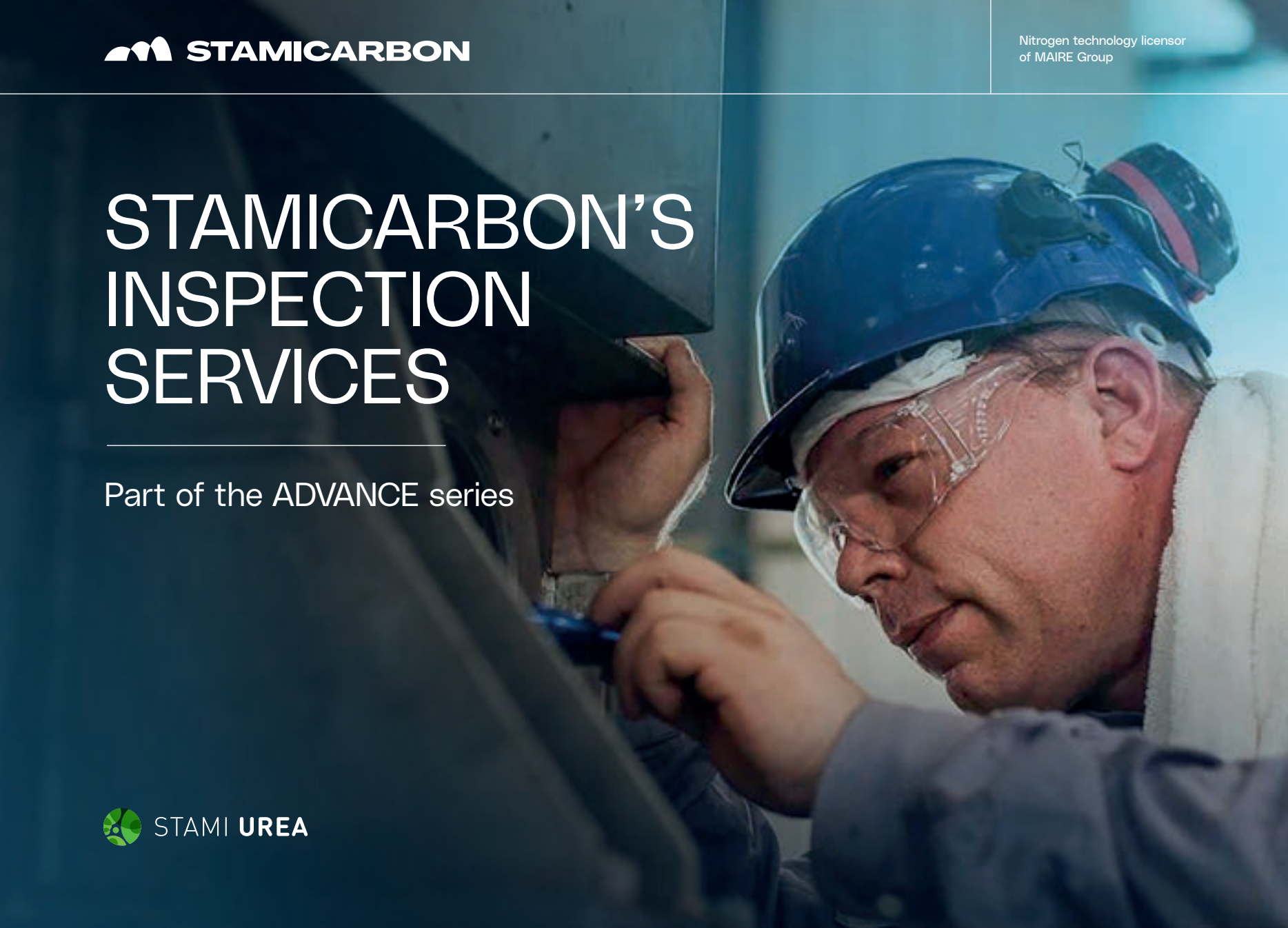
STAMICARBON

Nitrogen technology licensor
of MAIRE Group

STAMICARBON'S INSPECTION SERVICES

Part of the ADVANCE series



STAMI **UREA**

EXTEND THE SERVICE LIFE OF YOUR PLANT

INTRODUCTION

The challenge

As a plant manager you want to have the assurance that your equipment is safe, reliable and always available. Working with reliable equipment helps to prevent unsafe conditions and unscheduled plant stops. Urea plants are designed for a particular service life, usually 20 years or more. However, corrosion properties of ammonium carbamate hold a serious threat to the integrity of urea process equipment. Therefore, corrosion may reduce the service life of your plant significantly.
The good news? As long as the plant is well-maintained, well-operated and updated with state-of-the-art technology, the lifetime of the urea equipment can be extended beyond the design life and continue to produce urea safely and at a competitive cost.

