Kaolin Extenders for Coatings and Inks

We create chemistry
Kaolin
Extenders for Coatings and Inks

BASF is the world’s leading chemical company. As a globally recognized leader, our broad BASF Kaolin product portfolio offers customers the most innovative and premium quality kaolins. Using BASF Kaolin is a common solution for partially replacing titanium dioxide (TiO₂) while simultaneously controlling costs and improving both the performance and appearance in coatings and inks.

**BASF Kaolin Enhance Coatings and Inks**

Kaolin solutions from BASF can deliver:

- Improved cost (TiO₂ extension)
- Enhanced optical properties
- Improved processing efficiency
- Superior performance and appearance
- Controlled rheology

**Kaolin Solutions for Architectural Coatings**

**Kaolin**

High brightness, ease of dispersion, controlled particle size distribution, low specific gravity and platy morphology make BASF Kaolin products a value-added component in flat, eggshell, semi-gloss and high-gloss paints.

BASF Kaolin products in coatings applications can provide:

- TiO₂ extension
- Increased Opacity and Tint Strength
- Stain Resistance
- Sheen Control
- Color Pigment Extension
- Scrub Resistance
- Rheology Control
- Mud-crack Resistance

**Gloss and Semi-Gloss Paints**

In gloss and semi-gloss paints, ultrafine particle size BASF Kaolin products provide excellent TiO₂ extension while maintaining high gloss. ASP G90, ASP 200 and ASP 170 can be used in both latex and solvent-borne paints to improve coverage.

**Interior Paint**

For interior paints, BASF Kaolin products add value by providing TiO₂ extension (ASP® 170, ASP 172, ASP NC X-1) improved opacity and tint strength (Ultrax® 96 and Satintone® products), sheen control (Mattex® and Mattex PRO), washability and stain resistance (ASP NC X-1) and scrub resistance (Mattex PRO and Satintone W).

**Mattex PRO**

At BASF Kaolin we are committed to bringing customers the most innovative and premium quality kaolins. Our newest addition to the coatings portfolio is Mattex PRO, a new patent pending, engineered, high performance kaolin product designed for use in flat architectural coatings. In addition to providing very high scrub resistance in low VOC paints, Mattex PRO also simplifies paint formulations by eliminating the use of flattening agents, thereby reducing costs.

**Exterior Paints**

In exterior paints, kaolin positively impacts tint retention (ASP 400P, Satintone W and Mattex), gloss retention (ASP 170) and improved crack resistance. The platy structure and low oil absorption of ASP 400P provides a low degree of chalking, and a high resistance to dirt pick up.

**Stains**

Our BASF Kaolin portfolio includes a range of hydrous kaolin products designed to brighten, strengthen and visually enhance stain features. The hydrous pulverized kaolin ASP 400P provides easy dispersion and transparency in stains.
Kaolin Solutions for Automotive and Industrial Coatings

Automotive Coatings
BASF Kaolin products play an important role in automotive electrodeposition primers by providing film uniformity, tank stability, film smoothness, corrosion resistance, and edge film build. ASP® grades for automotive primers are characterized by low salts content, easy dispersion, good throwing power and proven performance.

Automotive Coatings - in the automotive refinish sector ASP 600 and ASP 172 offer superior optical and mechanical properties.

Coil Coatings - ASP 200 and ASP 170 offer TiO₂ extension, gloss flexibility, corrosion and humidity resistance.

Traffic Paint - Satintone® W offers titanium dioxide extension and abrasion resistance.

Baking Enamels - ASP 170 offers improved adhesion, titanium dioxide extension and excellent film properties.

Textured Paint - ASP 400P offers low viscosity, leveling and brushing ease.

Industrial Coatings
Polyester Gel Coats
Our kaolin products improve blister resistance in unsaturated polyester gel coats, which protects fiberglass composites in products at risk of attack by water, such as boats, snowmobiles and other vehicles. Translink® 37 provides improved blister resistance, superior color retention, and improved viscosity and sag control compared to calcium carbonate (CaCO₃) and talc. Satintone® W provides improved opacity. Studies indicate that kaolin has better gloss retention after long term exposure to water.

For technical advice on using kaolin extenders in any of these applications, please contact us at kaolin@basf.com.
Kaolin Solutions for Inks

BASF Kaolin products are common components of most ink systems and are characterized by high brightness and a tightly controlled fine particle size distribution. BASF Kaolin products are versatile ink extenders that simultaneously address a wide variety of formulation needs.

