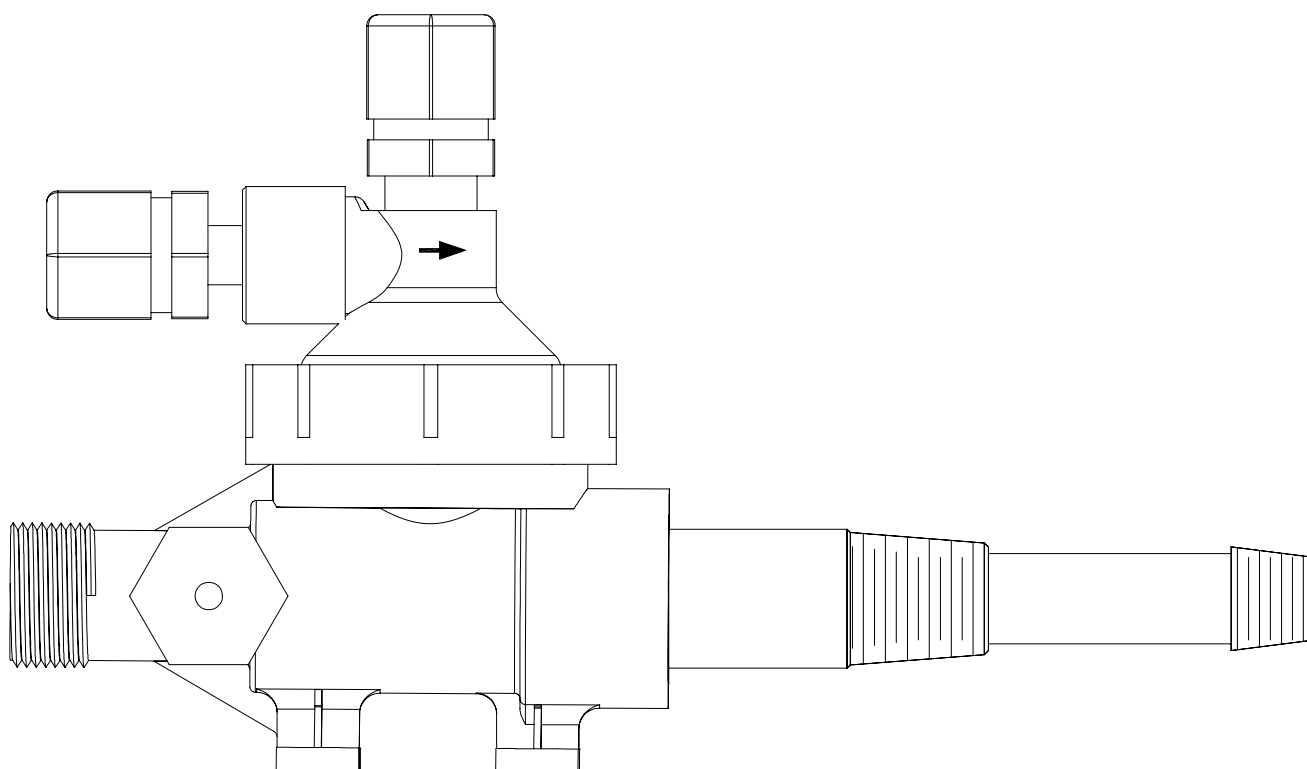

Instruction Manual —
EJ17 Ejector
Chlorine, Sulfur Dioxide and Ammonia

SEVERN

TRENT

SERVICES

Disinfection Products



These instructions describe the installation, operation and maintenance of the subject equipment. Failure to strictly follow these instructions can lead to an equipment rupture that may cause significant property damage, severe personal injury and even death. If you do not understand these instructions, please call Severn Trent Water Purification for clarification before commencing any work at 215-997-4000 and ask for a Field Service Manager. Severn Trent Water Purification, Inc. reserves the rights to make engineering refinements that may not be described herein. It is the responsibility of the installer to contact Severn Trent Water Purification, Inc. for information that cannot be answered specifically by these instructions.

