Chemical Choice

The three most common fluoridation chemicals are sodium silicofluoride, sodium fluoride and hydrofluosilicic acid. This bulletin deals with solution feed systems, utilizing the latter two of these chemicals.

Chemical	Properties	Typical Comm. Strength	Fluoride Ion Content
Sodium Fluoride (NaF)	white, odorless powder/crystals	90-98%	44%
Hydrofluosilicic Acid (H_2SiF_6)	clear to yellow liquid, pungent odor, skin irritant	30% 25% 22%	23.7% 19.8% 17.45%

The optimum concentration of fluoride in a public water supply is within a range at approximately one part per million (1 ppm) according to the U.S. Department of Health and Human Services, Center for Disease Control Statement on the 2006 National Research Council (NRC) Report on Fluoride in Drinking Water. Levels may vary. Be sure to check with local health authorities when designing your fluoridation system.
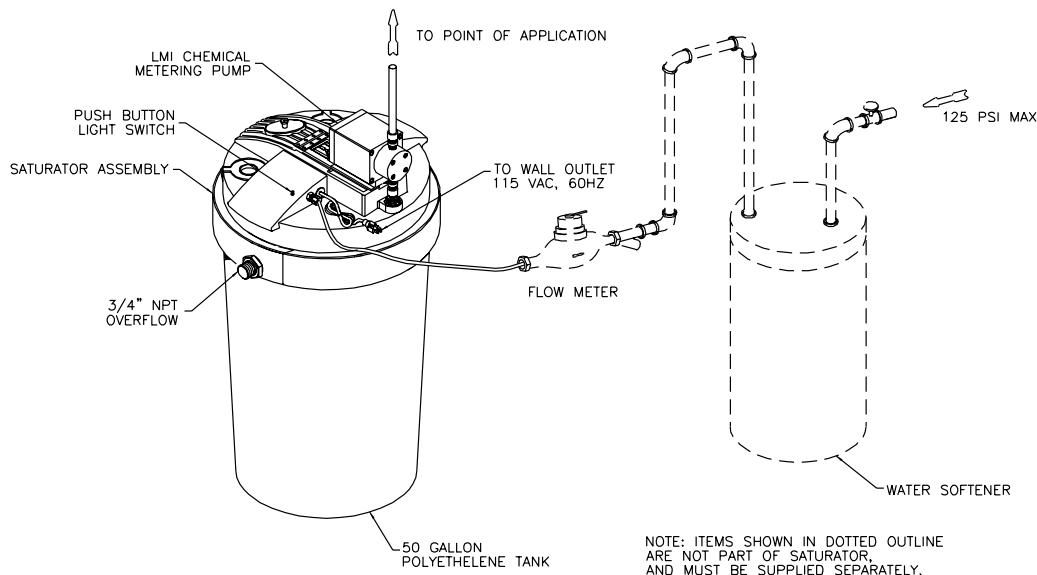

Figure 1 : Saturator Typical Installation

LMI Acid Pump Hydrofluosilicic Acid Feed

NOTE:

Hydrofluosilicic acid is a highly corrosive chemical, handle with caution.

Mount LMI pump on shelf above acid shipping container for direct feed into treated line (see Figure 2).

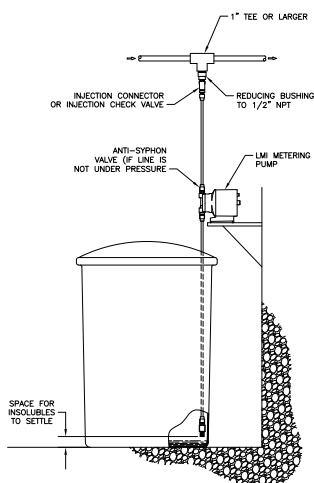For low rate feed position pump below acid container (see Figure 3).
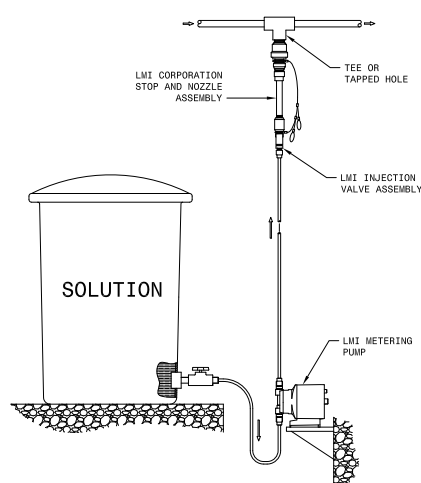