ASP® grades can provide in many benefits in ink applications:
- Strike-through resistance
- Color pigment extension
- Transparency
- Low abrasion
- Controlled ink-water balance
- Formulating flexibility
- Rheology control and ink flow
- Fast dry time

<table>
<thead>
<tr>
<th>Properties</th>
<th>Kaolin Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion</td>
<td>⬇️</td>
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<tr>
<td>Block Resistance</td>
<td>⬆️</td>
</tr>
<tr>
<td>Color Development</td>
<td>⬆️</td>
</tr>
<tr>
<td>Dispersion</td>
<td>⬆️</td>
</tr>
<tr>
<td>Gloss</td>
<td>⬆️</td>
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<tr>
<td>Hold Out</td>
<td>⬆️</td>
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<tr>
<td>Solvent Release</td>
<td>⬆️</td>
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<tr>
<td>Stability</td>
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<tr>
<td>Strike Through Resistance</td>
<td>⬆️</td>
</tr>
<tr>
<td>Transparency</td>
<td>⬆️</td>
</tr>
</tbody>
</table>

= Improved Positive Impact  = Decreased Negative Impact

Offset Inks
Both web and sheet fed offset inks run at high speed and require high viscosity and tack, as well as a high resistance to emulsification from the fountain solution. ASP 101 and ASP 200 offer the best balance of properties and emulsification resistance in ink fountain solution. ASP grades are especially suited for optimal colorant dispersion for improved transparency and high gloss.

Gravure Inks
The very low abrasion and platy nature of the ASP grades make them an ideal choice for gravure inks. ASP 600 kaolin provides excellent strike-through resistance and low abrasion properties and is a very good product for gravure inks.

Other grades suitable for this application are ASP 200 and Buca®. Kaolin’s low abrasion helps maximize the lifespan of the images engraved into the Cupper cylinders.

Flexographic Inks
For flexible packaging, the high degree of whiteness and fine particle size of ASP 170 and Ultrex® 96 are necessary to efficiently extend TiO₂, provide opacity and promote optimal dispersion of colorant particles. ASP 170 and Satintone® 5HB provide excellent pigment extension, hiding and ease of dispersion.

Screen Inks
Screen inks are characterized by high viscosity to allow for a high film thickness. Compared to gravure and flexographic applications, a thick film is applied during screen printing to provide vibrant color, opacity and longer service life. Satintone 5HB and Ultrex 96, with their high whiteness and light scattering properties, are excellent extenders for screen inks.

Specialty Inks
BASF Kaolin products are also used in several types of specialty inks, including letterpress, security, ultraviolet curing and electron beam curing.
Kaolin for Coating and Ink Applications
ASP®, Satintone®, Mattex®, Ultrex®, Translink® and Buca® Application Matrix

### Kaolin Product

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<thead>
<tr>
<th>Hydrous Spray Dried</th>
<th>Hydrous Pulverized</th>
<th>Delaminated</th>
<th>Hydrous Surface Modified</th>
<th>Calcined</th>
<th>Calcined Surface Modified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASP G92</strong></td>
<td>ASP G90</td>
<td>ASP NC X-1</td>
<td>ASP 101</td>
<td>Mattex</td>
<td>Translink 37</td>
</tr>
<tr>
<td><strong>ASP 072</strong></td>
<td>ASP 200</td>
<td></td>
<td></td>
<td>MX</td>
<td>Translink 77</td>
</tr>
<tr>
<td><strong>ASP 102</strong></td>
<td>ASP 400P</td>
<td></td>
<td></td>
<td>PRO</td>
<td>Translink 445</td>
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<tr>
<td><strong>ASP 172</strong></td>
<td>ASP 170</td>
<td></td>
<td></td>
<td>W</td>
<td>Translink 96</td>
</tr>
<tr>
<td><strong>ASP 602</strong></td>
<td>ASP 600</td>
<td></td>
<td></td>
<td>5HB</td>
<td>Translink 96</td>
</tr>
<tr>
<td><strong>ASP 802</strong></td>
<td>ASP 900</td>
<td></td>
<td></td>
<td>96</td>
<td>Translink 96</td>
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<tr>
<td></td>
<td>Buca®</td>
<td></td>
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</table>

| R = Recommended  |
| * = Can be Used |

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**Architectural Coatings**

<table>
<thead>
<tr>
<th>Solvent-Borne</th>
<th>Water-Borne</th>
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<tbody>
<tr>
<td>Gloss</td>
<td>Gloss</td>
</tr>
<tr>
<td>Semi-Gloss</td>
<td>Semi-Gloss</td>
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<tr>
<td>Interior Flat</td>
<td>Interior Flat</td>
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<tr>
<td>Exterior Flat</td>
<td>Exterior Flat</td>
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<tr>
<td>Primer</td>
<td>Primer</td>
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<tr>
<td>Stain</td>
<td>Stain</td>
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**Industrial Coatings**

