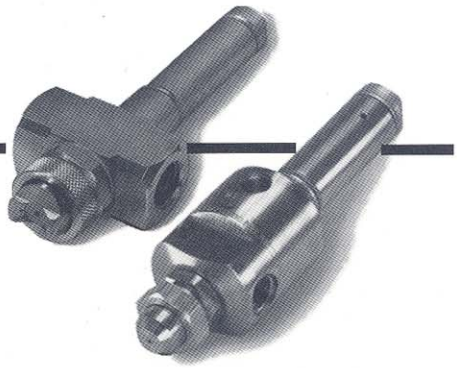
Most frequently asked questions about XA series nozzles!



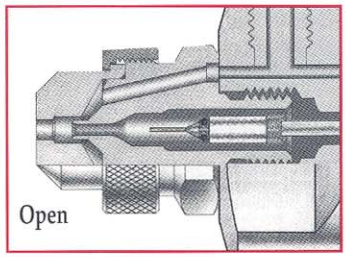
The BETE XA Series is a multi- component air- atomizing system. Because of the number of combinations of hardware assemblies and fluid/air caps we are often asked many questions regarding assembly, installation, and operation. The XA System was designed to allow the swift exchange and replacement of caps, bodies and tips. The system provides a wide range of spray patterns and simplifies maintenance.

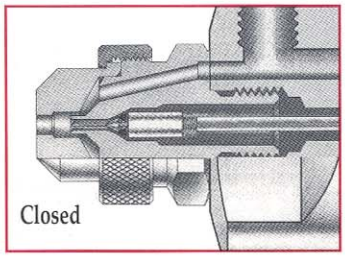
The XA Series assemblies may consist of anywhere from 7 to 11 parts.

Please be certain to read all instructions carefully before assembling or disassembling the nozzle. Damage to these assemblies can occur if these procedures are not followed.

A few generalizations

- The A- plug or B, C, D hardware assemblies are used with 2 gaskets and the square or 03 body
- You cannot use the 01 or 02 body with the A-plug, B, C, or D hardware assemblies
- You may use the E or F hardware assembly with most bodies provided you use the correct adapter, as shown inside. The exceptions are: 05, 06, 07 or 08 body styles.
- All spray set-ups fit on all assemblies





How to get the best operating performance

Operation of the air cylinder of the E or F BETE Automatics requires a minimum air pressure of 30 psi. Failure to provide sufficient air pressure is one of the most frequent causes of poor nozzle performance. The Automatics feature a built- in air cylinder which allows liquid flow to be shut off at the nozzle, resulting in precise, intermittent application of liquid. When air pressure is released a spring causes the cylinder to return to the closed position. For the "F" clean- out options the pin pushes accumulated material from the liquid orifice as it returns. The clean- out pin is not able to remove material from the orifices in the air cap.

Standard seal materials limit the XA to use at temperatures less than 400°F. Materials allowing higher user temperatures are available by special request.

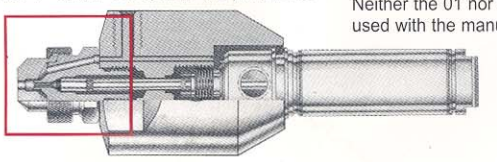
The 02 body requires two separate air lines, one to supply atomizing air and one to supply operating air to the cylinder. The two air lines allow the use of atomizing air at pressures both BELOW and ABOVE 30 psi, while maintaining the minimum 30 psi to the cylinder.

The 01 body features a consolidated air inlet combining both the atomizing air and cylinder air in a single line, resulting in simplified piping layouts. The 01 body can be used only for applications where the atomizing air pressure is ABOVE 30 psi.

The 01/02 bodies simplify external air line connections by fixing the orientation of the air, liquid and cylinder inlets.

The square body 00 with cylinder requires two separate air lines and more complex piping.

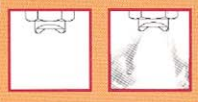
Neither the 01 nor the 02 bodies may be used with the manual hardware options. The square body 00 may be upgraded from a manual set-up to an automatic system with an adapter.



Trouble Shooting Tips

1. Adequately size air and liquid lines to maintain required pressures at each nozzle. (consult air and water flow piping charts)

2. Each siphon nozzle must have a separate liquid feed line from the reservoir.



3. For extreme temperatures and a range of chemicals, consult chart of options for special gaskets, sealants and loctite® adhesives.

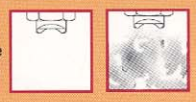
!CAUTION!