Working with reliable equipment helps to prevent unsafe conditions.

Our solution

Reliable and durable equipment is essential to the success of urea production. Therefore, we developed several different plant integrity inspection services to ensure optimum performance and maximum lifespan of your urea process equipment, for example:

1. Urea Equipment inspection
2. High-Pressure (HP) Piping inspection

We perform inspections on urea equipment and/or piping based on a thorough understanding of the urea process, equipment design and failure modes. We can offer these services in all urea plants based on experience gained from 500 inspections executed over many years.

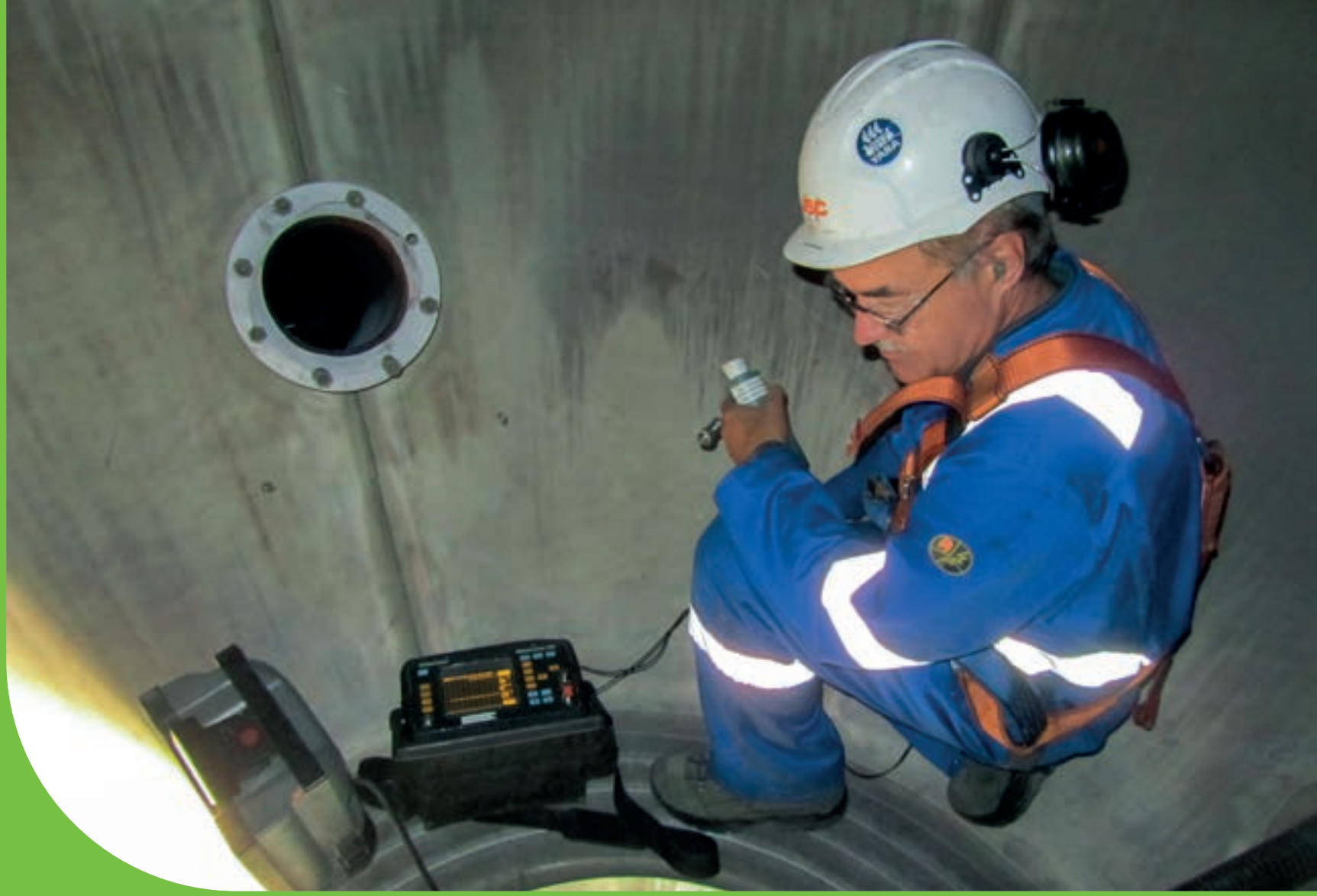
How does it work?

The Advance Inspect™ inspection takes several days depending on the scope. The inspectors report findings on a daily basis and submit a field inspection report with main conclusions and advice to management before leaving the site. This is followed by a final report with root-cause findings if applicable.

Stamicarbon can offer inspection services in all urea plants.