<table>
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<tr>
<th>Solvent or Water-Borne</th>
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<tbody>
<tr>
<td>Coatings</td>
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<tr>
<td>Gel Coatings</td>
</tr>
<tr>
<td>Textile Coatings</td>
</tr>
<tr>
<td>Traffic Coatings</td>
</tr>
<tr>
<td>Appliance</td>
</tr>
<tr>
<td>Barrier/Undercoats</td>
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<tr>
<td>Powder Coatings</td>
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<td>Electro-Deposition Coatings</td>
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**Inks**

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<th>Solvent or Water-Borne</th>
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<tr>
<td>Prime</td>
</tr>
<tr>
<td>Offset</td>
</tr>
<tr>
<td>Gravure - solvent</td>
</tr>
<tr>
<td>Gravure - aqueous</td>
</tr>
<tr>
<td>Flexo - solvent</td>
</tr>
<tr>
<td>Flexo - aqueous</td>
</tr>
<tr>
<td>Silk Screen</td>
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</tbody>
</table>
## Kaolin for Coating and Ink Applications
### ASP®, Satintone®, Mattex®, Ultrex®, Translink® and Buca® Physical Properties

<table>
<thead>
<tr>
<th>Product</th>
<th>Physical Form</th>
<th>Surface Modifications</th>
<th>GE Brightness</th>
<th>Screen Residue</th>
<th>pH</th>
<th>Median Sedigraph Particle Size</th>
<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(% Reflectance)</td>
<td>(% + 325 Mesh)</td>
<td>(20% solids)</td>
<td>(µm)</td>
<td>(D-281 Rubout)</td>
<td>(lbs/ft³/kg/m³)</td>
<td>(lbs/ft³/kg/m³)</td>
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</table>

### Hydrous Spray Dried

<table>
<thead>
<tr>
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<th>Physical Form</th>
<th>Surface Modifications</th>
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<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tbody>
<tr>
<td>ASP G90</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>90</td>
<td>0.01</td>
<td>6-8</td>
<td>0.2</td>
<td>40-50</td>
<td>44/700</td>
<td>53/930</td>
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<tr>
<td>ASP 072</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>90</td>
<td>0.01</td>
<td>6-8</td>
<td>0.3</td>
<td>40-50</td>
<td>44/700</td>
<td>58/930</td>
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<tr>
<td>ASP 102</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>86</td>
<td>0.01</td>
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<td>0.4</td>
<td>40-50</td>
<td>44/700</td>
<td>58/930</td>
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<tr>
<td>ASP 172</td>
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<td>0.01</td>
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<td>0.4</td>
<td>40-50</td>
<td>44/700</td>
<td>58/930</td>
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<tr>
<td>ASP 602</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>86</td>
<td>0.01</td>
<td>6-8</td>
<td>0.6</td>
<td>35-45</td>
<td>44/700</td>
<td>58/930</td>
</tr>
<tr>
<td>ASP 802</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>86</td>
<td>0.02</td>
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<td>2.5</td>
<td>35-45</td>
<td>48/770</td>
<td>54/900</td>
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### Hydrous Pulverized

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<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tbody>
<tr>
<td>ASP G90</td>
<td>Pulverized</td>
<td>Dispersant</td>
<td>90</td>
<td>0.01</td>
<td>6-8</td>
<td>0.2</td>
<td>40-50</td>
<td>13/210</td>
<td>18/290</td>
</tr>
<tr>
<td>ASP 170</td>
<td>Pulverized</td>
<td>Dispersant</td>
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<td>0.01</td>
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<td>0.4</td>
<td>40-50</td>
<td>15/240</td>
<td>20/320</td>
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<tr>
<td>ASP 200</td>
<td>Pulverized</td>
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<td>86</td>
<td>0.01</td>
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<td>40-50</td>
<td>18/290</td>
<td>30/480</td>
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<tr>
<td>ASP 400P</td>
<td>Pulverized</td>
<td>None</td>
<td>80</td>
<td>0.15</td>
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<td>3.5</td>
<td>30-40</td>
<td>25/400</td>
<td>40/640</td>
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<tr>
<td>ASP 600</td>
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<td>35-45</td>
<td>20/320</td>
<td>30/480</td>
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<td>ASP 900</td>
<td>Pulverized</td>
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<td>83</td>
<td>0.15</td>
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<td>30-40</td>
<td>25/400</td>
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<td>BUCA</td>
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<td>0.01</td>
<td>6-8</td>
<td>0.4</td>
<td>40-50</td>
<td>16/260</td>
<td>20/320</td>
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### Delaminated

