Next generation high-performance cationic dewatering flocculants

Kemira Superfloc® XD series

kemira
Kemira flocculant global manufacturing footprint
Sludge thickening / dewatering at WWTPs

Primary sludge separation → Aeration and denitrification → Biomass separation → Post treatment

Anaerobic digestion → Thickening

Dewatering → Dewatered sludge

Biogas

Polymer

Centrate
Sludge dewatering needs

Optimized OPEX for the sludge dewatering process
• Achieved through polymer / other reactive dosage reduction in kg/Ton Dry Solids
• Achieved through unit cost reduction in €/kg product
• Achieved through a combination of above criteria

Lower cost for transportation and sludge disposal
• Higher dry solids % in dewatered sludge
• Cost efficient sludge disposal route (landfill is cheaper than incineration, if legally authorized)

Better centrate quality
• Less suspended solids and COD going back to the process
• Overall improved process stability
New Superfloc XD series product line

<table>
<thead>
<tr>
<th>Product</th>
<th>MW</th>
<th>Cationic Charge</th>
<th>Target Sludge Dewatering Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superfloc XD-5200</td>
<td>Very High</td>
<td>Medium - High</td>
<td>Centrifuge</td>
</tr>
<tr>
<td>Superfloc XD-5300</td>
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<td>Centrifuge, Belt Press, Filter Press</td>
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<tr>
<td>Superfloc XD-7600</td>
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</tr>
</tbody>
</table>
Full scale industrial trials with Superfloc XD series
Case study 1
Superfloc XD-7600

Plant data:
- 410 000 Population Equivalent
- 109 000 m³/day
- 10 000 ton sludge dry matter
- Digested sludge
- 2 Guinard D7LL centrifuges
- Flowrate ≈ 30 to 35 m³/hr
- DS feed ≈ 4 to 4.5 %
- Polymer make-up unit: Batch system
- Date of testing: August, 2016
Case Study 1 / Superfloc XD-7600

Plant targets:
- Dry Solids: > 22.0%
- Suspended solids in centrate: < 1000 mg/l

Cake dry solids (%)

Suspended solids centrate (mg/l)

Polymer consumption with both polymers: 7-8 kg / tds
Results
Case 1

- Dry solids with reference polymer below target of 22%
- Dry solids with Superfloc XD-7600 above target of 22%
- Polymer consumption of both polymers 7-8 kg / tds
- Improved centrate quality with Superfloc XD-7600 versus reference polymer
Case study 2
Superfloc XD-7600

Plant data:
• 100 000 Population Equivalent
• 45 000 m³/day
• 1 300 ton sludge dry matter
• Digested sludge
• Alfa Laval centrifuge
• Flowrate ≈ 10 m³/hr
• DS feed ≈ 2 %
• Polymer make-up unit: Batch system
• Date of testing: week 1-21, 2017
Case study 2 / Superfloc XD-7600

Plant targets:

- Improve dry solids from 22-23% to 23-25%
- Improve centrate quality to below 300 mg/l
Results
Case 2

- Dry solids with Superfloc XD-7600 is slightly higher than dry solids with reference polymer
- Better centrate quality with Superfloc XD-7600 versus reference polymer
- Both targets on improved centrate quality and higher dry solids are achieved
Case study 3
Superfloc XD-5300

**Plant data:**
- 1 000 000 Population Equivalent
- 360 000 m³/day
- > 10 000 ton sludge dry matter
- Digested sludge mixed with primary sludge ratio 1:1
- Flowrate ≈ 55 m³/hr
- DS feed ≈ 1.2 to 2.5 %
- Polymer make-up unit: Batch system
- Date of testing: September, 2017

Municipal Waste Water Treatment plant in South East Asia
Plant targets:
• Dry Solids as high as possible with high variations in feed sludge concentration
• Lower dosage of flocculant by at least 10% without compromising sludge dry solids and centrate quality
Results

Case 3

- Same cake dry solids 23.5% was achieved with Superfloc XD-5300 versus reference polymer with 20% less consumption (5-6 kg/tds)
- Cake dry solids of 27% was achieved with Superfloc XD-5300 versus reference polymer with similar consumption (7-8 kg/tds)
Conclusion

1. Kemira Superfloc® XD-7600 significantly improves cake solids and filtrate quality compared to conventional cationic flocculants and at similar dosage levels.

2. In full-scale trials XD-series flocculants have improved the filtrate quality and the cake dry solids 2-3% compared to conventional cationic polymers.

3. In full-scale trials XD-series flocculants can give similar cake solids than with reference product by using even 20% lower dosage levels.
Where water meets chemistry™