

AMMO LASER Leak Detection System

The #1 Safety Measure for Urea Plants with a Guaranteed Pay Back

Question 9:

What is reason #3 to choose for a vacuum system ?

High pressure urea equipment consists of a carbon steel pressure bearing wall, which is protected against corrosion by a protective layer. This protective layer is typically an overlay welding or a loose liner. Any leak in a loose liner will lead to a dangerous situation in that a large surface of the carbon steel pressure bearing wall underneath the leaking loose liner compartment will be exposed to the extremely corrosive ammonium carbamate. Experience has shown that ammonium carbamate can corrode carbon steels with very high corrosion rates up to 1,000 mm (40 inch) per year.

When talking about active leak detection systems, one can distinguish a pressurized system, in which an inert carrier gas stream flows through the leak detection circuits and a vacuum based system, where one pulls vacuum pressure behind the liner.

It is a real challenge to avoid clogging as urea easily crystallises at any temperature even above its melting point due to its polymerisation behaviour forming biuret, triuret etc. with high melting points. This is the main reason that we strongly recommend to upgrade any passive leak detection system (FAQ 3).

Active leak detection systems can either be a pressurised or a vacuum based system (refer to FAQ 5). We recommend to use a vacuum based leak detection system for several important reasons.

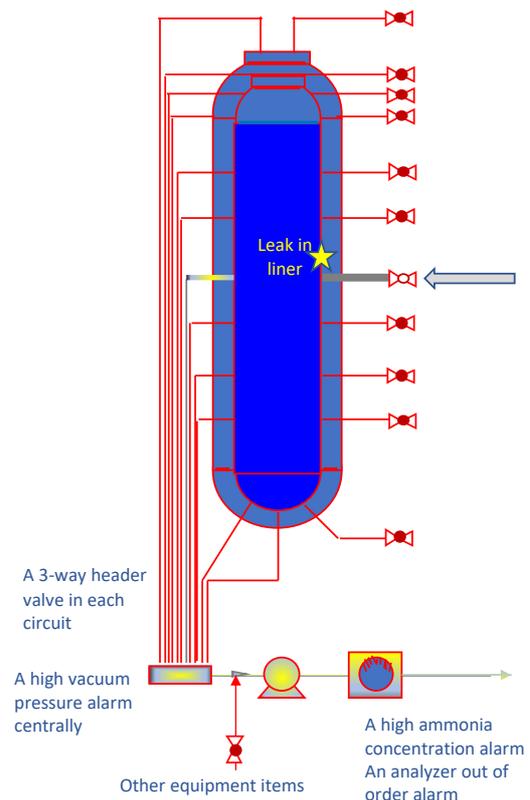
Reason #1 is: No risk of liner bulging (refer to FAQ 6)

Reason #2 is: Direct coverage of the complete carbon steel surface of a compartment (refer to FAQ 7)

Reason #3 is: A vacuum system is less prone to clogging.

But why is that ?

In case of a liner leak and operating a vacuum system, the vacuum pump of the leak detection system will pull the leaking ammonia to the ammonia analyser. After the leak detection circuit in which the leak occurs has been determined, one is able to dilute the leak in this line with



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air via the vacuum pump by opening the atmospheric ball valve and in that way one dilutes the leaking fluid and reduces (eliminates) the risk for clogging! This situation is illustrated in the figure.

With a pressurised system each leak detection circuit should contain a flowmeter to verify if there is any flow through the circuit. In case of a leak, the only thing what one can do is to increase the setpoint of the flowmeter. However the amount of air to dilute the leaking fluid will only be marginal and never enough to have a serious dilution that will eliminate the risk for clogging.