INTRODUCTION

Graftalloy products are the combination of the best properties of separate materials was made to create the best Co-continuous nano-morphology.

By grafting branch polymers to polyolefin-based polymers, we can improve the properties of many materials, and compatibilize different blends.
## PRODUCT GRADES

<table>
<thead>
<tr>
<th>Item</th>
<th>Test Method</th>
<th>Unit</th>
<th>GRAFTALLOY™ Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>LD-PS</td>
</tr>
<tr>
<td>Main Chain Polymer</td>
<td>-</td>
<td>-</td>
<td>LDPE</td>
</tr>
<tr>
<td>Branch Polymer</td>
<td>-</td>
<td>-</td>
<td>PS</td>
</tr>
<tr>
<td>MFI</td>
<td>ISO 1133</td>
<td>g/10 min</td>
<td>190°C, 2,16 kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>57,44</td>
</tr>
<tr>
<td>Tensile Strength at Yield</td>
<td>ISO 527, 1A, 20 mm/min</td>
<td>MPa</td>
<td>5,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Elongation at Break</td>
<td>ISO 527, 1A, 20 mm/min</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Melting Temp.</td>
<td>DSC</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>
# OUR RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Blend</th>
<th>GRAFTALLOY grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyolefin + PS</td>
<td>LD-PS / PP-SAN</td>
</tr>
<tr>
<td>Polyolefin + ABS</td>
<td>LD-SAN / PP-SAN / EB-SAN</td>
</tr>
<tr>
<td>Polyolefin + PLA</td>
<td>LD-SAN</td>
</tr>
<tr>
<td>Polyolefin + PET</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>Polyolefin + PBT</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>Polyolefin + PC</td>
<td>LD-PS / PP-SAN</td>
</tr>
<tr>
<td>Polyolefin + mPPE</td>
<td>LD-PS</td>
</tr>
<tr>
<td>PS + PLA</td>
<td>EB-PS</td>
</tr>
<tr>
<td>PS + PA</td>
<td>EB-PS</td>
</tr>
<tr>
<td>PS + PBT</td>
<td>EB-PS</td>
</tr>
<tr>
<td>PS + PC</td>
<td>EB-PS</td>
</tr>
<tr>
<td>ABS + PLA</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>ABS + mPPE</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>ABS + PC</td>
<td>EB-SAN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blend</th>
<th>GRAFTALLOY grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMMA + PET</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PMMA + PBT</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PLA + PA</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PLA + PBT</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PLA + PC</td>
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<tr>
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<tr>
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<td>EB-PS</td>
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<tr>
<td>PET + PC</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PBT + PC</td>
<td>EB-SAN</td>
</tr>
<tr>
<td>PBT + mPPE</td>
<td>EB-PS</td>
</tr>
</tbody>
</table>
GRAFTALLOY™ LD-PS 06000 - is a high performance polymer alloy, consisting of LDPE, with chemically bound PS.

Applications

- Improve tribological properties (POM, PA, ABS, PBT, PC, PPS, mPPE)
- Improve Melt Flow Index of blends (mPPE, TPE)
- Improves mechanical characteristics
- Improves scratch resistance (ABS, PMMA, PC)

Processing

- Can be processed with all usual processing technologies (Injection moulding, extrusion, blow moulding, thermoforming)
- Optimal processing temperatures are between 180°C and 200°C.
GRAFTALLOY LD-SAN 03000

GRAFTALLOY™ LD-SAN 01000 - is a high performance polymer alloy, consisting of LDPE, with chemically bound SAN.

Applications

• Improve tribological properties (POM, PA, ABS, PBT, PC, PPS, mPPE)
• Improves scratch resistance (ABS, PMMA, PC)

Processing

• Can be processed with all usual processing technologies (Injection moulding, extrusion, blow moulding, thermoforming...)
• Optimal processing temperatures are between 180°C and 200°C.
GRAFTALLOY™ LD-PS / LD-SAN improve tribological properties.

Example:
We measured mass loss from abrasion and coefficient of friction of:
POM
POM + 10 wt.%GRAFTALLOY™ LD-PS
PTFE

GRAFTALLOY™ LD-PS improves:
✓ Abrasion loss
✓ Coefficient of kinetic friction

POM with GRAFTALLOY™ LD-PS / SAN - has better tribological properties than PTFE.
GRAFTALLOY™ PP-SAN 03000 is a high performance polymer alloy, consisting of PP, with chemically bound SAN.

