POLYMER POWDER - GRAFTABOND™

Polymer powder based on MP-UHMWPE by using the most innovative technology method of Solid-state graft copolymerization.

UHMWPE graft copolymers having enhanced thermal stability and excellent nucleating efficiency & improved rheological properties.
## Product Line

<table>
<thead>
<tr>
<th>GRAFTABOND™</th>
<th>Reactive Monomer</th>
<th>MFI range [g/10min]</th>
<th>Grafting Degree [%]</th>
<th>Form</th>
<th>Olefin/PA Blends</th>
<th>Glass Fiber or Mineral Filled PP</th>
<th>Natural Fiber Filled Polyolefins</th>
<th>Metal Adhesion</th>
<th>Polymer Film Adhesion</th>
<th>Non-Halogen FR</th>
<th>Mixed Recyclates</th>
<th>ABS</th>
<th>PA</th>
<th>SAN</th>
<th>PVC</th>
<th>WPC</th>
<th>PC</th>
<th>Polyesters (PET,PBT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UHP-MAH</td>
<td>IM</td>
<td>MAH</td>
<td>-</td>
<td>2.5-3</td>
<td>Powder</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>UHP-GMA</td>
<td>IM</td>
<td>GMA</td>
<td>-</td>
<td>~1.5</td>
<td>Powder</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>UHP-SAN</td>
<td>IM</td>
<td>SAN</td>
<td>-</td>
<td>4.5-5</td>
<td>Powder</td>
<td>●</td>
<td>●</td>
<td>●</td>
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## Product Market

### Adhesives & Sealants
- To change module – increase or decrease, increase adhesion

### Cast Polyurethane, Epoxy, Polyether
- Abrasion resistance, flexibility, adhesion

### Rubber Goods
- Increase abrasive resistance, coefficient of friction, adhesion

### Pains & Coating
- To increase: abrasive resistance (Mar, Scrab, Rub, Scratch), gloss, toughness, adhesion to metal, glass, concrete etc.

### Heavy duty goods
- Coefficient of friction (increase or decrease to increase abrasion resistance)

### Nanomodified polymer powders & composites

### Thermoplastic & Thermosets
- Abrasion resistance, creep resistance, solvent resistance, adhesion and compatibilization.
GRAFTABOND™
UHP-MAH 00030 IM
UHP-GMA 00015 IM

APPLICATION

**Improve abrasion resistance** of engineering plastics (Epoxy, PU, PPS, PSU, PEEK, PI).

**Increase impact resistance** of engineering plastics, epoxy, polyurethane, paints and coatings.

**Increase adhesion** of engineering plastics to various substrates (Steel, Glass, Aluminum, Copper etc).

**Low coefficient** of friction in plastic goods.

**Increase** scratch resistance, mar, gloss in paints and coatings.

**Enhance** barrier properties of composite materials.

UHP-MAH 00030 IM grade is used for polyamides and olefin based plastics.

UHP-GMA 00015 IM grade is used for polyester based plastics.

Non-treated (left) and surface-modified (right) GRAFTABOND™ UHP Particles in a polyurethane matrix clearly illustrate

Non-treated UHMWPE (left) and surface-modified UHMWPE (right) in water.
GRAFTABOND™
UHP-SAN 00055 IM

Styrene-Acrylontirile grafted UHMWPE

GRAFTABOND™ UHP-SAN 00055 IM is excellent toughener for ABS and SAN compounds.

UHP grade is best used with ABS type.
TECHNICAL REPORT
UHMWPE-MAH / GMA
Ultra High Molecular Weight Polyethylene

Product information

<table>
<thead>
<tr>
<th>MATERIALS</th>
<th>PRODUCT DESCRIPTION</th>
<th>MANUFACTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAFTABOND™ UH-MAH</td>
<td>Ultra High Molecular Weight Polyethylene grafted with Maleic Anhydride in powder form</td>
<td>Graft Polymer</td>
</tr>
<tr>
<td>GRAFTABOND™ UH-GMA</td>
<td>Ultra High Molecular Weight Polyethylene grafted with Glycidyl Methacrylate in powder form</td>
<td>Graft Polymer</td>
</tr>
</tbody>
</table>

Measured Properties

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>MFI (190°C, 2,16 KG)</th>
<th>DRYING LOSS (105°C)</th>
<th>DEGREE OF GRAFTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAFTABOND™ UH-MAH</td>
<td>/</td>
<td>&lt;0,7 %</td>
<td>1,4 %</td>
</tr>
<tr>
<td>GRAFTABOND™ UH-GMA</td>
<td>/</td>
<td>&lt;0,7 %</td>
<td>&gt;2 %</td>
</tr>
</tbody>
</table>
Graftabond™ UH-MAH used as an additive for polyethylene increase mechanical properties, especially impact strength and flexural modulus. Because of the grafted maleic anhydride, Graftabond™ UH-MAH has increased compatibility, adhesion and wettability to other fibers (glass, natural) or natural/mineral fillers.

FTIR spectra shows a clear peak at the wavelength 1780 cm⁻¹, which signals the presence of anhydride group.
Graftabond UH-GMA is a polymer additive for polyethylene that increases the base material’s mechanical properties and allows for better bonding with the base material. Because of the grafted Glycidyl Methacrylate, Graftabond UH-GMA provides better interfacial interactions between the base polymer and ultra high molecular weight polyethylene.

FTIR spectra of Graftabond UH-GMA shows a large peak at 1720 cm\(^{-1}\), which signals the presence of Glycidyl Methacrylate.

FTIR Spectra of Graftabond UH-GMA