Any customer request to alter or reduce the design safeguards incorporated into Severn Trent Water Purification equipment is conditioned on the customer absolving Severn Trent Water Purification from any consequences of such a decision.

Severn Trent Water Purification has developed the recommended installation, operating and maintenance procedures with careful attention to safety. In addition to instruction/operating manuals, all instructions given on labels or attached tags should be followed. Regardless of these efforts, it is not possible to eliminate all hazards from the equipment or foresee every possible hazard that may occur. It is the responsibility of the installer to ensure that the recommended installation instructions are followed. It is the responsibility of the user to ensure that the recommended operating and maintenance instructions are followed. Severn Trent Water Purification, Inc. cannot be responsible deviations from the recommended instructions that may result in a hazardous or unsafe condition.

Severn Trent Water Purification, Inc. cannot be responsible for the overall system design of which our equipment may be an integral part of or any unauthorized modifications to the equipment made by any party other than Severn Trent Water Purification, Inc.

Severn Trent Water Purification, Inc. takes all reasonable precautions in packaging the equipment to prevent shipping damage. Carefully inspect each item and report damages immediately to the shipping agent involved for equipment shipped "F.O.B. Colmar" or to Severn Trent Water Purification for equipment shipped "F.O.B Jobsite". Do not install damaged equipment.

**SEVERN TRENT SERVICES, COLMAR OPERATIONS
COLMAR, PENNSYLVANIA, USA
IS ISO 9001: 2000 CERTIFIED**

TABLE OF CONTENTS

1	INTRODUCTION	5
1.1	General	5
1.2	Warranty	5
1.3	Specifications	5
2	OPERATION	7
2.1	General	7
2.2	Installation	7
3	START-UP	10
3.1	Vacuum Check	10
4	SERVICE	11
4.1	Periodic Maintenance	11
4.2	Functional Test	11
5	TROUBLESHOOTING CHART	17
FIGURES		
1	EJ17 Ejector	6
2	Pipeline Mounting	8
3	Ejector Piping	9
4	EJ17 Exploded View	12

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1 INTRODUCTION

1.1 General

The EJ17 ejector is a triple check design that is operated by the flow of water or process liquid flowing through it, under sufficient pressure and velocity, to create the necessary vacuum to operate the vacuum regulator. Correct installation and proper care will ensure best operation. Read instructions carefully and save for future reference.

NOTE: This ejector is not recommended for alkaline solutions (ph>9); Consult factory for appropriate ejector.

1.2 Warranty

See Bulletin 005.9001 for the Severn Trent Services equipment warranty.

1.3 Specifications

Gas Flow: 1 - 500 PPD (Cl_2 , SO_2)
5 - 1000 PPD (NH_3)

Capacities Available for Chlorine and Sulfur Dioxide	Capacities Available for Ammonia	Minimum Vacuum Tubing Connection sizes
1, 3, 10, 25, 50, 100 PPD (20, 60, 200, 500 g/h, 1, 2 kg/h)	5, 10, 25, 50 PPD (30, 100, 250, 500 g/h, 1 kg/h)	3/8"
200 PPD (4 kg/h)	100 PPD (2 kg/h)	1/2"
300, 500 PPD (5, 10 kg/h)	250 PPD (5 kg/h)	5/8"
	500, 1000 PPD (10, 20 kg.h)	1" PVC pipe

Connections:

Inlet: 1" MNPT

Outlet: For all throats (short) other than 0.656 and 0.750 - 3/4" MNPT, 1" I.D. hose, 1" MNPT inclusive.
For 0.656 and 0.750 throats (long) - 1 1/2" MNPT, 2" I.D. hose inclusive.

Nozzles and Throats:

Nozzles and throats are paired together in combinations to meet the desired feed rate and user hydraulic conditions. The combination supplied was chosen for your particular application. The nozzle and throat combination may be changed to accommodate a change of feed rate or hydraulic conditions.

