

# AMMO LASER Leak Detection System

## The #1 Safety Measure with a Guaranteed Pay Back

### Why does one need a proper Leak Detection System ?

High pressure urea equipment consist of a carbon steel pressure bearing wall, which is protected against corrosion by a protective stainless or duplex steel layer. This protective layer can be an overlay welding or a loose liner.

Any leak in the loose liner will lead to a dangerous situation where a large surface of the carbon steel pressure bearing wall underneath the loose liner 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.

At the same time crystallization of the leaking medium is very likely which will lead to clogging of the leak path. Once clogging occurs, one may not be warned anymore that there is a leak leading to an extremely dangerous situation as the corrosion of the carbon steel pressure bearing wall will continue. Suddenly a rupture of the vessel will occur.

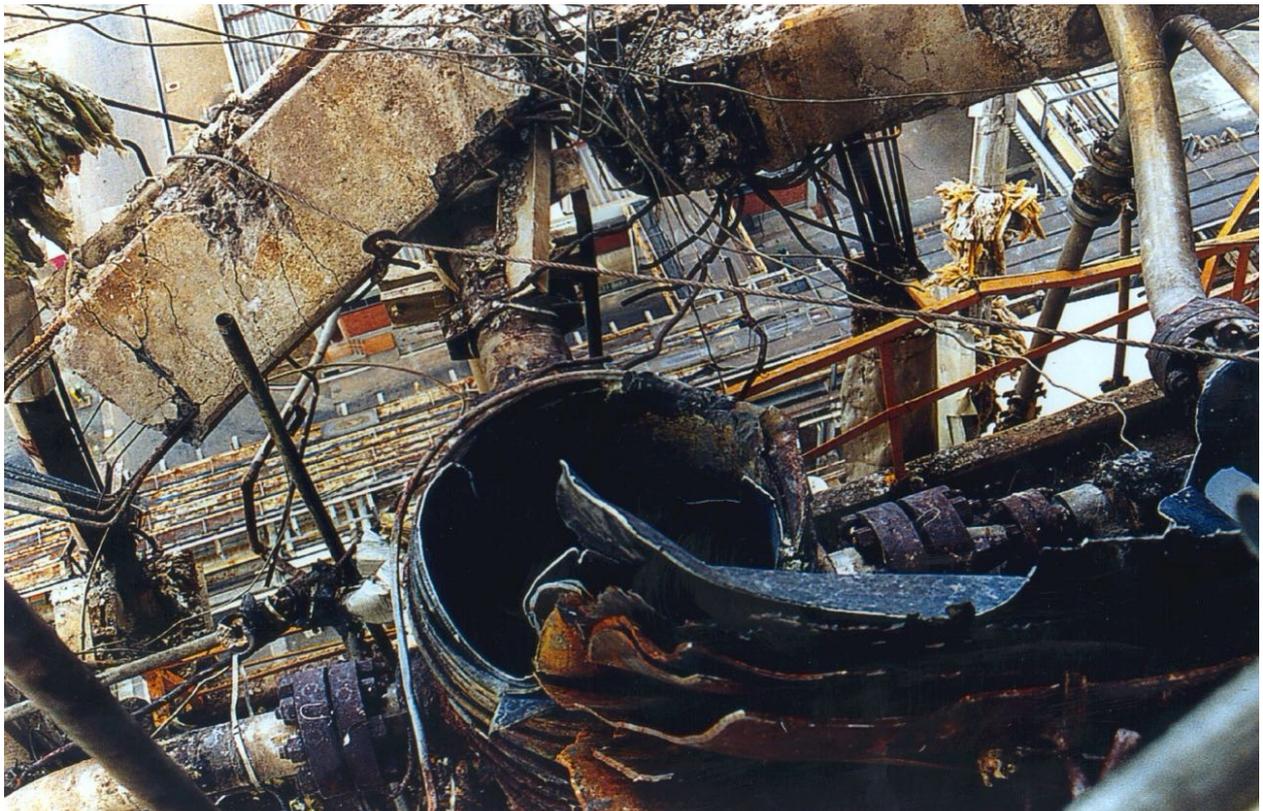


Figure: Rupture of a high pressure scrubber due a not properly working leak detection system

UreaKnowHow.com has collected and analyzed more than 130 serious urea incidents. Based on this analysis, one can easily conclude the most important, the number one safeguard, for any urea plant is a proper leak detection system for loose liners of the high pressure equipment.

In just the last two years (2018 and 2019), at least six serious incidents have occurred whereby the available leak detection system failed! It is really a miracle no casualties were involved.