4. To maintain adequate air pressure (30 psig min) for cylinder operation, use the 02 body if air pressure to the nozzle is expected to fall below 30 psig.

5. For severe chemicals and abrasive liquids, consult factory for optional nozzle materials.

!CAUTION!

6. Flush out air and liquid lines before connecting nozzles to clear out loose material which could cause pluggage.



7. Install air and liquid pressure gauges close to the nozzle location(s) to allow accurate control of pressures.

8. As a general rule avoid spraying counter- currently to reduce contamination problems from dirty gases.

!CAUTION!

9. To maintain atomization during startup and shutdown, always turn on air first and turn off air last.

10. Multiple nozzle installations are especially sensitive to line sizes and lengths. Size air and liquid lines generously and avoid large numbers of nozzles (no more than 6) on a single branch.

11. Humidification requires high air/ liquid ratios - usually in the range of 2 to 4 SCFM per gallon per hour to produce droplets small enough for evaporation.

12. Maximum operating rate for air cylinders is 3 cycles per second. Maximum pressure is 125 psi.

!CAUTION!

13. In dirty gaseous environments, a purge air pipe surrounding the nozzle can reduce contamination problems.

!CAUTION!

14. For viscosities greater than 150 cP, consider using one of the EF setups.

15. Whenever flow rate accuracy is critical, a positive displacement metering pump or flow controller should be used

!CAUTION!

E & F Hardware Assembly, Replaceable Tip

Effective 2/92 BETE Fog Nozzle, Inc. introduced a new replaceable tip with improved seal design for all E & F assemblies.

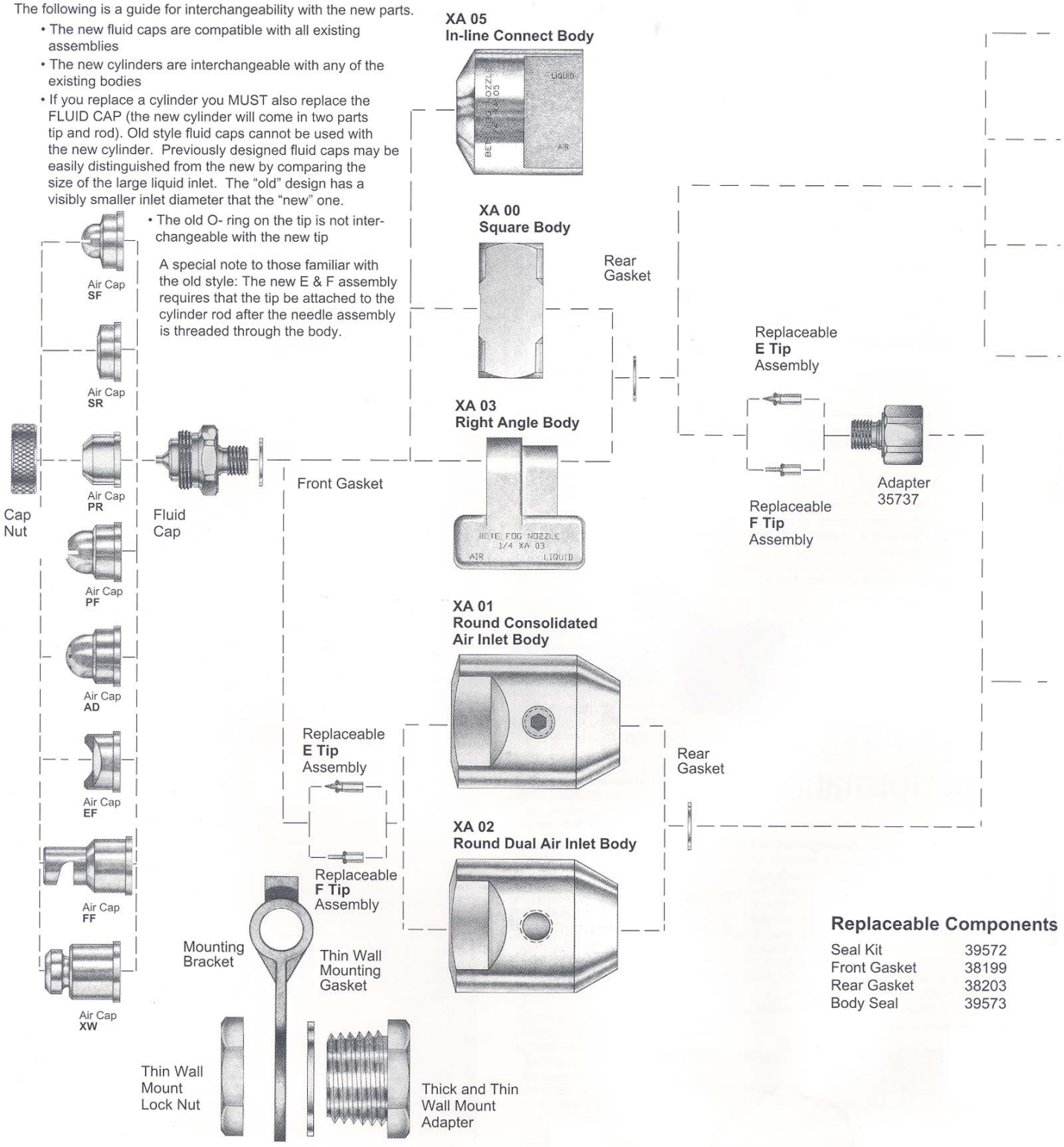
The new assembly incorporates a new poppet seal design which improves the life and effectiveness of the seal when compared to previous assemblies. A threaded cylinder rod end and replaceable tip assembly have been incorporated to allow easy field repair or replacement of worn tips. In addition this allows replacement of tips without necessitating the purchase of the entire cylinder and reduces inventory requirements.