Figure 2 : Suction Lift Installation

Figure 3 : Flooded Suction Installation

For varying flow rates, use LMI pump in conjunction with an LMI Flowmeter-Pulser for automatic proportional feed. Line sizes form 3/4" to 4" (see Figure 4).

If feed rate is so low as to make feeding acid full strength impractical, dilution of acid should be considered (unless prohibited by state regulations).
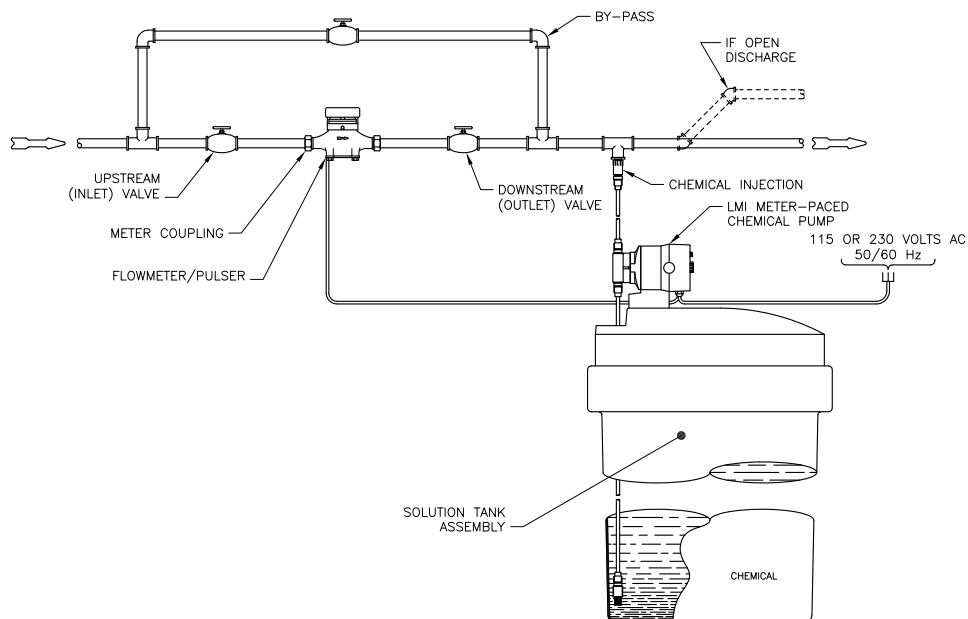

Figure 4 : Flow Proportional Installation

Simple Rules for Dosage Calculation

Sodium Fluoride (NaF) Solution
one (1) gallon of saturated solution treats 18,000 gallons of water to 1 ppm. For other dosage requirements, divide 18,000 by desired dosage to determine the amount of water treatable by one (1) gallon of saturated solution.

EXAMPLE:

for 1.2 ppm

$$\frac{18,000}{1.2} = 15,000 \text{ gallons}$$

for 0.8 ppm

$$\frac{18,000}{0.8} = 22,500 \text{ gallons}$$

Hydrofluosilicic Acid (H_2SiF_6)
The numerical value of the percentage concentration of the acid is supplied (usually ranges between 22% and 30%) multiplied by 10,000 equals the number of gallons of water which one (1) gallon of acid will treat to 1 ppm.

EXAMPLE:

for 23%

$$23 \text{ x } 10,000 = 230,000 \text{ gallons}$$

For other dosage requirements, divide the foregoing result by the required dosage to determine the number of gallons of water which one (1) gallon of acid will treat.