**An early and reliable detection of a leak in a loose liner of a high pressure urea equipment is of utmost importance and is the #1 Safety Measure in any urea plant.**

A leak in the loose liner can lead to a catastrophic failure of the vessel as has been the case in numerous incidents. For a complete list of these incidents, refer to the appendix and the link below:

<https://www.ureaknowhow.com/ukh2/library/1268-2017-brouwer-ureaknowhow-com-risk-register-of-a-urea-reactor.html>

Find more info about the AMMO LASER Leak Detection System:

<https://www.ureaknowhow.com/ukh2/services/1252-ureaknowhow-com-leak-detection-system.html>

## Appendix 1: List of Incidents With Failing Leak Detection Systems

1. Incident 19-006 Severe liner cracks in bottom HP scrubber not indicated by pressurized LDS  
Cause: The pressurized leak detection system fails due to backflow and clogging.  
Consequences: No active leak detection is available for all high pressure equipment items, extensive work needed to clean / open all circuits, relining required for bottom HP scrubber
2. Incident 19-004 Damage of reactor CS wall  
Cause: Failure in tray clip weld  
Consequences: Unplanned shut down and extensive reactor repair
3. Incident 19-003 Damage of urea reactor CS wall  
Cause: Failure in tray clip weld  
Consequences: Unplanned shut down and extensive reactor repair
4. Incident 19-002 Damage of urea reactor CS wall (outer CS layer coil ruptured)  
Cause: Failure in tray clip weld  
Consequences: Unplanned 30 days shut down and extensive reactor repair
5. Incident 18-005 Serous corrosion of CS wall HP scrubber  
Cause: Passive leak detection system did not alarm in time  
Consequences: Leak through wall, extensive repair, future replacement
6. Incident 18-004 Damage of reactor CS wall (outer CS layer coil ruptured)  
Cause: Failure in tray clip weld  
Consequences: Unplanned shut down and extensive reactor repair
7. Incident 15-005 Severe corrosion CS wall urea reactor  
Cause: Active pressurized leak detection system did not work properly  
Consequences: Leak through insulation was noted by operator and plant was shut down, serious repair work was required
8. Incident 13-002 Urea reactor damage after 35 years in operation  
Cause: Active corrosion during blocking in  
Consequences: Plant shut down, serious repair, no casualties, no damage to other plant parts
9. Incident 12-004 Damage CS wall urea reactor  
Cause: No proper leak detection system  
Consequences: Repair work 15 days 24 hours
10. Incident 12-003 Damage CS wall urea reactor  
Cause: No proper leak detection system  
Consequences: Repair work 20 days 24 hours
11. Incident 12-002 Urea reactor liner severely damaged  
Cause: Unknown but no active leak detection system present  
Consequences: Relining required, long unplanned shut down
12. Incident 05-001 Urea reactor rupture after 5 years in operation  
Cause: Stress corrosion cracking of carbon steel behind the liner likely due to steaming out leak detection holes  
Consequences: 4 casualties, 32 injured, 4.3 mln US\$ financial loss
13. Incident 04-001 Urea reactor rupture after 14 years in operation  
Cause: Corrosion of carbon steel from behind the liner likely due to steaming out leak detection holes  
Consequences: no casualties, complete damage of the 200 mtpd total recycle urea plant

14. Incident 03-002 Urea reactor damage in sleeve nozzle  
Cause: Unknown but no active leak detection system present  
Consequence: Shut down, no casualties
15. Incident 98-003 HP scrubber rupture after 16 years in operation  
Cause: Leak detection hole was still plugged with transportation plug  
Consequences: Plant shut down for 2 months, no casualties, significant damage to other plant parts
16. Incident 95-001 Urea reactor rupture  
Cause and consequences not exactly known but no active leak detection system present.
17. Incident 92-001 Urea reactor rupture  
Cause: clip weld failure in liner, no active leak detection system, no proper actions after leak was noted  
Consequences: 10 people injured + 90 citizens injured
18. Incident 90-001 Urea reactor rupture  
Cause: liner leak, no active leak detection system  
Consequences: Plant shut down
19. Incident 79-001 Urea reactor leak after 8 years in operation  
Cause: wrong design nozzle liner  
Consequences: repair, no casualties, no damage to other plant parts
20. Incident 77-001 Urea reactor rupture after 14 years in operation  
Cause: lead liner damage, corrosion from outside  
Consequences: no casualties, likely damage to other plant parts

Note

Incident AA-BBB means the incident did occur in the year 19AA or 20AA and it was the BBBth incident in our database of that year. When the year is indicated as XX it means that the year of the incident is not known.