniform feeding of each burner, they insure the same flame size from each burner thus providing maximum heat concentration at the focal point.

Connections on top for hex elbows are $\frac{1}{4}$ " pipe thread on $1\frac{1}{8}$ " centers. For feeding, $\frac{3}{8}$ " pipe thread connections are provided bottom and back, either of which may be used and the other plugged. The threaded connection in the back permits a horizontal connection

to be made to the manifold or permits mounting the manifold in the vertical plane for special applications. Manifold radius: $5\frac{1}{16}$ ".

Manifolds are supplied for 3, 4, 5, 6 or 8 tips. For two tips, the center connection on the three tip manifold is plugged. For seven tips, the end connection on the eight tip manifold is plugged.

Hex Elbows



Special machine-made hexagon brass elbows are employed for adjustment and alignment and for convenience, inasmuch as a wrench can be used on them. Connections are for $\frac{1}{4}$ " pipe thread inlet and $\frac{1}{8}$ " pipe thread outlet.

Ball Joints



Suitable Ball Joints are provided for the type of burners used in the Cross Fire to permit adjustment of the direction of the firing of the burners.

Vertical Risers

Vertical Risers 11" long are supplied as standard with all A.G.F. Cross Fires. Longer or shorter risers can be supplied as specified by customer.

Venturi Mixer

An A.G.F. Oxygen-Gas Venturi Mixer as described in Bulletin 670 complete with needle valves and equipped with a suitable size Fire Check is supplied to serve the Cross Fire Manifolds. This mixer supplies a consistently proportioned mixture of oxygen and gas to the burners to permit maximum and efficient operation.

For special applications, A.G.F. Combination Oxygen-Air-Gas Venturi Mixers can be supplied to enable admixture of a very slight amount of air.

Special Cross Fires

Special Oxygen-Gas Cross Fires can be supplied for your particular requirements.

Ordering Instructions

Specifying the following information will help us fill your order for Oxygen-Gas Cross Fires promptly and correctly.

1. For a standard two manifold Oxygen-Gas Cross Fire, specify the amount and model number of the Oxygen-Gas Tips desired in each of the two opposing manifolds.

Examples: An Oxygen-Gas Cross Fire having six No. 1142-A Oxygen-Gas Tips in each of the two opposing manifolds would be designated as an OG-6X6-1142-A.

An Oxygen-Gas Cross Fire having three No. 693-D Oxygen-Gas Tips in each of the two opposing manifolds would be designated as an OG-3X3-693-D.

2. If only a single manifold Oxygen-Gas Cross Fire is desired, specify the amount and model number of the Oxygen-Gas Tips desired in the following manner:

Examples: A single Manifold Oxygen-Gas Cross Fire with six No. 1142-A Oxygen Tips would be designated as an OG-6XO-1142-A.

A single manifold Oxygen-Gas Cross Fire with three No. 693-D Oxygen-Gas Tips would be designated as an OG-3XO-693-D.

3. If sliding bases are not desired, please specify "without sliding bases."
4. If ball joints are not desired, please specify "without ball joints."
5. An A.G.F. Oxygen-Gas Venturi Mixer complete with needle valves and Fire Check is normally supplied.

If an A.G.F. Combination Oxygen-Air-Gas Venturi Mixer is desired, please specify when ordering.
6. *If possible*, please specify the following information with every order.

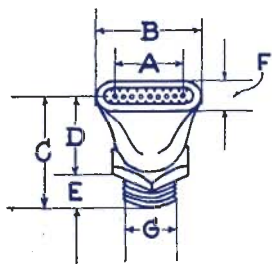
- (a) Type, b.t.u. value and pressure of gas to be used.
- (b) The oxygen pressure that is to be used. (Minimum recommended pressure is 5 lbs. per square inch.)
- (c) Air pressure if a Combination Oxygen-Air-Gas Venturi Mixer is to be supplied.

Oxygen-Gas Fish Tail Burners

A.G.F. Oxygen-Gas Fishtail Burners produce a hatchet-shape or fishtail type of flame pattern similar to that of the Air-Gas Fishtail Burners illustrated in Bulletin 614 but having a greater heat intensity and concentration. Careful testing of each burner insures uniformity of flame and operating characteristics.

To give long life under severe operating conditions A.G.F. Piloted Type Oxygen-Gas Fishtail Burners are manufactured of heat-resistant alloy, while the Unpiloted Type are fabricated of either alloy or chrome plated brass. If desired, A.G.F. Fishtail Burners can be supplied with special provisions for water cooling.

Piloted Type

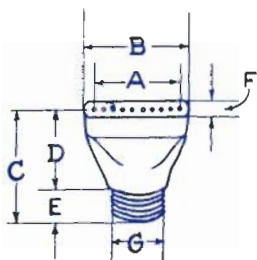


A.G.F. Piloted Type Oxygen-Gas Fishtail Burners have the flames from the main center-holes surrounded and supported by tiny pilots. These pilot holes, which burn the oxygen-gas mixture at a low velocity, support and help retain the flames from the main center-holes, thereby permitting the piloted type of burner to operate at a higher velocity than the unpiloted type. The flame from this type of burner is slightly heavier than that from the unpiloted type; however, it is well suited for operations such as ampule cutting, working hard glasses (Pyrex, Nonex) where high temperatures are required, working lead glass where the extreme oxidizing conditions obtainable with this type of burner are desirable, silver soldering, etc. If a lengthened focus or reduced heat intensity is desired a very small percentage of air may be added to the mixture by using an A.G.F. Combination Oxygen-Air-Gas Venturi Mixer as described in Bulletin 670.

Oxygen-Gas Piloted Fishtail Burner No.	PHYSICAL CHARACTERISTICS								FLAME CHARACTERISTICS				OPERATIONAL RATINGS (11½" W. C. Mixture Pressure)				Oxygen-Gas Piloted Fishtail Burner No.	
	Center-Holes		A	B	C	D	E	F	G	Width at Focus	Overall Length	Focal Length	Shape	Venturi Mixer Selection Rating	B.T.U. Capacity Per Hr. (325 B.T.U. Manufactured Gas)	B.T.U. Capacity Per Hr. (2500 B.T.U. Bottled Gas)		Oxygen Consumption Cu. Ft./Hr. at 5 lbs. per sq. in.
	Number	Drill Size No.												B.T.U. Cap. Per Hr. (1050 B.T.U. Nat. Gas)				
†1012	4	64	11/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	1/2"	2 1/2"	1/4"	Divergent	6,300	4,940	6,725	13.8	†1012
1012A	4	64	11/64"	9/16"	3/4"	5/8"	1/8"	1/4"	#10-32 Fem.	1/2"	5"	1/4"	Divergent	6,300	4,940	6,725	13.8	1012A
1012B	4	74	11/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	2 1/2"	1/8"	Divergent	2,100	1,650	2,280	4.3	1012B
1012C	6	78	11/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	6"	1/8"	Parallel	1,575	1,235	1,680	3.2	1012C
1012D	5	75	11/64"	9/16"	3/4"	5/8"	1/8"	1/4"	#10-32 Fem.	3/8"	3"	1/8"	Divergent	2,310	1,815	2,460	4.8	1012D
1012E	5	78	15/64"	3/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	4"	1/8"	Parallel	1,470	1,155	1,570	3.1	1012E
†1012F	5	71	15/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	7"	1/8"	Parallel	3,675	2,875	3,915	7.5	†1012F
1012G	4	64	15/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	8"	1/4"	Parallel	6,825	5,360	7,275	16.0	1012G
1012H	5	78	15/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	2"	1/8"	Divergent	1,470	1,155	1,575	3.0	1012H
1012J	6	70	15/64"	9/16"	7/8"	5/8"	1/4"	1/4"	1/4"-27 Male	3/8"	8"	3/16"	Parallel	5,250	4,115	5,600	10.7	1012J
1081	9	62	39/64"	15/16"	15/16"	15/16"	3/8"	5/16"	1/8" F.P.T.	7/8"	3"	1/4"	Divergent	12,080	9,500	12,900	18.5	1081
†1081A	9	62	39/64"	15/16"	15/16"	15/16"	3/8"	5/16"	1/4" M.P.T.	7/8"	3"	1/4"	Divergent	12,080	9,500	12,900	18.5	†1081A
1081B	9	62	1/2"	15/16"	15/16"	15/16"	3/8"	5/16"	1/4" M.P.T.	3/4"	12"	1/4"	Parallel	12,780	10,020	13,600	19.6	1081B
1081C	9	74	19/32"	15/16"	15/16"	15/16"	3/8"	5/16"	1/4" M.P.T.	7/8"	3"	3/16"	Divergent	12,780	10,020	13,600	19.6	1081C
1081E	5	62	39/64"	15/16"	15/16"	15/16"	3/8"	5/16"	1/4" M.P.T.	7/8"	3"	1/4"	Divergent	9,225	7,250	9,850	14.1	1081E
1081F	10	71	39/64"	15/16"	15/16"	15/16"	3/8"	5/16"	1/4" M.P.T.	7/8"	3"	1/8"	Divergent	6,375	5,000	6,800	9.8	1081F

† Standard burners normally stocked.

Unpiloted Type



Where a sharper flame than that obtainable from A.G.F. Piloted Type Oxygen-Gas Fishtail Burners is required and the burners may be operated at a lower velocity than the Piloted Type, A.G.F. Unpiloted Type Oxygen-Gas Fishtail Burners are recommended. These burners are suitable for applications such as fine cutting, forming, etc. which require an intense, highly concentrated flame.

Oxygen-Gas Unpiloted Fishtail Burner No.	PHYSICAL CHARACTERISTICS								FLAME CHARACTERISTICS				OPERATIONAL RATINGS AT INDICATED MIXTURE PRESSURES						Oxygen-Gas Unpiloted Fishtail Burner No.
	Center-Holes		A	B	C	D	E	F	G	Width at Focus	Overall Length	Focal Length	Shape	Mixture Pressure Inches Water Column	Venturi Mixer Selection Rating	B.T.U. Capacity Per Hr. (525 B.T.U. Manufactured Gas)	B.T.U. Capacity Per Hr. (2500 B.T.U. Bottled Gas)	Oxygen Consumption Cu. Ft./Hr. at 5 lbs. per sq. in.	
	Number	Drill Size No.													B.T.U. Cap. Per Hr. 1050 B.T.U. Nat. Gas				
†15	5	71	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	3/8"	6"	1/4"	Parallel	11"	4,200	3,300	4,435	9.5	†15
15A	2	71	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	—	4"	3/16"	Parallel	4"	1,050	825	1,120	2.1	15A
15B	2	58	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	—	4 1/2"	1/4"	Parallel	6"	3,460	2,740	3,680	7.0	15B
15C	3	71	1/8"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	1/4"	6"	3/16"	Parallel	6"	2,100	1,650	2,275	4.3	15C
15D	5	80	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	3/8"	2"	1/16"	Parallel	4"	1,155	910	1,230	2.3	15D
15E	3	80	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	—	1 1/2"	1/32"	Parallel	4"	925	725	985	2.0	15E
15F	2	80	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	—	1 1/2"	1/32"	Parallel	4"	655	515	695	1.2	15F
15G	5	77	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	3/8"	3"	1/4"	Parallel	4"	1,260	990	1,340	2.6	15G
15H	4	71	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	3/8"	7"	1/4"	Divergent	6"	3,680	2,590	3,920	7.5	15H
15K	3	71	1/4"	13/32"	5/8"	7/16"	3/16"	1/8"	1/4"-27 Male	—	7"	1/4"	Parallel	6"	2,100	2,275	1,650	4.3	15K
†1253	10	71	3/64"	23/32"	13/16"	13/16"	3/8"	3/32"	1/8" M.P.T.	3/4"	5"	1/8"	Parallel	6"	5,250	4,110	5,600	10.6	†1253
1253A	*20	71	39/64"	23/32"	13/16"	13/16"	3/8"	3/32"	1/8" M.P.T.	3/4"	5"	1/8"	Parallel	6"	8,400	6,600	8,950	17.0	1253A
1253C	6	71	39/64"	23/32"	13/16"	13/16"	3/8"	3/32"	1/8" M.P.T.	3/4"	2"	1/8"	Parallel	6"	3,680	2,885	3,925	7.5	1253C
1253D	4	71	39/64"	23/32"	13/16"	13/16"	3/8"	3/32"	1/8" M.P.T.	3/4"	2"	1/8"	Parallel	6"	2,625	2,060	2,800	5.5	1253D
1253F	12	70	19/32"	23/32"	13/16"	13/16"	3/8"	3/32"	1/8" M.P.T.	3/4"	7"	1/4"	Parallel	6"	6,835	5,360	7,275	13.8	1253F
†1368	15	71	1"	13/16"	17/16"	11/16"	3/8"	3/32"	1/4" M.P.T.	1 1/4"	5"	1/8"	Parallel	6"	7,555	5,940	8,050	15.5	†1368
1621	22	71	1 1/2"	1 1/16"	1 1/2"	1 1/4"	3/8"	1/8"	1/4" M.P.T.	1 5/8"	5"	1/8"	Parallel	6"	11,000	8,665	11,725	20.1	1621
1633	27	71	1 5/8"	2 1/16"	1 1/8"	1 3/8"	3/8"	1/8"	1/4" M.P.T.	2"	5"	1/8"	Parallel	6"	13,550	10,650	14,425	24.8	1633
1801	31	71	1 7/8"	2 1/16"	2 5/16"	2 1/8"	3/8"	1/8"	1/4" M.P.T.	2"	5"	1/8"	Parallel	6"	17,000	—	—	32.0	1801

†Standard burners normally stocked.

*Double row drilling, ten holes per row.

Hand Torches and Blowpipes

For special heating operations, Oxygen-Gas Fishtail Burners can be mounted in Opposed Flame Hand Torches as described in Bulletin 654.

