

# AMMO LASER Leak Detection System

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

### Question 11: What is reason number 5 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 (refer to FAQ 5)

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).

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 (refer to FAQ 9)

Reason #4 is: A vacuum system does not restrict the leaking flow and does not built-up pressure or introduces risks for backflow (refer to FAQ 10)

Reason #5 is: A vacuum system also works when there is only one leak detection hole in a liner compartment.

Note : a liner compartment is defined as that part of a loose liner which is compromised between two welds connecting the liner material to the carbon steel of the pressure vessel wall.

There may be only one leak detection hole present in a liner compartment, a typical location where that might be the case is in man way covers of high pressure equipment.

A pressurised leak detection system cannot work in such a case as it needs a minimum number of two leak detection holes per liner compartment; one to enter with the inert gas and one to exit to the analyser.

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When using a vacuum system that is not an issue; one pulls any leaking fluid via the leak detection hole towards the ammonia analyser by means of the vacuum pump.

Due to the presence of just one leak detection hole one can however not be noticed of clogging. The risk of clogging however can be minimised by adding near to the leak detection hole a high pressure alarm as illustrated in the figure below. Other precautions are sufficient large diameter tubing, proper tracing and insulation and a reliable and accurate ammonia analyser.

