

AMMO LASER Leak Detection System

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

Question 14:

How a vacuum system is able to detect clogging in the tubing ?

High pressure urea equipment consists of a carbon steel pressure bearing wall, which is protected against corrosion by a protective stainless, titanium or duplex steel layer. This protective layer can be an overlay welding, an explosive cladded layer 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. All liner compartments are connected in a logical and economical manner via tubing to the ammonia analyzer.

In a pressurized system a flow indicator should be installed to detect clogging.

In a vacuum system vacuum pressure exists in the complete leak detection system; the achieved vacuum pressure is a result of the capacity of the vacuum pump and the amount of ambient air leaking in via the tubing connections. It is unavoidable that some ambient air will enter into the system.

Once a clogging does occur somewhere in a section, the part between the clogging and the vacuum pump / ammonia analyzer will remain under vacuum pressure and under detection. However, the part between the atmospheric ball valve and the clogging will rise in pressure until atmospheric pressures has been reached. This allows for a detection of clogging also in a vacuum system as described below under point 5.

Our AMMO LASER Leak Detection System minimizes the risk of clogging by the following measures:

- 1) A very accurate and reliable ammonia analyser together with the pressure transmitter will immediately detect a liner leak or a false leak as explained in FAQ 8;
- 2) Dust screens are installed to avoid any entry of foreign materials;
- 3) Sufficient large internal diameters of the applied tubing;
- 4) Adequate tracing and insulation;

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5) Further our AMMO LASER Leak Detection System offers two options to check for a clogging situation depending on your operating philosophy.

- I. Regular manual checking: by opening at regular intervals one by one the atmospheric ball valves in each leak detection circuit, the operator is able to check for clogging. In case there is no clogging, the vacuum pressure will increase. In case there is clogging, the vacuum pressure will not increase. Most operating companies prefer this option as operators will be more actively involved with the leak detection systems for loose liners of high pressure equipment, which keeps them better aware of the presence of this critical safety measure.
- II. Automatic checking: High pressure alarms are installed close to the atmospheric ball valves which provide an alarm to DCS indicating a clogging situation.

Refer to the figure below representing both situations (left manual checking, right automatic checking)