When supplied with a suitable adapter any of the Oxygen-Gas Fishtail Burners can be used in a Hand Blowpipe Frame as described in Bulletin 655.

Ball Joints

Various Ball Joints as described on page 4 of Bulletin 612 and on page 1 of Bulletin 614 can be used with these Oxygen-Gas Fishtail Burners.

Special Burners

Special Piloted and Unpiloted Oxygen-Gas Fishtail Burners can be supplied for your particular requirement.

Manifolds

Curved or straight manifolds equipped with any of the above Oxygen-Gas Fishtail Burners and similar to the manifolds described on page 4 of Bulletin 614 can be supplied to suit your requirements.

Venturi Mixer

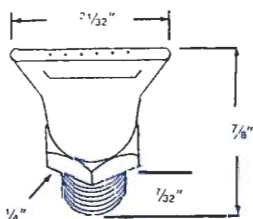
The use of an A.G.F. Oxygen-Gas Venturi Mixer as described in Bulletin 670 is recommended to supply a consistently proportioned mixture of oxygen and gas to both Piloted and Unpiloted Oxygen-Gas Fishtail Burners to permit maximum and efficient operation.

A.G.F. Combination Oxygen-Air-Gas Venturi Mixers can be furnished to admix a very small percentage of air to the oxygen-gas mixture supplied to Piloted Type Oxygen-Gas Fishtail Burners when desired.

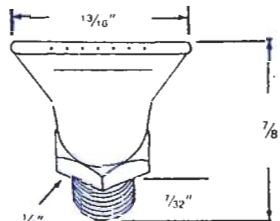
Please specify the following information when ordering Oxygen-Gas Venturi Mixers for use with Oxygen-Gas Fishtail Burners:

- The amount and model number of the Oxygen-Gas Fishtail Burners to be supplied by the Venturi Mixer.
- The type, b.t.u. value and pressure of gas to be used.
- The oxygen pressure that is to be used. (Minimum recommended pressure is 5 lbs. per square inch.)
- If the Oxygen-Gas Venturi Mixer is to be supplied complete with needle valves and Fire Check.

"New"
Single Row



Style 1

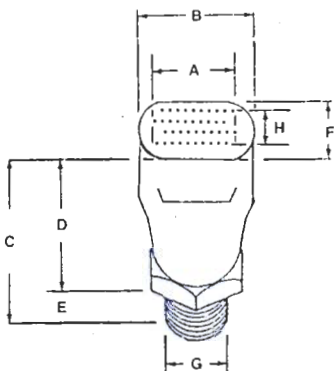


Style 2

No. 1414 Series Single Row Fishtail Burners

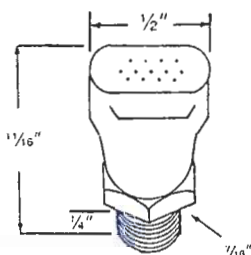
Burner Number	Drill Size Center Hole	Amount of Holes	Center to Center of Outside Holes	Body Style	BTU/HR Capacity 1050 BTU Nat. Gas	Material	Flame Shape	Characteristics Width at Focus	Remarks
1414	80	2	7/16"	1	—	St. Steel or Chrome Pltd Brass	Parallel	9/16"	
1414A	80	2	7/16"	1	—	St. Steel or Chrome Pltd Brass	Parallel	9/16"	
1414B	OBSOLETE								
1414C	80	2	5/16"	1	—	St. Steel or Chrome Pltd Brass	Parallel	7/16"	
1414D	80	4	7/16"	1	600	St. Steel or Chrome Pltd Brass	Parallel	9/16"	
1414E	71	8	3/8"	1 or 2	4800	St. Steel or Chrome Pltd Brass	Parallel	9/16"	Specify Body Style Desired
1414F	75	7	3/8"	1 or 2	2735	St. Steel or Chrome Pltd Brass	Parallel	1/2"	Specify Body Style Desired
1414G	73	7	.400"	1	3575	St. Steel or Chrome Pltd Brass	Parallel	.525"	
1414H	73	6	5/16"	1 or 2	3000	St. Steel or Chrome Pltd Brass	Parallel	7/16"	Specify Body Style Desired
1414J	75	7	9/16"	2	2735	St. Steel or Chrome Pltd Brass	Parallel	1 1/16"	
1414K	75	7	1/2"	1	2735	St. Steel or Chrome Pltd Brass	Parallel	5/8"	
1414L	75	9	7/16"	1	3500	St. Steel or Chrome Pltd Brass	Parallel	9/16"	
1414M	69	8	7/16"	1	6050	St. Steel or Chrome Pltd Brass	Parallel	9/16"	

Multi-Row



No. 1253 Series Multi-Row Fishtail Burners

Burner Number	Center Holes			Physical Characteristics								Flame Characteristics					
	Number Of Rows (Staggered) On 1/16" & to 4	Number Of Holes	Drill Size	A	B	C	D	E	F	G	H	Width at Focus	Overall Length	Focal Length	BTU Cap. Per Hour 1050 BTU Nat. Gas	Shape	Material
1253J	3	30	68	9/16"	29/32"	5/16"	1"	5/16"	1 1/32"	1/8" MPT	1/8"	1 1/16"	6"	1/8"	18,000	Parallel	St. Steel
1253L	2	20	71	39/64"	29/32"	5/16"	1"	5/16"	7/32"	1/8" MPT	1/16"	47/64"	6"	1/8"	12,000	Parallel	St. Steel
1253M	3	30	71	9/16"	29/32"	5/16"	1"	5/16"	1 1/32"	1/8" MPT	1/8"	1 1/16"	6"	1/8"	18,000	Parallel	St. Steel
1253MA	4	40	71	9/16"	25/32"	5/16"	1"	5/16"	3/8"	1/8" MPT	3/16"	1 1/16"	6"	1/8"	24,000	Parallel	St. Steel
1253MB	5	50	71	9/16"	25/32"	5/16"	1"	5/16"	13/32"	1/8" MPT	1/4"	1 1/16"	6"	1/8"	30,000	Parallel	St. Steel



1918 Series Multi-Row Fishtail Burners

Burner Number	Center Hole Size	Amount of Rows	Center to Center of Outside Rows	Amount of Holes			Width of Outside Holes, Center to Center	Flame Shape	BTU/Hr. Capacity, 1050 Nat. Gas	Flame Characteristics	
				1st Row	2nd Row	3rd Row				Material	Width at Focus
1918	71	2	3/32"	5	5		1/4"	Parallel	6,000	Brass	3/8"
1918A	80	2	3/32"	5	5		1/4"	Parallel	1,600	Brass	3/8"
1918B	71	3	3/32"	5	5	2, One at each end	3/8"	Parallel	7,200	Brass	1/2"
1918C	80	3	3/32"	5	5	2, One at each end	3/8"	Parallel	1,950	Brass	1/8"
1918D	76	3	5/64"	4	5	4	3/32"	Parallel	4,600	Brass	13/32"
1918DM	76	3	5/64"	4	5	4	3/32"	Parallel	4,600	Monel St. Steel	13/32"

Oxygen-Gas Hand Torches

A.G.F. Oxygen-Gas Hand Torches are sturdily constructed of brass tubing to permit bending for adjustment of burner spacing and yet have sufficient strength to withstand shop usage. Suitable insulation or wooden handles are provided to balance the Hand Torches and to minimize hand fatigue.

A.G.F. Oxygen-Gas Hand Torches are regularly supplied with the standard burners listed for each model; however, they may be equipped with any of the Oxygen-Gas Tips described in Bulletin 651 or Oxygen-Gas Fish-tail Burners per Bulletin 653 which have suitable threaded connections.

Application

Oxygen-Gas Hand Torches are used for many applications such as:

1. Sealing ampules.
2. Sealing off and welding on tubing for neon signs, laboratory glassware, etc.
3. Silver soldering and brazing of tubing, round pieces, etc.

Special Hand Torches

Oxygen-Gas Hand Torches can be supplied for your special requirements. A.G.F. Hand Torches are also supplied for air-gas operation as described in Bulletin 615.

Rubber Tubing

Suitable rubber tubing can be furnished for connecting the Hand Torch and Venturi Mixer.

Venturi Mixer

For proper operation of A.G.F. Oxygen-Gas Hand Torches the use of A.G.F. Oxygen-Gas Venturi Mixers is recommended. A.G.F. Oxygen-Gas Venturi Mixers supply a consistently proportioned mixture of air and gas to the burners of the Hand Torch.

A.G.F. Combination Oxygen-Air-Gas Venturi Mixers can be furnished to admix a very small percentage of air to the oxygen-gas mixture supplied to Piloted Type Oxygen-Gas Fishtail Burners or Oxygen-Gas Tips.

Please specify the following information when ordering Venturi Mixers for use with Hand Torches:

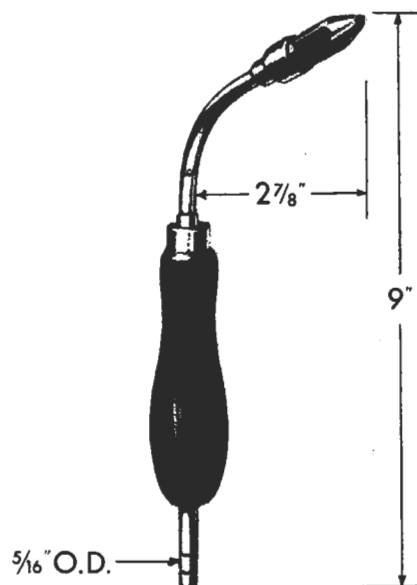
- (a) The model number of the torch and the model number of the burners with which the torch will be equipped.

- (b) The type, b.t.u. value and pressure of gas to be used.
- (c) The oxygen pressure that is to be used. (Minimum recommended pressure is 5 lbs. per square inch.)
- (d) If the Oxygen-Gas Venturi Mixer is to be supplied complete with needle valves and Fire Check.

Installation

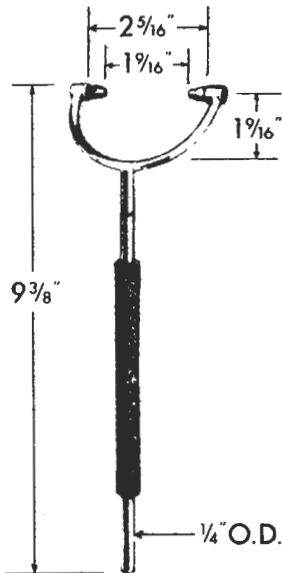
Installation of Oxygen-Gas Hand Torches is similar to that of the Air-Gas Hand Torch as illustrated on page 1 of Bulletin 615, with the exceptions that an oxygen-gas mixer is used in place of an air-gas mixer and a Fire Check is installed in the mixture supply line between the outlet of the Venturi Mixer and the Hand Torch.

No. 1258-OX Hand Torch



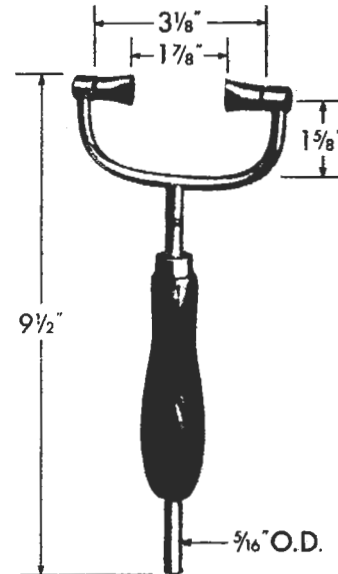
The No. 1258-OX Hand Torch is normally supplied with a No. 1142-A Oxygen-Gas Tip as described in Bulletin 651. The No. 1258-OX Hand Torch Frame will accommodate any 1/8" or 1/4"-27 male threaded Oxygen-Gas Fishtail Burner, Oxygen-Gas Tip, etc. If a burner other than the No. 1142-A is desired, please specify in the following manner: "No. 1258-OX Hand Torch Frame complete with Burner No."

No. 412-OX Hand Torch



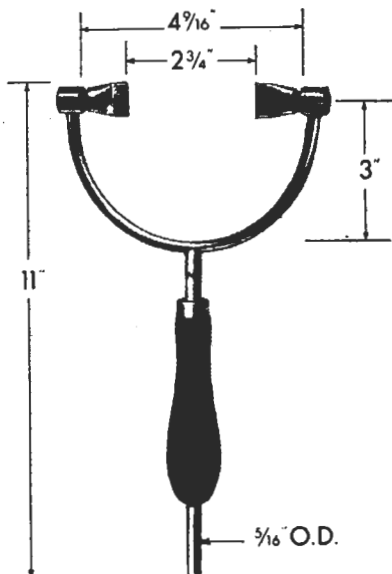
The No. 412-OX Hand Torch is normally supplied with two No. 8-A Oxygen-Gas Tips as described in Bulletin 651. The No. 412-OX Hand Torch Frame will accommodate any $\frac{1}{4}$ "-27 male threaded Oxygen-Gas Tip, Unpiloted Oxygen-Gas Fishtail Burner, etc. If burners other than the No. 8-A Tips are desired, please specify in the following manner: "No. 412-OX Hand Torch Frame complete with Burners No."

No. 659-OX Hand Torch



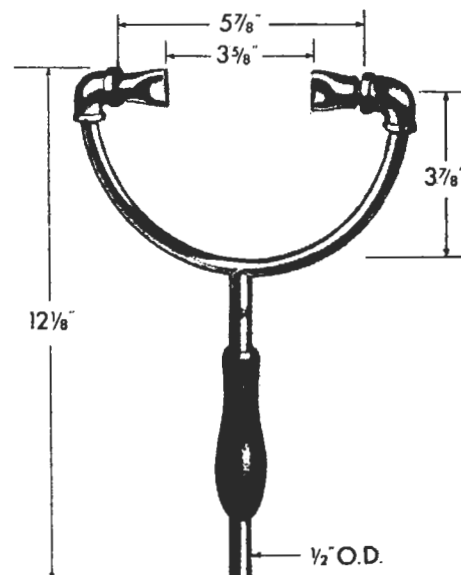
The No. 659-OX Hand torch is normally supplied with two No. 1012 Oxygen-Gas Fishtail Burners as described in Bulletin 653. The No. 659-OX Hand Torch Frame will accommodate any $\frac{1}{4}$ "-27 male threaded Oxygen-Gas Fishtail Burner, Oxygen-Gas Tip, etc. If burners other than No. 1012 are desired, please specify in the following manner: "No. 659-OX Hand Torch Frame complete with Burners No."

