Hostaform® SlideX™

New POM Product Range for Demanding Tribological Applications
Hostaform® SlideX™ – for Demanding Tribological Applications

Engineered materials from Celanese have been proven for years in moving technical systems as an alternative to metals. With proper selection of materials, the entire component can be made of a plastic type, without having to subsequently install additional bearings. The use of materials in moving systems requires precise knowledge of the tribological behavior (friction and wear of interacting surfaces in relative motion).

Specifically, the friction needed in these systems optimization, since due to the low thermal conductivity of plastics an effective dissipation of frictional heat generated is not always given. This frictional heat leads to a heating of the friction partner, thus especially could reduce the mechanical properties of the resin. This in turn can lead to increased wear of the entire tribological system. Materials for tribological components are often characterized by the coefficient of friction and wear characteristics. Both numbers are no material parameters, but sizes of each tribological system.

Hostaform® POM has proven its good suitability for tribological applications. In general, the addition of tribological additives changes the mechanical properties. The tribological modification of plastics is usually achieved with solid lubricants (e.g., PTFE or UHMW-PE), waxes, silicone oils, graphite, Molybdenum disulfide, special chalks or others. These modifiers reveal their advantages often only under specific tribological conditions, so that their wider applicability could be limited.

Celanese offers with the new Hostaform® SlideX™-series tribological modified POM Copolymer grades which can be used under demanding tribological conditions. The unique advantage of the new Hostaform® SlideX™ is his novel tribological modifier, which is characterized by low friction coefficients and wear rates and which even outperforms PTFE-modified materials. Compared to unmodified standard POM copolymers, the mechanical properties remain, almost unchanged. Customary form covering largely does not occur in Hostaform® SlideX™.

Hostaform® SlideX™ is FDA-compliant and can be used for applications with food and drinking water contact. Hostaform® SlideX™ is available in XAP² quality and complies with the stringent requirements on emissions in automotive interiors.
Hostaform® SlideX™

Product Portfolio

Hostaform® SlideX™ 0313 XAP²
Very good flowability, extremely low slip and wear coefficient

Hostaform® SlideX™ 0304 XAP²
Extremely high flowability, low slip and wear coefficient

Application Areas

• Bearing systems
• Conveyer systems
• Guides
• Sliding systems for
  · Appliances
  · Automotive (seats, sun roofs, gearshifts, HVAC, mirror systems)
  · Sports (ski binding, fishing, ...)
  · Roller Shutter
  · Fluid Handling
• Stearing Systems [Gearboxes]

Hostaform® SlideX™ – Advantages at a Glance

• Consistant low static coefficient of friction
• Low wear
• Food contact approved
• XAP² quality
• No customary form covering
• Eliminates noise
• No running in
• No further lubrication needed
Consistent Mechanical Properties
Most tribological modifiers influence the mechanics of the base polymer used in each case often significantly. In addition to the stiffness and strength, especially the strength and elongation is greatly reduced. The tribological modification of Hostaform® SlideX™ leaves the mechanical properties of the base polymer virtually untouched. The stress-strain curves show the comparison to unmodified Hostaform® C9021. Stiffness and strength remain almost constant. The elongation at break is even slightly increased.

Outstanding Performance
Since tribological properties are always based on the system, a material characterization can not be performed with a universal testing machine. Rather, the testing methods (test setups) for the material pre-selection must be as close as possible based on the real system. Celanese offers several test setups for their customers.

Suitable for High Surface Pressure and Low Sliding Speed
The static and dynamic friction of the sliding pair, as well as the wear of the material to be tested can be measured. The difference between dynamic and static coefficient of friction is an indicator for the occurrence of the so-called stick-slip and thus the noise while the slippage.

PTFE-modified materials have proven especially at low sliding speeds and high surface pressures and are characterized here by lowest friction coefficient and wear rates. Hostaform® SlideX™ 0313 is better than PTFE filled materials (Fig. 1), even under these conditions. The usual, occurring in PTFE-modified products form covering problem does not occur with Hostaform® SlideX™.

Plastic plastic pairings have always represented a major challenge to the tribological performance of materials. Hostaform® SlideX™ 0313 XAP also shows his extraordinary tribological performance.
Lowest friction coefficient reduce the heat input to the sliding system and can lead to a potential increase in service. As in Figure 2 can be seen at the same time very low wear rates are measured. POM-POM pairings with Hostaform® SlideX™ 0313 XAP² are not tend to noise and are therefore very well feasible.

