DYNAFLEX®
Designed Polymers for adhesive applications
Our Product Range

With our DYNACOLL® product range, we offer polyester-polyols, copolyesters and polyacrylates for your reactive and thermoplastic hot melts.

VESTOPLAST®

VESTOWAX®

POLYVEST®

DEGALAN®

Welcome from the Adhesive Experts of Evonik

Discover our product portfolio designed for the Adhesives & Sealants Industry. Based on our different polymer backbone systems, we develop individual solutions according to your needs.

YOUR BENEFITS – OUR VALUES

Focus on customer orientation
We are a solution provider. Our mission is to create tailor-made solutions to ensure that every one of your projects is a success. That is why we are considered to be the first choice when it comes to solving your challenging tasks. Thanks to our global presence we can respond promptly and make your individual wishes come true.

Perfectly targeted expertise
With our team of adhesive experts and our dedicated sales force, you can be assured that we offer a wealth of expertise. We do not only provide you with capabilities spanning from research and development through to logistics, but we can also offer you valuable market knowledge and in-depth technical expertise. That is why our know-how is spot-on, every time.

Absolute reliability
Any good business partnership is based on reliability. There is nothing more valuable than knowing that your business partner will be there for you. We take this to heart and offer you excellent product quality, security of supply and our continuous drive to make your challenges our own – this way we help you overcome any obstacle along the way.

Profiting from future orientation
Improving performance and efficiency can only be accomplished if you constantly stay ahead. That is why we identify future trends as early as possible, collaborating with you to develop innovative solutions. Our foresight is valued by customers and partners alike, because they know that we always keep an eye on the future to guarantee long lasting success.

YOUR MARKETS – OUR FOCUS

We offer custom-made Adhesive & Sealant solutions for a broad spectrum of industries. If you don’t find your line of business here, just talk to us. Our team will gladly help you accomplish your project.

• Automotive
• Construction
• Packaging
• Electronics
• Processing Aides
• Product Assembly

YOUR SOLUTIONS – OUR BRANDS

DYNACOLL®
Polyester-Polyols, Copolyesters, Polyacrylates

VESTOPLAST®
Amorphous Poly-Alpha-Olefines

VESTOWAX®
Fischer-Tropsch-Waxes

POLYVEST®
Liquid Polybutadienes

DEGALAN®
Methacrylate Binders for Heat Seal Lacquers
**DYNACOLL® 7000**

**Designed Polymers for adhesive applications**

**POLYESTER-POLYOLS**

With its DYNACOLL® 7000 polyester-polyols Evonik offers tailor-made raw materials for one-component moisture-curable hotmelt adhesives and sealants (RHM). DYNACOLL® 7000 products are linear copolyesters with primary hydroxyl functionality and medium molecular weight.

The product group is designed as a building block system, most DYNACOLL® 7000 polyester-polyols are compatible with each other. Partially incompatible but miscible systems are, however, necessary in many applications as well. DYNACOLL® 7000 copolyesters are usually supplied in 25 or 30 kg and 190 or 200 kg steel drums. Liquid bulk deliveries are available on special request.

Depending on their morphology the product range is divided into three basic groups:

- **DYNACOLL® 7100 series** - amorphous, solid
- **DYNACOLL® 7200 series** - liquid, pasty
- **DYNACOLL® 7300 series** - partially crystalline, solid

**YOUR BENEFITS**

Our building block system allows a precise formulation of reactive PUR hot melts with low application temperatures and high heat resistance. Basic effects on the RHM properties are:

**DYNACOLL® 7100 series**
- shortens open time
- increases initial strength, melt viscosity and adhesion to polar substrates

**DYNACOLL® 7200 series**
- increases flexibility, open time and adhesion to non-polar substrates
- lowers melt viscosity

**DYNACOLL® 7300 series**
- shortens open time (depending on crystallinity) and lowers melt viscosity
- increases initial strength

**EXAMPLE TO ADJUST SETTING TIME**

<table>
<thead>
<tr>
<th>DYNACOLL®</th>
<th>Setting time</th>
</tr>
</thead>
<tbody>
<tr>
<td>7150 - 40 pbw</td>
<td>1,200 sec</td>
</tr>
<tr>
<td>7250 - 40 pbw</td>
<td>7390</td>
</tr>
<tr>
<td>73XX - 40 pbw</td>
<td>7381</td>
</tr>
</tbody>
</table>

4,4’ MDI (OH/NCO 1/2.2)