Pressures:

Maximum Supply Pressure: 300 PSIG
Maximum Back Pressure: 200 PSIG
Minimum Back Pressure: 4" W.C.

Temperature:

Maximum Temperature: 100°F (38°C)

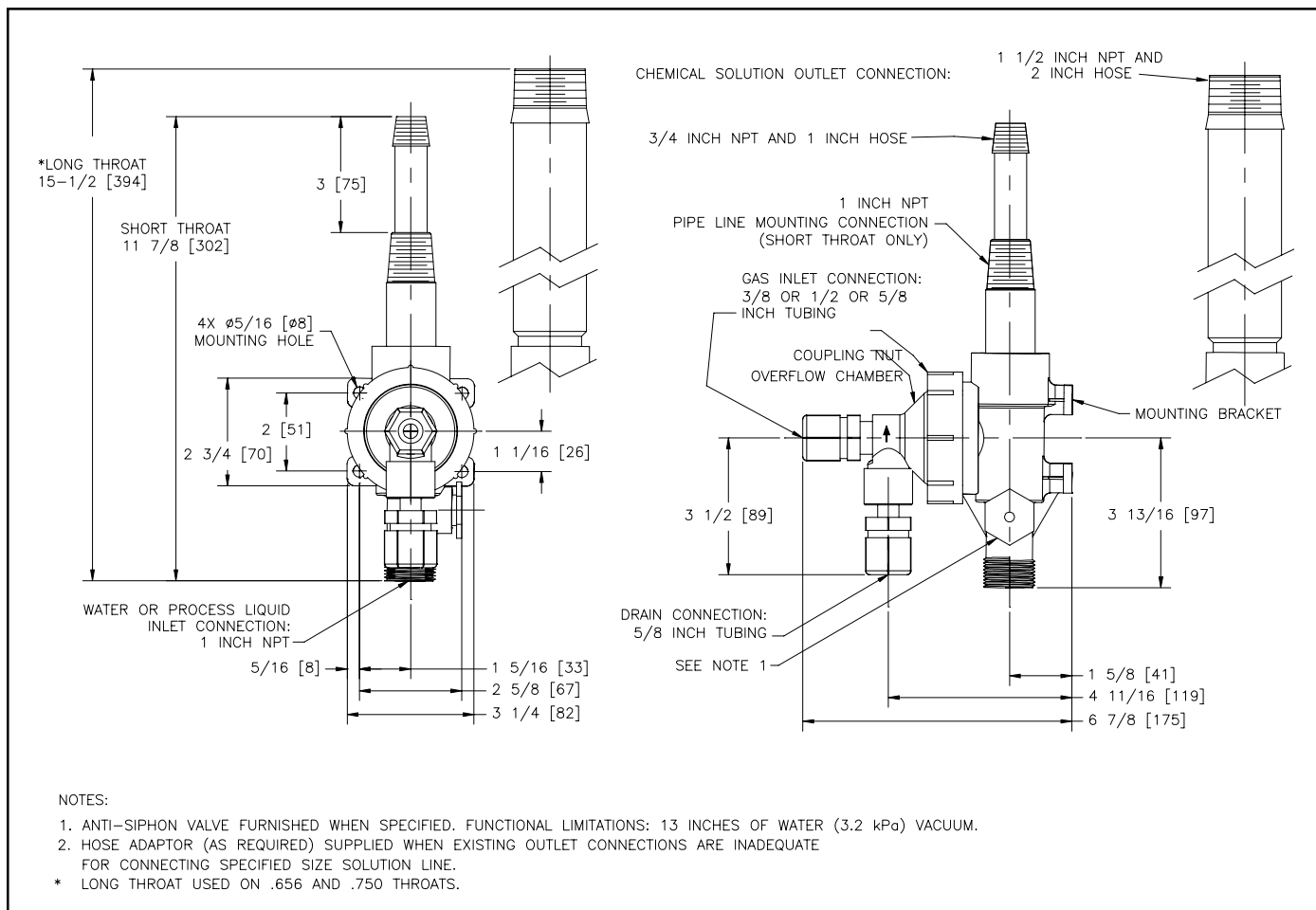


Figure 1 - EJ17 Ejector

2 OPERATION

2.1 General

- 2.1.1 Water or process fluid passing through the nozzle produces a high velocity jet stream into the associated throat. This action (Bernoulli Principle) creates a vacuum that allows the vacuum regulator to feed process gas at a controlled rate. The process gas is controlled and monitored by the meter-rate valve assembly located between the ejector and vacuum regulator. The process gas, entering the ejector, is mixed with the motive fluid and transported to the treatment process via the solution piping.
- 2.1.2 The ejector nozzle/throat combination is designed to provide the proper vacuum level required to maintain the sonic flow control capability of the gas feed system. The nozzle/throat combination was provided in your ejector based on hydraulic information available to Capital Controls at the time of order placement. Maintaining the appropriate water supply and flow conditions will insure that the ejector continues to function as designed. A copy of the appropriate ejector nozzle/throat curve can be provided by contacting Severn Trent Services.

The ejector must be provided with an anti-siphon valve for those applications where a negative pressure may exist when the receiving process is stopped. (i.e. swimming pools) This will prevent drawing the gas into an empty process line. An anti-siphon valve is required when the process vacuum exceeds 5" W.C. The anti-siphon valve will pass 9.1SCFM at a maximum vacuum of 13" W.C. (3.2 kPa). Should the operating conditions exceed these limits then a separate vacuum breaker will be required.

WARNING

Failure to adhere to the above limitation will result in the vacuum regulator being operated completely independent of ejector operation thereby resulting in a potentially hazardous condition at the point of pipeline discharge which could result in bodily injury.