Applications
- Improve trixotropy of PP
- Improve Melt Flow Index of blends (with PP, ABS, TPE)
- Improves impact strength (PMMA, PA, PET, PBT, PPS)
- Improve compatibilization (with PMMA, PLA, PA, PET, PBT)

Processing
- Can be processed with all usual processing technologies (Injection moulding, extrusion, blow moulding, thermoforming)
- Optimal processing temperatures are between 180°C and 200°C.
GRAFTALLOY PP-SAN 03000

GRAFTALLOY™ PP-SAN improves Impact Strength

Example:
Comparing Izod impact strength of:
- PBT
- PBT + 10 wt.% GRAFTALLOY™ PP-SAN
- PBT + 10 wt.% EGMA

![IZOD IMPACT STRENGTH [KJ/M²]]

- PBT + 10 WT. % EGMA: 7.4
- PBT + 10 WT.% GRAFTALLOY™ PP-SAN: 8.2
- PBT: 3.5

PBT with GRAFTALLOY™ PP-SAN has better Izod Impact Strength than PBT with EGMA.
GRAFTALLOY™ EB-PS 00700 is a high performance polymer alloy, consisting of EBA, with chemically bound polystyrene.

Applications
- Impact modifier
- Improves mechanical characteristics (for PLA, PA, PBT)
- Increases abrasion resistance

Processing
- GRAFTALEN™ EB-PS 00700 can be processed with all usual processing technologies (Injection molding, extrusion, blow molding, thermoforming...)
- Optimal processing temperatures are between 180°C and 200°C.
GRAFTALLOY EB-SAN 00700

GRAFTALLOY™ EB-SAN 00700 - is a high performance polymer alloy, consisting of EBA, with chemically bound SAN.

Applications

- Impact modifier (for PET, PBT, PPS, PA)
- Improves mechanical characteristics
- Increases abrasion resistance
- Matting (for ABS, PP)

Processing

- Can be processed with all usual processing technologies (Injection moulding, extrusion, blow moulding, thermoforming...)
- Optimal processing temperatures are between 180°C and 200°C.
GRAFTALLOY EB-SAN 00700

Improve compatibility and mechanical properties of blends with GRAFTALLOY™.

Example:
PC/PET blend
PC/PET + 5 wt.% GRAFTALLOY™ EB-SAN
PC/PET + 5 wt.% EGMA

Impact Strength of blend increases significantly, with only 5% reduction in maximum tensile stress, when using GRAFTALLOY™ EB-SAN.
WHAT MAKES GP UNIQUE

- Use proprietary co-agents and redox initiating system for grafting
- Use of Nitroxide Mediated Polymerization for controlled grafting reactions
- Co-continuous nano-morphology approach for creation polymeric alloys
- Interpenetrating Polymer Networks (IPN)
- Thermo-Reversible Crosslinking polymers and Vitrimers
- Smart Polymers
  - Self-Healing polymers
- In-house synthesis of unique “nitroxide stable radicals” (TEMPO) for high-tech composite materials – proprietary process
BUSINESS MODEL: INNOVATIONS

To support its unique modification technologies, GP has built the R&D center including Laboratory and Synthesis facilities.

**INNOVATIVE TECHNOLOGIES**

- Flow induced crystallization
- Solid Phase Grafting
- Solution Grafting
- Fillers Treatments
- Powders Hybridization
- Hot ozonolysis/plasma modification
- Nitroxide Mediated Polymerization
- Micro/Nano Porous polymer carries

**GRAFT / BLOCK POLYMERS**

**POLYMERIC NANO ALLOYS**

**CROSSLINKING**

**POROUS**

**SYNTHESIS**
Contact information

Anjeza Kuhar | Sales Manager
English / Italian / Albanian
Phone: +386 40 380 668
anjeza.kuhar(at)graftpolymer.com

Ekaterina Kulevskaia | Sales Manager
English / Russian / Slovenian
Phone: +386 31 399 366
ekaterina(at)graftpolymer.com

Pavel Kobzev | English / Hebrew
Business Development & Sales Director
Phone: +386 40 867 937
Pavel(at)graftpolymer.com

www.graftpolymer.com
Info(at)graftpolymer.com