**INFLUENCES OF DYNACOLL® ON RHM PROPERTIES**

<table>
<thead>
<tr>
<th>Series</th>
<th>7100</th>
<th>7200</th>
<th>7300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open time / setting time</td>
<td>↓</td>
<td>↑</td>
<td>↓↑</td>
</tr>
<tr>
<td>Green strength</td>
<td>↑</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Viscosity</td>
<td>↑</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Flexibility</td>
<td>↓</td>
<td>↑</td>
<td>↓↑</td>
</tr>
</tbody>
</table>
### PRODUCT RANGE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Properties</th>
<th>Melt Viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Grade Properties
- **Hydroxyl Number** (mg KOH/g)
- **Acid Number** (mg KOH/g)
- **Molecular Weight** (g/mol)
- **Glass Transition Temperature** (°C)
- **Melting Point** (°C)
- **Softening Point (R&B)** (°C)
- **Density at 23 °C** (kg/dm³)
- **Flash Point** (°C)

#### Grade |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Melt Viscosity (Pa·s)</td>
</tr>
</tbody>
</table>

#### 80 °C (Parallel plate) 130 °C (Parallel plate)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Melt Viscosity 80 °C</th>
<th>Melt Viscosity 130 °C</th>
</tr>
</thead>
</table>

### REACTIVE HOLT MELT DATA

<table>
<thead>
<tr>
<th>Grade</th>
<th>Properties</th>
<th>Melt Viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Grade Properties
- **Screwing Force (kgf/cm²)
- **Open Time** (s)
- **Setting Time** (s)
- **Tensile Strength** (N/mm²)
- **Elongation at Break** (%)

#### Grade |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Melt Viscosity (Pa·s)</td>
</tr>
</tbody>
</table>

#### 130 °C (Parallel plate)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Melt Viscosity 130 °C</th>
</tr>
</thead>
</table>

### Reaction products of DYNACOLL® Terra with: 4,4’ – MDI as a ratio of OH : NCO = 1 : 2.2
The product of the reaction between DYNACOLL® 7000 polyesters and an excess of diisocyanates is a reactive hot melt (RHM). The reaction occurs in this melt.

For characterization of the RHM data in this brochure the preparation was carried out under the following constant laboratory conditions.

This polyester melt was vacuum evaporated in a flask, disregarding the actual (normally low) water content of the DYNACOLL® 7000 products, in a vacuum of less than 10 mbar for 45 hours at 130°C. The polyesters are then stirred into an inert gas atmosphere (dried nitrogen or carbon dioxide) with the calculated amount of diisocyanate at 50°C. The reaction is complete when the theoretical free isocyanate content is obtained. After 45 minutes the melt was degassed until it is free of bubbles. The reactive hot melt was then filtered into containers and stored under exclusion of moisture and light. Under production conditions, the reaction times should be individually adjusted to the adhesive formulations. Drying is determined by the water content of all the components of the formulation, and is generally recommended in order to prevent side reactions.

The following data should be determined for quality control: isocyanate content, melt viscosity, melting point or softening point (RHM), open time, and setting time. Calculation of initial weight of diisocyanate:

\[ \text{Weight of diisocyanate} = \left( \frac{\text{WPES}_1 \cdot \text{OH}_1 + \text{WPES}_n \cdot \text{OH}_n}{\text{EW}} \right) \cdot R \]

**COMPATIBILITY OF DYNACOLL® 7000**

**ANALYTICAL METHODS**

- **Hydrolysis Number**
  - Determination according to DIN EN ISO 11357.
  - The sample is hydrolysed at 130°C for approximately 5 hours. The titre of the open surface paper is used to determine the hydrolysis number.

- **Acid Number**
  - Determination according to DIN EN ISO 11357.
  - The sample is titrated with methanolic or ethanolic KOH against phenolphthalein.

- **Glass Transition Temperature**
  - Determination according to ISO 11357.
  - The glass transition temperature is determined as the maximum of the melting peak.

- **Melt Viscosity**
  - Determination according to DIN 53504.
  - The melt viscosity of a sample is determined using a measuring cylinder filled with an RHM film.

- **Density**
  - Determination according to DIN 12119.

- **Flash Point**
  - Determination according to ISO 2592.

- **Open Time**
  - Determination according to DIN 51 757.

- **Molecular Weight**
  - Determination according to DIN EN ISO 2114.

- **Acid Number**
  - Determination according to DIN EN ISO 3219, parallel plate method.

