

# ULTRA®

## Ammonia Generation Process

*Smart and simple ... on-site ammonia generation without the risks of dangerous chemical handling*

Selective catalytic reduction (SCR) is the standard for attaining the most stringent NO<sub>x</sub> reduction requirements for power generating facilities. SCR systems using anhydrous ammonia (NH<sub>3</sub>) as the reducing agent require owners to contend with transportation, safety, and costs associated with handling this hazardous reagent.

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.

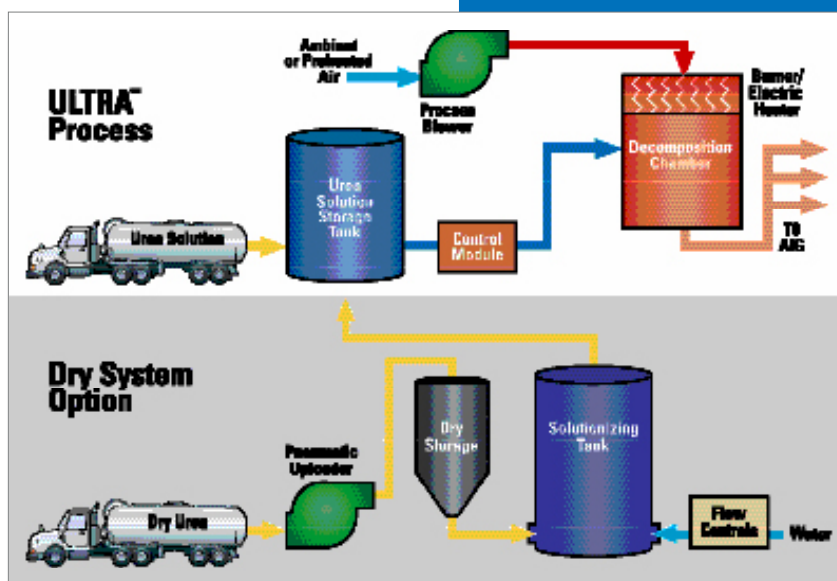
### How it works

The ULTRA process generates low pressure, dilute ammonia for SCR systems and flue gas conditioning applications 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. Urea is efficiently decomposed to ammonia to reduce NO<sub>x</sub> 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.**

### On-Site Ammonia Generation - SCR and Beyond

ULTRA systems have all the benefits of ammonia generation for SCR without the cost, safety and environmental concerns. More cost-effective than urea-hydrolyzing processes, it is a smart choice for simplifying SCR operation. ULTRA can be designed to address other on-site ammonia needs including Flue Gas conditioning and ammonia scrubber applications with a urea-to-ammonia conversion process.



ULTRA systems are customized based on application needs, from heat sources to decomposition chambers.

### Experience

Backed by Fuel Tech's proven start-up, optimization, and service experience  
Over 150 systems installed in the U.S., Europe and China  
Coal-fired boiler applications  
Gas turbine/heat recovery steam generator applications  
Customized solution for each application



Urea solution storage tank

## System Benefits

- Compatible with a wide range of urea sources
- Simplified system - no hydrolysis
- Simplified, highly efficient process designed for minimal maintenance
- Urea sourcing flexibility to minimize operating costs
- Low pressure operation
- Process controls facilitate rapid system shutdown

## Safety Benefits

- No DOT or DHS restrictions on the transportation or handling of urea
- Low pressure operation

## System Options

The ULTRA system can be customized to take advantage of all available resources. 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.



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The ULTRA systems decomposition chamber is optimized for our customer's needs. Based on ammonia demand and operating requirements, the number of injectors can vary greatly. The decomposition chamber shown on the left above typically uses 12 to 14 injectors; whereas the one on the right only uses one injector. The number of injectors used is optimized for performance requirements and provides for cost savings. Fuel Tech matches chamber designs specifically to each application.

## Ammonia: Hazardous and Complex

Anhydrous and Aqueous ammonia are both classified as hazardous chemicals. As such, ammonia requires additional procedures to protect from potential chemical release. Reporting, record keeping, permitting, and emergency preparedness planning are needed with ammonia transportation, unloading and on-site ammonia storage.

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FT - 1619201 - AP