Guide to Retrofiting Old E & F Assemblies

The following is a guide for interchangeability with the new parts.

- The new fluid caps are compatible with all existing assemblies
- The new cylinders are interchangeable with any of the existing bodies
- If you replace a cylinder you MUST also replace the FLUID CAP (the new cylinder will come in two parts tip and rod). Old style fluid caps cannot be used with the new cylinder. Previously designed fluid caps may be easily distinguished from the new by comparing the size of the large liquid inlet. The "old" design has a visibly smaller inlet diameter that the "new" one.
- The old O- ring on the tip is not interchangeable with the new tip

A special note to those familiar with the old style: The new E & F assembly requires that the tip be attached to the cylinder rod after the needle assembly is threaded through the body.



Replaceable Components

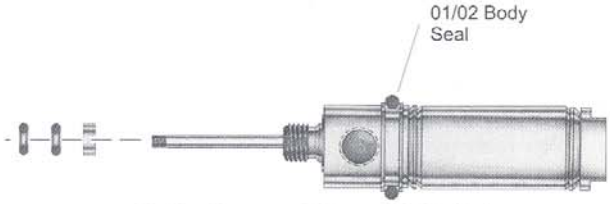
Seal Kit	39572
Front Gasket	38199
Rear Gasket	38203
Body Seal	39573

A. End Plug

B. Shut-Off

C. Clean-Out**

D. Clean-Out/Shut-Off**

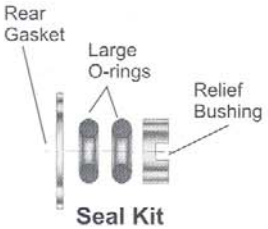


E. Air-Operated Shut-Off Cylinder
F. Air-Operated Clean-out/Shut-off Cylinder

and Gaskets

Cap Nut^	30381
Adapter	35737
E Replace. Tip*	
F Replace. Tip*	

* Specify Fluid Cap
**Re[illegible]eable pins
^ nic[illegible]ated brass



Seal Kit

Assembly Instructions For A, B, C and D Assemblies

Before disassembling or reassembling, please review the diagram on the left to make sure you have the parts necessary to complete your choice of set- up.

1. Attach gasket. Slide rear gasket onto A- plug or B, C, or D hardware assembly coming to rest on base (see figure 1, shown with C assembly.)

2. Thread into body. Thread this assembly into the standard (square) body or the 03 body (see figure 1, shown with standard body.)

3. Attach fluid cap. Place front gasket over assembly. Thread on fluid cap of choice (see figure 2.)

4. Attach air cap. Put on air cap of choice. Secure with cap nut (see figure 3.)

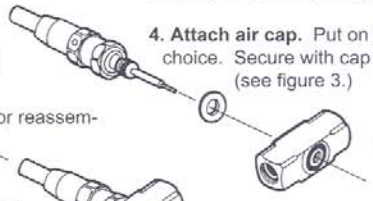


figure 1

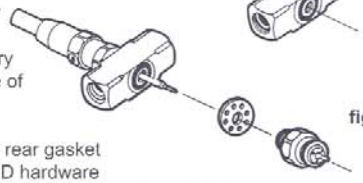


figure 2

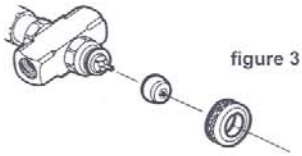


figure 3

Assembly Instructions for E and F Automatics

!WARNING! The needle assembly can be severely damaged if excessive torque is applied during assembly / disassembly.