- **Melt Strength / Elongation at break**
  - Determination according to DIN EN ISO 4629-2.

- **Max. Penetration**
  - Determination according to Evonik internal method.

- **Shear Adhesion**
  - Determination according to DIN 53 504.

- **Density**
  - Determination according to DIN 12119.

- **Flash Point**
  - Determination according to ISO 2592.

- **Open Time**
  - Determination according to DIN 51 757.

- **Molecular Weight**
  - Determination according to DIN EN ISO 2114.

- **Acid Number**
  - Determination according to DIN EN ISO 3219, parallel plate method.

- **Melt Strength / Elongation at break**
  - Determination according to DIN EN ISO 4629-2.

- **Max. Penetration**
  - Determination according to Evonik internal method.

- **Shear Adhesion**
  - Determination according to DIN 53 504.
BIO-BASED POLYESTER-POLYOLS

With its DYNACOLL® Terra product range Evonik offers polyester-polyols made from renewable raw materials. These bio-based polyesters contain between >30 and 100 pbw of renewable monomers. According to our DYNACOLL® 7000 product range a building block system of mediums molecular weight copolyesters for moisture curing PUR hot melts was developed. It is divided in three basic groups:

- Amorphous Grades
- Liquid Grades
- Crystalline Grades

DYNACOLL® Terra bio-based polyesters are usually supplied in 25 or 30 kg and 190 or 200 kg steel drums.

### PRODUCT RANGE

<table>
<thead>
<tr>
<th>Grade</th>
<th>Properties</th>
<th>[%]</th>
<th>[mg KOH/g]</th>
<th>[g/mol]</th>
<th>[°C]</th>
<th>[°C]</th>
<th>[°C]</th>
<th>[Pa•s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amorphous EP 413.01</td>
<td>&gt; 30</td>
<td>3,500</td>
<td>30</td>
<td>30</td>
<td>30</td>
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<td>brittle</td>
<td></td>
</tr>
<tr>
<td>EP 413.02</td>
<td>&gt; 30</td>
<td>3,500</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>brittle</td>
<td></td>
</tr>
<tr>
<td>EP 413.03</td>
<td>&gt; 35</td>
<td>2,800</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>brittle</td>
<td></td>
</tr>
<tr>
<td>EP 413.04</td>
<td>&gt; 30</td>
<td>2,200</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>brittle</td>
<td></td>
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<tr>
<td>Liquid EP 424.01</td>
<td>&gt; 95</td>
<td>3,500</td>
<td>-90</td>
<td>-90</td>
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<tr>
<td>EP 424.02</td>
<td>&gt; 53</td>
<td>3,500</td>
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<td>-95</td>
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<td>Crystalline EP 481.01</td>
<td>100</td>
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### Compatibility of DYNACOLL® 7000

<table>
<thead>
<tr>
<th>Grade</th>
<th>EP 413.01</th>
<th>EP 413.02</th>
<th>EP 413.03</th>
<th>EP 413.04</th>
<th>EP 424.01</th>
<th>EP 424.02</th>
<th>EP 481.01</th>
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<tbody>
<tr>
<td>EP 413.01</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
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<tr>
<td>EP 413.02</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>EP 413.03</td>
<td>+</td>
<td>+</td>
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<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>EP 413.04</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<td>EP 424.01</td>
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<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>EP 481.01</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

### YOUR BENEFITS
- Support of resource efficiency by using green components
- Modular combination of polyesters in RHMs formulation possible
- Available grades exhibiting broad range of properties in formulations
- Well-balanced and versatile adhesion properties
- Implementation of new properties possible

### CARBON FOOTPRINT EVALUATION
The use of renewable raw materials helps to slow down the climate change because less greenhouse gases are released. A lower global warming potential (GWP) and thus a lower carbon footprint lead to a reduction in global warming.

Considering the GWP of products measured in mass of CO2 equivalents the “Cradle-to-gate” carbon footprint is primarily influenced by raw materials. Therefore cooperation with suppliers are essential.

Carbon footprint assessments have been carried out for two example grades of DYNACOLL® Terra in which the carbon footprint for the life cycle of the products was determined. The carbon footprint is reduced up to approximately 65 % by using renewable resources compared to conventional petrochemical-based polyester polyols.