- 2.1.3 On/off applications that control the ejector water supply, with a solenoid valve, (typically, well head chlorination with multiple on/off cycles in a daily period) can cause a *water hammer* condition at the ejector. Severe water hammer may cause the back checks in the ejector to bounce allowing water into the vacuum line. If this is evident the use of a slow acting solenoid valve is suggested. Also running the vacuum line vertically above the ejector for a few feet will allow the accumulated water to drain through the drain check.

2.2 Installation

- 2.2.1 The ejector(s) may be located either indoors or outdoors. However the water or process liquid supply system restricts outdoor installations to geographical areas where the ambient temperature does not fall below freezing.

Refer to Figure 2. The ejector should be mounted in a vertical position with the solution outlet at the top. **Do not mount the ejector with the solution outlet pointing down.** If horizontal mounting is required, position (or screw into the pipeline) so that the gas inlet connection is on a horizontal line with the water flow through the ejector. The solution outlet piping must be arranged so that the ejector remains full at all times. (A minimum head/back pressure of 4" W.C. must be maintained.) After locating and mounting the ejector loosen the overflow chamber coupling nut and rotate the overflow chamber so that the arrow is pointing up. Hand tighten the nut to secure the chamber in position.

Where the point of application is an open tank or channel and the back pressure is zero or less, some portion of the solution line, if present, of an ejector with functional anti-siphon valve must be elevated to promote positive start-up.

2.2.2 Pipeline Mounting

Mounting of the ejector(s) directly in the pipeline at the point of application (even when design permits this option) is subject to the following limitations. If any of the following limitations exist, it will be necessary to mount the ejector on a wall and install a solution line to transport the chemical solution from the ejector to the point of application.