No. 658-OX Hand Torch



The No. 658-OX Hand Torch is normally supplied with two No. 1253 Oxygen-Gas Fishtail Burners as described in Bulletin 653. The No. 658-OX Hand Torch Frame will accommodate any $\frac{1}{8}$ " male threaded Oxygen-Gas Fishtail Burner, etc. If burners other than No. 1253 are desired, please specify in the following manner: "No. 658-OX Hand Torch Frame complete with Burners No."

No. 1022-OX Hand Torch



The No. 1022-OX Hand Torch is normally supplied with two No. 1081-A Oxygen-Gas Fishtail Burners as described in Bulletin 653. The No. 1022-OX Hand Torch Frame will accommodate any $\frac{1}{4}$ " male threaded Oxygen-Gas Fishtail Burner, etc. If burners other than No. 1081-A are desired, please specify in the following manner: "No. 1022-OX Hand Torch Frame complete with Burners No."

Oxygen-Gas Hand Blowpipes

A.G.F. No. 583 Oxygen-Gas Hand Blowpipes are recommended for applications requiring temperatures and heat intensities not obtainable with the Air-Gas Blowpipes described in Bulletin 610.

A.G.F. No. 583 Oxygen-Gas Hand Blowpipes are equipped with needle valves and employ the venturi principle for proportionate premixing of the oxygen and gas before it reaches the blowpipe burner head. These features permit operation of A.G.F. Oxygen-Gas Blowpipes at higher velocities than the ordinary nozzle mixing type.

A.G.F. No. 583 Oxygen-Gas Hand Blowpipes when equipped with a correctly sized adapter as illustrated in Figures A through D below can be supplied with any of the Oxygen-Gas Tips per Bulletin 651 or Oxygen-Gas Fishtail Burners per Bulletin 653.

These versatile Blowpipes can also be operated on air and gas when supplied with No. 0-N, 00-N, 000-N or 1-EN Air-Gas Blowpipe Heads. Burners as described in Bulletins 612, 614, etc. can be supplied with suitable adapters for use in the No. 583 Oxygen-Gas Blowpipe Frame.

Ordering Instructions

When ordering, specify No. 583 Oxygen-Gas Blowpipe complete with

Adapter and specify the model number and type of burner with which it will be used.

If Adapter and Burner only are desired, please order stating the model number and type of burner desired and specify that it is to be used in a No. 583 Blowpipe Frame. *Example:* Adapter and No. 1012 Oxygen-Gas Fishtail Burner for use in No. 583 Blowpipe Frame.

Stand

A Universal Style Clamp and Stand as illustrated on Bulletin 610-1 can be supplied to convert the Oxygen-Gas Hand Blowpipe to a Universal Stand Type for bench work.

Applications

A.G.F. Oxygen-Gas Hand Blowpipes have found wide application in the dental industry, glass novelty industry and are used for many applications such as copper brazing, silver soldering, etc.

Physical Specifications

Overall length—11 $\frac{1}{4}$ ".

Supply Connections, Oxygen and Gas— $\frac{5}{16}$ " o.d.

Weight—12 ounces.



Fig. A



Fig. B



Fig. C



Fig. D



Fig. E

Illustrated at right, No. 583 Blowpipe Frame complete with No. 1142-A Oxygen-Gas Tip and Adapter.

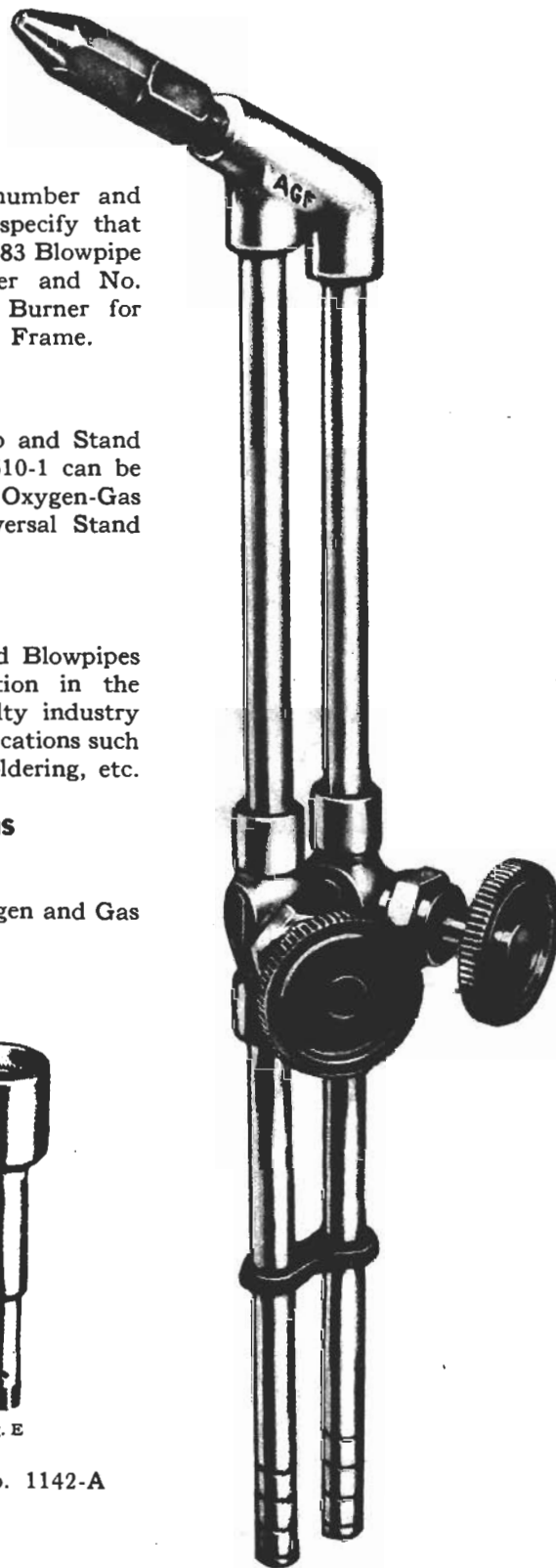
Fig. A. No. 1636 Oxygen-Gas Tip with Adapter.

Fig. B. No. 8-A Oxygen-Gas Tip with Adapter.

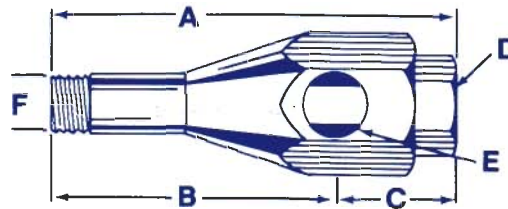
Fig. C. No. 1012 Oxygen-Gas Fishtail Burner with Adapter.

Fig. D. No. 1081-A Oxygen-Gas Fishtail Burner with Adapter.

Fig. E. No. 0 Air-Gas Blowpipe Head.



No. 0-11 & 0-12 Oxy/Gas Venturi Mixers



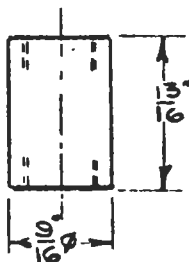
Venturi Mixer No. †	DIMENSIONS			PIPE SIZE			Material
	A	B	C	Oxy D	Gas E	Outlet F	
11	2-5/8"	1-13/16"	13/16"	1/8"	1/8"	1/8"	BRASS
12	3-7/16"	2-11/32"	1-3/32"	1/4"	1/4"	3/8"	BRASS

Procedure for Selection of Correct Size Venturi Mixers

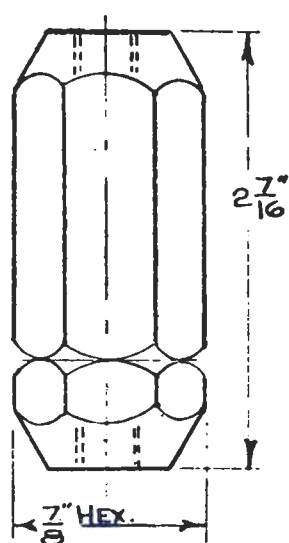
1. Determine for the particular model burner, its total hourly B.t.u. requirement either from the Venturi Mixer Selection Rating or from the rated B.t.u. capacity for the burner at 11-1/2" water column mixture pressure as listed in the various burner bulletin pages.
2. Multiply the obtained B.t.u. rating for the individual burner by the number of burners that will be supplied by the Venturi Mixer.
3. Select the proper Venturi Mixer from the table below. If the total B.t.u. rating obtained in Step 2 falls in between two mixer sizes, choose the smaller Venturi Mixer model.

Oxygen-Gas Venturi Mixer Model No.	Hourly Capacity Rating with Oxygen at 5 p.s.i.		Oxygen-Gas Venturi Mixer Model No.	Hourly Capacity Rating with Oxygen at 5 p.s.i.	
	B.t.u.	1050 B.t.u. gas cu.ft./hr.		B.t.u.	1050 B.t.u. gas cu.ft./hr.
0-11-80-65	1,180	1.12	0-11-56-33	12,800	12.15
0-11-79-64			0-11-55-30	17,100	16.25
0-11-78-60	1,600	1.53	0-11-54-29	18,800	17.9
0-11-77-57			0-11-53-27	20,500	19.5
0-11-76-56	2,600	2.45	0-11-52-23	23,600	22.5
0-11-75-55			0-11-51-19	26,800	25.5
0-11-74-54	3,300	3.15	0-11-50-17	30,500	29.0
0-11-73-53			0-11-49-15	33,600	32.0
0-11-72-52	4,000	3.8	0-11-48-13	37,300	35.5
0-11-71-52			0-11-47-10	40,200	38.25
0-11-70-51	5,140	4.9	0-11-46-8	43,300	41.25
0-11-69-49			0-11-45-7	46,500	44.25
0-11-68-48	6,140	5.85	0-12-44-4	47,800	45.5
0-11-67-47			0-12-43-2	55,700	53.0
0-11-66-46	7,000	6.65	0-12-42-1	63,500	60.5
0-11-65-44			0-12-41-1	69,300	66.0
0-11-64-43	8,300	7.9	0-12-40-15/64	72,500	69.0
0-11-63-43			0-12-38-1/4	78,200	74.5
0-11-62-42	9,240	8.8	0-12-36-17/64	86,100	82.0
0-11-61-41			0-12-34-17/64	92,400	88.0
0-11-60-40	10,500	10.0	0-12-32-9/32	100,300	95.5
0-11-59-39					
0-11-58-37	11,500	10.9			
0-11-57-35					

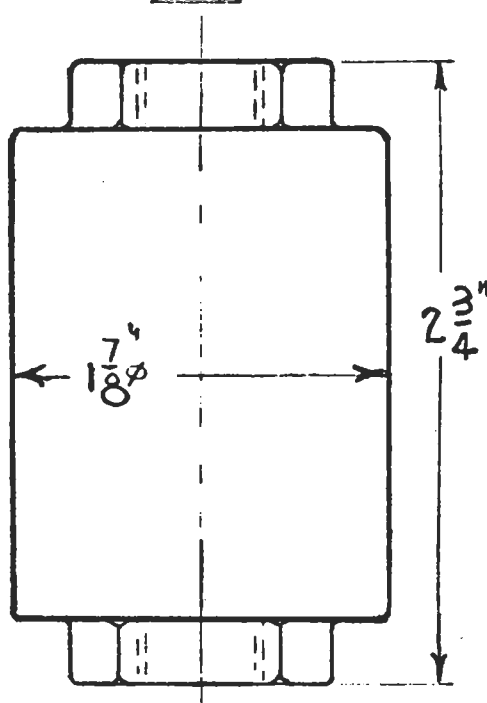
Nº 10



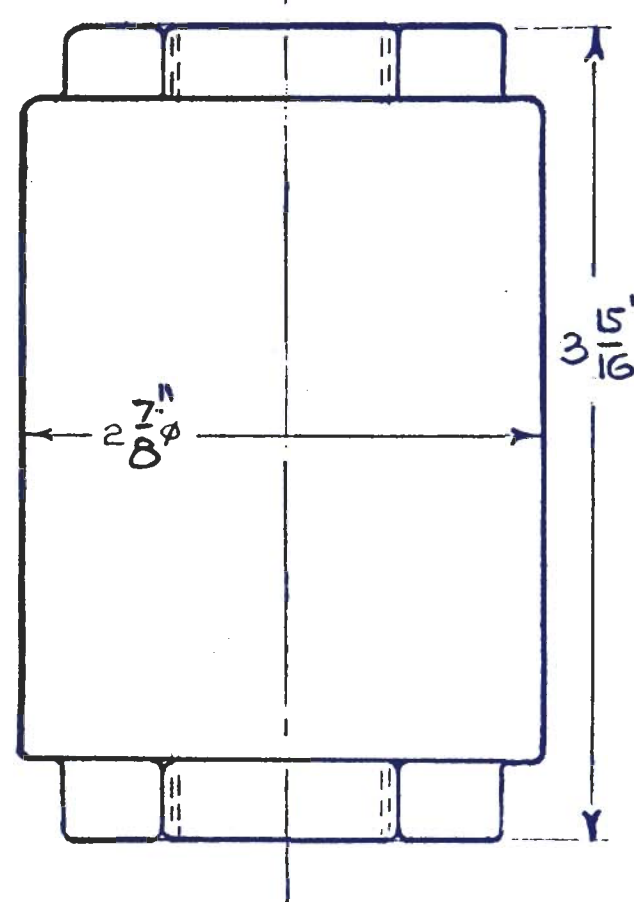
Nº 30



Nº 75



Nº 300



BULLETIN 669-TA

FIRE CHECKS

MODEL Nº	PIPE SIZE CONN.	CAP CFH AT 2 1/2" PR. DROP
10 F.C.	1/8"	20
30 F.C.	1/8"	60
30 F.C.	1/4"	60
75 F.C.	3/8"	260
75 F.C.	1/2"	260
300 F.C.	3/4"	550
300 F.C.	1"	550
300 F.C.	1 1/4"	550

All A.G.F. Fire Checks approved by N.Y.C. BDS & A.
CAL. No. 391-43-SA.



