Formulating with Plasthall® UVC

**Hallstar Technology**

Formulating with Plasthall® UVC will result in increased surface tension in polyvinyl chloride (PVC) film, which allows ink to adhere to the film’s surface.

PVC formulation: PVC Resin 100.0, Stabilizer 2.0, Paraplex® G-62 5.0, Plasticizer 67.0

<table>
<thead>
<tr>
<th>Original Physical Properties</th>
<th>Plasthall® UVC</th>
<th>Paraplex® G-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress at 100% Elong. MPa</td>
<td>8.7</td>
<td>9.0</td>
</tr>
<tr>
<td>psi</td>
<td>1265</td>
<td>1310</td>
</tr>
<tr>
<td>Stress at 200% Elong. MPa</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>Stress at 300% Elong. MPa</td>
<td>16.5</td>
<td>16.2</td>
</tr>
<tr>
<td>Tensile Strength, MPa</td>
<td>18.4</td>
<td>18.3</td>
</tr>
<tr>
<td>psi</td>
<td>2665</td>
<td>2655</td>
</tr>
<tr>
<td>Elongation at Break, %</td>
<td>365</td>
<td>385</td>
</tr>
<tr>
<td>Hardness Duro A, pts.</td>
<td>72</td>
<td>73</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.281</td>
<td>1.264</td>
</tr>
</tbody>
</table>

**Surface Energy, dynes/cm**

- Initial: 41
- 1 week: 41
- 2 weeks: 41
- 3 weeks: 41
- 4 weeks: 41
- 5 weeks: 41
- 6 weeks: 40
- 7 weeks: 39
- 8 weeks: 38
- 14 weeks: 37

**Powder Mix Test. 60 RPM, 98°C**

- Dry Point Temperature, °C: 88.4, 88.3
- Time, min: 31, 72
- Maximum Torque, mg: 45, 30

**Melt Viscosity, 31.5 RPM, 140°C**

- Fusion Torque, mg: 1700, 1400
- Fusion Time, min: 1.5, 1.5
<table>
<thead>
<tr>
<th>Property</th>
<th>Plasthall® UVC</th>
<th>Paraplex® G-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fusion Temperature, °C</td>
<td>132</td>
<td>130</td>
</tr>
<tr>
<td>Melt Torque, mg</td>
<td>1020</td>
<td>940</td>
</tr>
</tbody>
</table>

**Low Temperature Impact**

- Brittle Point, °C | -10 | -12 |

**Air Oven Aging, 3 d at 136°C**

- Stress at 100% Elong. Mpa, psi | 10.2 (1475), 9.7 (1400) |
- Stress Change, % | 17 (7) |
- Tensile Ultimate at Break, Mpa, psi | 19.3 (2805), 18.5 (2690) |
- Tensile Change, % | 5 (1) |
- Elongation at Break, % | 365 (390) |
- Elongation Change, % | 0 (1) |
- Hardness Duro A, pts | 69 (68) |
- Hardness Change, pts. | -3 (-5) |
- Weight Change, % | -3.6 (-1.1) |

**High Humidity, 24 h at 90 °C**

- 1.0 (1.0) |

**Dry Out, 1 h at 90 °C**

- -0.5 (-0.3) |

**High Humidity, 9 d at 90 °C**

- 0.4 (1.4) |

**Dry Out, 1 h at 90 °C**

- -0.9 (-0.7) |

**Immersion/Extraction Resistance**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plasthall® UVC</th>
<th>Paraplex® G-54</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexane, 24 h at 23°C</td>
<td>0.8</td>
<td>3.9</td>
</tr>
<tr>
<td>Dry Out, 4 h at 70°C</td>
<td>-2.4</td>
<td>-1.6</td>
</tr>
<tr>
<td>Cottonseed Oil, 24 h at 60°C</td>
<td>-5.8</td>
<td>-4.1</td>
</tr>
<tr>
<td>Distilled Water, 24 h at 90°C</td>
<td>1.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Dry Out, 24 h at 60°C</td>
<td>-2.2</td>
<td>-1.2</td>
</tr>
<tr>
<td>1% Soapy Water, 24 h at 90°C</td>
<td>-2.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Dry Out, 24 h at 60°C</td>
<td>-5.8</td>
<td>-4.1</td>
</tr>
</tbody>
</table>
1% Soapy Water, 7 d at 90°C  
Dry Out, 24 h at 60°C
<table>
<thead>
<tr>
<th></th>
<th>Plastall® UVC</th>
<th>Paraplex® G-54</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-6.6</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>-12</td>
<td>-8.2</td>
</tr>
</tbody>
</table>

**Compatibility and Permanence**

**ABS Migration**
- Weight Change, %
  - Plastall® UVC: -0.8
  - Paraplex® G-54: -0.2
- Visual
  - Plastall® UVC: Min
  - Paraplex® G-54: Slt

**Polystyrene Migration**
- Weight Change, %
  - Plastall® UVC: -0.3
  - Paraplex® G-54: -0.2
- Visual
  - Plastall® UVC: None
  - Paraplex® G-54: None

**QUV Weathering**
4 h UV, 4 h condensation
- 1 week
  - No change
  - Slightly tacky
- 2 weeks
  - Slightly yellow, tacky
- 3 weeks
  - Tacky
  - Yellow, slightly tacky
- 4 weeks
  - Tacky
  - Tacky, light brown spots, yellow
- 5 weeks
  - Slightly yellow, tacky
  - Tacky, light brown spots, yellow
- 6 weeks
  - Slightly yellow, tacky
  - Tacky, light brown spots, yellow