Ammonia to Fermenters

Save time and money with an easier-to-use and less expensive nitrogen source

ICM's ammonia-to-fermenter delivery system was designed to make your plant even more efficient. Our solution replaces your plant's current yeast nitrogen source with a liquid ammonia delivery system.

Compared to the use of liquid or dry urea, our system:

- Reduces manpower needs
- Reduces heat exchanger fouling
- Extends equipment longevity
- Increases fermentation efficiency
- Provides always-ready, consistently timed ammonia delivery that matches yeast nitrogen demand

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How it works

Currently, most plants meet the nitrogen needs of the yeast in their fermentation process with either dry or liquid urea. ICM's new Ammonia Delivery System provides an easier, automatic nitrogen dosing method that reduces handling time and costs.

System overview

A DSC-controlled ammonia line will be routed to your mash fill line, fermenter fill header, or the fermenter recirculation pump, depending on your plant's design and rate. This line relies on either ammonia tank pressure or an ammonia feed pump to inject ammonia on a controlled schedule during the fermenter filling cycle. This can happen either automatically or through operator control.

This system integrates with your plant's existing DCS system, and it will adjust the dosing time sequence as the cook flow rate is adjusted when it is in "Automatic" mode.

40 MGY and 50 MGY Plants running below 60 MGY rate

Fill cycles longer than 15 hours allow yeast in the process to consume nitrogen without causing distress, so we are able to utilize fermenter fill headers for ammonia injection. This lowers the installation cost versus our higher capacity system.

100 MGY Plants, and all other designs running over 60 MGY

With fermenter fill cycles running less than 15 hours, our system requires direct ammonia injection into each fermenter for optimal performance. Use of a fill header on these shortened fermentation cycles would distress the yeast, raising the pH and residual NOx levels.

Benefits of using ammonia

ICM's Ammonia Delivery System was designed to deliver nitrogen in the most efficient manner possible.

Reduced expenses

- Ammonia has been historically less expensive than urea to meet nitrogen requirements
- Depending on your enzyme supplier, the potential exists to reduce or discontinue use of ammonia in the slurry tank

Improved equipment life

- Compared to urea, ammonia is cleaner and reduces equipment wear
- The nitrogen carrier in urea has a tendency to plate out on hot surfaces. Ammonia does not contain this carrier, reducing the rate of exchanger fouling

Simple, automated nitrogen dosing

- ICM's proven delivery system provides timed, consistent ammonia delivery to assure the lowest NOX change possible
- Dosing adjusts automatically to match cook flow rate
- Because of labor required to handle urea, optimal dosing times are sometimes missed. Our system is always ready, ensuring on-time dosing every time

Less labor required

- Delivery is handled by vendor, directly into storage tank, reducing your labor requirements by eliminating need for receiving, storing, and loading urea

Do the Math:

Ammonia vs. Urea can save a 100 MGY plant $246K annually

The break-even cost ratio between urea and ammonia is 0.56.

Available nitrogen, urea - 46%
Available nitrogen, ammonia - 82.4%
(0.46 ÷ 0.824 = 0.56)

This means that when you use ammonia in place of urea, you will incur cost savings if the ratio is greater than 56%.

So, for every 10 lbs. of urea you use, you will only use 5.6 lbs. of ammonia. At that substitution rate and at current price levels, a 100 MGY plant would save almost a quarter of a million dollars annually.

Behind the numbers:
Our engineers calculate that a 100 MGY plant requires 3007 lbs. urea per fermentation cycle. With a urea cost of $0.21/lb., the average 941 fermentation cycles per year at a 100 MGY plant would result in a nitrogen cost of $594,213.

The same plant would require only 1,678 lbs of ammonia to deliver the same free available nitrogen levels. At $0.22/lb., costs would be reduced to $347,360 per year.

That's an estimated savings of $246,853 per year, not including the reduced labor or extended equipment life.

Included equipment and services

ICM-designed plants featuring Model 2007 or later engineering already have a portion of the equipment that is necessary for this modification in place. Earlier design models will require additional equipment.

	ICM Services Provided with 2007 & Later Design	ICM Services Provided with Pre-2007 Design
Dosing	• Timed Dosing and Delivery Programming — Start and stop tied to cook flow rate to accurately deliver ammonia to the fermenters at the appropriate times	• Timed Dosing and Delivery Programming — Start and stop tied to cook flow rate to accurately deliver ammonia to the fermenters at the appropriate times
Automation/ Electrical	• Automation and Screen Updates • Programming to Read Ammonia Flow Accurately and Totalize	• Automation and Screen Updates • Piping, Manual Valves, and Relief Valves • Flow Transmitter to Read Ammonia • Flow Accurately and Totalize • Electronic and Flow Control Valves • Electrical Design
P&ID's	• Updated P & IDs	• Updated P & IDs
Installation	• N/A	• Installation (Including travel, fuel, and per diem)
Startup and Training	• Startup Assistance and Training – First 2 Fermenters	• Startup Assistance and Training – First 2 Fermenters
Standard Operating Procedure	• Detailed Standard Operating Procedure (SOP) explaining system operation, including flow stop and start, and ammonia quantity	• Detailed Standard Operating Procedure (SOP) explaining system operation, including flow stop and start, and ammonia quantity
Equipment Verification/ Specifications	• Flow Transmitter Accuracy Verification	• Equipment Specifications

Environmental considerations

Using anhydrous ammonia in fermentation can potentially increase NOX downstream, technically considered "process" NOX , not combustion NOX . Plants are required to notify their state about any New Process Change, and ICM's Environmental Affairs Team can quickly handle the variance/permitting for your plant.

Contact us for more information

Learn more about this and other ICM technology by calling our Customer Service department today.

877.456.8588

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