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<th>pH</th>
<th>Median Sedigraph Particle Size</th>
<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tbody>
<tr>
<td>ASP NC X-1</td>
<td>Spray Dried</td>
<td>Dispersant</td>
<td>87</td>
<td>0.01</td>
<td>6-8</td>
<td>0.7</td>
<td>40-50</td>
<td>40/650</td>
<td>55/890</td>
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### Hydrous Surface Modified

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<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tbody>
<tr>
<td>ASP 101</td>
<td>Pulverized</td>
<td>Stearate</td>
<td>86</td>
<td>0.03</td>
<td>3.5-5</td>
<td>0.4</td>
<td>40-50</td>
<td>18/290</td>
<td>30/480</td>
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### Calcined

<table>
<thead>
<tr>
<th>Product</th>
<th>Physical Form</th>
<th>Surface Modifications</th>
<th>GE Brightness</th>
<th>Screen Residue</th>
<th>pH</th>
<th>Median Sedigraph Particle Size</th>
<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tbody>
<tr>
<td>Mattex</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
<td>90</td>
<td>0.01</td>
<td>5-7</td>
<td>1.3</td>
<td>60-70</td>
<td>20/320</td>
<td>30/480</td>
</tr>
<tr>
<td>Mattex MX</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
<td>90</td>
<td>0.01</td>
<td>5-7</td>
<td>1.1</td>
<td>65-75</td>
<td>20/320</td>
<td>30/480</td>
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<td>Mattex PRO</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
<td>89</td>
<td>0.3</td>
<td>6-8</td>
<td>2.7</td>
<td>52-62</td>
<td>26/416</td>
<td>44/704</td>
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<tr>
<td>Satintone W</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
<td>90</td>
<td>0.02</td>
<td>5-7</td>
<td>1.4</td>
<td>50-60</td>
<td>20/320</td>
<td>30/480</td>
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<tr>
<td>Satintone 5HB</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
<td>91</td>
<td>0.01</td>
<td>5-7</td>
<td>0.8</td>
<td>85-95</td>
<td>13/210</td>
<td>20/320</td>
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<td>Ultrex 96</td>
<td>Pulverized</td>
<td>Dehydroxylated</td>
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<td>0.02</td>
<td>5-7</td>
<td>0.8</td>
<td>85-95</td>
<td>16/260</td>
<td>22/350</td>
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### Calcined Surface Modified

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<tr>
<th>Product</th>
<th>Physical Form</th>
<th>Surface Modifications</th>
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<th>Screen Residue</th>
<th>pH</th>
<th>Median Sedigraph Particle Size</th>
<th>Oil Absorption</th>
<th>Loose Bulk Density</th>
<th>Tamped Bulk Density</th>
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<tr>
<td>Translink 37</td>
<td>Pulverized</td>
<td>Silane functional</td>
<td>90</td>
<td>0.02**</td>
<td>N/A</td>
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<td>45-55</td>
<td>20/320</td>
<td>35/560</td>
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<td>Translink 77</td>
<td>Pulverized</td>
<td>Silane functional</td>
<td>91</td>
<td>0.02**</td>
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<td>80-90</td>
<td>13/210</td>
<td>21/340</td>
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<td>Translink 445</td>
<td>Pulverized</td>
<td>Silane functional</td>
<td>90</td>
<td>0.02**</td>
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<td>1.4**</td>
<td>45-55</td>
<td>20/320</td>
<td>35/560</td>
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</tbody>
</table>

** Pre-treatment value
About BASF

BASF Corporation, headquartered in Florham Park, New Jersey, is the North American affiliate of BASF SE, Ludwigshafen, Germany. BASF has nearly 17,500 employees in North America, and had sales of $17.4 billion in 2015. For more information about BASF’s North American operations, visit www.basf.us.

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. The approximately 112,000 employees in the BASF Group work on contributing to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio is organized into five segments: Chemicals, Performance Products, Functional Materials & Solutions, Agricultural Solutions and Oil & Gas. BASF generated sales of more than €70 billion in 2015. BASF shares are traded on the stock exchanges in Frankfurt (BAS), London (BFA) and Zurich (AN). Further information at www.basf.com.

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