

# Chemical Injectors

With Fixed Orifice Metering System

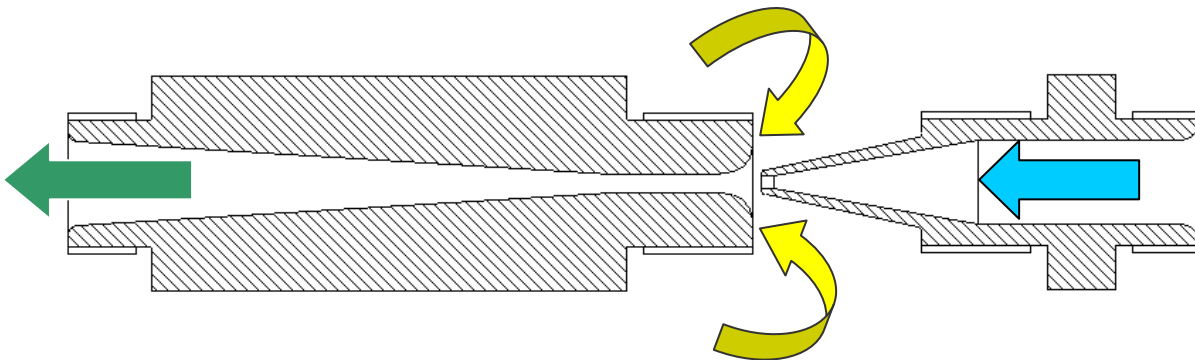
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The Venturie Principle- a simple explanation.

The Venturie phenomenon relies upon the velocity of a Fluid passing uninterrupted between a Nozzle (1) and a Diffuser (2) across an aperture that is generally open to atmosphere.

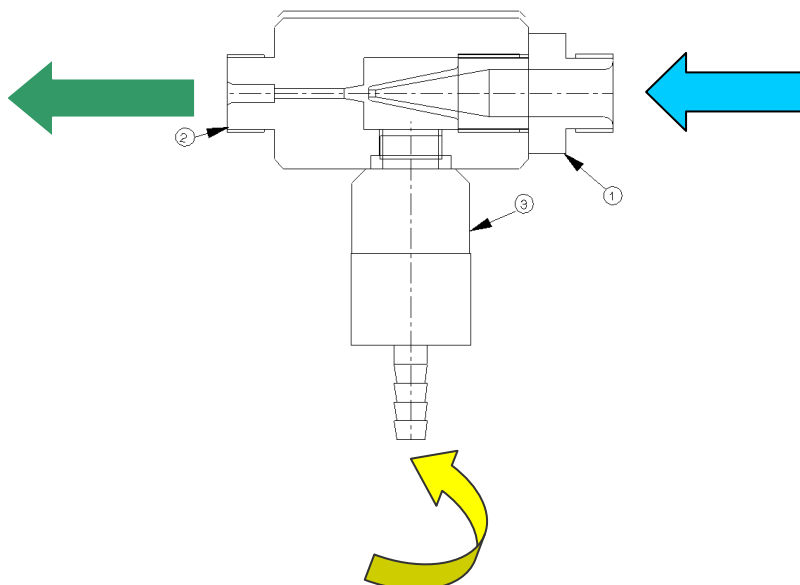
Secondary media coming into contact with the jet stream as it crosses the divide will be entrained and transferred downstream to the outlet port



If the space surrounding the jet stream is completely enclosed its contents will be evacuated and a Vacuum will be formed.

If a secondary fluid is connected to the evacuated space it will be draw into the jet stream and mixed with the primary fluid as it flows through the system.

If the secondary fluid connection is a device that can house a metering system (3), such as an orifice plate or an adjustable needle valve the flow of secondary fluid can be controlled and a mixture of known value will be discharged from the outlet of the venturie



## Suction Problem Diagnosis

There are two important practical relationships in the internal geometry of a venturie system that, if not respected, can affect the performance or cause the injector to stop pulling chemical altogether.

**The first relationship** is the ratio between the bore of the nozzle and the diffuser.

The diffuser needs to be large enough to accommodate the fluid passing through the nozzle and the fluid that is entrained; it also needs to be compact enough to cause the two fluids to mix together quickly and thoroughly. This relationship is often a precise measurement and small variations can affect performance.

**The second relationship.** The ratio is between the motive force (the speed) of the fluid flowing through the injector and the resistance to flow (the brake) created by whatever outlet pipe work system it is attached to.

Generally if the resistance to flow downstream of the venturie is less than 50% of the motive force, the venturie will perform satisfactorily

### Resistance factors

In practical terms; when an injector is used for introducing cleaning chemical into a jetting hose system, resistance will be affected by the following factors.

- The bore of the hose system.
- The length of the hose system.
- The bore sizes in the Washdown gun
- The orifice size in the jetting nozzle

These elements of resistance when added together can slow the speed of the water passing through the injector to a point where little or no secondary fluid (chemical) is entrained.

## Fault finding

### **The Venturie does not pull chemical when first commissioned**

Firstly ascertain that the injector is correctly installed.

An arrow on the body of the unit generally marks the correct direction of flow. Alternatively look down the bore at each end. The fluid inlet tapers to a small diameter down the bore. See diagram above.

Secondly determine that the chemical suction hose is fitted tightly onto the hose barb and secured with a suitable hose clip.

Air drawn into the chemical supply will reduce the suction on the liquid.

Thirdly, examine the resistance factors listed above for a possible cause, starting with the Jetting Nozzle as the most obvious cause.

### **The venturie performance decays over time**

Where an injector has been performing satisfactorily and the performance deteriorates over time (a few days or weeks). The likely cause may be mineral deposits adhering to the bore of the diffuser as a result of a reaction between the water and the chemical passing through.

A coating of just 0.25mm may in some cases be sufficient to destroy the ratio between the nozzle and diffuser bores and cause the venturie function to cease.

The mineral scale may be seen as a white or light brown discolouration on the outlet of the injector. The hose and gun fittings will also have signs of scale adhering to the internal bores.

### **Corrective action**

De-scaling the Venturie in a strong acidic solution for a period of time will usually be sufficient to restore the performance