

## Aqua Ammonia Injection System Tips

When injecting the small amounts of ammonia that are typically added to a water supply, be aware that it is difficult to quickly disperse chemicals when the additive amount is a small amount (typically measured in gallons per hour).

Small additive chemical flowrates will noticeably have greater variation in their dispersion merely due to the physics of mixing.

The best way to dilute small amounts of chemicals is through the use of liberal amounts of softened carry water. This will quickly provide the level of chemical diffusion and mixing desired, and allow for a simpler injector arrangement.

Additionally, a good dilution program will less the effects of disinfection by-products (DBP's), as diluted chemicals are less likely to produce unexpected organic substances.

When chloraminating, add the ammonia to the water first and then add the chlorine. This will generally prevent the formation of compounds that produce chlorinous taste and odors.

The injectors are typically a corporation stop style injector or a thin-wall diffuser (a multi orifice design to disperse the chemicals or the use of multiple bayonet style injectors). As aqua ammonia is a scaling chemical, the injectors may need to be removed on occasion to clean any hardness deposits that occur on the injector. For pipelines that cannot shut down, it is recommended that a corporation style injector that be installed. Soft water dilution of the aqua ammonia will also reduce scaling of the injectors.

### **General Materials of Construction**

#### **Metals**

Stainless Steel is recommended for most injector applications. Other metals that are compatible include Hastelloy alloys, carbon steel, aluminum and cast iron.

Do not use copper, brass, silver brazing, nickel, or Monel.

#### **Plastics**

Most plastics including PVC, PVDF (Kynar), Teflon, & polyethylene are suitable for aqua ammonia contact.



### **Elastomers**

Neoprene, Ethylene Propylene, Buna, Butyl, Teflon are all acceptable for aqua ammonia use.

Do not use Natural Rubber, nitrile, polyurethane, Hypalon, Silicon, or Viton

### **Background**

Aqua ammonia, aqueous ammonia and ammonium hydroxide are synonymous terms referring to a solution of ammonia in water. The chemical formula for ammonium hydroxide is  $\text{NH}_4\text{OH}$ . Hydrated molecules of  $\text{NH}_3$  may also exist as  $\text{NH}_3 \bullet \text{H}_2\text{O}$  or  $\text{NH}_3 \bullet 2 \text{H}_2\text{O}$ .

Ammonia dissolved in water is commonly referred to as simply "ammonia". This usage of the word does not refer to anhydrous ammonia.

Aqua ammonia is classified as a weak base. Typically the pH of an ammonia solution will be between 11 and 12, compared with a pH of about 14 for sodium hydroxide solutions.

The most common aqua ammonia concentration is 29.4% ammonia by weight (also known as 26 Bé [degrees baume]).

Baumé is related to specific gravity by the formula:

$$^\circ \text{Bé} = (140/\text{specific gravity}) - 130$$

"26 ° Baumé density at 60 ° F", "29.4% ammonia by weight" and "0.8974 specific gravity at 60 ° F" are all terms referencing an identical concentration of aqua ammonia.

