PARALOID™ BPM-500 Acrylic Impact Modifier For Polylactic Acid Resin

Description

PARALOID™ BPM-500 is an acrylic impact modifier specially designed to improve the impact resistance of Polylactic Acid (PLA) resin used in the industry and more specifically for transparent packaging applications.

Thanks to the unique morphology of the modifier, blending PARALOID™ BPM-500 with PLA improves impact properties without sacrificing the transparency of the product. In addition to better impact properties, PLA modified with BPM-500 shows a marked improvement in cutting and slitting as well as increased flexibility.

For over 30 years, acrylic impact modifiers from Rohm and Haas have led to the development and market recognition of many unique resins and brought Rohm and Haas a wealth of scientific and industrial experience.

Today Rohm and Haas is committed to investing in programs that drive sustainability improvements.

PARALOID™ BPM-500 provides the needed solution to allow a broader use of resins derived from renewable resources.

Applications/uses

PARALOID™ BPM-500 is especially useful in applications where a balance between toughness and transparency is a key. These include packaging applications, as well as industrial and consumer goods.

Impact performance

Improved impact properties are obtained with addition levels as low as 3%. Excellent impact performance is obtained at higher use levels: the impact strength of PLA is increased three fold using BPM-500 at 5 wt% loading.

Figure 1- Dart drop impact (ASTM 5420) for PLA modified with BPM-500 Extruded 4042D PLA sheet, 15 mil thickness

![Dart drop impact](image1)

Dart drop impact

- Neat PLA
- 5 wt% BPM-500 loading

Brittle failure

Ductile failure
Tear resistance

PARALOID™ BPM 500 enhances the tear resistance and the cutability of PLA extruded sheets. The brittle nature of pure PLA could lead to uneven rough edges of the sheet during cutting and handling. The addition of BPM-500 increases the resistance of the film to tearing and improves cutting.

Table 1 - Elemendorf tear resistance (ASTM 1922) Extruded 4042D PLA sheet, 15 mil thickness

<table>
<thead>
<tr>
<th>% PARALOID™ BPM-500</th>
<th>0</th>
<th>5</th>
<th>7.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave Tear Force (grms-force)</td>
<td>208</td>
<td>550</td>
<td>922</td>
</tr>
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Optical Properties

Thanks to the combination of the nano-scale particle size and excellent dispersability of PARALOID™ BPM-500 in PLA, the addition of the modifier has minimal effect on the clarity of the PLA film. The haze measured on a 15 mil extruded sheet is less than 6% for up to 5 wt% of BPM-500 loading.
Figure 2- Haze measured on a 15 mil extruded sheet

Physical description

Appearance: Free flowing white powder
Bulk Density: 0.48-0.56 g/cm³
Total residual volatiles: <1%

Processing Information

PARALOID™ BPM-500 is supplied in a free flowing powder form. It is easily dispersed into PLA by controlled addition of the additive during melt mixing in a twin screw extruder. A typical heating profile for the twin screw extruder is shown in the table below.

Table 2. Recommended twin-screw extruder temperature profile

<table>
<thead>
<tr>
<th>Zone</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>T°C</td>
<td>150</td>
<td>180</td>
<td>190</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

For processing with PLA on a single screw extruder or other processing equipment, it is recommended to blend pre-compounded PARALOID™ BPM-500 in PLA.

The addition of PARALOID™ BPM-500 at the recommended use levels under typical processing conditions does not affect the thermal stability of PLA.

It is recommended that both the BPM-500 modifier and PLA resin be thoroughly dried to below 250 ppm moisture before compounding.

Regulatory Compliance

PARALOID™ BPM-500 complies with EU Directive 2002/72/EC of 6 August 2002 which governs food packaging in the European Union. In compliance to US Food and Drug Administration (FDA) requirements, PARALOID™ BPM-500 may be used up to 10% in food contact resins (maximum thickness of 20 mil) with all types of food at room temperature and below.

We moreover recommend that you verify on a regular basis with your local Rohm and Haas Office, the latest food status update of our product.
Storage, Handling and Safety

Refer to the MSDS for guidelines

Rohm and Haas Company is a raw materials supplier, not an end-use manufacturer of product. Development of a final formulation, testing, application, and ultimate performance of the end-use product is fully the responsibility of the formulator.

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