Material Report

GRAFTALEN™ PP-FE 003 EFFECTIVENESS REPORT

This report is a guideline for effectiveness and dosation of GRAFTALEN™ PP-FE 003 for decreasing viscosity (Increasing MFI) of polypropylene (PP)

MATERIALS USED

Base PP: BRASKEM Inspire 137
Flow Enhancer: GRAFTALEN™ PP-FE 003

TESTS PERFORMED

To determine the effectiveness of our flow enhancer, we measured the melt flow index (MFI) of base PP with different amounts of flow enhancer added.

We added 1%, 2%, 3%, 4% and 5% of GRAFTALEN™ PP-FE 003

Mixtures were extruded on a laboratory scale extruder.

MFI of mixtures was measured at 230°C, 2,16 kg, in accordance with ISO 1133.
RESULTS

<table>
<thead>
<tr>
<th>GRAFTALEN™ PP-FE Added [wt.%]</th>
<th>MFI [g/10 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0,73</td>
</tr>
<tr>
<td>1</td>
<td>6,2</td>
</tr>
<tr>
<td>2</td>
<td>13,3</td>
</tr>
<tr>
<td>3</td>
<td>27,6</td>
</tr>
<tr>
<td>4</td>
<td>38,7</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
</tr>
</tbody>
</table>

The MFI increases significantly with added GRAFTALEN™ PP-FE 003, even at low amounts.

MFI increases in a polynomial fashion, according to:

\[
MFI = A \times x^2 + B \times x + MFI_{\text{start}}
\]

\(MFI = \text{Melt flow index of mixture}\)

\(A, B = \text{Constants, depending on the extrusion parameters}\)

\(x = \text{Percentage of GRAFTALEN™ PP-FE 003 added}\)

\(MFI_{\text{start}} = \text{MFI of base PP}\)
CONCLUSIONS

- GRAFTALEN™ PP-FE 003 greatly increases the MFI of polypropylene, even at low additive amounts.

- MFI increase follows a polynomial trend with GRAFTALEN™ PP-FE 003 added, meaning:

  More additive means even greater MFI increase than at low additive levels (exponential increase).
Material Report

CONTACTS

MANAGEMENT

CEO/CTO | Victor Bolduev +386 40 534 739
Executive Director / CMO | Pavel Kobzev +386 40 867 937
Pavel@graftpolymer.com

GRAFT POLYMER D.O.O (OFFICE)

Emonska Cesta 8, Ljubljana Slovenia.
Company Num. 8056200000,
VAT. SI 30561345
Tel  +386 1 777 6561
office@graftpolymer.com
www.graftpolymer.com

GRAFT POLYMER D.O.O (PRODUCTION/WAREHOUSE)

Mejaceva ulica 2, 1353 Borovnica Slovenia
Company Num. 8056200000,
VAT. SI 30561345
office@graftpolymer.com
www.graftpolymer.com

GRAFT POLYMER (UK) LTD

Central Working Victoria Eccleston Yards 25,
Eccleston Pl, London, UK, SW1W 9NF.
Company Num. 10776788, VAT. 281712016
www.graftpolymer.com