AGF BURNER INC.

SETTING THE INDUSTRY STANDARD
FOR EXCELLENCE SINCE 1878.

1955 Swarthmore Ave., Lakewood, NJ 08701
732-730-8090 (fax) 732-730-8060

FIRE CHECKS

Fire Checks are a necessary line restriction on all burner installations where oxygen is being used, or where the possibility of flashback (or backfire) is considered a hazard. Their purpose is to prevent flame from traveling beyond a predetermined point in the mixture line following a flashback.

Fire Checks do not prevent flashback, nor do they stop the resulting concussion. They simply retard combustion and reduce the flame speed to a level where the burning mixture is cooled, then quenched, by the exhaust velocity of the mixture.

Principles of operation are simple: the mixture is fed into the Fire Check and must pass through four coils of corrugated stainless steel ribbon before being returned to the line. The total area of the openings in each coil through which the mixture passes is slightly larger than the total area of the outlet. This provides a free flow of mixture with a minimum of pressure drop during operation. If you look into a Fire Check by holding it up to a light source you will see light passing through, but will notice that you do not have a direct line of sight.

When a flashback occurs, the flame burns at an explosive rate through the mixture line unobstructed until it reaches the Fire Check. At this point, the flame enters the cavity of the Fire Check 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 cool the fire. Their subsequent expansion serves to further restrict the passage of flame through the Fire Check until the flame speed is exceeded by the exhaust velocity of the mixture and the fire is extinguished.

Proper selection of a Fire Check is based upon the mixer size. A Fire Check should be of equal size to the outlet of your mixer. Do not install any valves, gas cocks, or any restrictions other than the Fire Check between burners and mixers.

A Fire Check 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 mixture to the burners. Here again, you simply hold the Fire Check up to a light source and view the condition of the coils and the passage of light. The coils closest to the burners will naturally be the ones to inspect, and in severe enough cases the stainless steel will actually be burned beyond recognition and the Fire Check should be replaced. Continued operation of Fire Checks damaged to this degree will result in a serious safety hazard.

Minor flashbacks do not as a rule fuse the coils. In these cases you simply turn off your supply lines feeding the problem zone, then relight the system as you do at start up. If you are unable to return to "normal" operation, then inspect the Fire Check.

Most capacity charts in use today are based on a 2-1/2" pressure drop.* Fire Checks operate at higher through-put capacities, understanding that the pressure drop will be higher. The use of oversized Fire Checks or dual Fire Checks is not recommended.

Should you have any questions or require any additional information, please contact your AGF Burner Representative.

5/8" DIAMETER INSERT BURNERS, SCREEN PILOTED, FOR AIR/GAS AND AIR/OXY/GAS

AGF screen piloted round style insert burners incorporate new construction features to achieve a greater degree of flame stability and to provide a longer trouble free operating life. As in all insert burner types, the flames from the main center holes are supported by tiny pilot flames developed along the surface of the screen piloting.

The new style AGF insert burners employ a special alloy pilot screen designed to withstand continuous usage with oxygen additions of up to 10% of the total mixture. The flat shaped face of the screening prevents overheating of the brass center bar containing the drilled center holes.

AGF insert burners are carefully aligned and then tested to assure uniformity of flame characteristics.

For ease in identification and ordering, the new style AGF insert burners carry a part number designation which details the specifications of the burner itself. The following explanation with typical example

illustrates the coding of the burner model numbers:

Part No. 58-1-01-53:

- a) First two digits (58) - Insert diameter code
- b) Second digit (1) - Style number of screen pilot insert
- c) Third two digits (01) - Number of center holes
- d) Fourth two digits (53) - Size of each center hole

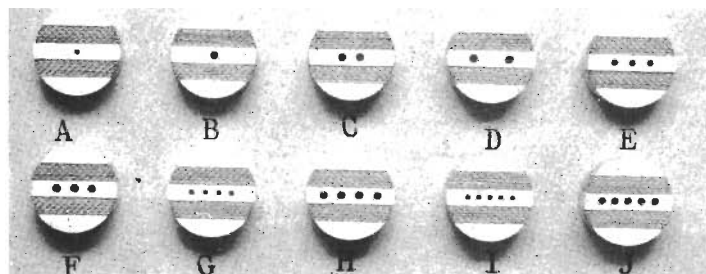
The inserts can be ordered separately, complete with the #5600 shell, or as a complete assembly including insert, base, etc. These parts are fully described below.

The tables listing the various standard inserts detail the physical characteristics and the operational data. Special drillings can be supplied to suit specific heating applications.

Insert with equivalent center hole drilling is available with special milled piloting to permit operation with oxygen-gas mixtures. These are described in Bulletin 700-T.

AGF STANDARD 5/8" SCREEN INSERT BURNERS

- A. #58-1-01-53
- B. #58-1-01-64
- C. #58-1-02-53
- D. #58-1-02-53
- E. #58-1-03-53



- F. #58-1-03-56
- G. #58-1-04-54
- H. #58-1-04-64
- I. #58-1-05-55
- J. #58-1-05-64

5/8 Diameter Insert Burners, Screen Piloted, Style 1 operational Data

Burner model number	Focal Length of Flame Inches at Various Pressures				Overall Flame Length Inches at Various Pressures			Flame Width	Natural Gas 1050 BTU/cu. ft. operating pressures & burning capacity at various pressures			
	Maximum		Optimum	Minimum	Maximum	Optimum	Minimum		Max. Press w.c.	BTU/hr.	BTU/hr. at 8" w.c.	BTU/hr. at 2" w.c.
	Press. W.C.	Lg.	Press. 8" w.c.	Press. 2"	Lg. at Max. w.c.	Lg. at 8" w.c.	Lg. at 2" w.c.					
58-1-01-53	20"	3 - 1/8"	2 - 1/2"	1 - 5/8"	8"	7"	3"	1/8"	22"	2100	1200	525
58-1-01-64	27"	2 - 1/4"	1 - 5/16"	7/8"	5"	3"	1"	1/16"	15 - 1/2"	1480	950	290
58-1-02-53	12"	2 - 7/8"	2 - 1/4"	1 - 1/4"	5 - 1/2"	5 - 1/2"	3"	1/4"	31"	2960	2290	950
58-1-02-53	12"	2 - 7/8"	2 - 1/4"	1 - 1/4"	4 - 1/2"	4 - 1/2"	2 - 3/4"	3/8"	31"	2960	2290	950
58-1-03-53	11"	2 - 3/4"	2 - 1/4"	1 - 3/16"	4"	4 - 1/2"	3"	3/8"	38"	3630	3050	1340
58-1-03-56	15"	2 - 1/4"	1 - 9/16"	1"	3 - 1/2"	4"	1 - 3/4"	3/8"	30"	2860	2000	860
58-1-04-54	9"	2 - 3/16"	2"	1 - 1/8"	3 - 1/2"	3"	3"	1/2"	39"	3720	3480	1620
58-1-04-64	13"	1 - 3/8"	1"	1 - 1/2"	3 - 1/4"	3"	1 - 1/4"	13/32"	22 - 1/2"	2150	1620	670
58-1-05-55	8"	1 - 3/4"	1 - 3/4"	1"	3 - 3/4"	3 - 3/4"	3"	1/2"	41"	3910	3910	1810
58-1-05-64	12"	1 - 5/16"	1"	1/2"	3"	3 - 1/4"	1 - 1/2"	7/16"	29"	2770	2200	1000

5/8 Diameter Insert Burners, Screen Piloted

Burner Model Number	Physical Characteristics				Optimum rating at 8" w.c. or max. capacity if less than 8" w.c. cu. ft.
	No. of Holes	Drill Size	Hole Dia.	ctr. to ctr. between outside holes	
58-1-01-53	1	53	.0595	0	1200
58-1-01-64	1	64	.0360	0	950
58-1-02-53	2	53	.0595	1/8"	2290
58-1-02-53	2	53	.0595	1/4"	2290
58-1-03-53	3	53	.0595	1/4"	3050

Burner Model Number	Physical Characteristics				Optimum rating at 8" w.c. or max. capacity if less than 8" w.c. cu. ft.
	No. of Holes	Drill Size	Hole Dia.	ctr. to ctr. between outside holes	
58-1-03-56	3	56	.0465	1/4"	2000
58-1-04-54	4	54	.0550	3/8"	3480
58-1-04-64	4	64	.0360	9/32"	1620
58-1-05-55	5	55	.0520	3/8"	3910
58-1-05-64	5	64	.0360	5/16"	2200

SERIES 5600 COMPLETE BURNER ASSEMBLIES FOR 5/8" DIAMETER INSERTS

AGF 5/8" diameter screen piloted insert burners are mounted into the standard #5600 shell when specified. The insert burners can also be ordered as complete assemblies consisting of insert, shell, locking ring and base. The base is always furnished complete with baffle screen parts which are designated Part #5800-3.

To order a complete insert burner assembly including base, specify as follows:

- 1) Model number of insert
- 2) Model number of shell
- 3) Model number of base
- with 4) Part number of baffle screen parts

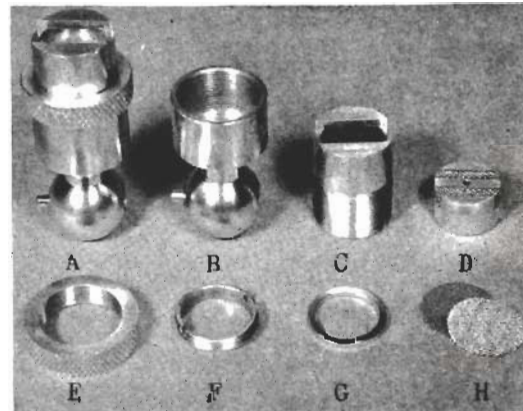
Example: Assembly 58-1-01-53-5600-5700-5800-3

58-1-01-53	Insert
5600	Shell
5700	Base
5800-3	Baffle Screen Parts

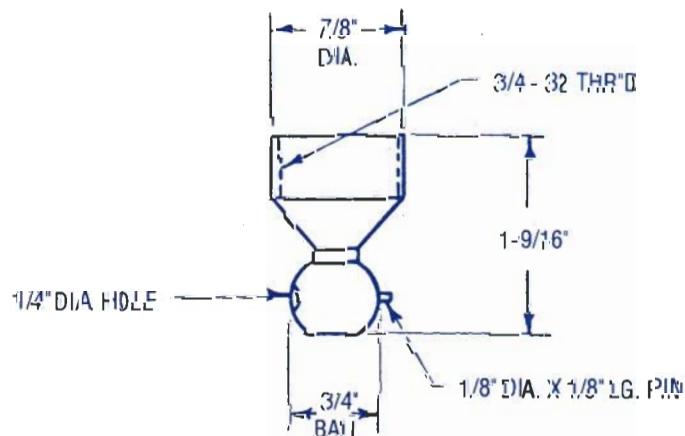
The illustration and captions identify the shell, base and baffle screen parts.

NAME OF PARTS PHOTOGRAPH FOR THE #5600 SERIES BURNER

- A. Assembled #5600 with 5/8" screen insert
 - B. #5700 Ball base (round)
 - C. Insert Shell #5600
 - D. Screen Insert #58-1-01-50
 - E. Locking Ring #5800
 - F. Screen Retainer #5801
 - G. Baffle Screen Spacer #5802
 - H. Baffle Screens #5803
- } 5800-3



AGF STANDARD BASES FOR THE 5/8" SCREEN INSERT BURNERS



NO. 5700 ROUND BASE

A.G.F. STANDARD BASE FOR 5/8" SCREEN INSERT BURNERS

7/8" DIAMETER INSERT BURNERS, SCREEN PILOTED FOR AIR/GAS AND AIR/OXY/GAS

AGF screen piloted round style insert burners incorporate new construction features to achieve a greater degree of flame stability and to provide a longer trouble free operating life. As in all insert burner types, the flames from the main center holes are supported by tiny pilot flames developed along the surface of the screen piloting.

The new style AGF insert burners employ a special alloy pilot screen designed to withstand continuous usage with oxygen additions of up to 10% of the total mixture. The flat shaped face of the screening prevents overheating of the brass center bar containing the drilled center holes.

AGF insert burners are carefully aligned and then tested to assure uniformity of flame characteristics.

For ease in identification and ordering, the new style AGF insert burners carry a part number designation which details the specifications of the burner itself. The following explanation with typical example

illustrates the coding of the burner model numbers:

Part No. 78-1-01-53:

- a) First two digits (78) - Insert diameter code
- b) Second digit (1) - Style number of screen pilot insert
- c) Third two digits (01) - Number of center holes
- d) Fourth two digits (53) - Size of each center hole

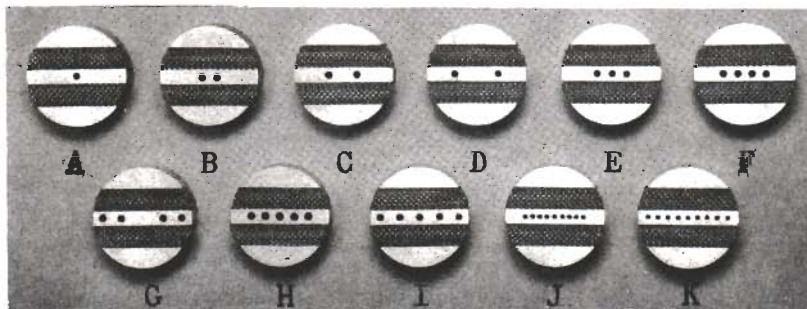
The inserts can be ordered separately, complete with the #5000 shell, or as a complete assembly including insert, base, etc. These parts are fully described below.