<table>
<thead>
<tr>
<th>Raw materials and transport</th>
<th>Product Carbon Footprint [kg CO2 Equiv.]</th>
<th>Data sources: Suppliers, GaBi database, CEFIC, own calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP 481.01</td>
<td>7,300</td>
<td>7,200</td>
</tr>
<tr>
<td>EP 424.01</td>
<td>3,700</td>
<td>3,700</td>
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</tbody>
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### REACTIVE HOT MELT DATA

<table>
<thead>
<tr>
<th>Grade</th>
<th>Softening Point [°C]</th>
<th>Open Time [s]</th>
<th>Setting Time [s]</th>
<th>Melt Viscosity at 130 °C [Pa•s]</th>
<th>Tensile Strength [N/mm²]</th>
<th>Elongation at Break [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amorphous EP 413.01</td>
<td>102</td>
<td>1</td>
<td>1</td>
<td>200</td>
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<td>1</td>
<td>1</td>
<td>300</td>
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<td>EP 413.03</td>
<td>103</td>
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<td>EP 413.04</td>
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<td>&lt; 1</td>
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<td>Liquid EP 424.01</td>
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<td>EP 424.02</td>
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<td>14</td>
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<tr>
<td>Crystalline EP 481.01</td>
<td>60</td>
<td>200</td>
<td>5</td>
<td>5</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>
DYNACOLL® AC
Designed Polymers for Adhesives & Sealants

POLYCRYLATES

With its DYNACOLL® AC product range Evonik offers acrylics for one-component moisture curable hot melt adhesives. Acrylics for adhesives are bead polymers made of methyl methacrylate and n-butyl methacrylate which are mainly used to modify reactive hot melt primarily for flat lamination applications. Various DYNACOLL® AC grades with tailored glass transition temperature and molecular weight are available. They also differ according to their acid and hydroxyl functionality. DYNACOLL® AC polyacrylates are supplied as beads in bags of 25 kg, big bags are possible on request.

PRODUCT RANGE

<table>
<thead>
<tr>
<th>Product</th>
<th>Glass Transition Temperature [°C]</th>
<th>Molecular Weight [g/mol]</th>
<th>Viscosity Number [cm³/g]</th>
<th>Acid Number [mg KOH/g]</th>
<th>Hydroxyl Number [mg KOH/g]</th>
<th>Softening Point (R&amp;B) [°C]</th>
<th>Melt Flow Rate 190°C [g/10 min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 1420</td>
<td>55</td>
<td>10,000</td>
<td>18</td>
<td>1.5</td>
<td>14</td>
<td>138</td>
<td>100</td>
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<tr>
<td>AC 1520</td>
<td>56</td>
<td>10,000</td>
<td>19</td>
<td>1.5</td>
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<td>135</td>
<td>50</td>
</tr>
<tr>
<td>AC 1620</td>
<td>66</td>
<td>10,000</td>
<td>19</td>
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<td>140</td>
<td>20</td>
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<td>40</td>
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<td>1.5</td>
<td>14</td>
<td>150</td>
<td>7</td>
</tr>
</tbody>
</table>

ANALYTICAL METHODS

• Glass Transition Temperature
  Determination according to ISO 11357-1.
• Molecular Weight
  Determination according to DIN 55627-1.
• Viscosity Number
  Determination according to ISO 1628-1.
• Acid Number
  Determination according to DIN EN ISO 2114.
• Hydroxyl Number
  Determination according to DIN EN ISO 4629-2.
• Softening Point (Ring and Ball)
  Determination according to DIN ISO 4625.
• Melt Flow Rate 190°C
  Determination according to DIN ISO 1133 (21.6 N).

COMPARISON OF CONVENTIONAL AND BIO-BASED POLYESTER POLYOLS

<table>
<thead>
<tr>
<th>Conventional polyester-polyols</th>
<th>Bio-based polyester-polyols</th>
<th>Bio-based monomers</th>
<th>Renewable raw materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrochemical raw materials</td>
<td>Aliphatic diacids &amp; diols</td>
<td>Methyl, corn, sugar</td>
<td>Corn, sugar, sugar</td>
</tr>
<tr>
<td>Petrochemical-based monomers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional polyester-polyols</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

YOUR BENEFITS

DYNACOLL® AC provide outstanding quality and flow properties
• Low particle size
• Easy handling
• Short dilution time

DYNACOLL® AC modified reactive hot melts for flat lamination provide
• Low viscosity
• Very long open time
• Aggressive tack
• High creep resistance directly after bonding