Elevated temperatures often lead to a degradation of the friction and wear behavior. Accompanying this a significant increase in noise exposure is recorded. Again Hostaform® SlideX™ 0313 offers a solution. The sliding pair Hostaform® SlideX against Hostaform® SlideX™ runs even at elevated temperatures, noise-free (Fig.3).

Fig.4 shows the friction and wear behavior of Hostaform® SlideX™ in dry running operations against Hostaform® C9021 compared to pairings Hostaform® C9021 - Hostaform® C9021 with an additionally applied lubricant. The wear behavior of Hostaform® SlideX™ is comparable to the externally lubricated systems. At the same time much lower friction coefficients could be measured.
Suitable For Low Surface Pressure and High Sliding Speed

High sliding velocities have a great influence on the heating behavior of tribological systems due to induced frictional energy. Even at relatively low pressure and high sliding speed, the new Hostaform® SlideX™ is characterized by extremely low coefficient of friction and wear rates.

The following results show no measurable noise. Thermal and mechanical effects on the test, such as fusing or adhesive or abrasive removal of material, are not detectable. Thus Hostaform™ SlideX™ is used under a particularly wide range of tribological systems.
Properties
Below the mechanical properties of Hostaform® SlideX™ 0313 and 0304 are shown in comparison to various competing products, such as PTFE-modified POM homo- and copolymers at one glance.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Unit</th>
<th>Hostaform® C 0021</th>
<th>Hostaform® SlideX™ 0313</th>
<th>Hostaform® SlideX™ 033%</th>
<th>Hostaform® C021 TF</th>
<th>Hostaform® C021 GD</th>
<th>POM-Homo + 20% PTFE</th>
<th>POM Copo + 20% PTFE</th>
<th>POM Copo + 18% PTFE + 2% Si</th>
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<tbody>
<tr>
<td>Density</td>
<td>ISO 1183</td>
<td>g/cm³</td>
<td>1,41</td>
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<td>1,4</td>
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<td>1,34</td>
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<tr>
<td>Melt Volume Rate (MVR)</td>
<td>ISO 1183</td>
<td>cm³/10min</td>
<td>8</td>
<td>13</td>
<td>24</td>
<td>6</td>
<td>5,5</td>
<td>13</td>
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<tr>
<td>Tensile Strength</td>
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<td>MPa</td>
<td>64</td>
<td>60</td>
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<td>48</td>
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<td>54</td>
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<td>Strain at yield</td>
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<td>7</td>
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<tr>
<td>Stress at yield</td>
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<td>%</td>
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<td>15</td>
<td>18</td>
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<td>E-Modulus</td>
<td>ISO 527</td>
<td>MPa</td>
<td>2850</td>
<td>2700</td>
<td>2500</td>
<td>2500</td>
<td>2300</td>
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<td>Notched Charpy</td>
<td>ISO 1791 G10°C</td>
<td>kJ/m²</td>
<td>6,5</td>
<td>5,8</td>
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<td>Flexural Modulus</td>
<td>ISO 178</td>
<td>MPa</td>
<td>2700</td>
<td>2500</td>
<td>2350</td>
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<td>2100</td>
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<td>Heat deflection temperture</td>
<td>ISO 75</td>
<td>°C</td>
<td>184</td>
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Processing
The recommended processing conditions for Hostaform® SlideX™ can be found in the following sketches and tables. Hostaform® SlideX™ is ideally suited for the injection molding of various components. If the conditions in specific components sometimes not directly lead to an optimal result, the processing conditions can be adjusted. Please do not hesitate to contact Celanese Technical Information Service for further processing adjustments.
Engineered Materials

- Celanex®: thermoplastic polyester (PBT)
- Hostaform® and Celcon®: acetal copolymer (POM)
- Celstran®, Compel®, and Factor®: long fiber reinforced thermoplastic (LFT)
- Celstran®: continuous fiber reinforced thermoplastic (CFR-TP)
- Fortron®: polyphenylene sulfide (PPS)
- GUR®: ultra-high molecular weight polyethylene [UHMW-PE]
- Impet®: thermoplastic polyester (PET)
- Riteflex®: thermoplastic polyester elastomer (TPC-ET)
- Thermx®: polycyclohexylene-dimethylene terephthalate (PCT)
- Vandar®: thermoplastic polyester alloy (PBT)
- Vectra® and Zenite®: liquid crystal polymer (LCP)

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