ADVANCE™ DESIGN

PRILL IMPACT STRENGTHENER

To dramatically improve the mechanical strength of your urea prills through seeding and decreasing disintegration, dust formation and caking

The innovation & license company of Maire Tecnimont.

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STAMI UREA

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The challenge
Mechanical strength is especially important when the product needs to be stored after being subjected to a variety of handling operations. Poor mechanical strength leads to disintegration and dust formation, which also increases caking tendency. Improvement of the impact strength is important if the prills are handled several times.

Why it is necessary to improve the mechanical strength of your urea prills:

During prilling, the impact of the prills on the prilling tower floor and the action of the scraper give rise to formation of very fine urea dust. A part of this dust can be carried along with the rising air stream in the prilling tower.

On collision with the descending urea droplets the dust particles act as nuclei. If a droplet collides with several dust particles, the prill will ultimately consist of a number of randomly oriented crystals. Because of the coherence between these irregular crystals, the prills have high impact strength.

If the dust concentration in the rising air is low, the droplets do not collide with enough dust particles.

Urea droplets may get super cooled. Owing to crystallization from the super cooled phase, the weak prill modification is formed.

Super cooling is the physical phenomenon, whereby a substance is in the liquid phase even though its temperature is below the crystallization temperature. The crystallization temperature of super cooled droplets can be as low as 90°C.

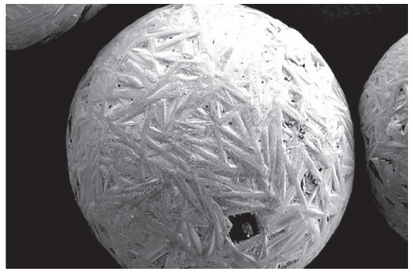
The absence of sufficient urea dust particles is imputable to the quantity of dust carried along with the rising air stream from the prilling tower bottom or by atmospheric conditions.

Due to the hygroscopic nature of urea, the urea dust particles will adsorb moisture from the ambient air, if the relative humidity of the air is higher than the Critical Relative Humidity (CRH) of the urea. At high humidity of the ambient air the dust particles may adsorb so much water, that they pass in the solution and act no longer as nuclei.

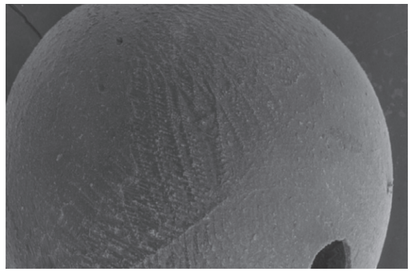
Stamicarbon's solution
Stamicarbon offers a unique technology that improves the impact strength of the prills to reduce the formation of mechanically weak prills. Urea seeds are introduced into the prilling tower, allowing the urea dust particles to collide with the urea droplets. The seeds will act as nuclei for crystallization, leading to prills with many different crystal orientations and much higher strength.

Benefits:
- Better product quality
- Higher mechanical strength
- Less dust formation
- Better uniformity

Urea prill with seeding



Urea prill without seeding



Schematic drawing of a seeding system