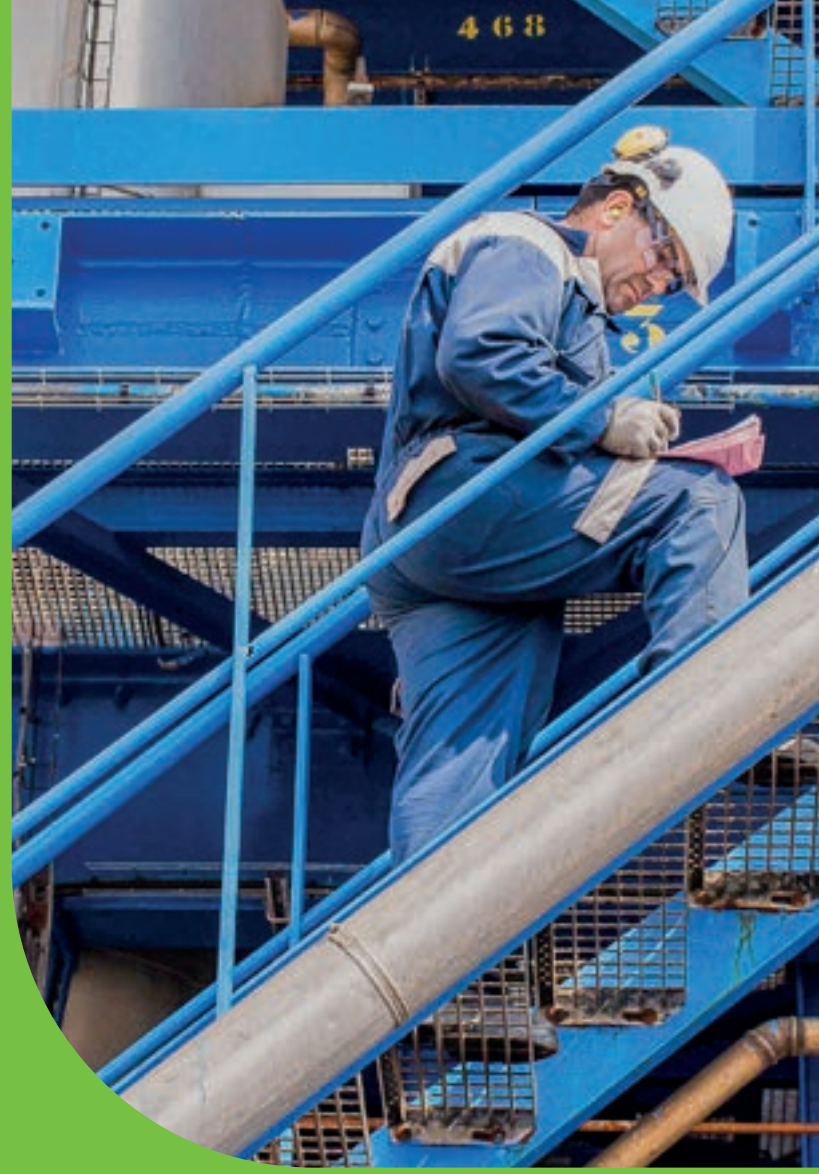
Your benefits

- Detailed management reporting on equipment condition, based on all measurements and findings
- Type and level of corrosion identified such as condensation corrosion, crevice corrosion, strain-induced cracking, stress corrosion cracking, stern-face corrosion
- Advice and recommendations on repairs and repair procedures
- Advice and recommendations on plant operations in relation to corrosion and damages
- Advice on scope and time interval for next planned inspection
- Equipment lifetime prediction and when follow-up action or replacement is due



WHY HP EQUIPMENT INSPECTIONS?

Equipment failures can severely interrupt plant operations and even cause serious safety risks and fatal accidents.



Ensuring reliability and long lifetime of the most critical equipment

Reliable and durable HP equipment is critical for successful urea production. However, being exposed to highly corrosive ammonium carbamate at high temperatures and pressure puts stress on your HP equipment. As a result, equipment failures can severely interrupt plant operations and even cause serious safety risks and fatal accidents. These risks can be prevented with a proper inspection program in place.

Our solution

Regular inspections will help to ensure safety, optimal performance, and maximum lifetime of the HP equipment. These inspections should be performed every 2-6 years, depending on corrosion-resistant materials used and inspection results. We give advice and recommendations on repairs, modifications and the next recommended inspection date for your HP equipment. We offer inspections in urea plants based on a thorough understanding of the process, materials of construction and failure modes, and experience gained from over 500 inspections executed worldwide over many years.

