Your Product Guide to Formulate Smarter Adhesives & Sealants

Flexible, tough, moisture repellent, and sustainable, the Cargill Specialty bio-based building blocks profile offers a wide range of properties, benefits, and choice for adhesive and sealant formulations, whatever the application.

Cargill is a leading global solution provider of bio-based building blocks and functional ingredients that provide a variety of smart effects in a wide range of polymer types and applications.

With our smart innovations we support our customers in marketing differentiated, durable, tailored and sustainable solutions for adhesive applications that meet the ever-evolving needs of demanding and environmentally conscious consumers.
Pripol™ dimer fatty acid and dimer diol are used as monomers in adhesives to bring flexibility, water barrier properties and improved adhesion to a broad range of substrates, including plastics and metal. The flexible nature of these materials prevents shrinkage and brings relief of stress, which is especially interesting for cross-linked systems such as epoxies and radiation cured adhesives. Priacid™ azelaic acid is used to formulate or modify adhesives to enhance mechanical properties, water barrier properties and flexibility.

**Food contact approvals**

Specialty dimer fatty acid products have European food contact approval according to the Commission Regulation (EU) No 10/2011. In addition, the F grade products meet the FDA food contact approval. These products comply with several FDA paragraphs.

For Adhesives, section 175.105 (c)(5) is cleared. Individual statements are given upon request, also for dimer diol.

---

### Specialty Dimer Fatty Acids, Dimer Diol and Specialty Linear Di-acid for Polyester, Polyurethane and Polyamide Adhesives & Sealants

<table>
<thead>
<tr>
<th>TRADENAME</th>
<th>CHEMICAL DESCRIPTION</th>
<th>BENEFIT</th>
<th>APPLICATION / FUNCTION</th>
<th>FORM AT 25°C</th>
<th>RENEWABLE CARBON</th>
<th>FOOD CONTACT APPROVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specialty Dimer Fatty Acids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pripol™ 1013</td>
<td>Distilled dimer acid</td>
<td>High purity building block offering water repellency, flexibility and excellent hydrolysis and chemical resistance</td>
<td>Epoxy, polyurethane, polyester and polyamide adhesives monomer</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Pripol™ 1006</td>
<td>Hydrogenated, distilled dimer acid (98%)</td>
<td>Good color and color stable high purity building block bringing water repellency, flexibility, thermo-oxidative stability and excellent hydrolysis and chemical resistance</td>
<td>Epoxy, polyurethane, polyester, UV radiation curing and polyamide adhesives monomer</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Pripol™ 1009</td>
<td>Hydrogenated, distilled dimer acid (98%)</td>
<td>Very high purity building block for enhanced mechanical performance, offering water repellency, flexibility, thermo-oxidative stability and excellent hydrolysis and chemical resistance</td>
<td>Epoxy, polyurethane, polyester, UV radiation curing and polyamide adhesives monomer</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Pripol™ 1010 VEG</td>
<td>Hydrogenated, distilled dimer acid (98%)</td>
<td>Lower viscous, high purity building block with good color and color stability. Provides water repellency, flexibility, thermo-oxidative stability and excellent hydrolysis and chemical resistance</td>
<td>Epoxy, polyurethane, polyester, UV radiation curing and polyamide adhesives monomer</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td>Pripol™ 1025</td>
<td>Hydrogenated dimer acid (95%)</td>
<td>Color stable building block. Provides water repellency, flexibility, thermo-oxidative stability and excellent hydrolysis and chemical resistance</td>
<td>Epoxy, polyurethane, polyester, UV radiation curing and polyamide adhesives monomer</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Dimer diol</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pripol™ 2033</td>
<td>Dimer diol fully amorphous</td>
<td>Good color and color stable diol providing outstanding hydrolysis/chemical resistance, water repellency, flexibility, and thermo-oxidative stability</td>
<td>Polyurethane adhesives chain extender</td>
<td>Liquid</td>
<td>100%</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Specialty Linear Di-acid</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priacid™ DC1195</td>
<td>Azelaic acid min 95%</td>
<td>High purity building block to enhance mechanical properties as elongation and strength. Provides moisture protection, good hydrolytic stability and low color</td>
<td>Polyurethane, polyester and polyamide (hotmelt) adhesives monomer</td>
<td>Flakes</td>
<td>100%</td>
<td>✓</td>
</tr>
</tbody>
</table>

* FDA 175.105 is cleared  † EU 10/2011 is cleared  ✓ Statements available upon individual request with explicit directions
Bio-based Polyester Polyols in Adhesives and Sealants

The Priplast™ range of polyester polyols offers flexibility to the resin and the hydrocarbon character imparts excellent water repellency. The polyol can be built into the polyurethane by reacting with isocyanates.