EXAMPLE:

0.8 ppm required dosage

$$\frac{230,000}{0.8} = 287,500 \text{ gallons}$$

1.1 ppm required dosage

$$\frac{230.000}{1.1} = 209,091 \text{ gallons}$$

Further Recommendations

- Injection should take place 45° from the bottom of the pipe and protrude 1/3 of the way into the diameter of the pipe. A corporation stop with withdrawable injection nozzle is a helpful accessory. It permits removal of the entire injection line for service or inspection while the water main is under pressure (see Figure 5 for LMI Corporation Stop and Nozzle Assembly).

- Position the pump as close to the point of injection as possible. Keep suction line as straight as possible to prevent formation of air straps which could result in loss of pump prime.

- An anti-syphon / pressure release valve assembly should be present in every installation to prevent syponing.

- Do not feed fluoride in close proximity with other chemcials. In particular, where calcium containing chemcials are also being fed, watch for fluoride loss through precipitation.
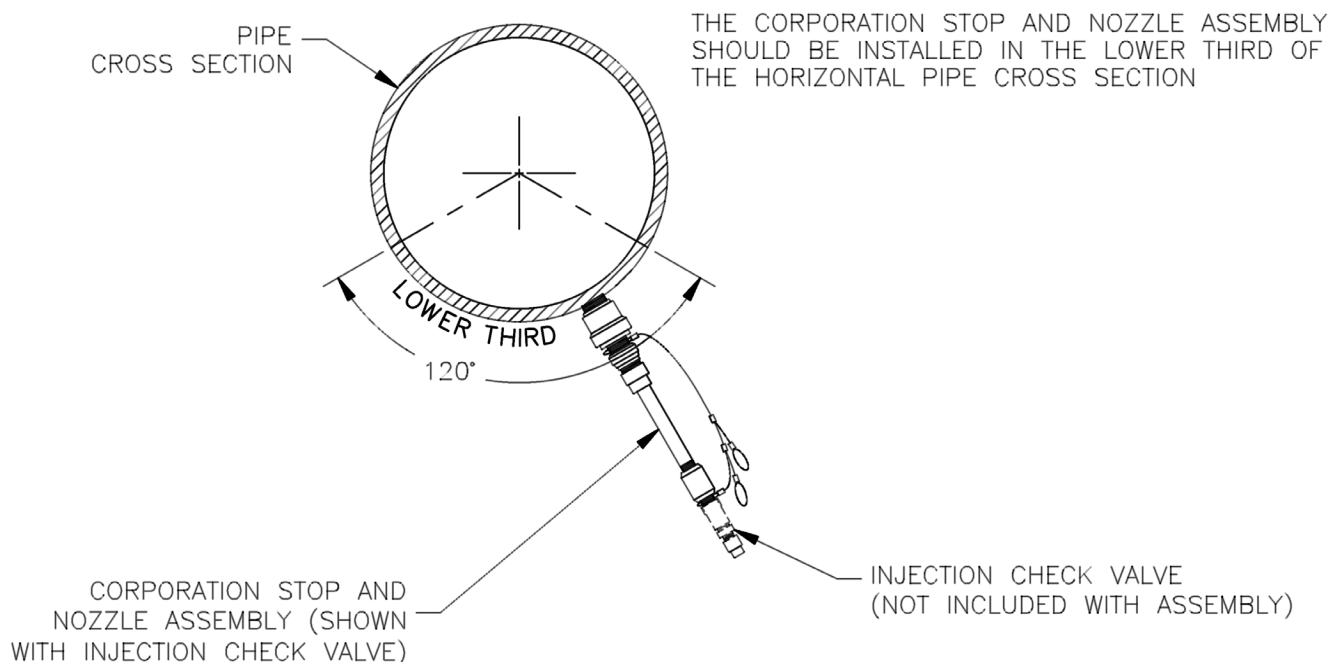

Figure 5 : Corporation Stop and Nozzle Assembly