Assembly Instructions

1. Attach bushings and two O-rings. Slide relief bushing onto cylinder rod to threaded base. Slide two larger O- rings onto cylinder rod. Slide rear gasket onto cylinder rod coming to rest on base (figure A.)

2. Prepare cylinder rod and insert through body. Insert cylinder through the body, **HAND TIGHTEN.** (Shown being inserted into 02 body, figure B) *NOTE: if using cylinder with 00 or 03 bodies thread through adapter first, then attach rear gasket before proceeding to step 3.*

3. Attach tip and small O- ring. Use supplied Loctite® per label directions to coat threads on cylinder rod. Screw tip to cylinder rod, **HAND TIGHTEN.** Slide front gasket over tip to rest on body. **WARNING.** Do not mar or gouge surface of tip when assembling, keep surface smooth (see figure C).

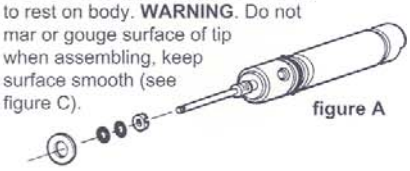


figure A

4. Thread fluid cap, air cap and cap nut. Thread fluid cap into body. Tighten fluid cap to 40 to 50 in- lb. torque. This is a snug fit, **DO NOT OVER TIGHTEN.** Attach air cap and thread on cap nut to secure. (See figure D.)

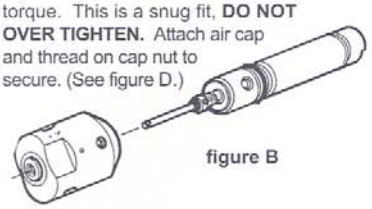


figure B

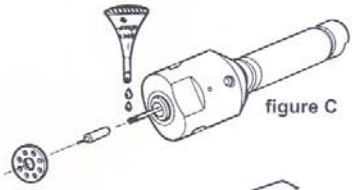


figure C

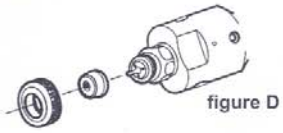


figure D

What you need to consider in designing your XA system

• Confirm that the correct nozzle flow rate, spray pattern, and operating pressures have been selected and supplied for the application, that the correct mounting and accessory hardware such as thick wall adapters and clean out needles are installed on the nozzle and that the correct number of nozzles is available.

• The header (for a multiple nozzle installation) and supply lines should be sized generously to prevent inbalance between liquid and air pressures for each nozzle and excessive pressure losses along the header that could cause erratic nozzle operation.

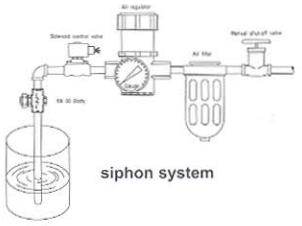
Size a header to accommodate the total flow to all the nozzles on the header. The correct pipe size can be chosen from the shaded regions on the air and water pressure loss charts. Headers that are longer than 10 feet or that have more than 10 nozzles may be fed from both ends to minimize pressure differences along their length.

Be sure to account for the air pressure according to the instructions on the chart when sizing the air piping.

The line supplying air to an automatic cylinder can usually be 1/8" even when multiple nozzles are used since the volume flow of air to the cylinders is very small.

When the nozzles are supported by at least one rigid pipe or wall, plastic tubing often makes connections fast and easy, but be certain the inside diameters of the tubing to be used are as large as those in the corresponding pipe size.

• Filters for the air and water lines should be placed upstream of pressure regulators and solenoid valves. Regulators and pressure gauges should be placed as close to the nozzles or header inlet as possible to allow the regulator to respond rapidly to pressure changes, especially when the nozzles are being cycled on and off automatically.



siphon system

• Solenoid valves are generally installed downstream of the pressure regulator and as close to the nozzle as possible, especially if they are to be used to cycle the nozzles on and off.

• Automatic operation requires at least one three-way valve so that air can escape from the cylinder and allow the spring to push the clean-out or clean-out/shut-off needle into place. Faster operation is usually possible when you control the cylinder separately using the square or 02 body. Using the 01 body requires the air to be exhausted from the larger atomizing air supply piping to allow the cylinder to return to the closed position.