The tables listing the various standard inserts detail the physical characteristics and the operational data. Special drillings can be supplied to suit specific heating applications.

Insert with equivalent center hole drilling is available with special milled piloting to permit operation with oxygen-gas mixtures. These are described in Bulletin 700-T.

AGF STANDARD 7/8" SCREEN INSERT BURNERS

- A. #78-1-01-53
- B. #78-1-02-53
- C. #78-1-02-53
- D. #78-1-02-53
- E. #78-1-03-53



- F. #78-1-04-53
- G. #78-1-04-53
- H. #78-1-05-53
- I. #78-1-05-53
- J. #78-1-09-64

7/8 Diameter Insert Burners, Screen Piloted, Style 1 Operational Data

Burner Model Number	Focal Length of Flame Inches at Various Pressures					Overall Flame Length Inches at Various Pressures				Flame Width	Nat. gas 1050 BTU/cu.ft. operating pressures and burning capacity at various pressures					
	Maximum		Optimum		Minimum	Maximum		Optimum			Minimum	Max. Press. w.c.	BTU/ hr.	BTU/ hr. at 8" w.c.	BTU/ hr. at 4" w.c.	BTU/ hr. at 2" w.c.
	Press. w.c.	Lg.	Press. 8" w.c.	Press. 4"		~ Press. 2"	Lg. at Max. w.c.	Lg. at 8" w.c.	Lg. at 4" w.c.							
78-1-01-53	17"	3 -1/2"	2 -3/8"	4"	1- 1/2"	6"	5"	-	2- 3/4"	1/8"	17"	2740	1700	-	710	
78-1-02-53	14"	3 -1/4"	2 -3/8"	-	1- 3/8"	6"	5 -1/2"	-	3"	1/4"	14"	3590	2600	-	1040	
78-1-02-53	16"	3 -1/2"	2 -3/8"	-	1- 1/2"	5 -1/2"	4 -1/2"	-	2- 3/4"	3/8"	16"	3590	2460	-	1040	
78-1-02-53	16"	3 -1/2"	2 -3/8"	-	1- 1/2"	5 -1/2"	4 -1/2"	-	2- 3/4"	1/2"	16"	3590	2460	-	1040	
78-1-03-53	13"	3 -1/8"	2 -3/8"	-	1-3/8"	4 -1/2"	5"	-	2- 3/4"	3/8"	13"	4253	3310	-	1470	
78-1-04-53	8"	2 -1/4"	-	1- 5/8"	1- 1/8"	4-1/2"	-	4- 1/2"	4"	5/8"	8"	4065	4065	2840	1900	
78-1-04-53	8"	2 -1/4"	-	1- 1/2"	1- 1/8"	5"	-	4- 1/2"	4"	13/16"	8"	4440	4440	3120	2080	
78-1-05-53	6"	2"	-	1- 5/8"	1- 1/8"	4"	-	4- 1/2"	4"	5/8"	6"	4440	-	3500	2360	
78-1-05-53	6"	2"	-	1- 1/2"	1- 1/8"	4"	-	4"	3"	13/16"	6"	4630	-	3690	2550	
78-1-09-64	10"	1 -1/8"	1"	1"	5/8"	3"	3"	3"	2"	19/32"	10"	4065	3500	2360	1420	
78-1-09-64	10"	1 -1/4"	1"	1"	1/2"	3"	3"	3"	1- 1/2"	25/32"	10"	4440	3780	2650	1610	

7/8 Diameter Insert Burners, Screen Piloted

Burner Model Number	Physical Characteristics				Optimum rating at 8" w.c. or max. capacity if less than 8" w.c. BTU/hr.
	No. of Holes	Drill Size	Hole Dia.	ctr. to ctr. between outside holes	
78-1-01-53	1	53	.0595	0	1700 BTU
78-1-02-53	2	53	.0595	1/8"	2600 BTU
78-1-02-53	2	53	.0595	1/4"	2460 BTU
78-1-02-53	2	53	.0595	3/8"	2460 BTU
78-1-03-53	3	53	.0595	1/4"	3310 BTU
78-1-04-53	4	53	.0595	3/8"	4065 BTU

Burner Model Number	Physical Characteristics				Optimum rating at 8" w.c. or max. capacity if less than 8" w.c. BTU/hr.
	No. of Holes	Drill Size	Hole Dia.	ctr. to ctr. between outside holes	
*78-1-04-53	4	53	.0595	*11/16"	4440 BTU
78-1-05-53	5	53	.0595	1/2"	4440 BTU
78-1-05-53	5	53	.0595	11/16"	4630 BTU
78-1-09-64	9	64	.0360	1/2"	3500 BTU
78-1-09-64	9	64	.0360	11/16"	3780 BTU

*Special Drilling Pattern $\phi \leftarrow 5/32 \rightarrow \phi \leftarrow 3/8 \rightarrow \phi \leftarrow 5/32 \rightarrow \phi$

SERIES 5000 COMPLETE BURNER ASSEMBLIES FOR 7/8" DIAMETER INSERTS

AGF 7/8" diameter screen piloted insert burners are mounted into the standard #5000 shell when specified. The insert burners can also be ordered as complete assemblies consisting of insert, shell, locking ring and base. The base is always furnished complete with baffle screen parts which are designated Part #5300-3.

To order a complete insert burner assembly including base, specify as follows:

- 1) Model number of insert
- 2) Model number of shell
- 3) Model number of base
- with 4) Part number of baffle screen parts

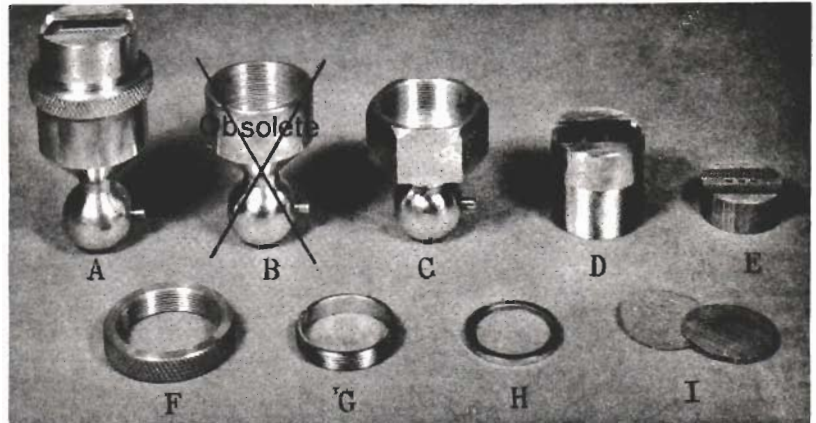
Example: Assembly 78-1-03-53-5000-5200-5300-3

78-1-03-53	Insert
5000	Shell
5200	Base
5300-3	Baffle Screen Parts

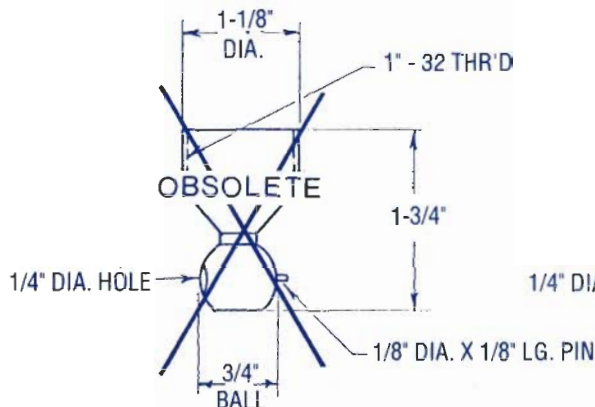
The illustration and captions identify the shell, base and baffle screen parts.

NAME OF PARTS PHOTOGRAPH FOR THE #5000 SERIES BURNER

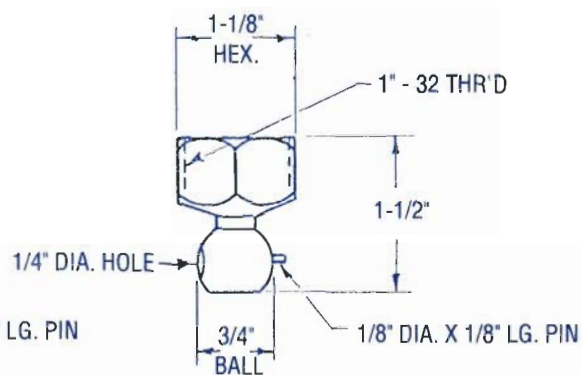
- A. Assembled #5000 burner with 7/8" screen insert
 - ~~B. #5100 Ball base (round Style)~~ Obsolete
 - C. #5200 Ball base (Hex Style)
 - D. Insert Shell #5000
 - E. Screen Insert #78-1-03-53
 - F. Locking Ring #5300
 - G. Screen Retainer #5301
 - H. Baffle Screen Spacer #5302
 - I. Baffle Screens #5303
- } part # 5300-3



AGF STANDARD BASES FOR THE 7/8" SCREEN INSERT BURNERS



~~NO. 5100 ROUND BASE~~



NO. 5200 HEX. BASE



www.agfburner.com

SETTING THE INDUSTRY STANDARD FOR EXCELLENCE SINCE 1878.

Gas Burners for the Glass, Plastic & Metal Industries

AGF SURFACE MIX BURNERS

AGF BURNER INC. since 1878, has been the pioneer in the development of surface-mix burners for working quartz.

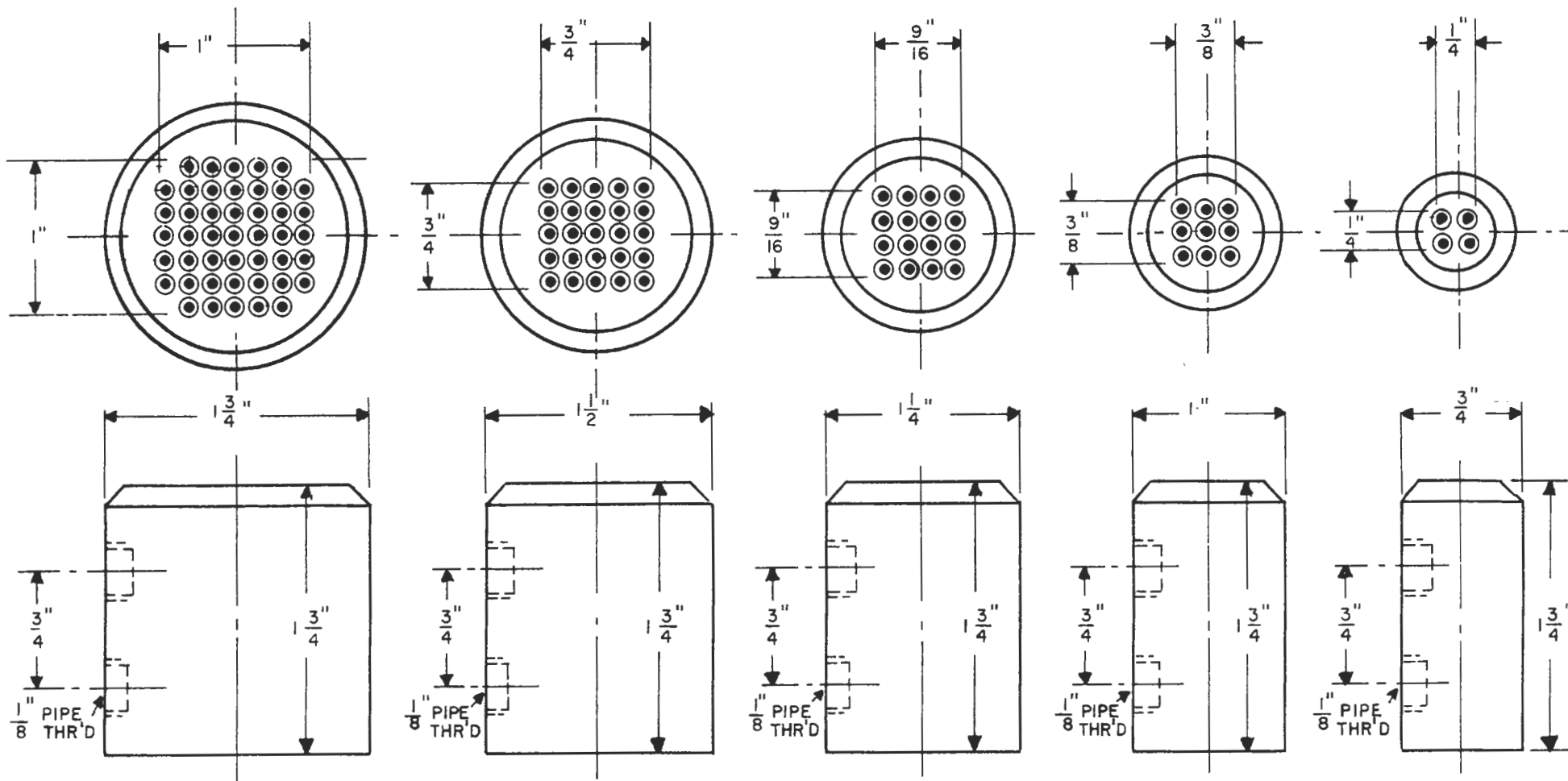
We were one of the first to develop and produce burners where small concentric tubes are assembled in a two chamber head and fuel mixture ($H_2 - O_2$) combusts on the surface.