The Priplast technology offers unique benefits to polyurethane adhesives such as:

- Durability: a unique combination of thermo-oxidative and hydrolysis resistance
- Moisture repellency of the final adhesive, also achieved for PU dispersions
- Adhesion to a wide range of substrates, including low-polarity plastics
- Good chemical resistance

### TRADENAME | CHEMICAL DESCRIPTION | BENEFIT | APPLICATION / FUNCTION | FORM AT 25°C | MOLECULAR WEIGHT (MW) | RENEWABLE CARBON | FOOD CONTACT APPROVAL | FDA* | EU† |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
Polyester Polyols

**Priplast™ 3162**  
Semi-crystalline polyester polyol  
Polyl for excellent wetting of rigid and fibrous substrates providing hardness, flexibility and good adhesion  
Rigid substrates PU and PU dispersions  
Waxy solid  
1000  
36%  

**Priplast™ 3192**  
Semi-crystalline polyester polyol  
Versatile and all-round polyol with excellent hydrolytic resistance and mechanical properties  
Flexible substrates, textile, leather, wood and metal or plastic PU and PU dispersions  
Waxy solid  
2000  
38%  

**Priplast™ 3172**  
Semi-crystalline polyester polyol  
Polyl with enhanced green strength providing excellent hydrolytic resistance and versatile strong adhesion  
PU and PU dispersions for flexible substrates, wood, metal or plastic  
Waxy solid  
3000  
39%  

**Priplast™ 1837**  
Amorphous polyester polyol  
Lower viscous polyol providing hydrophobicity and flexibility  
PU adhesives with flexibility; room temperature flow  
Liquid  
1000  
92%  

**Priplast™ 1838**  
Amorphous polyester polyol  
Versatile and all-round polyol providing extreme hydrophobicity, excellent color and durability, good flow and wetting properties on non-polar substrates, like plastics  
PU systems with versatile adhesion with shock absorption; compatible with low polar components  
Liquid  
2000  
82%  

**Priplast™ 3196**  
Amorphous polyester polyol  
Polyl providing extremely high hydrophobicity, excellent durability and good compatibility with low polar components and polymers  
PU systems for extreme moisture protection and adhesion to plastics; compatible with low polar components  
Liquid  
3000  
83%  

**Priplast™ 3190**  
Amorphous polyester polyol  
Polyl with good compatibility with polyester and polyester polyols and good hydrophobicity  
PU adhesives and sealants with very low temperature flexibility  
Liquid  
2000  
41%  

**Priplast™ 3187**  
Amorphous polyester polyol  
Polyl providing high flexibility at very low temperatures, extreme hydrophobicity, and good compatibility to low polar components and polymers  
PU systems for moisture protection and adhesion to plastics; compatible with low polar components  
Liquid  
2000  
84%  

**Priplast™ 3186**  
Amorphous polyester polyol  
Polyl for cross-linked PU providing excellent hydrolytic stability and water repellency  
2K PU adhesives and sealants for moisture protection  
Liquid  
1700  
86%  

**Priplast™ 1900**  
Amorphous polyester polyol  
All-round polyol for good hydrolytic stability versus PTMEG and adipate polyols, providing good hydrophobicity and improved chemical resistance  
PU systems for dissimilar substrates, metal, wood, PC, PVC, PA or ABS  
Liquid  
2000  
48%  

**Priplast™ XL 101**  
Semi-crystalline polyester polyol  
Superior strength balanced with high flexibility and elongation; excellent hydrolytic stability and improved adhesion to aluminum, steel and glass fiber reinforced epoxy  
PU systems for dissimilar or flexible substrates, metal, PC, epoxy glass  
Waxy solid  
2000  
18%  

### 100% Bio-based Polyester Polyols

**Priplast™ 3197**  
Amorphous polyester polyol  
Polyl providing extremely high hydrophobicity, excellent durability, water repellency and flexibility  
PU system stable to sterilization, for extreme moisture protection; compatible with low polar components  
Liquid  
2000  
100%  

**Priplast™ 3238**  
Amorphous polyester polyol  
Versatile polyol, 100% bio-based, providing extreme hydrophobicity, excellent color and durability, no strain hardening  
Bio-based PU systems with versatile with shock absorption; compatible with low polarity components  
Liquid  
2000  
100%  

**Priplast™ 3294**  
Semi-crystalline polyester polyol  
Polyl providing excellent water resistance, high flexibility and durability  
PU adhesives and sealants for moisture protection and flexibility  
Waxy solid  
2000  
100%  

* FDA 175.105 is cleared  
† EU 10/2011 is cleared  
✓ Statements available upon individual request with explicit directions
Dimer diamines in Adhesives & Sealants

The Priamine™ product range has been designed to offer unique benefits to polyamide hotmelt adhesives such as reduction of brittleness, higher flexibility and moisture protection, that extend to the final application. Modifying polyamide adhesives with Priamine creates formulation freedom in the choice of diacids used. This gives formulators the flexibility to adjust the melting point.

