The State-of-the-Art Urea Reactor

"Highest Safety and Reliability Standards, Minimum Maintenance and Repair Efforts"

The heart of every urea plant is the urea reactor. The high pressures, high temperatures and the presence of very corrosive ammonium carbamate puts high demands on its reliability and safety during its typical lifetime of 40-50 years.

UreaKnowHow.com has established a Urea Incident Database containing numerous serious incidents with urea reactors and a Urea Reactor Risk Register containing fifty risks and failure modes of a traditional design urea reactor.

Based on the above information plus by applying our extensive experience and knowledge, we can offer you the complete detailed design specification of a State-of-The-Art Urea Reactor with optimum design details of the carbon steel pressure bearing wall, the protective layers and all the internals. This will **realise the highest reliability and safety standards and minimize maintenance and repair efforts**.

You will receive elaborated and detailed answers on amongst others the following questions:

- What material I should apply for the protective layer and what are its pros and cons compared to alternatives?
- Where it is best to apply a loose liner and where overlay welding and what are the optimum thicknesses?
- What are the optimum materials for the carbon steel pressure bearing wall taking into account all possible failure modes like amongst others Corrosion Under Insulation and possible future repair procedures?
- Is it best to apply a solid wall or multi-layer carbon steel wall?
- Which kind of high efficiency trays are optimum?
- How can I design the reactor in such a way that future required maintenance will be minimum?

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- What is the optimum leak detection system including its detailed design of the passage ways (grooves)?
- What are the optimum nozzles and gaskets design?
- How to assure the optimum quality during fabrication?

Furthermore we can support you in all other related services like for example a lifetime assessment of your current urea reactor, procurement services and bid evaluations of your new urea reactor and of course installation and (pre-)commissioning support.

If you are interested and like to receive more information, contact:
Mark Brouwer
Owner/Director UreaKnowHow.com mark.brouwer@ureaknowhow.com

Why involve UreaKnowHow.com ?

UreaKnowHow.com is an **independent group of nitrogen fertilizer specialists** with an impressive number of years experience in designing, maintaining and operating nitrogen fertilizer plants. UreaKnowHow.com's mission is to support, facilitate and promote the exchange of information within the nitrogen fertilizer industry with the target to improve the Safety and Performance of All Nitrogen Fertilizer plants worldwide.

Jo Eijkenboom
Jo Eijkenboom was born in 1950 graduated in Mechanical Engineering. Jo joined Stamicarbon in 1974 as Mechanical Engineer to advise and assist construction and commissioning teams. Improvements of mechanical details of rotating as well as stationary equipment in urea plants from his hands and brains are widely used today.
Practical experience with maintenance and repair of High Pressure Equipment has become Jo's specialty. Jo grew up with urea and melamine related materials in relation to welding, corrosion, maintenance and troubleshooting.
Jo was one of the founders of Safurex®, the super duplex material nowadays standard in any Stamicarbon urea plant. Jo retired in 2012 as Vice-President responsible for Equipment and Mechanical Services from Stamicarbon. After that and since January 2013, Jo started up a company called JO EIJKENBOOM CONSULTANCY BV and became Director of UreaKnowHow.com.

Giel Notten
Giel Notten is a materials and corrosion expert who, before his retirement, spent thirty eight years working with DSM in The Netherlands. After gaining his Chemical Engineering degree he joined DSM's Central Laboratory.
Giel was to remain with the company for the rest of his career and held several positions as a materials and corrosion expert there. For the last twenty years before he retired, Giel was heading the Corrosion Department as Managing Senior Corrosion Engineer. In this job Giel was involved in selection of materials of construction for numerous chemical and electrochemical plants as well as other corrosion consultancy activities in these plants.
For Stamicarbon, Giel set up programs for lifetime extension studies in urea and ammonia plants and supervised these studies.
Giel was also involved in the development of Safurex®, the super-duplex stainless steel grade (developed by Sandvik in cooperation with Stamicarbon) for application in urea plants.
Giel was a board member of NACE Benelux and a member of the Contact Group Corrosion of the Dutch Chemical Process Industry and the Studiekern Corrosion of the Dutch Corrosion Society (NCC).

Mark Brouwer
Mark graduated at the Technical University of Eindhoven (Chemical Engineering). After military service he joined DSM where he worked first seven years as a process engineer. In 1996 he joined Stamicarbon as Licensing Manager Urea Revamps. Later he became the Manager of Stamicarbon Services responsible for all Stamicarbon's activities in existing urea plants. In these nearly fourteen years he visited more than 100 urea plants worldwide and was involved in numerous revamp, relocation, debottlenecking and grass root projects.
Since early 2009 Mark Brouwer started up UreaKnowHow.com. UreaKnowHow.com is an independent group of nitrogen fertilizer specialists with an impressive number of years experience in designing, maintaining and operating urea plants. UreaKnowHow.com's mission is to support, facilitate and promote the exchange of information within the nitrogen fertilizer industry with the target to improve the Safety and Performance of all nitrogen fertilizer plants worldwide. UreaKnowHow.com has become the largest network in the urea industry and offers various technical and commercial consultancy services.

Reference Project Yara Canada
Yara invited UreaKnowHow.com to be present during a major turnaround of Yara Canada in Belle Plaine, Canada. UreaKnowHow.com provided consultancy services related to the extension of the urea reactor, the replacement of several HP Urea Equipment items and the inspection and possible repair of equipment and piping. Click here for all details.

Reference project: Shaanxi, China
UreaKnowHow.com was involved in providing various critical services for end-user of the Shaanxi project in China, a 1760 mtpd Stamicarbon PoolReactor plant with a complete Safurex synthesis section and a prilling tower. Click here for all details.

Reference project: Koch, USA
UreaKnowHow.com was involved in providing consultancy services relating to the lifetime assessment, design and procurement of a replacement a urea reactor at one of their sites.

Urea Incident Database Urea Plants
UreaKnowHow.com started up a Urea Incident Database for Urea Plants which contains many serious incidents. UreaKnowHow.com also performed evaluation studies of this database, which were presented at sveral AICHE Ammonia Safety Conferences. Click here for all details.

Risk Register Urea Reactor
UreaKnowHow.com prepared a Risk Register of a Urea Reactor with a 316L Urea Grade liner. This design is typical for most urea reactors currently in operation. The Risk Register is a collection of possible hazards that can occur in such a urea reactor and includes the related mitigation measures: 50 safety risks are identified and numerous recommendations / barriers are defined. Click here for all details.

Risk Register Leak Detection Systems
UreaKnowHow.com prepared a Risk Register of Leak Detection Systems for loose liners in high pressure urea equipment. Based on that the AMMO LASER Leak Detection System has been developed. Click here for all details.