

## **TROUBLESHOOTING MAZZEI<sup>®</sup> INJECTORS**

When properly specified, installed, and operated, Mazzei Injectors provide trouble-free operation. In the real world, however, there are a number of factors that can cause a Mazzei Injector to decrease in performance or fail to perform altogether. These factors are discussed in detail below.

### **A. Installation Tips**

1. Mazzei Injectors should always be installed in a horizontal or vertically up position (outlet above inlet). Installation in a vertically down position (outlet below inlet) may cause intermittent or erratic suction by the injector.
2. To optimize performance of a Mazzei Injector, there should always be some piping attached to the injector outlet. For plastic injectors, as little as 12" of piping works well when venting directly to atmospheric pressure.
3. Always use "full flow" valves and fittings when connecting to a Mazzei Injector. Never use piping or pipe fittings smaller than the thread size of the Mazzei Injector.
4. Do not over-tighten Mazzei Injectors when attaching them to pipes or fittings. The use of a thread sealant/tape is recommended.
5. Mazzei Injectors require a pressure differential to operate properly. Normally, the outlet pressure must be at least 25-30% less than the inlet pressure for significant suction to occur. Pressure gauges are recommended to determine the actual pressure differential.

### **B. Some Simple Tests to Determine Whether or Not a Mazzei Injector Is Working**

1. With the suction line disconnected and the injector in operation, place your finger over the suction port. Can you feel suction?
2. With the suction line disconnected and the injector in operation, gently depress the ball inside the internal check valve on the suction port (a slender, blunt tool should be used for this purpose). Does water spurt out of the suction port?
3. If you can feel suction and water does not spurt out of the suction port during operation, the injector is generating a vacuum and is working properly. If you cannot feel suction and water does spurt out of the suction port during operation, the injector is not generating a vacuum.

### C. Reasons Why a Mazzei Injector Might Not Be Working

1. **Injector Is Damaged:** Mazzei Injectors are made from Polypropylene, MPVC, PVDF, Natural PVDF or ECTFE thermoplastic. These materials are quite resistant to abuse. They can be damaged, however, by over tightening, from impact or from being subjected to excessive torsion. If you suspect this to be the case, examine the injector for cracks, holes or other signs of damage. If any of these signs of damage are found, replace the injector.
2. **Insufficient Pressure Differential:** Mazzei Injectors typically begin suction with a water pressure differential of about 20%. Significant suction does not begin until the water pressure differential is in the range of 25%-30%. For liquid suction, Mazzei Injectors reach maximum suction when the water pressure differential is about 50%. For gas suction, suction capacity increases until the outlet water pressure is zero. It is difficult to estimate water pressure differential. It should be measured with pressure gauges both upstream and downstream of the injector.

An important characteristic of Mazzei Injectors is that they do not, by themselves, create a pressure differential. Both the upstream and downstream pressures experienced by an injector are caused by the system into which the injector is placed, not by the injector. Thus, merely placing a Mazzei Injector in a pressurized water line will not necessarily create a significant water pressure differential, other than friction loss. If a particular system cannot generate sufficient water pressure differential for the Mazzei Injector to operate properly, then an alternative method of installation must be considered.

3. **Insufficient Water Flow:** At any given set of inlet and outlet water pressures, Mazzei Injectors require a certain water flow. This water flow may be determined from the Injector Performance Tables shown on the Mazzei website ([www.mazzei.net](http://www.mazzei.net)) in the "Performance Data & Drawings – Injectors" section. If less water is supplied than that stated in the Performance Table, suction capacity could be decreased or disappear entirely. There are several possible causes for insufficient water flow. These are:
  - a) The supply pump is incorrect, worn or damaged.
  - b) Inlet and/or outlet piping are too small. Piping and pipe fittings should always be of the same piping size as the injector thread size.
  - c) There is debris or an obstruction in the upstream side of the injector.
  - d) The injector selected is too large. Select an injector that requires less water flow.
4. **Suction Line Is Obstructed:** The suction line to a Mazzei Injector may become dirty or obstructed. It should be checked periodically to make certain that it is clean and clear.
5. **Injector Is Scaled or Fouled:** Many contaminants found in water can precipitate on water-wet surfaces. These surfaces include the interior of the Mazzei Injector.

When this occurs, the performance of the injector can be severely impaired. Sufficient scaling and/or fouling can cause a complete loss of suction capacity.

Compounds that can cause scaling and/or fouling include calcium carbonate, iron, manganese, metal sulfides, calcium sulfate, silica and microbiological slimes. Many times scaling and/or fouling are most severe at the point of gas or chemical injection. This is due to the gas or chemical being extremely concentrated at the injection site owing to water not passing through this point which would dilute it.

Scaling and/or fouling of the Mazzei Injector are not design flaws of the injector. Rather, they are characteristics of the water being treated and would occur with any method of gas or chemical injection. When scaling and/or fouling occurs, the Mazzei Injector must be removed from service and chemically (not mechanically) cleaned.

A. Plastic injectors can be cleaned with the following method:

Pour two quarts of water into a 5-gallon bucket. Pour one quart of "Pool Acid" into the bucket – **ALWAYS ADD THE ACID INTO THE WATER.** ("Pool Acid" is Hydrochloric Acid or Muriatic Acid. Typical "Pool Acid" is about 30% acid.) Place the injector in the bottom of the bucket and allow it to soak for 30 minutes. Rinse the injector with fresh water and place back in service. When finished cleaning the injector, fill the bucket with water and dispose of properly.

**ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT WHEN HANDLING ACIDS OR OTHER HAZARDOUS CHEMICALS.** At a minimum, this would include rubber gloves, rubber apron, and goggles or a full-face shield.

As actual cleaning methods are beyond the control of Mazzei Injector Company, LLC, we assume no liability for this recommendation.

B. Stainless steel injectors can be cleaned by following the procedures listed in ASTM A380 – Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.