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

Our Product Range

With our POLYVEST® grades, we offer a range of stereospecific, low-viscous and unsaponifiable liquid polybutadienes of different chemical composition. They are used in a broad field of adhesive and sealant applications.
LIQUID POLYBUTADIENES

With POLYVEST®, Evonik’s Adhesive Resins Product Line offers a range of stereospecific, low viscous and unsaponifiable liquid polybutadienes of different chemical composition. Based on their characteristic microstructure all POLYVEST® grades exhibit an excellent reactivity and could be used for a broad field of applications. The unsaturated polymer backbone of all POLYVEST® grades offers the opportunity for various crosslinking options like sulfur curing and oxidative drying. In addition the functional moieties of POLYVEST® HT and POLYVEST® MA make further options for crosslinking and polymer modification feasible.

POLYVEST® - non-functionalyzed liquid polybutadienes
POLYVEST® MA – maleic anhydride-functionalyzed liquid polybutadienes
POLYVEST® HT – hydroxyl-terminated liquid polybutadienes

Further information

• Low viscosity
• Excellent chemical resistance to acids and bases
• High water resistance
• Excellent electrical insulation properties
• Low temperature flexibility
• Low moisture and oxygen permeability

Analytical methods

• Viscosity
  Determination according to DIN EN ISO 3219.

• Acid Number
  Determination according to DIN EN ISO 2114.

• Hydroxyl Number
  Determination according to DIN S3 240-2.

• Peroxide Number
  Determination according to DGF–method: C-VI-6a (84).

• Iodine Number
  Determination according to DIN S3 241.

• Molecular Weight Mn
  Determination via GPC according to DIN S5 627-1, calibrated with polystyrene standard. Determination via GPC calibrated with polybutadiene standard, (POLYVEST® HT).

• Density at 20 °C
  Determination according to DIN EN ISO 2811-1.

• Flash Point
  Determination according to DIN EN ISO 2719.

• Ignition Temperature
  Determination according to DIN 51 794.

• Pour Point
  Determination according to DIN ISO 3016.

• Glass Transition Temperature Tg
  Determination according to DIN EN ISO 11 357-1.

• Gardner Color
  Determination according to DIN EN ISO 4630-2.

• Peroxide Number [mval/kg]
  ≤ 10 ≤ 10 - - -

• Density at 20 °C [g/cm³]
  0.90 - 0.92 0.90 - 0.92 0.95 0.97 0.90 - 0.92

• Flash Point [°C]
  approx. 180 approx. 200 approx. 300 > 300 (DIN ISO 2592) approx. 215

• Ignition Temperature [°C]
  approx. 360 approx. 350 approx. 360 approx. 355 approx. 375

• Pour Point [°C]
  approx. -55 approx. -50 approx. -25 approx. -1 approx. -18

• Tg [°C]
  approx. -100 approx. -99 approx. -95 approx. -92 approx. -80

• Gardner Color
  Determination according to DIN EN ISO 4630-2.

• Ignition Temperature
  Determination according to DIN 51 794.

• Pour Point
  Determination according to DIN ISO 3016.

• Glass Transition Temperature Tg
  Determination according to DIN EN ISO 11 357-1.

Discover our portfolio of liquid polybutadienes

<table>
<thead>
<tr>
<th>Product Range</th>
<th>POLYVEST®</th>
<th>110</th>
<th>130</th>
<th>MA 75</th>
<th>EP MA 120</th>
<th>HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifications</td>
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<tr>
<td>Viscosity at 20 °C [mPa s]</td>
<td>700 - 860</td>
<td>2,700 - 3,300</td>
<td>6,000 - 9,000</td>
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<td>44 - 51</td>
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<td>Peroxide Number [mval/kg]</td>
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<td>Typical Data</td>
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<td>approx. 4,600</td>
<td>approx. 3,000</td>
<td>approx. 3,200</td>
<td>approx. 2,900***</td>
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<td>Iodine No. [g iod/100g]</td>
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<td>Density at 20 °C [g/cm³]</td>
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<td>Gardner Color</td>
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<td>≤ 2.5</td>
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<tr>
<td>Flash Point [°C]</td>
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<td>approx. 200</td>
<td>approx. 300</td>
<td>&gt; 300 (DIN ISO 2592)</td>
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<td>Ignition Temperature [°C]</td>
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<td>approx. 350</td>
<td>approx. 360</td>
<td>approx. 355</td>
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<tr>
<td>Pour Point [°C]</td>
<td>approx. -55</td>
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<td>approx. -25</td>
<td>approx. -1</td>
<td>approx. -18</td>
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<tr>
<td>Tg [°C]</td>
<td>approx. -100</td>
<td>approx. -99</td>
<td>approx. -95</td>
<td>approx. -92</td>
<td>approx. -80</td>
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</tbody>
</table>

* EP = Experimental Product
** = Determination via GPC calibrated with polystyrene standard
*** = Determination via GPC calibrated with polybutadiene standard
## POLYVEST® Liquid polybutadienes of different chemical composition