Our 1880 Series Burners have become a standard in the quartz working industry with the Model 1885DA as the most popular size. This head still provides the greatest heat output of any burner in its size available today. They are all still fabricated in heat resisting alloy material for the ultimate in burner life. (Beware of inferior imitations).

Please feel free to contact us with your surface-mix burner requirements.

AGF BURNER

1955 Swarthmore Ave., Lakewood, NJ 08701 (tel) 732-730-8090 (fax) 732-730-8060



#1885 DA

#1884 AA

#1883 CA

#1882 CA

#1880 AA

AGE BURNER INC.

No.1880 BURNER SERIES, O₂ - H₂ DIAGRAM

SCALE		CHKD.	DWG No.	REV.
DRAWN	M.D. - Traced F.M.	APPD.	M-246-34	
DATE	2-10-64, 10-29-77			

SUPERSEDES DWG. P-200-34



SETTING THE INDUSTRY STANDARD FOR EXCELLENCE SINCE 1878.

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Gas Burners for the Glass, Plastic & Metal Industries

SPECIFICATIONS

APPROXIMATE FUEL CONSUMPTION IN CFH AND HEATED WIDTHS ON THE
1880 THROUGH 1885 SERIES HEADS

MODEL	INLET CONNECTIONS	HYDROGEN 40 - 45 PSI CFH	OXYGEN 20-25 PSI CFH	HEATED WIDTH (APPROX.)
1880AA	1/8" FEMALE N.P.T.	100	50	1/4"-3/8"
1882CA	1/8" FEMALE N.P.T.	225	112.5	3/8"-5/8"
1883CA	1/8" FEMALE N.P.T.	400	200	9/16"-3/4"
1884AA	1/8" FEMALE N.P.T.	625	312.5	3/4"-1-1/4"
1885DA	1/8" FEMALE N.P.T.	1125	562.5	1"-1-3/4"
1885HC	3/8" FEMALE N.P.T.	5175	2587.5	2"-3"

AGF BURNER

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SETTING THE INDUSTRY STANDARD FOR EXCELLENCE SINCE 1878.

Gas Burners for the Glass, Plastic & Metal Industries

NEW MODEL 1885-HC HIGH CAPACITY TYPE BURNER

(FOR WORKING LARGER TUBING DIAMETERS)

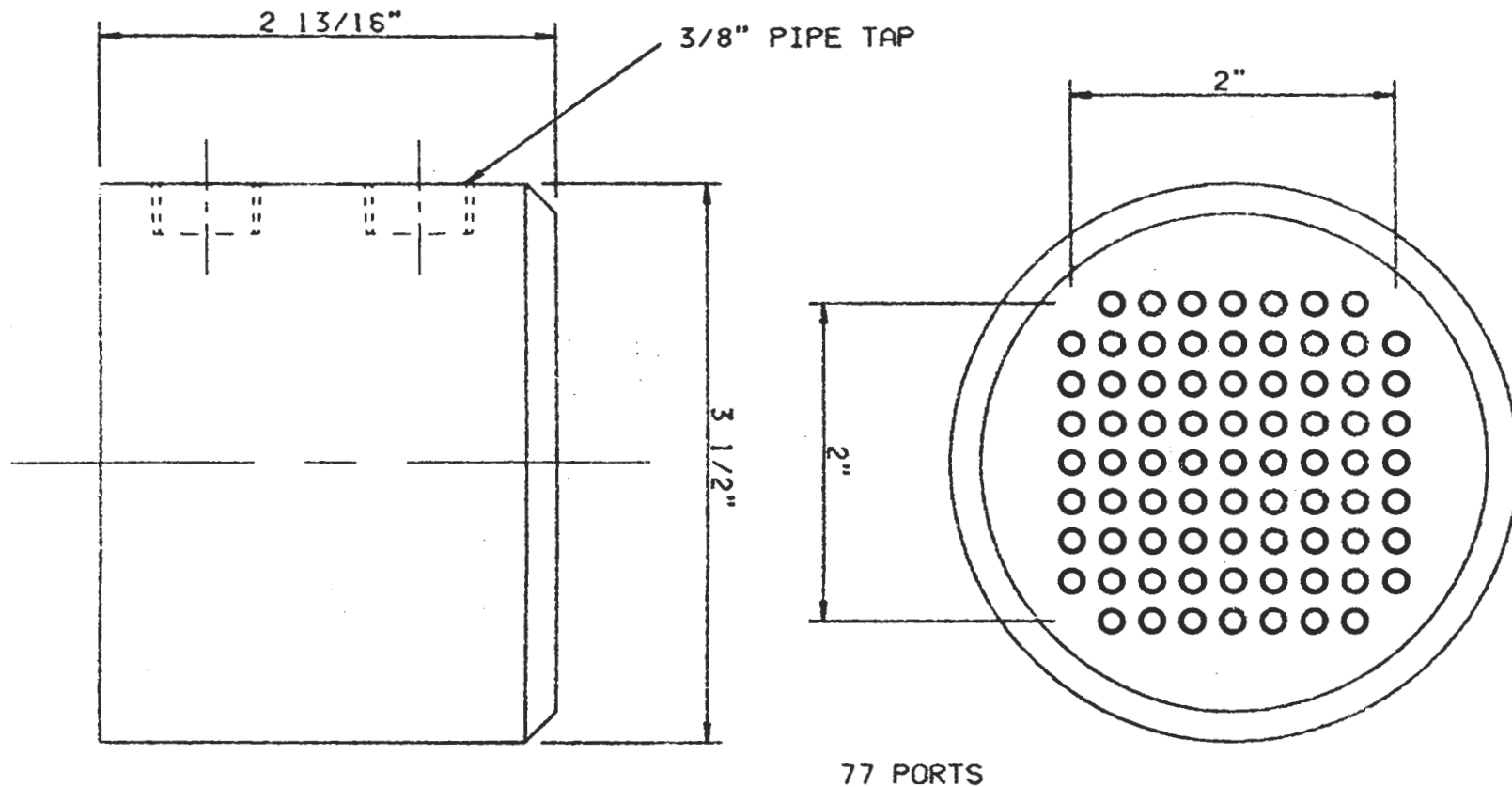
Introducing the new AGF Model 1885-HC High Capacity Burner for Quartz Working. This burner has been developed for working the larger diameter (200mm and up) thicker wall tubing sizes being worked in increasing numbers by fabricators today.

The burner produces the highest BTU/Hr. output of any single surface-mix burner available today. The burner contains almost twice the amount of ports than the 1885-DA size but has five (5) times the total port area.

These burners are ideal for applications requiring a substantial amount of heat to be fired in one area. Refer to the attached drawing for specifications.

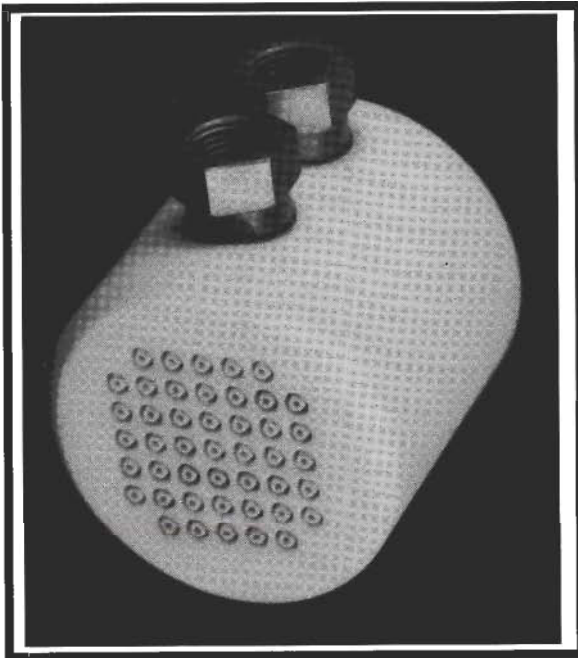
AGF BURNER

1955 Swarthmore Ave., Lakewood, NJ 08701 (tel) 732-730-8090 (fax) 732-730-8060



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AGF BURNER INC.			
LAKEWOOD, NEW JERSEY			
NO. 1885 HC HIGH CAPACITY O_2H_2 BURNER			
SCALE		CHKD.	DWG No.
DRAWN		APPD.	M-246-34
DATE			REV.



CONTAMINATION FREE CERAMIC SURFACE MIX BURNER

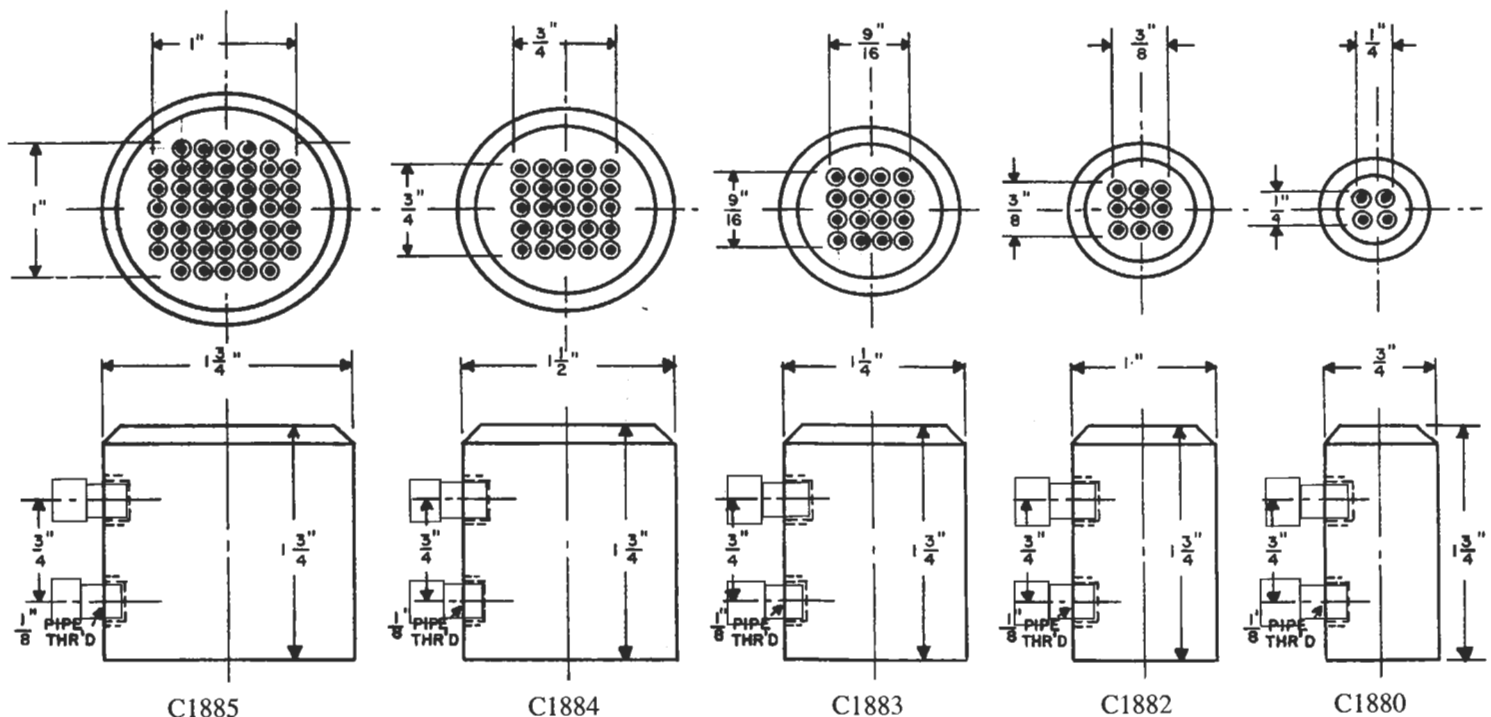
AGF'S NEW CERAMIC CONSTRUCTION
SURFACE MIX HYDROGEN / OXYGEN BURNER

- ◆ NO METALLIC ION CONTAMINATION
- ◆ LIGHT WEIGHT
- ◆ STABLE BURNING
- ◆ LOW HEAT RETENTION
- ◆ LONGER LIFE
- ◆ CUSTOM SIZES AVAILABLE

Embodying all the product features for which **AGF Burners** have become renowned, we now provide the world our contaminant free ceramic burners. Due to the ever increasing demands for purity in component parts, the metallic ion contamination associated with metal burners is not acceptable in some applications. **AGF Burner, Inc.** can now provide many of our standard and custom products in a contaminant free ceramic construction.

Our ceramic burners utilizes a patent pending ceramic assembly process which permits the construction of intricate shapes while maintaining the purity and strength of ceramic. Because of the 1800°C+ operating temperature of the basic ceramic material, these burners do not expel burner generated contaminants in the gas stream. Additionally the inertness of the ceramic means that no metal oxidation can occur and therefore no metal ions are present in the flame.

When a clean burning and stable burner is required, our metallic-ion free ceramic surface-mix burners are un-matched in performance and efficiency.



BURNERS FOR LAMP WORKING

By H. K. Richardson

Glass Technologist
Westinghouse Electric Corp.
Pittsburgh, Pa.

THIS paper will be limited to a discussion of those burners required by high speed glass forming machines used in assembly of incandescent lamps. From Fig. 1 it is seen that the glass assembly operations of an incandescent lamp fall into four categories; the operations, the temperature reached and viscosity of the glass reached, are tabulated in Table I.

When applying gas heat to the above operations, three equally important units must be considered:

1. The burner itself: designed for the gas used and the operation to be performed.

2. The burner mounting: manifolds and valves used.

3. The mixer, i.e., the means of supplying the proper quantity of air or oxygen to burn the gas properly and supply the proper gas-oxygen or air mixture pressure to the burner head.