- 2.2.2.1 The diameter of the pipeline must be at least 6 inches to achieve adequate dispersion of the chemical solution within the process liquid. **It is never permissible to cut off the end of the ejector throat to make it fit the diameter of the pipeline, as this will prevent proper operation of the ejector.**
- 2.2.2.2 The pipeline must be one in which no suction condition exists unless the ejector contains an integral anti-siphon valve.
- 2.2.2.3 The pipeline must be one in which the pressure can be reduced to zero by closing off existing valves, since the ejector must be removed from the line for servicing.
- 2.2.2.4 A. Drill and tap the pipeline to accept a 1 1/2" NPT x 1" NPT malleable iron reducing bushing.
B. Apply ordinary pipe dope to the male threads of the bushing. Screw the bushing into the pipe and tighten securely using a wrench.
C. Screw the ejector into the bushing, sparingly lubricating (or apply teflon tape to) the male threads to provide a perfect seal.

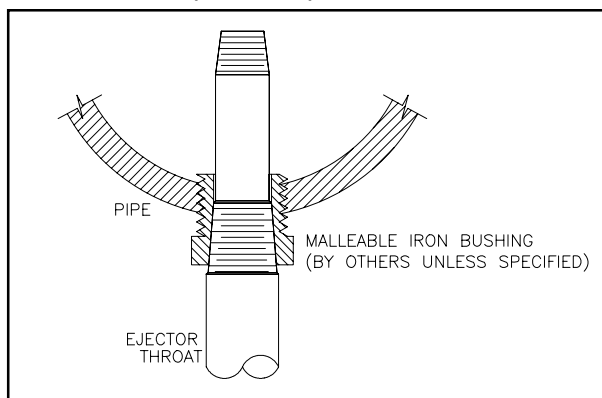


Figure 2 - Pipeline Mounting

2.2.3 Wall Mounting

- 2.2.3.1 Locate as close as conveniently possible to the point of application to reduce the length of solution line to an absolute minimum.
- 2.2.3.2 Mount on a wall (or other suitable surface) using the four 5/16" diameter holes provided in the mounting bracket.
Following mounting, make the connections as illustrated in Figure 3 and described on page 9.

2.2.4 Piping

- 2.2.4.1 Refer to the appropriate vacuum regulator instruction book, Figures 1, 2 & 3 and specifications paragraph 1.3 for interconnection and connection size information.
- 2.2.4.2 Using rigid piping, extend a supply line to the ejector inlet. Line size to be 1", 1 1/2" or 2" pipe, as specified by the supplier; if larger than 1 inch, bush down at ejector inlet. Provide a union (or flange) adjacent to the inlet to complete the connection and allow for easy removal of the ejector for servicing.

