

AMMONIA SYSTEMS

for SCR Applications



 **WAHLCO, INC.**

Environmental Systems for Air Pollution Control

FOR ALL YOUR SCR AMMONIA EQUIPMENT NEEDS

Having supplied over 50,000 Megawatts of Utility, IPP, and Industrial Power ammonia systems, WAHLCO understands the critical nature and reliability requirements of the ammonia handling and injection equipment for SCR Applications. WAHLCO has supplied virtually all commonly used types of ammonia unloading, storage, vaporization and handling systems, from industrial applications of a few pounds per hour to Utility Boiler Applications requiring up to 4,000 pounds per hour of ammonia. WAHLCO approaches each project as a team member, insuring the equipment will correctly integrate within the overall SCR system and is uniquely qualified to meet all of your project requirements for ammonia handling.



Ammonia Overview

Ammonia reagent is typically supplied as commercial grade anhydrous ammonia or aqueous ammonia. Anhydrous ammonia is significantly less expensive for SCR applications; however, aqueous ammonia is often specified due to permitting and safety considerations in transport, storage and handling. Commercial grade anhydrous ammonia is 99.5–99.7% pure, with a minimum of 0.3% water content. Aqueous ammonia or ammonia hydroxide can be specified and purchased over a range of ammonia contents. Typically, aqueous ammonia is specified at concentrations of 19.5%, 25%, or 29% pure ammonia in water. Due to the additional cost, typically 4–5 times as expensive (on the basis of weight of pure ammonia) as anhydrous ammonia, and the additional cost of transport and storage of the water content, aqueous ammonia is used only when

anhydrous ammonia is not a viable option. Aqueous ammonia is also significantly more expensive to vaporize, due to the energy required to evaporate the water content.

For utility SCR installations, anhydrous ammonia will always be a more economical reagent selection than aqueous ammonia. The disadvantage of anhydrous ammonia is that it is classified as a hazardous material, and is subject to strict regulations and Risk Management Procedures for transport, storage, and handling. These requirements result in additional costs and complications in permitting and may generate local community concerns over transporting hazardous materials. Aqueous ammonia below 20% concentration has no hazardous rating and requires no special handling or permitting.

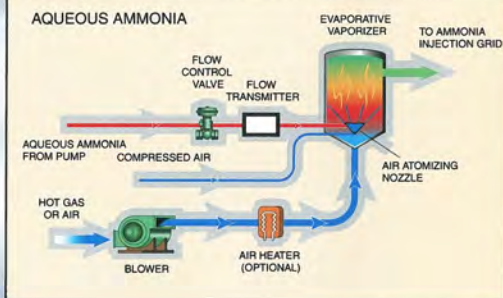
Products and Services

- Unloading Systems
- Storage Tanks & Accessories
- Forwarding/Feed Pump Skids
- Anhydrous Ammonia Vaporizers
 - Electric
 - Steam
 - Hot Water
- Aqueous Ammonia Vaporizers
 - Hot Gas Recirculation
 - Combustion Air
 - Electric Air Heaters
- Ammonia Flow Control Units (AFCU's)
- Ammonia Injection Grids (AIG's)
- Design & Fabrication
- Full Turnkey Systems
- Start-Up & Maintenance Services
- O&M and Safety Training

HIGHEST QUALITY STANDARDS, FAST TRACK DELIVERY

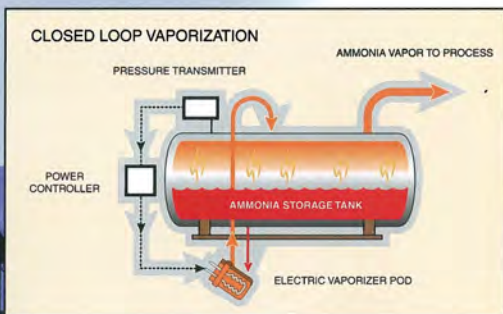
Aqueous Ammonia Vaporizers

Aqueous ammonia vaporizers are most commonly spray evaporation type, utilizing air atomizing nozzles for the aqueous ammonia and either electric heaters, hot flue gas, or heated combustion air as the energy source to evaporate the liquid (ammonia and water). Aqueous ammonia liquid is metered into the atomizing nozzle at a fixed pressure. Within the nozzle, the liquid is mixed with atomizing air and dispersed into the vaporization chamber as a fine mist. Heated air (from the heaters or hot process gas) enters the chamber and evaporates the mist of aqueous ammonia. The air, ammonia vapor, and water vapor are then conveyed to the ammonia injection grid.



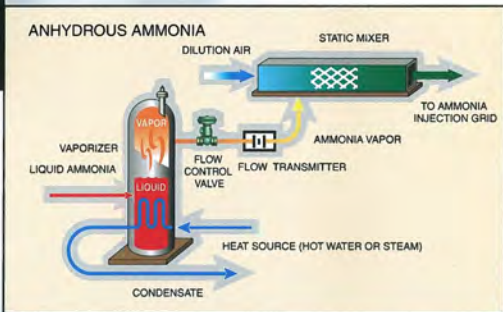
Closed-loop Anhydrous Ammonia Vaporization

Installations requiring smaller quantities of anhydrous ammonia vapor, typically less than 300-400 pounds per hour, may use a closed loop or pressurized tank type vaporization system. In this case, the vaporizer is a heater, usually electric, located in a pressure vessel adjacent to and below the storage tank. The heater power is controlled to maintain the anhydrous ammonia vapor pressure in the tank at a pre-determined level.



Once-through Anhydrous Ammonia Vaporizers

Anhydrous ammonia vaporization and flow control skids for large utility installations include vaporizer vessels, which accept liquid input and produce a continuous stream of ammonia vapor for the process. Vaporizers can use steam, hot water, or electricity for vaporization. Anhydrous ammonia vapor flow is regulated with a flow control valve and measured with a flow transmitter. Dilution air fans carry the vapor to the ammonia injection grid manifold.



DEDICATED PROJECT TEAMS, RELIABILITY, COMPETITIVE SERVICES

For more information contact
WAHLCO at 800-423-5432
or visit our website
at www.wahlco.com



WAHLCO PRODUCTS



AMMONIA SYSTEMS

- Anhydrous Ammonia Systems – Unloading, Storage, Transfer, Vaporization, Metering, and Injection
- Aqueous Ammonia Systems – Unloading, Storage, Transfer, Metering, Vaporization, and Injection
- U₂A™ Urea to Ammonia Conversion Systems – Patented process converts urea to ammonia on-site.



FLUE GAS CONDITIONING (FGC)

Worldwide Leader in FGC.

- Sulfur Systems – Molten, Gas, or Granular
- Ammonia Systems – Anhydrous and Aqueous
- Dual Conditioning Systems – Combination Sulfur and Ammonia



NO_x SYSTEMS

- SNCR Systems – For moderate efficiency applications, ammonia or urea is injected directly into the boiler.
- SCR Systems – For high efficiency requirements, ammonia is injected into the flue gas stream ahead of catalyst.



THERMOCOUPLE ARRAYS

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