HYDREX® P Silicate – Key benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>High pigment brightness</td>
<td>Higher brightness, whiteness and shade</td>
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<tr>
<td>High light scattering powder</td>
<td>Increased opacity in low basis weight grades</td>
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<tr>
<td>Improved coefficient of friction (CoF)</td>
<td>Less winder reject</td>
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<tr>
<td>Porous/Fluffy structure</td>
<td>Increased thickness, bulk and stiffness</td>
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<tr>
<td>Improved print quality</td>
<td>Possibility to decrease basis weight and use less chemical pulp</td>
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<tr>
<td>No abrasive impurities</td>
<td>Minimized printthrough</td>
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<tr>
<td>High purity</td>
<td>Lowest abrasion</td>
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**HYDREX® P Silicate – Functional properties**

HYDREX® P has a unique structure which gives superior optical, printing and physical properties to the paper products when added to the machine wet-end or to the coating layer. This multifunctional additive offers numerous benefits to paper and carton board products including improved brightness, opacity, printability, bulk and enhanced friction control. Furthermore, HYDREX® P silicate has excellent efficiency as TiO₂ extender for cost savings by the formulators. HYDREX® P silicate is available in dry and slurry forms.

**HYDREX® P Silicate – Effects and End-Use Application**

- **TiO₂ extension**
  - Cost saving in decor and thin printing paper applications
- **Higher opacity**
  - Decreased need for chemical pulp in specialty fine papers, white-top and folding box board
- **Higher brightness**
  - Better visual appearance in specialty fine papers and improved newsprint
- **Improved print quality**
  - Good contrast ratio and high definition in all paper grades
- **Reduced print-through**
  - Prevents ink strike through in thin printing paper grades
- **Increased bulk**
  - Improved stiffness in book paper, white-top and folding box board
- **Higher friction in winding**
  - Perfect reeling of mechanical printing papers

**HYDREX® P Silicate – Technical details:**

1. **Brightness**

   HYDREX® P Silicate brightness is close to 100 % and its unique pore structure provides paper with a significant number of light scattering interfaces, boosting optical properties of paper and impart desired bluish-white shade. Typically, 1 % of HYDREX® P addition increases brightness by one unit in unfilled papers. Because of improved visual appearance of paper, it is possible to reduce pulp bleaching to gain better fiber quality and strength as well as to decrease need for kraft pulp.
2. Printability
Light-weight, fine papers are particularly susceptible to ink strike- and print-through. Highly porous structure of HYDREX® P Silicate reduces the risk by quickly immobilizing the printing ink at the paper surface resulting in high definition print quality and a reduction in total ink demand, enabling uniform color and low level of print mottling due to even ink absorption.

3. Opacity
HYDREX® P properties are optimized to provide both high brightness and opacity to many paper grades such as thin printing paper, tipping paper, folding boxboard and white top liner boards. Paper strength is maintained in low weight paper grades due to low HYDREX® P addition levels. HYDREX® P enables TiO₂ replacement and high quality multi color printing in thin printing paper grades and considerable cost savings through the reduced need for chemical pulp and optical brighteners.

4. Bulk
In contrast with common fillers (e.g. clays), HYDREX® P Silicate provides substantial bulk improvement in paper and cartonboard due to its low density, porous structure and optimized particle size distribution, which leads to better stiffness in book paper as well as improved control of paper thickness and smoothness during calendaring. Basis weight reduction is possible while maintaining paper thickness, stiffness and opacity. Gravure print quality is improved due to better contact of paper and printing plate.

5. Titanium dioxide replacement
Excellent efficiency as TiO₂ extender is based on the optimized particle size distribution, high optical efficiency and unique internal structure. TiO₂ optical efficiency is improved by preventing its self-agglomeration tendency and optimizing inter-particle distance for light scattering. When TiO₂ is properly spaced, opacity is increased, and the appearance of the paper products is enhanced. Fixing of TiO₂ particles to the porous surface of HYDREX® P Silicate improves filler retention and gives substantial saving potential in total pigmentation cost.

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