

## **TECHNICAL BULLETIN No. 10**

### **TROUBLESHOOTING MAZZEI INJECTORS**

When properly specified, installed and operated, Mazzei Injectors provide trouble-free operation. In the real world, however, there are a number of factors which 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 be installed with the flow arrow in a horizontal or upward position. If installed in a vertically down position, there must be at least 5 to 10 psig of outlet pressure.
2. To optimize performance of a Mazzei Injector, there should always be some piping attached to the injector outlet. 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 piping fittings smaller than the pipe size of the Mazzei Injector.
4. Do not over tighten Mazzei Injectors when attaching them to pipe or fittings. The use of a thread sealant is recommended.
5. Mazzei Injectors require a pressure differential to operate properly. Normally, the outlet pressure must be at least 25% to 30% less than the inlet pressure for significant suction to occur. Pressure gauges are very helpful in establishing 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?

If you can feel suction, and water does not spurt out 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 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 either Polypropylene or PVDF (Kynar) thermoplastics. Both of these materials are quite resistant to abuse. They can be damaged, however, by over tightening as well as impact or 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 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% to 30%. In liquid suction, Mazzei Injectors reach maximum suction when the water pressure differential is about 50%. In gas suction, suction capacity increases until the outlet water pressure is zero. There is no way to estimate water pressure differential. It must be measured with pressure gauges both upstream and downstream of the injector.

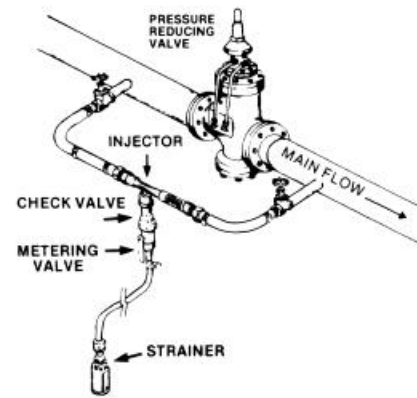
An important characteristic of Mazzei Injectors is that they do not, by themselves, create a pressure differential. Both the upstream and downstream pressures experienced by an injector are caused by the system into which the injector is placed, not by the injector. Thus, merely placing a Mazzei Injector in a pressurized water line will not necessarily create any 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 Mazzei Performance Table for each injector. If less water is supplied than that given in the Performance Table, suction capacity can be decreased or disappear entirely. There are several possible causes for insufficient water flow. These are:
  - (a) The supply pump is incorrect or it is 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
  - (c) There is debris or an obstruction in the upstream side of the injector
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 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.

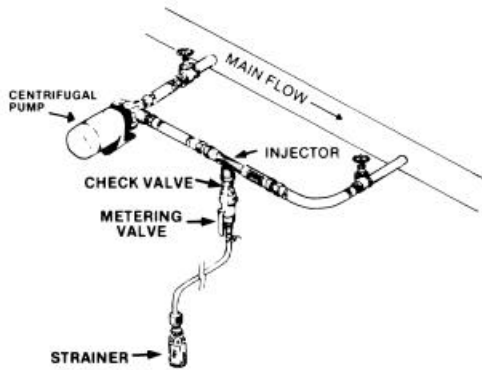
Compounds which can cause scaling and/or fouling include calcium carbonate, iron, manganese, metal sulfides, calcium sulfate, silica and microbiological slimes. Many times scaling and/or fouling is most severe at the point of gas or chemical injection. This is due to the gas or chemical being extremely concentrated at this point, before it is diluted by the water passing through the injector.

Scaling and/or fouling of the Mazzei injector is not a design flaw of the injector. Rather, it is a characteristic 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. Please contact Mazzei Injector Corporation for recommended methods of chemical cleaning.

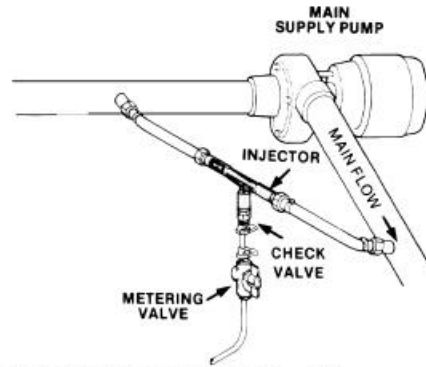
## TYPICAL INSTALLATIONS



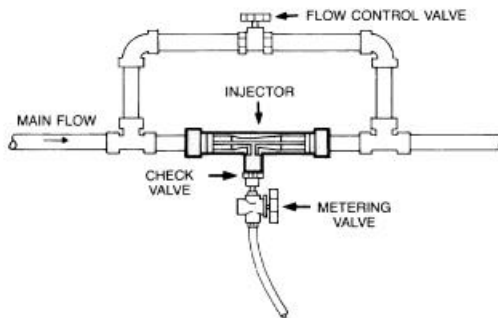
Injector installed around a point of restriction such as a regulator valve or gate valve which creates a differential pressure, thereby allowing the injector to produce a vacuum.



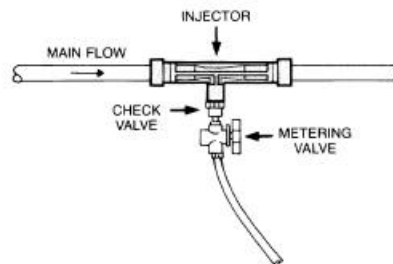
Installed in conjunction with a centrifugal pump to boost pressure through the injector thereby creating a differential pressure and producing a vacuum for chemical induction downstream from the pump.



Injector installed across the differential pressure created by an existing booster or supply pump in the system. It is plumbed from the discharge side to the intake side of the pump.



Injector installed in main flow line with flow control valve on by-pass line.



Installed directly in the main flow line with total flow of the system moving thru the injector.