We will now take up these items separately and bring out some of the interesting scientific facts collected from their practical operation over a period of years.

A. The Burner

General Considerations. To accomplish efficiently the glass working operations shown in Fig. 1, several characteristics are noted; the four most important being:

1. *Flame shape* must be such as to concentrate the heat just where it is wanted.

2. *Flame temperature* must be right for the job.

3. *Flame character* must be under

control, i.e., oxidizing for lead glass, reducing for alumina glasses.

4. *Heat release* must be proper for the job. The heat release must be sufficient to bring the glass to the working viscosity in the machine index time.

These factors are interrelated and will be grouped in different ways as we analyze the burner situation from the practical angle.

Before analyzing the burner situation, we will take a look at the most important burners now in practical use. Since over 300 different shapes, sizes and characteristics are in use, we will only indicate

the general types. These are all practically cut and try made. Many times a machine is designed mechanically and then the burners must be made to make it work. All the burners noted are piloted burners; the reason for which will appear later in the discussion.

The general classes of burners are:

a. Single hole, long focus: These are the original pioneers in the industry, and are still used. Examples are—A.G.F. burners as shown in Fig. 2.

b. Multiport, short focus: Used for wide application of heat. Examples are A.G.F. burners shown in Fig. 3.

TABLE I

Operation on Glass	Factory Operation	Glass Type	Approx. Temp. °C.	Viscosity Log
1. Shaping	Flare making	Lead	800	5.5
2. Sealing glass to metal	Stem making	Lead	1000	3.8
3. Sealing glass to glass	Sealing-in	Lime to lead	1050	3.5
4. Cutting off excess glass	Cullet cut-off	Lime	1140	3.3
	Tipping Exhaust Tube	Lead	1100	3.3

TABLE II
PILOTAGE

GAS	Max. Flame Speed Ft. per Second	% Pilot Jet Range	Ratio Average	Area Pilot Burning Area Area Ports Range (Times)
Hydrogen	9.2	No pilots		No pilots
Manufactured	2.2	10-40	25	8-12
Natural	1.0	50-200	90	20-30

TABLE III

HEAT RELEASE—B.t.u. PER HOUR PER SQ. IN. OF JET AREA—
INCLUDING PILOT AREA
(Except as noted, figures are for perfect combustion flames)

GAS	AIR—GAS			OXYGEN—GAS	
	Drilled Pipe Without Pilots Usual Household Operation— 55% Air	With Pilots Extreme 70% Air	Glass Working Burners	Without Pilots	With Pilots
				Glass Working Burners	Burners
Manufactured	30,000	19,000	500,000	800,000 to 1,200,000	1,500,000
Natural	18,000	9,500	300,000	800,000 to 1,200,000	1,850,000

c. High pilot ratio screen: Short and long focus, single and multiport. These are natural gas burners. Examples shown in Fig. 4.

d. Piloted oxygen burners: These replace oxygas torches and are the most powerful burners in use. Examples are A.G.F. burners as shown in Fig. 5.

Some interesting technical data deducted from the practical working of these burners, follows.

1. *Pilotage.* By pilots we mean the use of low velocity flames around the main jet for the prime purpose of keeping the flame anchored to the burner head, i.e., to reduce blow off or lifting of the flames. Other advantages will be noted as we proceed.

a. *Effect of pilots on flame retention: its primary function.* The speed of burning of a gas-air or oxygen mixture, or the speed of flame propagation is a function of the gas and varies with the composition of the gas-air or oxygen mixture. The effect of this factor on pilotage is seen from Table II from actual commercial burners.

It is evident that the slow burning natural gas required much more gas in the pilot and a much larger burning area for this gaseous mixture.

b. *Effect of pilots on heat release:* The effect of pilots on the heat release of burners is large, as will be seen from Table III. These figures are relative but the greater heat release of piloted than unpiloted ports is actual, and has been obtained in practical everyday working. The exact ratio is affected by burner construction and operation.

The figures given are those reached when glass working burners are operated at approximately perfect combustion.

The rates are exceeded, when soft

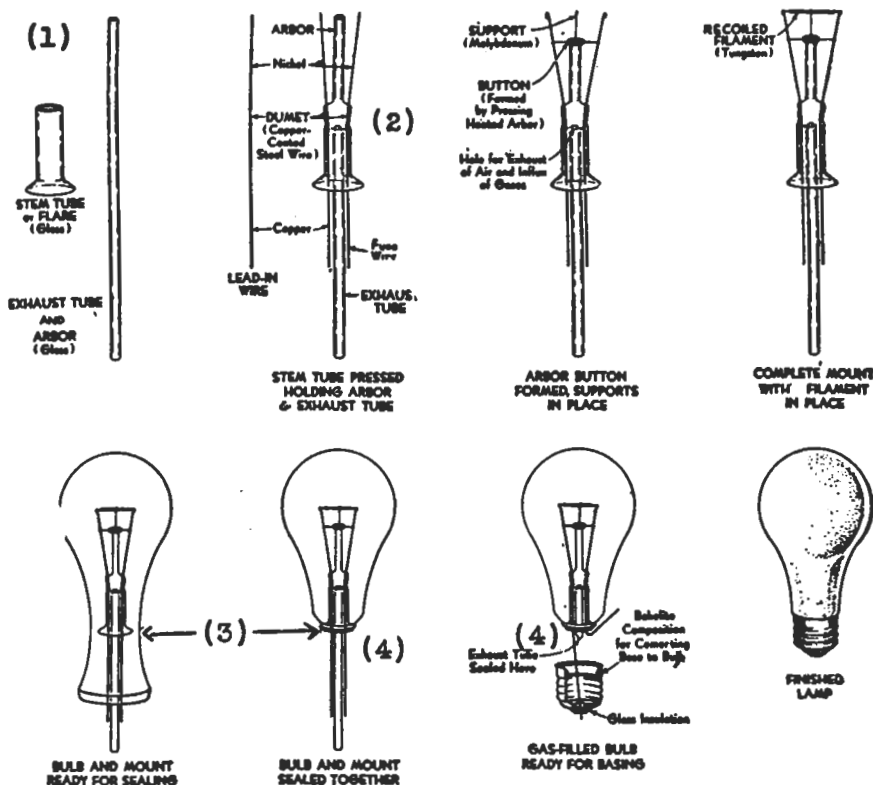


Figure 1. Steps in assembling mount and completed lamp.

- (1) Shaping (2) Glass-Metal Seal (3) Glass-Glass Seal (4) Cutting Off Excess Glass

TABLE IV

GAS	B.t.u. of Gas per Cu. Ft.	Heat Release in B.t.u./Hole/Hour Air-Gas Operation (M.T. Drill Size)				
		33	55	64	71	78
Manufactured	525	5000	1050	525	263	100
Natural	1050	3000	630	315	158	60

Figure 2

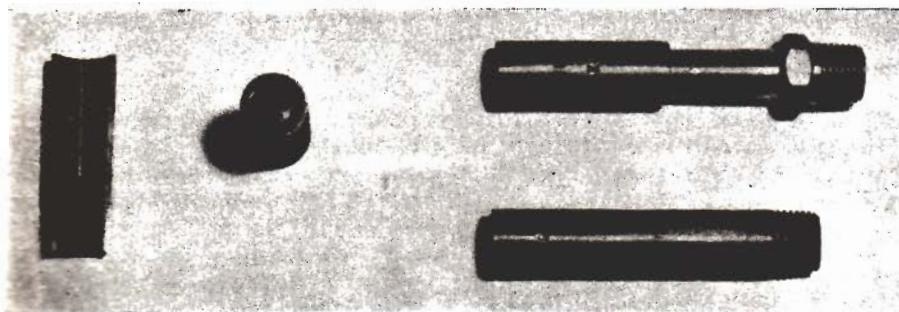
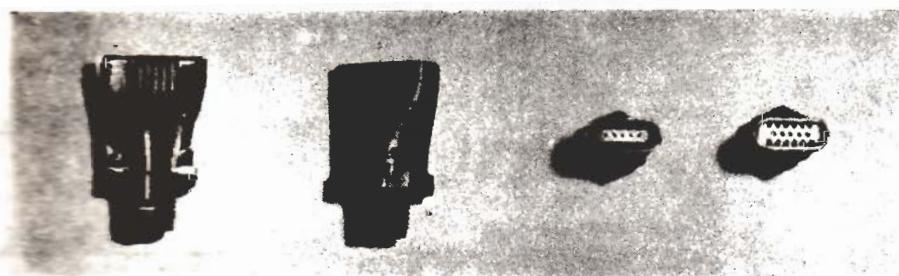


Figure 3



or high gas rate mixtures are used. But these mixtures, being of lower flame temperature, are not used for comparison.

All of the above data are for usual operation on the two-pipe system, noted later. If gas and oxygen are both under pressure, the piloted oxygen burner will exceed the figures given. As high as 4,000,000 B.t.u. /in.²/hr. has been obtained on small burners burning natural gas and oxygen. This does not appear to be the limit.

In all data on the heat release with oxygen, the burner construction and design play a large role in the quantity released. This is seen in the uncertainty of the relation of natural to manufactured gas in the case of unpiloted oxygen burners. In all probability, when conditions are exactly comparable, natural gas and oxygen will give the theoretical 128 per cent of the release of manufactured gas and oxygen.

c. *Flame shape, length, focus and form.* (See Fig. 6) The flame length, focus, and form are all functions of the ratio of

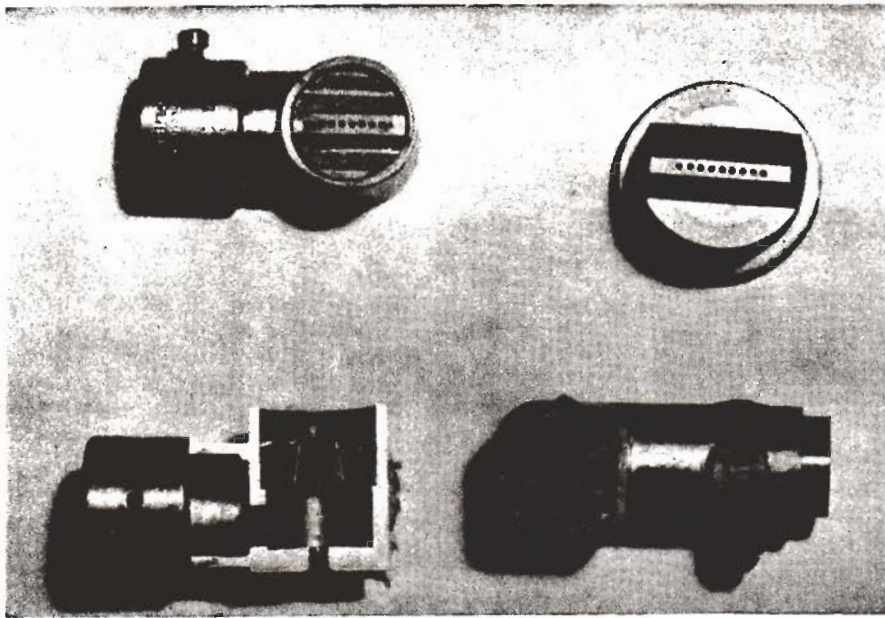
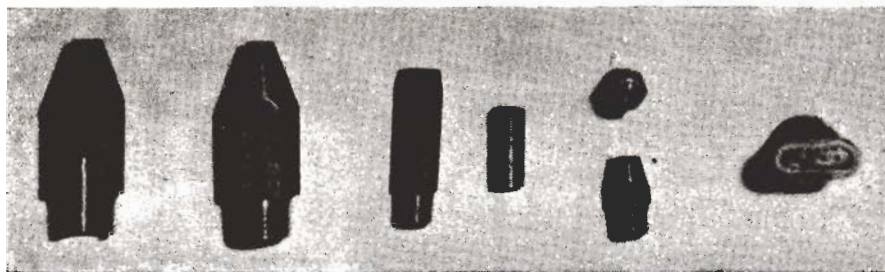


Figure 4, ABOVE

Figure 5, BELOW



2. Pilotage. The greater the pilotage and pilot area, the fatter the flame and the tendency to be of more even temperature for a longer distance.

3. Output rate of burner (B.t.u. per in.² of port per hr.). This is the characteristic which determines the actual focal length when burning on any given gas, but the output rate is a function of the gas, the pilotage and the burner head pressure.

In using burners for usual equipment, it is relatively safe to use the following approximate data to determine the focal length of different size burners.

Burner Jet Drill Size No.	Approx. Focal Length in Inches Mfg. Gas	Nat. Gas
55-56	2½	3¾
62	1½	2¼
71	½	¾

It is difficult to state just what the full length flame of a burner is. It is of little use except for annealing purposes and is almost impossible to predict what it will be.

2. Heat Release (B.t.u. capacity per hour). The size of the jet (including pilot), the flame speed of the burning mixture, and the burner head pressure, govern the quantity of gaseous mixture released by a burner. The relative heat release of a few sized holes at 6 in. W.C. is given in Table IV.

These figures apply both to the jet

pilot to jet area and the pilot burning area. These factors are very important in the practical operation of the burner. They are extremely difficult to appraise in figures, as they are also functions of the burner head pressure, the gas, air or oxygen mixture ratio, the type of gas and the output rate of the burner. These factors—length, focus and form—determine where the working temperature of the flame is, and so are of vital interest.

