The global shift towards a biobased economy has placed pressure on plastic producers to seek alternatives to their oil-based products. Until now, PLA (Poly Lactic Acid) could not be used in applications where higher heat resistance was required. However, Corbion’s breakthrough in high heat PLA is changing the face of biobased plastics, offering plastic producers an excellent level of performance.

Corbion is a technology leader in biobased plastics innovation. Now Corbion has raised the bar even higher when it comes to high heat PLA performance.

**Unlocking bioplastic potential for durable applications**

Most PLA bioplastics of the past had the major drawback that they could not withstand increased temperatures. However, Corbion has developed a high heat solution for PLA-based bioplastics.

At the heart of this technology, you find high heat PLA compounds based on stereochemically pure lactides, a type of PLA that until recently was not commercially available. These new high heat PLA resins open up new markets for bioplastic products, including consumer electronics, high heat packaging, automotive interiors, apparel and many more. Corbion has demonstrated that this is not just a theory by developing a range of compounds in cooperation with our PLA partners, Universities, Institutes, compounders and brand owners.
High heat heat potential for high heat applications

A biobased alternative, comparable heat performance
Corbion’s PLA technology can replace PS, PP and ABS type materials in applications where heat performance (HDT B) is a key requirement (see Figure 1). This higher heat performance is achieved by improving the purity of the PLA polymer backbone. The key driver behind this innovation, is adding PDLA as a nucleating agent to high heat PLA neat resin. This results in a compound that combines good heat resistance with excellent mechanical properties.

Figure 2 and the table below show typical results of using high heat PLA neat resins in a number of sample compounds:

- **Compound A**: a general purpose compound, featuring increased heat performance without adding significant amounts of filler.
- **Compound B**: a mineral (talc) filled compound with a higher modulus, and an even higher temperature resistance than compound A.
- **Compound C**: an impact modified compound featuring an ABS type of impact resistance.
- **Compound D**: a cost optimized base compound for sheet/film extrusion. PDLA can be added separately to increase crystallization speed and optimize processing.
- **Compound E**: a general purpose compound optimized for sheet/film extrusion and thermforming.
- **Compound K**: compliant with industrial composting requirements while maintaining good heat resistance.

<table>
<thead>
<tr>
<th>Market</th>
<th>Injection molding</th>
<th>Extrusion/thermoforming</th>
<th>Food contact</th>
<th>Clarity</th>
<th>Density (g/cm³)</th>
<th>MFI (210°C/2.16Kg)</th>
<th>Melt temperature (°C)</th>
<th>Molding temperature (°C)</th>
<th>Pre-drying</th>
<th>Tensile modulus (MPa)</th>
<th>Tensile strength (MPa)</th>
<th>Strain at break (%)</th>
<th>Heat modification (HDT B, 0.45MPa, flatwise) °C</th>
<th>Impact</th>
<th>Charpy Notched Impact / kJ/m²</th>
<th>PLA nucleated with PDLA D070 (nucleating agent)</th>
<th>Compliance with EN13432 to be verified on actual end product.</th>
<th>Food contact</th>
<th>General purpose</th>
<th>Mineral filled</th>
<th>Impact modified</th>
<th>Base compound</th>
<th>General purpose</th>
<th>Compostable</th>
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</thead>
<tbody>
<tr>
<td>HIPS</td>
<td>PLA</td>
<td>Corbion PLA sample compounds*</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D**</td>
<td>E</td>
<td>K***</td>
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* Developmental grades, all data is preliminary. Data was obtained by measuring IM test bars. Corbion does not commercially produce these PLA compounds. ** For high heat applications it is recommended to add 3-7% Luminy® PDLA D070 (nucleating agent). *** Compliance with EN13432 to be verified on actual end product.

Corbion is the global market leader in lactic acid, lactic acid derivatives and lactides, and a leading company in emulsifiers, functional enzyme blends, minerals and vitamins. For the plastics industry, Corbion offers lactides and PLA resins for general purpose and high performance bioplastics. PLA (Poly Lactic Acid) is a biobased plastic with a low carbon footprint and is used in packaging, disposables, fibers, electronics and automotive markets. Corbion operates 11 production plants, in the USA, the Netherlands, Spain, Brazil and Thailand, and markets its products through a worldwide network of sales offices and distributors.

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