• A complete XA system diagram with filters, regulators and solenoid valves is shown at right.

• You must correctly size the supply piping to ensure that adequate air and water are supplied to the nozzle. Correct size is especially important in multi- nozzle systems where differences in air and water pressures from one nozzle to the next can cause erratic operation. Several charts are included to help you choose the correct pipe sizes.

Flow of air through schedule 40 steel pipe

For lengths of pipe other than 100 feet, the pressure drop is proportional to the length. Thus, for 50 feet of pipe, the pressure drop is approximately one- half the value given in the table . . . for 300 feet, three times the given value, etc.

The pressure drop is also inversely proportional to the absolute pressure and directly proportional to the absolute temperature.

Therefore, to determine the pressure drop for inlet or average pressure other than 100 psi and at temperatures other than 60° F, multiply the values given in the table by the ratio:

$$\left(\frac{100 + 14.7}{P + 14.7}\right)\left(\frac{460 + t}{520}\right)$$

where:

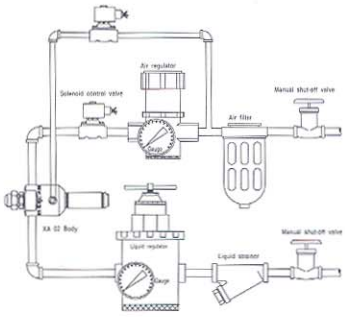
"*P*" is the inlet or average gauge pressure in pounds per square inch, and,

"t" is the temperature in degrees Fahrenheit under consideration.

The cubic feet per minute of compressed air at any pressure is inversely proportional to the absolute pressure and directly proportional to the absolute temperature.

To determine the cubic feet per minute of compressed air at any temperature and pressure other than standard conditions, multiply the value of cubic feet per minute of free air by the ratio:

$$\left(\frac{14.7}{P + 14.7}\right)\left(\frac{460 + t}{520}\right)$$



pressure system with XA02 body

Example: Suppose you need to supply two XAPR300 nozzles with 60 psi water and 50 psi air as shown in the diagram below.

Water

Total flow = (59 gph) x 2 / 60 = 1.96 gpm

Select 3/8" or larger pipe

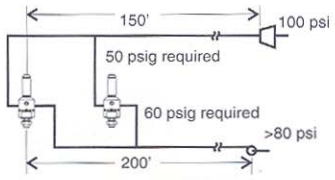
Air

Total Flow = (4.6) x 2 = 9.2 scfm

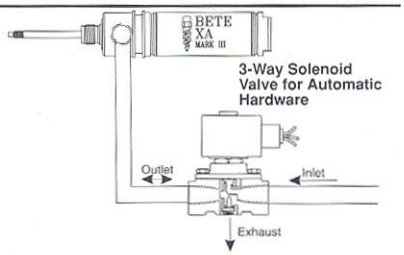
Note that tabulated pressure losses will need to be multiplied by

$$\left(\frac{100 + 14.7}{P + 14.7}\right) = \left(\frac{114.7}{50 + 14.7}\right) = 1.77$$

to obtain losses at 50 psi. Select 3/8" or larger pipe.



Filters, regulators and valves



BETE recommends that filters be used on both the air and liquid lines supplying XA nozzles to minimize the potential for clogging. The air filters supplied by BETE remove both water and particulates and are equipped with an automatic drain. The water filters remove particulates larger than 100 mesh and can be equipped with a quick flush drain valve to remove accumulated deposits.

Liquid strainers for siphon setups should have large areas to minimize pressure losses across the strainer itself. It is also preferable to install the strainer below the liquid level.

The liquid pressure regulators are inbalanced and the downstream pressure may fluctuate with variations in inlet pressure regardless of the pressure setting. The air regulators are the relieving type and pressures can be set without the air actually flowing through the nozzles. In addition these are less sensitive to variations in upstream pressure.

We have produced this booklet to answer the most frequently asked questions we receive. If after reading this piece you have further questions please do not hesitate to call our customer service department at: **413-772-0846or visit our website at: www.bete.com.**

Thank you for purchasing your nozzles from BETE.

