reFlex™ 100
High Solvating Bio-Derived Plasticizer
and the
USDA BioPreferred® Program

USDA BioPreferred® Program
The core goals of the USDA BioPreferred program are:
- To spur the development of the biobased economy
- To enhance national energy security, by promoting the purchase and use of biobased products as alternatives to petroleum
- To better manage the atmospheric carbon cycle

The USDA BioPreferred program has two major initiatives:
- **Product Labeling**
  - USDA certifies and awards labels to qualifying products and/or packaging to increase consumer recognition of biobased content
- **Federal Procurement Preference**
  - USDA designates categories of biobased products that are afforded preference by Federal agencies when making purchasing decisions
Meaning of the USDA BioPreferred® Label

- Products have been tested and certified to the USDA BioPreferred standards.
- Identifies “USDA Certified Biobased Products” and the verified biobased content of the certified product or package.
- Products achieve the minimum meaningful threshold of biobased content as determined by the USDA.
- Manufacturers and vendors who have obtained the rights to use the USDA BioPreferred Label on their product have submitted to the USDA, independent test evidence of the biobased content of the product.
Biobased Content Determination

- Measured by ASTM 6866
- Represents the % of renewable carbon vs. total organic carbon
  - Carbonate carbon is not included in calculation but must be reported separately
- BETA Analytics, Inc. is authorized by the USDA to perform the ASTM test and directly submit the results
  - Max, requirement 25 grams
  - Results typically in 3-7 days
  - About $ 600 per sample
- Theoretical biobased content can be calculated
A biobased product will fall into one of two categories:

1. **Within a Designated Product Category**: a product category designated by USDA for Federal Procurement Preference in which the product meets the minimum biobased content established for that category
   - Ranges between 7% (carpets) up to 95% (compost materials)
   - [Product Categories](#)

2. **Not Within a Designated Product Category**: a product that is not within a product category already designated by USDA requires a minimum of 25% biobased content to be certified
reFlex™ 100: USDA BioPreferred® Certification

- reFlex 100 was tested to the USDA BioPreferred standards and has been certified to contain 94% biobased content by weight.
### Calculating Theoretical Renewable Content

#### Examples

<table>
<thead>
<tr>
<th>Formulation</th>
<th>% Carbon&lt;sup&gt;1,2&lt;/sup&gt; (non-carbonate)</th>
<th>Weight Total Carbon (non-carbonate)</th>
<th>% Old Carbon</th>
<th>Weight Old Carbon</th>
<th>% New Carbon</th>
<th>Weight New Carbon</th>
<th>% Carbonate Carbon</th>
<th>Weight Carbonate Carbon</th>
<th>Weight Total Carbon&lt;sup&gt;3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>100</td>
<td>38.4</td>
<td>100.0%</td>
<td>38.4</td>
<td>0.0%</td>
<td>0.0</td>
<td>0.0%</td>
<td>0.0</td>
<td>38.4</td>
</tr>
<tr>
<td>reFlex 100</td>
<td>20</td>
<td>72.3%</td>
<td>6.0%</td>
<td>0.9</td>
<td>94.0%</td>
<td>13.6</td>
<td>0.0%</td>
<td>0.0</td>
<td>14.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>52.9</strong></td>
<td><strong>39.3</strong></td>
<td><strong>13.6</strong></td>
<td><strong>0.0%</strong></td>
<td><strong>52.9</strong></td>
<td><strong>0.0%</strong></td>
<td><strong>0.0</strong></td>
<td><strong>52.9</strong></td>
</tr>
<tr>
<td>Biobased Content %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.7%</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Formulation</th>
<th>% Carbon&lt;sup&gt;1,2&lt;/sup&gt; (non-carbonate)</th>
<th>Weight Total Carbon (non-carbonate)</th>
<th>% Old Carbon</th>
<th>Weight Old Carbon</th>
<th>% New Carbon</th>
<th>Weight New Carbon</th>
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<td>0.0%</td>
<td>0.0</td>
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<td>0.0</td>
<td>38.4</td>
</tr>
<tr>
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<td>72.3%</td>
<td>6.0%</td>
<td>0.9</td>
<td>94.0%</td>
<td>13.6</td>
<td>0.0%</td>
<td>0.0</td>
<td>14.5</td>
</tr>
<tr>
<td>CaCO3 Filler</td>
<td>100</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0</td>
<td>0.0%</td>
<td>0.0</td>
<td>12.0%</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>220</strong></td>
<td><strong>52.9</strong></td>
<td><strong>39.3</strong></td>
<td><strong>13.6</strong></td>
<td><strong>0.0%</strong></td>
<td><strong>52.9</strong></td>
<td><strong>12.0%</strong></td>
<td><strong>12.0</strong></td>
<td><strong>64.9</strong></td>
</tr>
<tr>
<td>Biobased Content %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.7%</td>
</tr>
</tbody>
</table>

1. Molecular mass of carbon in compound divided by the molecular weight of the compound.
2. "Carbonate" carbon does not enter into calculations but is reported.
3. Includes all Carbon including carbonate carbon.
Potential Benefits

- Public statement of sustainability commitment
- Easy recognizable and presentable to customers
- “Green Claim” not subjected to “greenwashing”
- Allows entry in the USDA BioPreferred® Catalogue
- Could lead to Federal Procurement Preference if pursued
- May allow participant to expand their business

To learn more about the USDA BioPreferred Program, visit: [www.biopreferred.gov](http://www.biopreferred.gov)
Thank You!

Please contact stephen.horton@polyone.com with any questions

Steve Horton
PolyOne Corporation
33587 Walker Rd.
Avon Lake, OH 44012

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