

ULTRA™

Ammonia Generation Process

Smart and simple...the ULTRA™ process provides ammonia for SCR systems without the risks of dangerous chemical handling

Selective catalytic reduction (SCR) has become the standard for attaining the most stringent NO_x reduction requirements for power generating facilities. Until recently, NO_x reduction using SCR employed anhydrous ammonia (NH₃) as the reducing agent, requiring owners of these systems to contend with transportation, safety, and costs associated with handling hazardous ammonia.

Fuel Tech's patented ULTRA™ process is an innovative alternative for ammonia generation from urea. Available for new and retrofit SCR systems, the ULTRA system is a safe, cost-effective solution that simplifies SCR operation.

How it Works

The ULTRA process generates low pressure, dilute ammonia for SCR systems by thermally decomposing urea. The diluted ammonia is fed through the ammonia injection grid (AIG) to the SCR. The ULTRA process controls ammonia generation by metering urea into a decomposition chamber. The generation rate responds rapidly based on urea flow rate. The ULTRA system is simple, consisting of a blower, heat source, decomposition chamber, urea storage, urea metering and process controls.

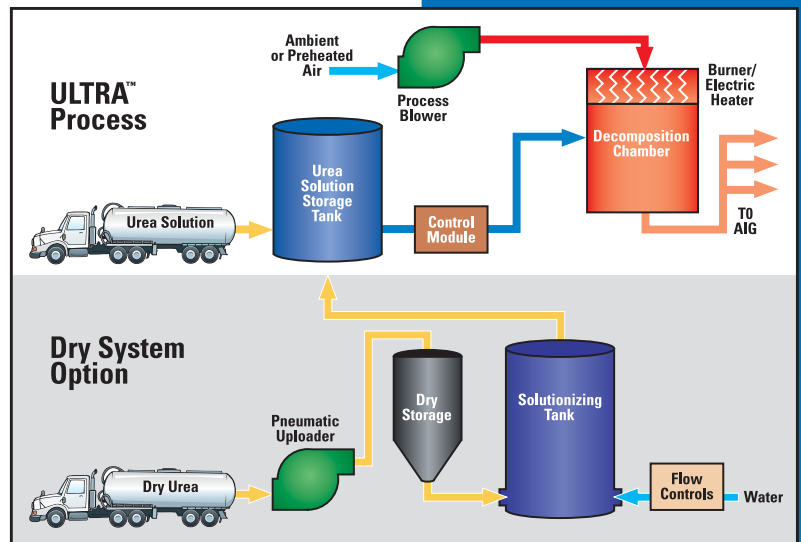
Filtered ambient air is fed into the chamber through the use of a blower with automatic dampers to control discharge flow and pressure.

A burner is fired downstream of the dampers, and an aqueous urea solution supplied by the metering system is sprayed into the decomposition chamber through the injectors. The urea is efficiently decomposed to ammonia to reduce NO_x through the SCR. The outlet stream of decomposition chamber feeds the AIG for a traditional SCR system.

Other urea-to-ammonia conversion systems on the market work by hydrolyzing urea. These processes often require higher priced specialty solutions and are complex systems that operate under high pressures and significant steam consumption. The ULTRA system is an economical and easy method to generate ammonia at low pressure.

System Options

The ULTRA system can be customized for each application. In addition to natural gas, heat sources include electric heaters for small systems, and fuel oil or propane for larger systems. Where energy efficiency is critical, we can use pre-heated combustion air directly or a heat exchanger to preheat ambient air. Aqueous urea can be delivered to the site or created on-site from solid or concentrated urea solutions by adding condensate or demineralized water. Water purity is essential for SCR catalyst performance.



Experience

- Backed by Fuel Tech's proven start-up, optimization, and service experience
- Over 30 systems operating on over 10,000 MW combined experience
- Installations in the US, Europe and China
- Coal-fired boiler applications
- Gas turbine/heat recovery steam generator applications



Urea solution storage tank

Safety Benefits

- Customized solution for each application
- No DOT or DHS restrictions on the transportation or handling of urea
 - Avoid tight regulations on ammonia transportation from DOT and Rail Safety Act
 - Ammonia has been cited by DHS as a chemical of interest under Anti-Terrorism Standards
- Low pressure operation

Ammonia: Hazardous and Complex

Anhydrous ammonia is classified as a hazardous chemical per the Clean Air Act (CAA) Section 112(r). As such, ammonia requires additional procedures to protect personnel, neighboring communities, and the environment from potential chemical release. Reporting, record keeping, permitting, and emergency preparedness planning are needed with ammonia transportation, unloading and on-site ammonia storage.

The U.S. Department of Homeland Security (DHS) and the Department of Transportation (DOT) are restricting the transport and handling of anhydrous ammonia through the Rail Security Act. DHS has labeled anhydrous ammonia as a chemical of interest for its Anti-Terrorism Standards. In addition, the US EPA has determined the toxic radius of a spill to be between five to seven miles.

Aqueous ammonia systems use less concentrated ammonia, but are still considered hazardous under Section 112(r). These systems require five times the amount of transportation and handling, increasing the potential for spills and releases. The EPA toxic radius for aqueous ammonia is one to two miles. In contrast, urea products are non-hazardous sources of ammonia, so transport, handling and storage concerns are minimized.



AMMONIA	UREA
HEALTH HAZARD	FIRE HAZARD
4 - Deadly	Flash Points F
3 - Extreme Danger	4 - Below 73
2 - Hazardous	3 - Below 100
1 - Slightly Hazardous	2 - Below 200
0 - Normal Material	1 - Above 200
	0 - Will Not Burn

Proven Technologies

The ULTRA system incorporates proven features of Fuel Tech's other NO_x reduction products on over 600 commercial installations. Our Urea storage, metering and injection techniques have all been standard in place since 1990.

The ULTRA system has all the benefits of ammonia generation for SCR without the cost, safety and environmental concerns associated with ammonia handling. More cost-effective than urea-hydrolyzing processes, it is a smart choice for simplifying SCR operation with a urea-to-ammonia conversion process.

The facts are clear: urea is a safer alternative to dangerous anhydrous ammonia