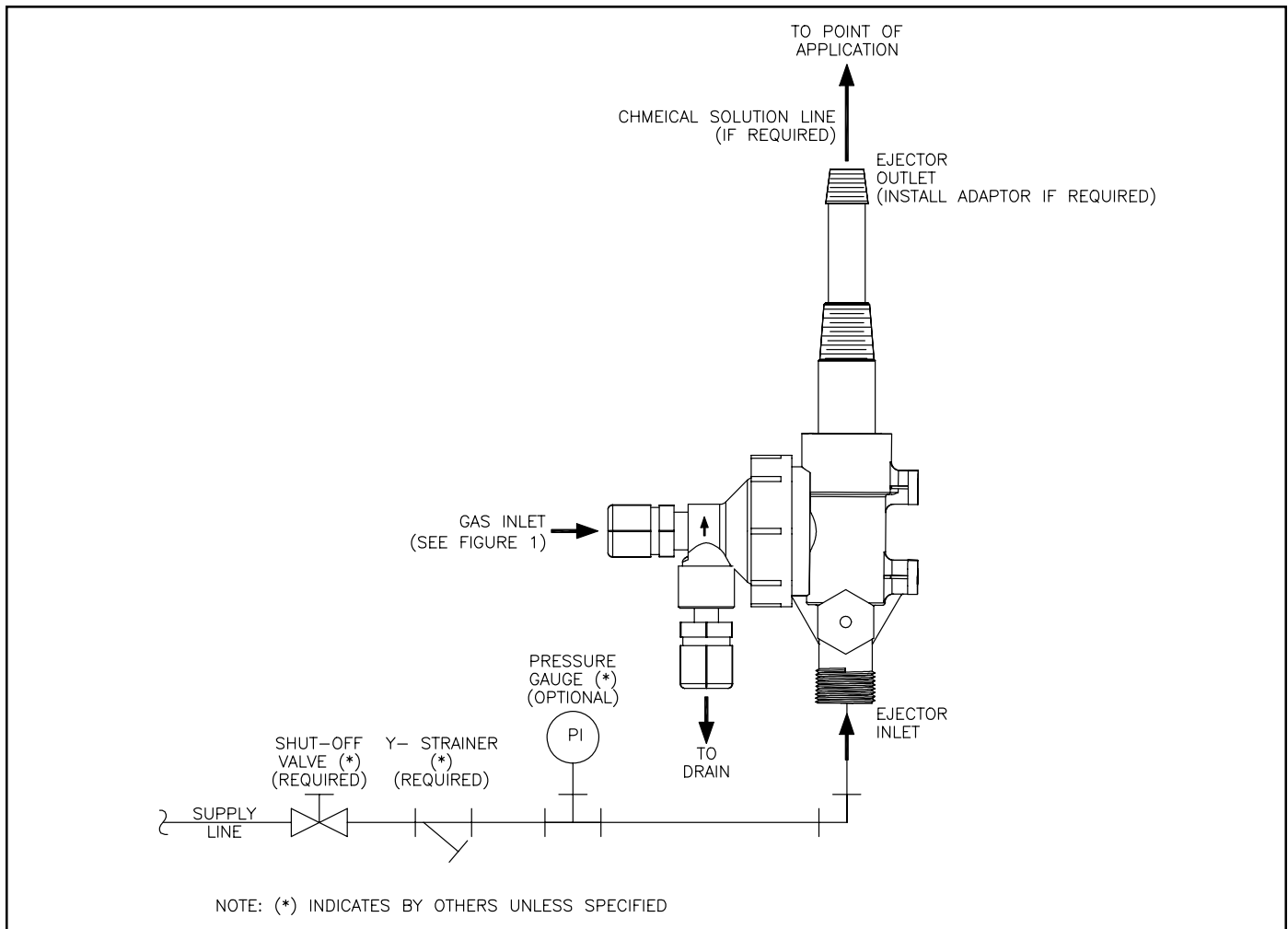


Figure 3 - Ejector Piping

When the solution piping is 1-1/2" or larger and the 1-1/2" MNPT ejector outlet connection is to be used, **do not cut off the end of the throat between the 1 1/2" connection and the end of the throat. Doing so will prevent proper operation of the ejector.**

2.2.4.3 If a solution line is required, connect a flexible hose (sufficient in length to extend to the point of application) to the ejector outlet. Line size to be 1", 1-1/2" or 2" ID hose, as specified by the supplier. Depending on hose size, either connect the hose directly to the hose connection of the ejector or install the hose adaptor (as required and furnished) on the ejector outlet. Secure the hose connection using a hose clamp. See Figure 2 and 3 for additional piping information.

In those instances where rigid piping has been specified for the solution line, provide a union (or flange) adjacent to the ejector outlet to complete the connection and allow for easy removal of the ejector for servicing. Depending on the size of the line, the union (or flange) is either installed directly on the NPT connection of the ejector or bushed to the proper size.

2.2.4.4 Using 5/8 inch (5/8" x 1/2" ID) tubing, connect and extend a drain line to a floor drain or other suitable discharge area. Arrange the line to prevent crimping; and, to eliminate back pressure, do not elevate this line above the connection to the ejector or create traps. The line must drain freely. Protect this line along its entire length from freezing during cold weather.

3 START-UP

3.1 Vacuum Check

The ejector, its water supply and solution lines, must be properly installed and checked before operating the vacuum regulator. Unless the ejector is creating a vacuum at the required level, the vacuum regulator will not function.

