TECHNICAL BULLETIN No. 1

SUCTION CAPACITY CORRECTIONS FOR MAZZEI INJECTORS

Gas Suction:

1. Suction Port At Greater Than Atmospheric Pressure

The gas suction capacities of Mazzei Injectors are shown in our Performance Tables, contained in our catalog. These capacities are based upon injecting gas at atmospheric pressure (14.7 PSIA). When the suction port is pressurized, the actual gas suction capacity increases with increasing gas pressure. This increase can be calculated as shown below. Gas pressure will usually be reported in gauge pressure units. 0 PSI gauge (PSIG) is equal to 14.7 PSI absolute (PSIA). 0 PSIA is equal to a complete vacuum. The following formula is used to calculate the suction capacity of a Mazzei Injector at gas pressures other Standard Atmospheric Pressure (14.7 PSIA).

GP = Gas Pressure (PSIG)
Suction Capacity Correction = $((GP+14.7)/14.7)^2$

Examples:

For a gas pressure of 5 PSIG (19.7 PSIA)
$((5+14.7)/14.7)^2$ = 1.80 times catalog
For a gas pressure of 10 PSIG (24.7 PSIA)
$((10+14.7)/14.7)^2$ = 2.82 times catalog
For a gas pressure of 14.7 PSIG (29.4 PSIA)
$((14.7+14.7)/14.7)^2$ = 4.00 times catalog

This relationship has been verified experimentally, and in the field. The applicability of this formula is limited by gas volume. At very high gas flow rates, head losses in the gas plumbing, and within the suction port of the injector, become the limiting factors for suction capacity. The above formula for calculating ASC and ESC has been shown to be a reliable tool for predicting actual suction capacities of Mazzei Injectors at suction gas pressures up to 35 to 40 psig.

2. Suction Port At Less Than Atmospheric Pressure (Under a Vacuum)

When the suction port is at less than atmospheric pressure (under a vacuum), the actual gas suction capacity decreases with decreasing gas pressure. The correction formula is the same as for positive gas pressure. There are at least two situations where the suction port is at less than atmospheric pressure. The first is when the site location is at a considerable altitude above sea level. Typically, atmospheric pressure begins to decrease significantly at 1,000 feet elevation above sea level. Charts are included to determine the atmospheric pressure at any altitude above sea level. The second situation arises when the gas being injected is at less than atmospheric

pressure. This can occur when a gas regulator requires the presence of a vacuum before it will operate, or when an ozone generator requires the injector to "pull" air through the generator at a slight vacuum. The following formula is used to convert vacuum gauge readings in inches of mercury (“Hg) to PSIA values for use in the Suction Capacity Correction formula.

Vacuum Pressure (PSIA) = ((29.92 - Vacuum Reading (“Hg))/29.92) x 14.7

Suction Capacity Correction = (Vacuum Pressure (PSIA)/14.7)^2

Examples:

For a gas pressure of -1.0 PSIG = 13.7 PSIA
$(13.7/14.7)^2$ = 0.869 times catalog
For a gas pressure of 15 “Hg = 7.3 PSIA
$(7.3/14.7)^2$ = 0.25 times catalog
For a gas pressure of -5.0 psig = 9.7 PSIA
$(9.7/14.7)^2$ = 0.436 times catalog

B. Liquid Suction

1. Specific Gravity

The “Liquid Suction” portions of the Mazzei Injector Performance Tables are based upon water as the injected fluid. If the particular liquid being injected has a specific gravity greater than water, this specific gravity must be taken into account. The formula is:

Actual Suction Capacity = (Listed Suction Capacity) / (Specific Gravity)

Example: Model 1078 at 50 psig inlet and 20 psig outlet
Listed Suction Capacity = 75 gph
Specific Gravity of chemical = 1.5
Actual Suction Capacity = 75 gph / 1.5 = 50 gph

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2. Suction Height

The "Liquid Suction" portions of the Mazzei Injector Performance Tables are based upon the assumption that the height of the injector and height of the injected liquid are the same. If this is not the case, this difference in height must be taken into account. The formulas are:

a. Injector Above Liquid

Example: Injector has a suction lift of ten (10) feet
Actual Suction Capacity = Suction Capacity From Item #1 (times) Formula
Formula = [(34 - Difference in Elevation) / (34)] / (S.G.)

Example-Same as in Item #B-1. Actual Suction Capacity = 50 gph
Difference in elevation = 10 feet, SG = 1.5
Corrected Suction Capacity = (50 gph) x [(34-10)/(34)] / 1.5 = 23.5 gph

b. Injector Below Liquid

Example: Chemical surface is ten (10) feet above suction port
Actual Suction Capacity = Suction Capacity From #1 (divided by) Formula
Formula = [(34 + Difference in Elevation) / (34)] x SG

Example-Same as in Item #B-1. Actual Suction Capacity = 50 gph
Difference in elevation = 10 feet, SG = 1.5
Corrected Suction Capacity = (50 gph) x [(34+10)/(34)] x 1.5 = 97.1 gph

Obtaining Maximum Suction

In order to obtain maximum suction from any Mazzei Injector, it is critical to use the correct size of suction line. If obtaining maximum suction is the primary factor, use the following guide:

Model	Minimum Suction Tubing Size (ID)		
283/287	3/16"	384/484/584/684	¼"
878/1078	3/8"	1583/2584/1585	½"
	1"		

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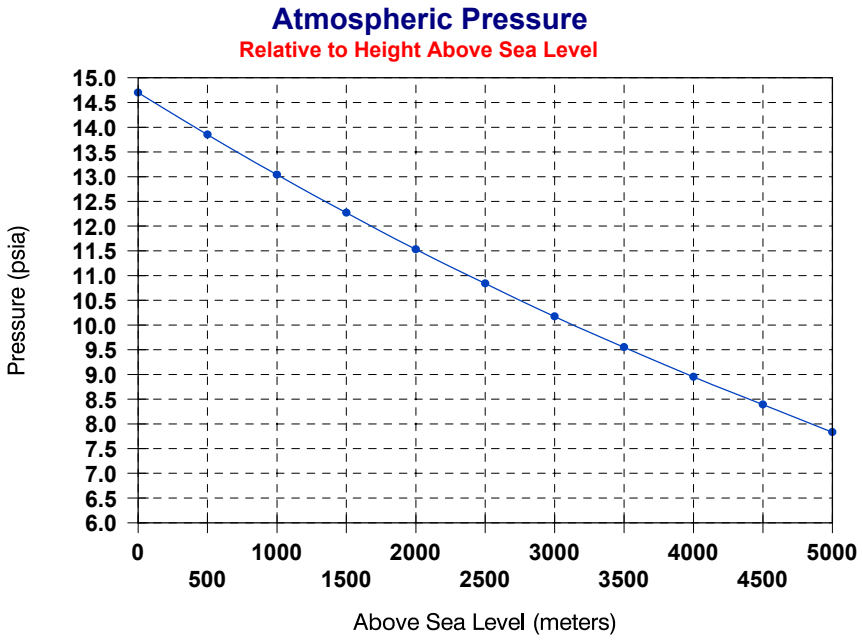

1,000 Meters = 3,281 Feet