The information in this brochure is provided in good faith. To our knowledge it reflects the truth.
**The problem of crystallization**

- Particularly at the dewatering of digested sludge it comes to trouble by crystallization and depositions. Layers consisting from salt crystals in the change with sludge and polymer particles are frequently built up.

- The crystal formation depends on the nature of the contents and on the concentration of the ions as well as on the pH value. Another important point for sludge dewatering with centrifuges is the gas escape of CO₂. The pH value increases and depending on the solubility of the products, the precipitation starts.

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**mechanism of crystallization**

- **Super saturation of Mg, Ca - salts**

- **High pressure in centrifuge +/- 2000 bar**

- **Sudden violent release of CO₂**

- **PH increase**

- **Precipitation of dissolved salts, ie. Struvite, CaCO₃, CaSO₄, Apatite**
**FLOSPERSE™**  
amino-phosphonic acid complex

**Double action**
- Complexes Mg and Ca ions
- Interferes with crystal formation

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**Buffer, pH and why it works**

- During the digestion process large amounts of NH₃ and CO₂ are produced by the degradation of organic material.
- Both, NH₃ and CO₂ gases are highly soluble in water. These gases combine to form Ammonium-hydrogen-carbonate (NH₄HCO₃). NH₄HCO₃ is a strong buffer with a pH below 7. At this pH most Mg and Ca ions are in solution. If there is sufficient phosphorus in solution (as HPO₄ and PO₄), we have a system with all the necessary components to potentially form Struvite (MgNH₄PO₄, 6H₂O).
- A necessary condition for Struvite to remain in solution is a low pH value (the lower the pH, the more soluble the ions). Precipitation of Struvite depends on pH and concentration.
- A sudden change in pressure or temperature will allow the dissolved CO₂ gas to escape. This causes the pH to increase, thus causing the precipitation of salts such as Struvite, CaCO₃ or CaSO₄.
- In order to prevent the precipitation of salts, the addition of FLOSPERSE™ is required. FLOSPERSE™ complexes the metal ions. Then these ions are not available to precipitate out of a solution.
- An additional advantage of FLOSPERSE™ is that it will dissolve any salts already precipitated over a period of time.

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**Optimum dose determination**

- One of the many advantages of FLOSPERSE™ over Polyacrylate is that there is a reliable method to determine the optimum dose.
- The optimum dose of FLOSPERSE™ is determined when 100% of the relevant ions are still in solution after we have reached the critical pH value.
## Products for Inhibition of Crystallization

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| **FLOSPERSE™ PX 60 N** | Modified amino-Phosphonic acids and Phosphonates. | **Inhibition of Mg precipitation (Struvite), Ca and Fe precipitation (Carbonate, Sulphate, Phosphate).**  
The product avoids precipitation and re-dissolves existing deposits from pipes and machines over a period of time. Recommended dose 20 – 60 ppm. | Container 1.000 kg net  
Drums 200 kg net | pH approx. 5.5  
Density (20°C): 1.13 kg/l |
| **FLOSPERSE™ HT** | Modified Phosphonic acids and Phosphonates. | **Product composition with a special effect against calcium precipitation.**  
High complexing ability with Ca ions beside of an effective Threshold potential.  
Required dose between 10 – 40 ppm. | Container 1.000 kg net  
Drums 200 kg net | pH 5.5 - 5.7  
Density (20°C): 1.13 kg/l  
P content 2.9% |
| **FLOSPERSE™ DISSOLVER** | Modified Phosphonic acids, Phosphonates and surfactants. | **Special designed for crystal, sludge polymer removal for pipes, dewatering machines and heat exchangers.** | Container 1.000 kg net  
Drums 200 kg net | pH (1%): approx. 2.1  
Density (20°C): 1.21 kg/l |