BETE®

Water and Air Flow Data

FLOW OF WATER THROUGH SCHEDULE 40 STEEL PIPE

Discharge		Press. Drop per 100' and Vel. in Sched. 40 Pipe for Water at 60°F															
		Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop	Veloc-ity	Press. Drop
Gallons per Minute	Cubic Ft. per Second	Feet per Second	Lbs per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.	Feet per Second	Lbs. per Sq. In.
		1/8"		1/4"		3/8"		1/2"									
0.2	0.000446	1.13	1.86	0.616	0.359												
0.3	0.000668	1.69	4.22	0.924	0.903	0.504	0.159	0.317	0.061								
0.4	0.000891	2.26	6.98	1.23	1.61	0.672	0.345	0.422	0.086	3/4"							
0.5	0.00111	2.82	10.5	1.54	2.39	0.840	0.539	0.528	0.167	0.301	0.033						
0.6	0.00134	3.39	14.7	1.85	3.29	1.01	0.751	0.633	0.240	0.361	0.041						
0.8	0.00178	4.52	25.0	2.46	5.44	1.34	1.25	0.844	0.408	0.481	0.102						
												1"		1 1/4"			
1	0.00223	5.65	37.2	3.08	8.28	1.68	1.85	1.06	0.600	0.602	0.155	0.371	0.048				
2	0.00446	11.29	134.4	6.16	30.1	3.36	6.58	2.11	2.10	1.20	0.526	0.743	0.164	0.429	0.044	1 1/2"	
3	0.00668			9.25	64.1	5.04	13.9	3.17	4.33	1.81	1.09	1.114	0.336	0.644	0.090	0.473	0.043
4	0.00891			12.33	111.2	6.72	23.9	4.22	7.42	2.41	1.83	1.49	0.565	0.858	0.150	0.630	0.071
5	0.01114	2"				8.40	36.7	5.28	11.2	3.01	2.75	1.86	0.835	1.073	0.223	0.788	0.104
6	0.01337	0.574	0.044			10.08	51.9	6.33	15.8	3.61	3.84	2.23	1.17	1.29	0.309	0.946	0.145
8	0.01782	0.765	0.073	2 1/2"		13.44	91.1	8.45	27.7	4.81	6.60	2.97	1.99	1.72	0.518	1.26	0.241
10	0.02228	0.956	0.108	0.670	0.045			10.56	42.4	6.02	9.99	3.71	2.99	2.15	0.774	1.58	0.361
15	0.03342	1.43	0.224	1.01	0.094	3"				9.03	21.6	5.57	6.36	3.22	1.63	2.37	0.755
20	0.04456	1.91	0.375	1.34	0.158	0.868	0.056	3 1/2"		12.03	37.8	7.43	10.9	4.29	2.78	3.16	1.28
25	0.05570	2.39	0.561	1.68	0.234	.09	0.083	0.812	0.041			9.28	16.7	5.37	4.22	3.94	1.93

FLOW OF AIR THROUGH SCHEDULE 40 STEEL PIPE

Free Air *q' m ft*³/min. at 60°F & 1.47 psia	Compressed Air ft³/min. at 60°F at 100 psig	Press. Drop per 100' of Sched. 40 Pipe For Air For 60° and 100 Pounds Per Square Inch (PSI)								
		1/8"	1/4"	3/8"	1/2"					
1	0.128	0.361	0.083	0.018						
2	0.256	1.31	0.285	0.064	0.020	3/4"				
3	0.384	3.06	0.605	0.133	0.042					
4	0.513	4.83	1.04	0.226	0.071					
5	0.641	7.45	1.58	0.343	0.106	0.027				
							1"	1 1/4"		
6	0.769	10.6	2.23	0.408	0.148	0.037				
8	1.025	18.6	3.89	0.848	0.255	0.062	0.019			
10	1.282	28.7	5.96	1.26	0.356	0.094	0.029		1 1/2"	
15	1.922		13.0	2.73	0.834	0.201	0.062			
20	2.563		22.8	4.76	1.43	0.345	0.102	0.026		
25	3.204		35.6	7.34	2.21	0.526	0.156	0.039	0.019	
30	3.845			10.5	3.15	0.748	0.219	0.055	0.026	
35	4.486			14.2	4.24	1.00	0.293	0.073	0.035	
40	5.126			18.4	5.49	1.30	0.379	0.095	0.044	
45	5.767			23.1	6.90	1.62	0.474	0.116	0.055	2"
50	6.408			28.5	8.49	1.99	0.578	0.149	0.067	0.019
60	7.690	2 1/2"		40.7	12.2	2.85	0.819	0.200	0.094	0.027
70	8.971				16.5	3.83	1.10	0.270	0.126	0.036
80	10.25	0.019			21.4	4.96	1.43	0.350	0.162	0.046
90	11.53	0.023			27.0	6.25	1.80	0.437	0.203	0.058