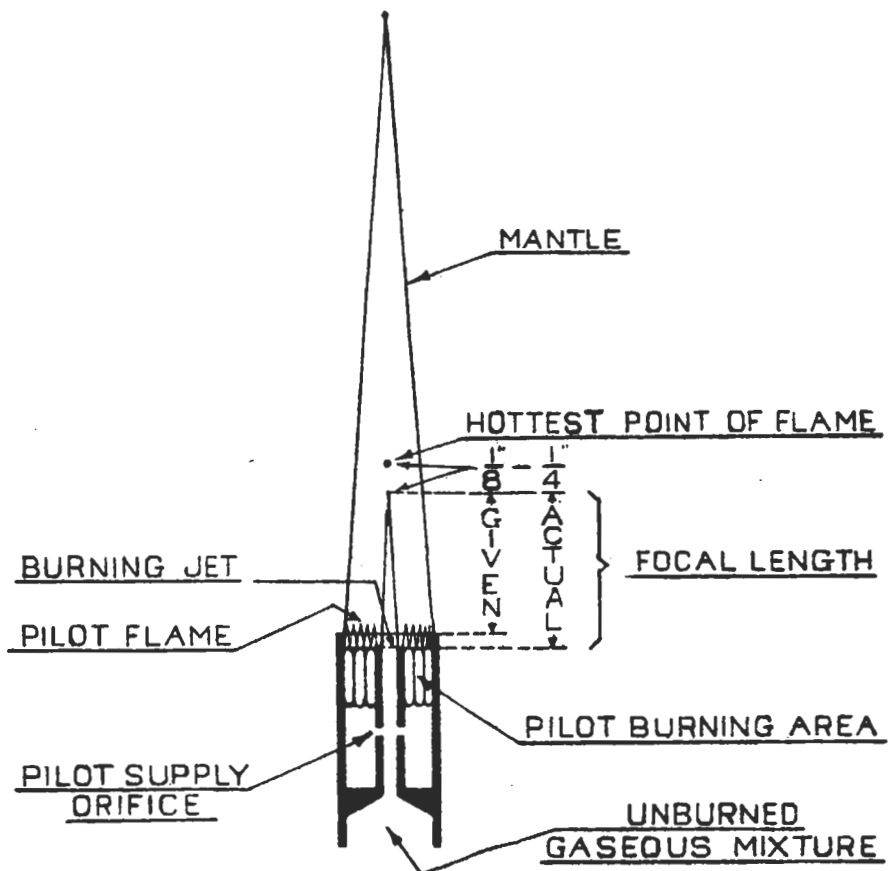
Definition: The focus or focal length of a burner is the length of the cone from the face of the burner jet to the tip of the cold cone. The tip of the cone is the coldest part of the flame, while ¼ in. in front of the cone is the hottest part of the flame.

There can be a change of 5000 deg. F. in the temperature in that small distance. For quartz working, we want to get as near this spot as possible.

Observations: Some of the factors operating to change flame shape and focal length are:

1. Gas Used. Hydrogen or carbon monoxide gases give a short, sharp cone and high temperature spot, and the temperature of the rest of the flame falls off rapidly. A natural gas cone is 50 per cent longer than manufactured gas and the temperature of the flame falls off more slowly.

Figure 6



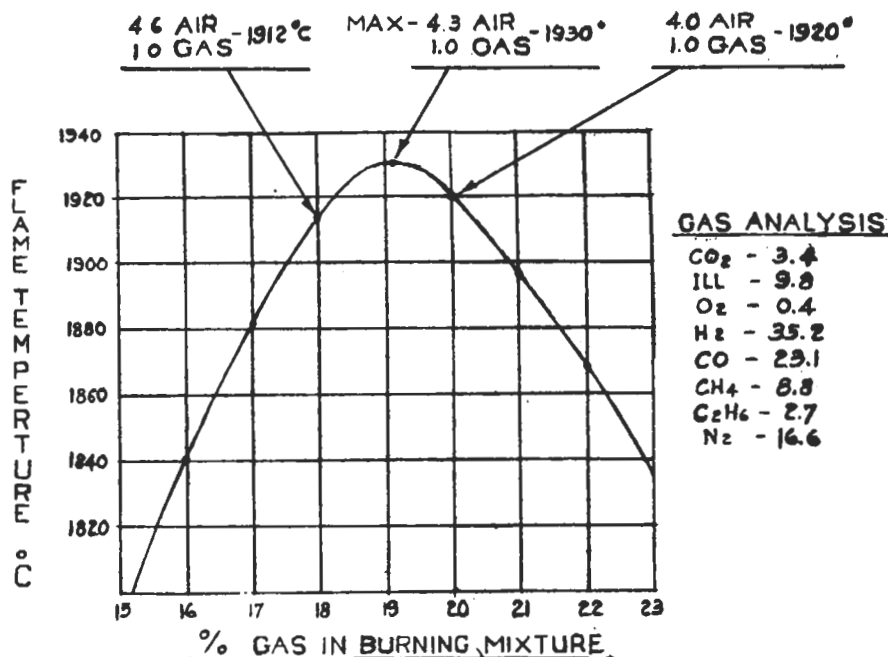


Figure 7

and pilot. To get total capacity, the release of the two must be added.

An illustration of their use is:

On manufactured gas: a burner with No. 55 jet and two No. 74 pilots (38 per cent pilot) will release 1450 B.t.u. per hour.

On natural gas: a burner with No. 53 jet and two No. 64 pilots (78 per cent pilot) will release 1465 B.t.u. per hour.

close pressure control, the reason for which will appear as the discussion proceeds.

The mixers of the venturi type in use today are improvements on the old mixing TEE and are of two general types: (1) A.G.F., shown by Fig. 8; (2) Adjustable TEE, shown by Fig. 9. Each has its advantages—a full discussion of these is too long for this

paper. Suffice it to say that the B.t.u. release is nearly the same for all ordinary gases, being 110 B.t.u. for 1 cu. ft. air and 440 per cu. ft. oxygen, for perfect combustion. It is different for hydrogen and carbon monoxide. These mixers serve a dual purpose:

a. Mix gas and air or oxygen in desired proportions.

b. Make the burner head pressure.

These two requirements sometimes conflict. Mixers must be calculated carefully to the maximum capacity of the burners to be used. This becomes more and more important, as the speed of flame propagation of the gaseous mixture is reduced. Careful tailoring of the mixer is most important with methane and the least important with hydrogen.

The control of the air and gas to the mixer is most important. Fine thread (40 per inch on stems) needle valves are needed for the mixer itself while the air supply pressure must be controlled to 1 per cent variation at any point of the system under all variations of load normally met. For this purpose, two methods are in use:

1. Smooth control on supply line—most large plants.
2. Independent pressure controls at each unit—small plants.

The importance of the pressure control cannot be overlooked, for some of the glass working operations are completed in 6 seconds—few take over 30 seconds.

B. Burner Mounting—Manifolds

Many troubles laid to faulty burner design are the fault of the burner mounting—the manifolds too constricted, too many turns and too small. It is wise to err on the large size of all these factors.

C. Mixer

In all burner discussions, it has been assumed that a mixture of gas and oxygen or air in the right proportions has been burned. The effect of the proportion of gas to air on the flame temperature is given for a specific gas in the accompanying curve—Fig. 7.

From the curve, the following relationship of gas-air mixture and temperature is noted:

Air-Gas Ratio	Temperature of Flame C°
4.0-1	1920
4.3-1	1930
4.6-1	1912

In all lamp working, the two-pipe system is used to mix the gas and air or oxygen. Gas at 18 in. W.C. and air at 4 psi are the usual supply to a venturi type mixer. Both gas and air are under

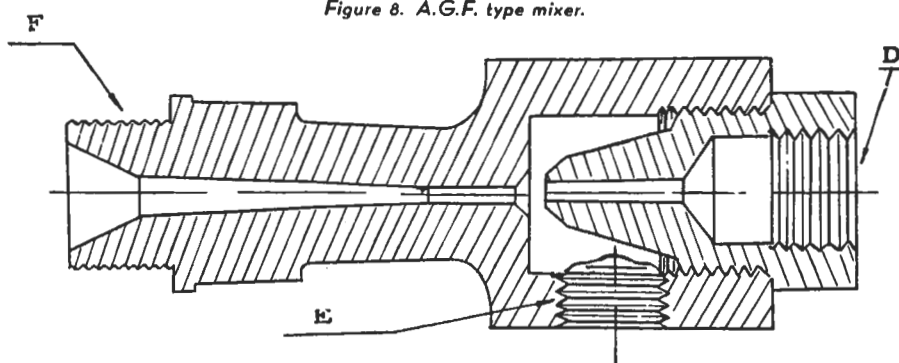


Figure 8. A.G.F. type mixer.

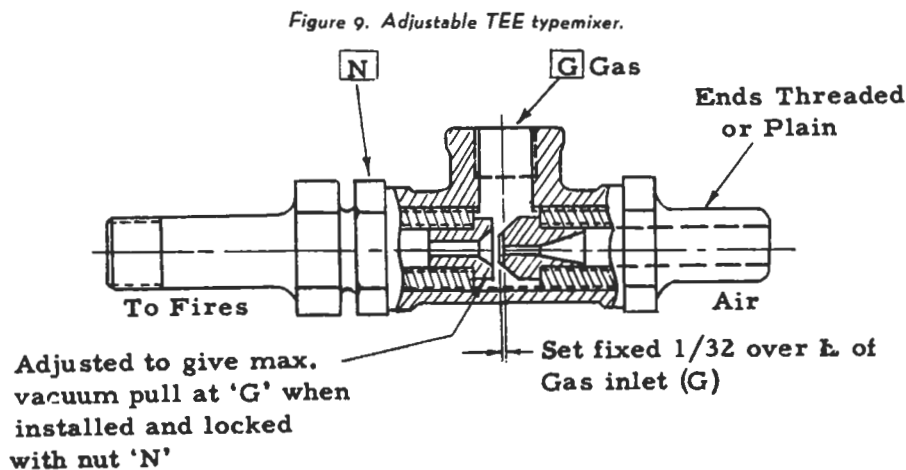


Figure 9. Adjustable TEE typemixer.

A change of 0.03 in. W.C. in burner head pressure at some operations will cause objectionable shrinkage.

This translates to a 1 per cent main header pressure change. A change in gravity of the gas of .03 will also cause all the burners in a factory to change, causing objectionable shrinkage.

Miscellaneous Factors

There are several interesting side products worth noting.

Relative Efficiency of Different Gases. Many times it is necessary to pass judgement on the use of various gases on a job. It has been found that the product of the *net B.t.u. per ft.* of gaseous mixture, times the speed of flame propagation, is a measure of the ability of a flame to transfer heat to an object.

In the new (1948) book from A.G.A., "Gaseous Fuels," page 126, a full discussion of this type of thinking is given. It is called "The Specific Flame Capacity of a Gas," and is worked out according to the following formula:

$$\left. \begin{array}{l} \text{Specific flame capacity in} \\ \text{B.t.u. per sq. in. port area} \\ \text{per second.} \end{array} \right\} F = \frac{WU}{K}$$

W = Net heating value B.t.u. per cu. ft. gas, air, or oxygen mixture issuing from burner per second.

U = Rate of flame propagation of mixture—ft. per second.

K = Ratio: $\frac{\text{Burner Area}}{\text{Inner flame cone area.}}$

Figures for four gases burned in a specific unpiloted burner with air, are given as follows:

Gas	Highest Specific Flame Intensity B.t.u.-in. ² -Sec } (F)
Hydrogen	6.37
City Gas	1.46
Coal Gas	1.35
Methane	0.69

This indicates why it is easier to do glass working with manufactured gas than with natural gas.

Flame Temperatures

The maximum flame obtainable from burning gas is calculable from its composition, but actual determinations vary. Two interesting figures are noted below:

GAS	Flame Temperature—Max. °F Burned With:	
	AIR	OXYGEN
Manufactured	3650	5050
Natural	3563	5135

It is noticeable that the relative position of the two gases is reversed in case of burning with oxygen.

Effects of Inerts on Heat Release

Relative Value of Different Factors. (Theoretical Considerations.) Replacing air by oxygen, the following takes place:

1. The maximum rate of flame propagation in the case of hydrogen increases from 9.2 ft. per second, when mixed with air, to 30.6 ft. per second when mixed with oxygen.

Data is lacking, but this ratio of 3.33 probably holds for all gases.

2. The B.t.u. (net) per cubic foot of burning mixture rises sharply as will be seen from the following tabulation:

GAS	B.t.u. Per Cu. Ft. of Burning Mixture When Burned With:		
	AIR	OXYGEN	RATIO $\frac{\text{Oxygen}}{\text{Air}}$
Hydrogen	82.5	184	2.23
Manufactured	94.2	251	2.67
Natural	89.0	320	3.60

3. Reduction in density of the combustible mixture results in the passage

of more volume for the same burner head pressure. This is a small effect:

Hydrogen increase flow is in ratio of 1.19.

Mfg. Gas increase flow is in ratio of 1.06.

Nat. Gas increase flow is in ratio of 1.007.

Assuming the same burner head pressure (the use of oxygen will probably allow this factor to be increased markedly), these factors multiply out as follows:

RATIO	Heat Release with Oxygen Heat Release with Air
Hydrogen	8.82
Mfg. Gas	9.43
Nat. Gas	12.07

	°F Temperature of Flame with	
	Air	Oxygen
Hydrogen	3960	5385
Mfg. Gas	3650	5050
Nat. Gas	3563	5135

Theoretically, the advantage of the use of oxygen is evident.

In actual practice these large ratios are seldom attained due to the factors of burner manufacture not under control, but their potentiality is there to spur on burner development.

Especially to be noted is the change in relative position of natural and manufactured gas when burned with air or oxygen.

For example, the B.t.u./in.² release of the same burner using natural gas burned with air has 60 per cent the heat release of manufactured gas burned with air, but natural gas burned with oxygen has 128 per cent the heat release of manufactured gas burned with oxygen.

$$\frac{12.07}{9.43} = 1.28$$

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RIBBON BURNERS	31-35
RING BURNERS	20
SUPER BLOWPIPES	8
SURFACE MIX BURNERS	62-67
TIP BURNERS	15