Your benefits

- Information about the actual condition of the plant
- Increased plant safety
- Reduced costs of maintenance and/or repairs
- Improved productivity

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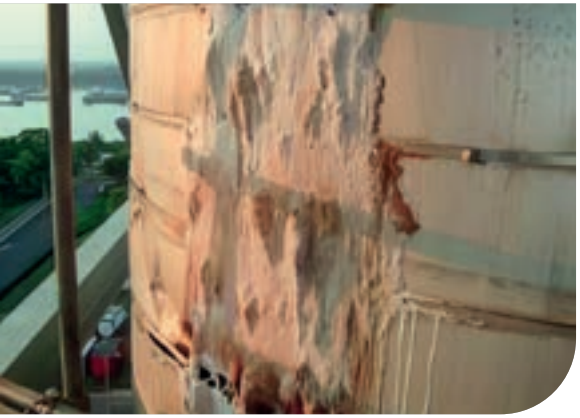

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NEAR MISS CATASTROPHIC FAILURE OF UREA REACTOR

The case

During the daily round, the plant operator observed crystallized product contamination on the outside of the urea reactor. The plant was stopped within one day to open up the reactor for inspection. A leak was observed in a liner weld and upon removal of the liner plate, severe corrosion of the pressure shell was observed. The plant was stopped just in time to prevent a catastrophic failure.
The corrosion damage was repaired and the reactor was put into service again safely.

The cause

The leak was caused by a defect in a liner weld, which was missed during routine inspections. Unfortunately, the leak detection system was out of order and the unavailability of the leak detection system worsened the situation to near-catastrophic.

Lessons learned

Small invisible defects are potential threats to the structural integrity of critical HP urea equipment. So in addition to scrupulous inspections by experienced inspectors, the final line of defense (leak detection system) should also be checked and maintained properly.

CATASTROPHIC FAILURE OF HP SCRUBBER

The case

During normal operations, suddenly the high-pressure scrubber ruptured and caused damage to the structure. Fortunately, nobody was injured.

The cause

A small leak in a patch plate weld on the liner was not noticed and created severe corrosion in the c-steel pressure shell resulting in the rupture of the vessel. The root cause of this mishap is the combination of:

1. The patch plate was not inspected on regular basis
2. The leak detection system was not available

Lessons learned

Inspection of critical high-pressure urea equipment needs to be done on a regular basis. Furthermore a good functioning and maintained leak detection system is of paramount importance as last line of defense to avoid catastrophic failure.

Ruptured HP Scrubber

Inspection of critical high pressure urea needs to be done on regular basis.

ADVANCE™ INSPECT

Urea Equipment

The critical urea equipment inspection is performed by our experienced corrosion engineers and non-destructive testing (NDT) experts, on both high-pressure synthesis and low-pressure equipment.

High-Pressure Piping

Stamicarbon executes lifetime assessments of the high-pressure (HP) piping and accessories. The approach is based on the Risk-Based Inspection methodology (RBI), meaning that all the components will be ranked critically from the process and atmospheric point of view. In this way the most critical points in the pipe system are identified and target the inspection program.

With Stamicarbon, you can rely on:

- A combined knowledge of process design, material science and fabrication techniques, resulting in a perfect position to execute inspections utilizing these three disciplines.
- An extensive experience with inspection services enables us to know where to look for critical parts of your plant.

The inspectors have very high standards and have worked well with us and our welding company to ensure that we are getting the best repair possible.

Pryor Chemical

Emergency inspections

In case of an emergency shutdown in the plant, we can immediately arrange for inspectors to travel to the plant site at your request. Thanks to our extensive knowledge and experience in urea processes and materials, we are in a perfect position to identify the root cause of leakage and advise on the next steps to remediate it.

Stamicarbon successfully performed an inspection on our high pressure equipment.

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WE ARE STAMICARBON

Stamicarbon is the Nitrogen innovation and license company of the MAIRE Group.
We are a trailblazing specialist in the fertilizer industry, with the vision needed to help feed the world and improve everyone's quality of life. As a global leader in fertilizer technologies, we have licensed more than 260 urea plants and completed more than 110 revamping and optimization projects.

Our leading position is based on more than 75 years' licensing experience and maintained by continuous innovation in terms of technologies, products and materials.
Headquartered in Sittard, the Netherlands, Stamicarbon has a sales office in the USA and representative offices in Russia and China.
For more information, see **www.stamicarbon.com.**

WHAT CAN WE DO FOR YOU?

Any questions about Stami Urea?
Like to know how our expertise, knowledge and experience creating, optimizing and upgrading fertilizer plants can help you make the switch to sustainable, futureproof production?
We are here for you. Contact our experts at **www.stamicarbon.com.**

Stamicarbon
Mercator 3 - 6135 KW Sittard - Netherlands | P.O. Box 53 - 6160 AB Geleen - Netherlands
Tel. +31 46 4237000 - communication@stamicarbon.com - www.stamicarbon.com

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