CASE STUDY

Switch to high performance non-phthalate plasticizers for your PVC Plastisol applications

Technology: Eastman non-phthalate specialty plasticizers
Eastman Effusion™ plasticizer, Eastman TXIB™ formulation additive, Benzoflex™ RF 532 (US), Benzoflex™ VP 953 (US), Benzoflex™ 2088 (EMEA)

Application / Market: Flooring, Toys, Wall coverings, Coated fabrics, Printing inks, PVC-dipped tools, Sporting goods

Key benefits
- Safe alternative to traditional phthalate plasticizers
- Enhanced rheological properties thanks to low viscosity plasticizers
- Highly efficient at lowering hardness
- Excellent solvating ability
- Lower plastisol cost

The Challenge

As a formulator of flexible PVC products, you want to find an alternative to traditional phthalate plasticizers while maximizing performance properties and minimizing raw material costs of your plastisol formulation.

The Solution

Eastman has been developing alternatives to traditional phthalate plasticizers for making PVC flexible for many years. Today, with a comprehensive product line including Benzoflex™ non-phthalate plasticizers, Eastman offers a wide range of fast fusing products that provides numerous advantages such as:

- Enhanced rheological properties of PVC plastisols thanks to low viscosity plasticizers
- Lower processing temperatures due to excellent solvating ability in PVC
- Highly efficient at lowering hardness level, allowing reduction of plasticizer usage in formulation
• Better low-temperature flexibility
• Lower plastisol cost by enabling addition of higher filler loadings

› Enhanced rheological properties thanks to low viscosity plasticizers
Eastman fast fusers enable better initial and long-term viscosity of your plastisols compared to traditional phthalate plasticizers:

![Figure 1: Brookfield viscosity of Eastman 168™/fast fuser blends](image)

In addition to the Eastman Benzoflex family of plasticizers, Eastman Effusion™ plasticizer also offers an alternative to dibenzoate-based solutions, providing lower plastisol viscosity and excellent low-temperature flexibility in PVC formulations.

› High efficiency at lowering hardness and excellent solvating ability
Eastman’s fast fusing plasticizers provide excellent mechanical properties, whether formulating as the sole plasticizer or in combination with a general purpose plasticizer, such as Eastman 168™.

<table>
<thead>
<tr>
<th>Property</th>
<th>Eastman 168™/Effusion™ 70/30 at 60 phr</th>
<th>Eastman 168™/Benchmark DBP phthalate plasticizer 70/30 at 60 phr</th>
<th>Eastman 168™/Benzoflex™ 70/30 at 60 phr</th>
<th>Eastman 168™ at 60 phr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusion temperature, °C</td>
<td>128</td>
<td>131</td>
<td>134</td>
<td>148</td>
</tr>
<tr>
<td>Shore A hardness</td>
<td>67</td>
<td>67</td>
<td>67</td>
<td>71</td>
</tr>
</tbody>
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*Table 1: Mechanical properties comparison of Eastman 168™/fast fuser blends*
Table 2: Mechanical properties comparison of fast fuser

Tables 1 and 2 show that the excellent solvating characteristics of these plasticizers allow for a broader processing window for vinyl plastisols. These non-phthalate plasticizers offer the same low fusion temperatures and Shore A hardness as traditional plasticizers.

Lower plastisol cost
Last but not least, replacing traditional plasticizers with Eastman TXIB™ formulation additive can allow you to add filler, while maintaining viscosity, and lower the overall plastisol cost:

Figure 2: Lower plastisol cost & maintain viscosity - Eastman TXIB™ and filler