The melting point can easily be increased by 10-15°C, allowing higher temperature exposure of the end product without compromise on performance.

Priamine is available in different grades, carefully selected on purity and functionality.

<table>
<thead>
<tr>
<th>TRADENAME</th>
<th>CHEMICAL DESCRIPTION</th>
<th>BENEFIT</th>
<th>APPLICATION / FUNCTION</th>
<th>FORM AT 25°C</th>
<th>RENEWABLE CARBON</th>
<th>FOOD CONTACT APPROVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priamine™ 1073</td>
<td>Dimer diamine &gt;85%</td>
<td>Low viscous building block for use in polyamides and epoxy adhesives</td>
<td>Curing additive for epoxy adhesives to reduce brittleness and enhance moisture protection</td>
<td>Liquid</td>
<td>100%</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Priamine™ 1074</td>
<td>Dimer diamine 99%</td>
<td>Low viscous building block offering high flexibility, moisture repellency and adhesion to plastics in polyamides</td>
<td>Polyamide hotmelt adhesives with higher flexibility and hydrophobicity</td>
<td>Liquid</td>
<td>100%</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>Priamine™ 1075</td>
<td>Dimer diamine &gt;99%</td>
<td>High purity, low viscous building block offering high flexibility, moisture repellency and adhesion to plastic; improving mechanical properties for use in high molecular weight polyamides</td>
<td>Low color polyamide hotmelt adhesives with higher flexibility, enhanced mechanical properties and hydrophobicity</td>
<td>Liquid</td>
<td>100%</td>
<td>✔ ✔</td>
</tr>
</tbody>
</table>

* FDA 175.105 is cleared  † EU 10/2011 is cleared  ✔ Statements available upon individual request with explicit directions
**Toughening Agents in Adhesives & Sealants**

Epoxy adhesives are versatile in use because of their excellent bond strength and high chemical and heat resistance, however the rigid structure can pose issues when stress in the system cannot be absorbed. Toughening agents have been introduced to overcome this issue while maintaining rigidity.

**B-Tough™** A toughening agents are epoxy functional and outperform conventional toughening technology on fracture toughness.

<table>
<thead>
<tr>
<th>Fracture toughness</th>
<th>KJ/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmodified epoxy</td>
<td>0</td>
</tr>
<tr>
<td>CTBN</td>
<td>6</td>
</tr>
<tr>
<td>B-Tough A2</td>
<td>12</td>
</tr>
</tbody>
</table>

B-Tough A series includes three different grades available in varying polarities to match the epoxy system.

Each epoxy adhesive formulation is different and therefore Cargill has developed the following guide to quickly determine the best toughening agent/resin type combination that can yield the best toughening result.
<table>
<thead>
<tr>
<th>TRADENAME</th>
<th>CHEMICAL DESCRIPTION</th>
<th>BENEFIT</th>
<th>APPLICATION / FUNCTION</th>
<th>FORM AT 25°C</th>
<th>RENEWABLE CARBON</th>
<th>FOOD CONTACT APPROVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toughening agents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-Tough™ A1</td>
<td>Epoxy functional toughening additive</td>
<td>Reactive toughening agent for excellent stability, low moisture diffusion, and easy handling. Lowest polarity grade</td>
<td>Structural epoxy adhesives from liquid resin with impact resistance</td>
<td>Viscous liquid</td>
<td>29%</td>
<td>✓</td>
</tr>
<tr>
<td>B-Tough™ A2</td>
<td>Epoxy functional toughening additive</td>
<td>Reactive toughening agent for excellent stability, low moisture diffusion, and easy handling. Low polarity grade</td>
<td>Structural epoxy adhesives from liquid and solid resin with impact resistance</td>
<td>Viscous liquid</td>
<td>18%</td>
<td>✓</td>
</tr>
<tr>
<td>B-Tough™ A3</td>
<td>Epoxy functional toughening additive</td>
<td>Reactive toughening agent for excellent stability, low moisture diffusion, and easy handling. Medium polarity grade</td>
<td>Structural epoxy adhesives from solid resin with impact resistance</td>
<td>Viscous liquid</td>
<td>15%</td>
<td>✓</td>
</tr>
</tbody>
</table>

* FDA 175.105 is cleared  † EU 10/2011 is cleared
Further Information

Cargill Bioindustrial sales and distribution are coordinated through an extensive worldwide network of technical and commercial experts. For further information or guidance please contact us:

cOATINGS AND POLYMERS@cargill.com