PRODUCT PORTFOLIO DYNACOLL® AC

DYNACOLL® Terra
Bio-based polyesters for sustainable adhesives

DYNACOLL® Terra
Bio-based polymers for sustainable adhesives

Petrochemical raw materials
Natural gas, oil

Petrochemical-based monomers
Aromatic and aliphatic diesters, dicarboxylic acids & diols

Conventional polyester-polyols
Not bio-based, not fully bio-degradable

Bio-based monomers
Aliphatic diacids & diols

Bio-based polyester-polyols
Partly also biodegradable

Bio-based raw materials
Millet, corn, castor oil, sugar

COMPARISON OF CONVENTIONAL AND BIO-BASED POLYESTER POLYOLS

YOUR BENEFITS

DYNACOLL® AC provide outstanding quality and flow properties
• Low particle size
• Easy handling
• Short dilution time

DYNACOLL® AC modified reactive hot melts for flat lamination provide
• Low viscosity
• Very long open time
• Aggressive tack
• High creep resistance directly after bonding

PRODUCT PORTFOLIO DYNACOLL® AC

ANALYTICAL METHODS

• Glass Transition Temperature
  Determination according to ISO 11357-1.
• Molecular Weight
  Determination according to DIN 55627-1.
• Viscosity Number
  Determination according to ISO 1628-1.
• Acid Number
  Determination according to DIN EN ISO 2114.
• Hydroxyl Number
  Determination according to DIN EN ISO 4629-2.
• Softening Point (Ring and Ball)
  Determination according to DIN ISO 4625.
• Melt Flow Rate 190°C
  Determination according to DIN ISO 1133 (21.6 N).
ACRYLIC MODIFIED REACTIVE HOT MELTS

Reactive hot melts for flat lamination applications are typically prepared by reacting polymer mixtures of DYNACOLL® AC polyacrylates, mainly crystalline DYNACOLL® 7000 polyester polyols and polypropylene glycol (PPG) with molecular weight 1000 or 2000 with excess diisocyanates like MDI (Diphenylmethane diisocyanates) at elevated temperatures under exclusion of moisture. It is recommended to dissolve DYNACOLL® AC in PPG under strong stirring first and then add DYNACOLL® polyesters into the molten mixture. After drying and homogenization the reaction with MDI can be carried out until the theoretical NCO-content is reached. After degassing the adhesive is filled in sealed containers. These reactive hot melts can be applied e.g. by roll coater.

FLAT LAMINATION APPLICATIONS

The flat lamination technology is widely used for multilayer sandwich constructions and surface lamination of lightweight materials with decorative films to give them a solid or more valuable appearance. Core materials are mainly made from MDF fiber-board, particle-chipboard or plywood, cardboard or plastic foams while typically plastic films, high-gloss films, paper, HPL or veneers are used as surface layers.

The adhesives need to provide low viscosity and long open times for sufficient wetting and long handling times for banding large size panels. On the other hand, setting times should be short to allow fast production runs. Pure polyester polyol based RHM formulations with long open time often do also have long setting times and therefore do not provide sufficient initial strength. Instead, DYNACOLL® AC polyacrylates enable the formulation of moisture curing hot melts with long open times and high initial strength. Especially their high molecular weight leads to excellent creep resistance of the adhesive allowing to keep bonded parts in place without any further mechanical fixation. Therefore, DYNACOLL® AC modified RHM provide new opportunities for flat lamination applications.

FLAT LAMINATION ENHANCE PROPERTIES OF YOUR RHM WITH DYNACOLL® AC

DYNACOLL® AC modified reactive hot melts are the first choice for flat lamination purposes.

Typical areas of application are:
- Sandwich composites of aluminium, FRP panels, foam or wood-based substrates e.g. for recreational vehicals
- Honeycomb structures e.g. for door manufacturing
- Foil laminated particleboard e.g. for furniture
- Medium density fiberboard panels e.g. for furniture

BONDING OF PANELS OR SANDWICH COMPOSITES REQUIRE

- Long open time
  Large assembly parts need long handling times
- High initial strength
  Bonding without further mechanical fixation saves time
- Short setting time
  Cost-efficient production runs need short cycle times

![Initial strength – influence of DYNACOLL® AC](image1)

![Lab results – setting time comparison](image2)
With its DYNACOLL® S product range Evonik offers thermoplastic copolyesters of high molecular weight for use in thermoplastic hot melt and solvent based adhesives. The product range includes amorphous as well as crystalline grades of different melting points and various degrees of crystallinity or hardness. The crystalline grades are distinguished particularly by high adhesive strength as well as good resistance to chemicals and solvents. For solvent based applications the amorphous grades are recommended; these have good solubility in non-chlorinated and excellent adhesion to a wide range of substrates.