- 3.1.1 Disconnect the vacuum tubing from the ejector.
- 3.1.2 Open the ejector water supply valve. The ejector should now be in operation and creating a vacuum.
- 3.1.3 Put your finger on the vacuum connector opening and feel the vacuum. There should be no doubt that a vacuum exists as your finger will be hold on the fitting with substantial force. If there is no vacuum, be certain the supply pressure is sufficient for the nozzle and throat selection and back pressure conditions. Also check that the nozzle and/or piping are not plugged with debris, which is a common problem with a new installation. Correct the condition and obtain proper vacuum before proceeding with vacuum regulator operation. (Reference the appropriate vacuum regulator instruction manual)
- 3.1.4 Reconnect the vacuum tubing to the ejector. Leave the ejector running and proceed to commision the gas feed system as required by following the start-up procedures in Instruction Bulletin 100.6701.

4 SERVICE

4.1 Periodic Maintenance

- 4.1.1 As with all gas feeding equipment, it is recommended that the ejector be serviced a minimum of once per year. The nature and extent of servicing is dependent upon 1) the complexity of the gas supply system, 2) the type, quality and quantity of gas being handled, 3) the quality and quantity of water or process liquid being used to operate the ejector(s). More frequent service periods may be required and must be learned from experience due to the prevailing site conditions.
- 4.1.2 The manner in which the components can be disassembled for servicing becomes apparent by referring to Figure 4. A preventative maintenance kit P/N 614S092U01 is available for periodic service. The kit contains all the recommended spare parts and cleaning/assembly directions required for complete maintenance of the ejector.
- 4.1.3 Once an O-ring is disturbed, it is highly recommended that it be replaced as it will take a "set" and may not properly reseal yielding poor ejector performance.

NOTE: Nozzle plugging can be caused by foreign material (pipe scale, stone, dirt accumulation). This can usually be blown out or pushed out with a wire.

Build up of deposits caused by iron, manganese, carbonates or other material can usually be removed by immersing the nozzle in muriatic acid and rinsing. Exercise care to prevent the acid from coming in contact with the skin or clothing.

4.2 Functional Test

When the ejector is reassembled, a functional test of the check valve assembly is recommended to check for proper ejector assembly and operation.

- 4.3.1 Do not connect vacuum tubing to the vacuum regulator.
- 4.3.2 Turn on water supply.
- 4.3.3 Verify vacuum at ejector.
- 4.3.4 Turn water supply off for approximately 5 minutes. If the ejector has been re-assembled properly, no water should be evident in the vacuum tubing.

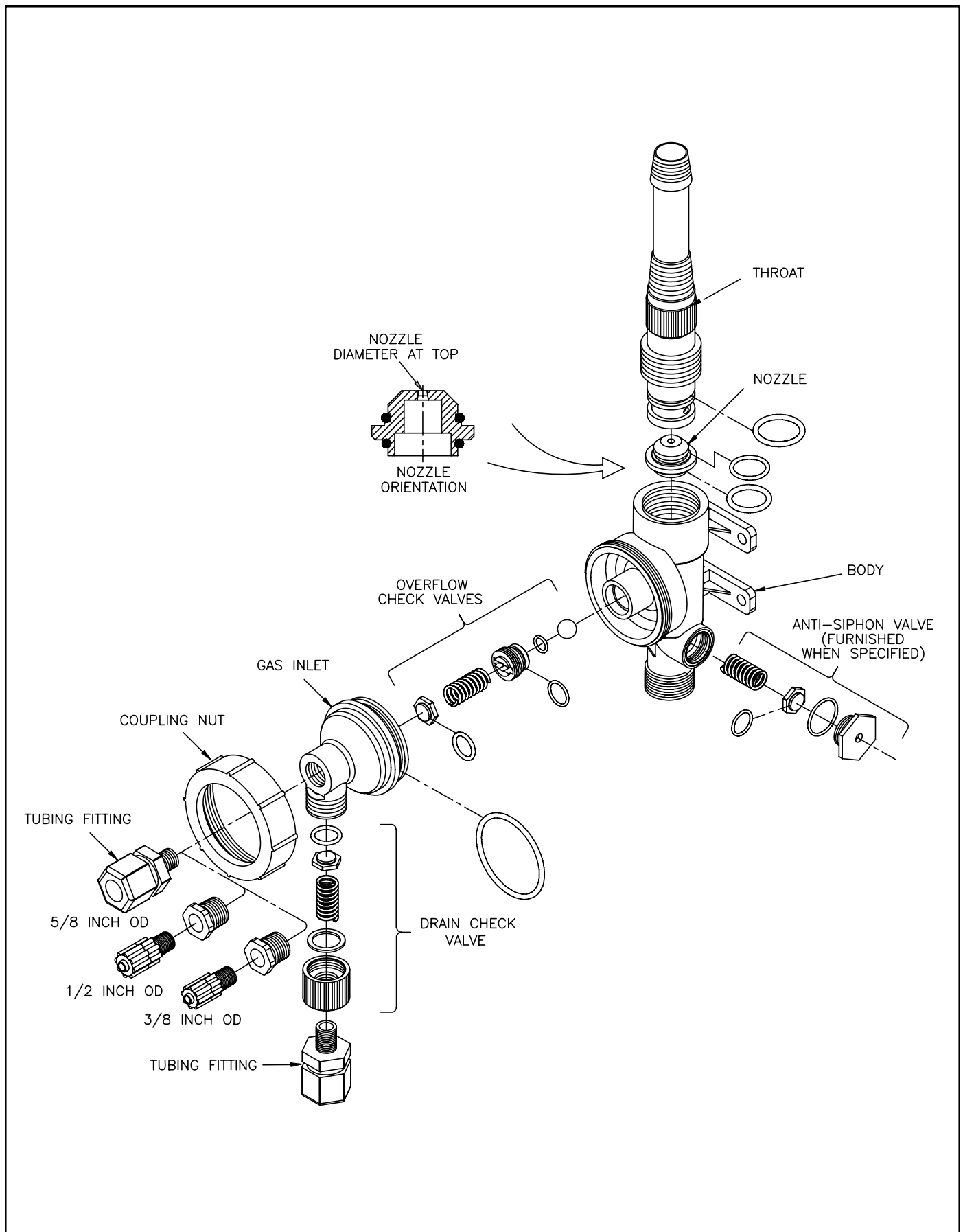


Figure 4 - EJ17 Exploded View

5 TROUBLESHOOTING CHART

Trouble	Probable Cause	Corrective Action
1. Insufficient ejector vacuum.	a. Water supply Y-strainer dirty. b. Supply pressure (measured at ejector inlet) too low. c. Back pressure (measured at ejector discharge) too high. d. Nozzle clogged. e. Nozzle worn. f. All of the above Corrective Actions do not solve the Probable Cause listed above.	a. Clean Y-strainer. b. Check that water supply pressure and flowrate is suitable for nozzle and throat combination. Fully open water supply valve. c. check that back pressure is suitable for nozzle and throat combination. Fully open all solution valves between ejector and diffuser. Clean solution line and/or diffuser. Reducer dynamic back pressure by reducing elbow/tee quantities and increasing the solution line size. d. Clean debris from nozzle and ejector body. e. Replace nozzle. Inspect throat and replace also if wear signs exist. f. Replace the nozzle/throat combination to suit site conditions. Add booster pump on water supply to ejector.
2 Flooded vacuum lines/meter assembly.	a. Dirt on back pressure check valves. b. Improperly seated or defective O-ring. c. Water in vacuum lines and/or meter assembly. d. Water in vacuum lines and/or meter assembly caused by water hammer of solenoid valve controlled water supply.	a. Clean and replace O-rings. b. Replace O-rings. c. Clean and or replace drain check valve. d. Use a slow acting solenoid valve. Extend vacuum line, at ejector, a few feet above the ejector to allow the drain valve to empty the line.

Design improvements may be made without notice.

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