### PRODUCT RANGE

<table>
<thead>
<tr>
<th>Crystalline Grades</th>
<th>Amorphous Grades</th>
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<tbody>
<tr>
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<td>S 140</td>
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<td>S 1272</td>
<td>S 142</td>
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<td>S 1327</td>
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<td>S 1227</td>
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<td>S 1402</td>
<td>S 1426</td>
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</tbody>
</table>

Properties

- **Softening Point [°C]**: 195, 140, 135, 130, 115, 100, 97, 155, 130, 140
- **Melting Point [°C]**: 195, 128, 120\(^1\), 115, 100, 90\(^1\), 85\(^1\)
- **Glass Transition Temp. [°C]**: 35, 0, 20, 15, 10, -10, -25
- **Hydroxyl Number [mg KOH/g]**: 6, 5, 4, 4, 4
- **Acid Number [mg KOH/g]**: 3, 2, 2, 2, 2
- **Viscosity Number [cm³/g]**: 68, 84, 94, 80, 80, 80, 62, 61, 90
- **Shore D Hardness**: 79, 53, 64, 63, 63, 27, 19, 80, 79, 78
- **Open Time [s]**: 5, 10, 5, 20, 5, 15, 15, 15, 10, 20
- **Tensile Strength [N/mm²]**: 40, 25, 20, 20, 15, 10, 5, 60, 20, 50
- **Elongation at Break [%]**: 7, 400, 450, 300, 350, 400, 500, 5, 3, 5

### APPLICATIONS

**Textile Industry**
- Hot Melts
- Adhesive film
- Adhesive web and net

**Profile Wrapping**
- PVC Window frames
- Metal / Plastics bonding

**Electronic Industry**
- Solvent based adhesives
- Hot Melt adhesives

**Automotive Industry**
- Interior textile lamination
- Decorative film lamination

**Packaging Industry**
- Flexible packaging

**Polymer Modification**
- Additive for Reactive Hot Melts
- Masterbatches

* Make to order product

1) optical method
- + = > 10 % (soluble)
- • = < 10 % (slightly insoluble)
- - = < 1 % (virtually insoluble)
ANALYTICAL METHODS

- **Softening Point (Ring and Ball)**
  Determination according to DIN ISO 4625.

- **Melting Point**
  The melting point is determined by DSC according to ISO 11357 or an optical method (Mettler FP 82).

- **Glass Transition Temperature**
  Determination according to ISO 11357.

- **Hydroxyl Number**
  Determination according to DIN EN ISO 4629-2.

- **Acid Number**
  Determination according to DIN EN ISO 2114.

- **Shore D Hardness**
  Determination according to DIN EN ISO 204. All values refer to crystallized products.

- **Viscosity Number**
  Determination according to DIN 53 728. 0.5 g of the test substance are dissolved in 100 ml of a mixture of 50 % by weight phenol and 50 % by weight 1,2-dichlorobenzene. The viscosity of the solution and the solvent is determined by the Ubbelohde method. The viscosity number J is determined using the formula:

  \[
  J = \frac{t_1}{t_2} - 1 = \frac{1}{c}
  \]

  where:
  - \( t_1 \) = flow time of solution [s]
  - \( t_2 \) = flow time of solvent [s]
  - \( c \) = concentration of test substance [g/cm³]

- **Open Time**
  Determination according to Evonik internal method. The open time is defined as the time between the application of the adhesive and the start of recrystallization or in case of amorphous products until the surface becomes tack-free.

- **Tensile Strength / Elongation at Break**
  Determination in accordance with DIN EN ISO 527-1/3. It is determined on standard dumbbell-shaped specimens. The elongation at break denotes the percentage increase in length of an original section of 10 mm marked on the bar of the dumbbell specimen, at the moment of rupture.

- **Melt Flow Rate (MFR)**
  Determination according to DIN ISO 1133. Approx. 10 g of the test sample are placed in a temperature-conditioned metal cylinder. Via a cylindrical die, a force of 21.6 N acts on the melted sample. The weight of sample flowing through the standardized nozzle within a measured time is used to calculate the MFR. The MFR is expressed as the weight of sample extruded in 10 minutes.

- **Melt Viscosity**
  Determination according to DIN EN ISO 3219, parallel plate method.

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**Find your regional contact:**
http://evonik.com/adhesive-resins-contacts
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