**POLYVEST® 110**
- Stereospecific, low viscous and unsaponifiable liquid polybutadiene manufactured by Ziegler-Natta polymerization. Due to its microstructure and high 1,4-cis double bonds, the apolar and highly hydrophobic polybutadiene is a highly reactive and crosslinking binder, providing benefits to a broad field of applications.
- Microstructure:
  - x = 1,2-vinyl double bonds [%]: ~ 22
  - y = 1,4-trans double bonds [%]: ~ 20
  - z = 1,4-cis double bonds [%]: ~ 78
- Typical properties (selected):
  - Viscosity @ 30°C [mPa s]: 6,000 - 9,000
  - Glass transition temperature [°C]: -99
- Performance characteristics:
  - Excellent chemical resistance to acids and bases
  - Low temperature flexibility
  - Good compatibility in aliphatic, aromatic and ethers

**POLYVEST® 130**
- Stereospecific, low viscous and unsaponifiable liquid polybutadiene manufactured by Ziegler-Natta polymerization. Due to its microstructure and high 1,4-cis double bonds, the apolar and highly hydrophobic polybutadiene is a highly reactive and crosslinking binder, providing benefits to a broad field of applications.
- Microstructure:
  - x = 1,2-vinyl double bonds [%]: ~ 22
  - y = 1,4-trans double bonds [%]: ~ 20
  - z = 1,4-cis double bonds [%]: ~ 78
- Typical properties (selected):
  - Viscosity @ 30°C [mPa s]: 6,000 - 9,000
  - Glass transition temperature [°C]: -99
- Performance characteristics:
  - Excellent chemical resistance to acids and bases
  - Low temperature flexibility
  - Good compatibility in aliphatic, aromatic and ethers

**POLYVEST® HT**
- Is a liquid hydroxyl-terminated polybutadiene manufactured by radical polymerization. The polymer exhibits a highly hydrophobic polybutadiene backbone and primary hydroxyl groups that are accessible for precise chemical modifications. With a hydroxyl functionality of appx. 2.4, POLYVEST® HT is used as polycomponent in various adhesive and sealant applications.
- Microstructure:
  - x = 1,2-vinyl double bonds [%]: ~ 1
  - y = 1,4-trans double bonds [%]: ~75
  - z = 1,4-cis double bonds [%]: ~ 25
- Typical properties (selected):
  - Viscosity @ 20°C [mPa s]: 4,000 - 5,900
  - Hydroxyl number [mg KOH/g]: 44 - 51
  - Molecular weight Mn [g/mol]: ~ 2,900
  - Hydroxyl functionality: ~2.4
  - Glass transition temperature [°C]: -80
- Performance characteristics:
  - Excellent chemical resistance to acids and bases
  - Low temperature flexibility
  - Good compatibility in aliphatic, aromatic and ethers

**POLYVEST® MA 75**
- Is a maleic anhydride functionalized abdum of a low molecular weight 1,4-cis polybutadiene which is successively grafted by maleic anhydride groups randomly distributed along the polymer chains. This makes the original apolar polybutadiene more polar and accessible for various chemical reactions. Further maleic anhydride functionalized abdums differing in maleic anhydride content and viscosity may be available, e.g. POLYVEST® EP MA 120.
- Microstructure:
  - x = 1,2-vinyl double bonds [%]: ~ 22
  - y = 1,4-trans double bonds [%]: ~ 22
  - z = 1,4-cis double bonds [%]: ~ 22
- Typical properties (selected):
  - Viscosity @ 20°C [mPa s]: 6,000 - 9,000
  - Acid number [mg KOH/g]: 70 - 90
  - Glass transition temperature [°C]: -95
- Performance characteristics:
  - Excellent chemical resistance to acids and bases
  - Excellent electrical insulation properties
  - Low temperature flexibility
  - Good compatibility with long-oil Alkyd resins, male melamine and other melamine resins
  - Good solubility in aliphatic, aromatic and ethers

## Export regulations
POLYVEST® HT is subject to export control measures by German Export Control Authorities. An approval by this organization may be required for export.

## Compatibility of POLYVEST® grades with binders and resins

<table>
<thead>
<tr>
<th>POLYVEST®</th>
<th>110</th>
<th>130</th>
<th>MA 75</th>
<th>EP MA 120</th>
<th>HT</th>
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<tr>
<td>Acrylic resins</td>
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<td>Nitrocellulose</td>
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<td>Hydrocarbon resins</td>
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<td>Styrene-alkyd resins</td>
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<td>Maleic anhydrides</td>
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<td>Aromatic hydrocarbons</td>
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<td>Phthalate resins</td>
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<td>–</td>
<td>◦</td>
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<tr>
<td>Melamine resins</td>
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<td>◦ ◦ ◦ ◦ ◦</td>
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<td>Ketone resins</td>
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<td>◦ – ◦ – –</td>
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<tr>
<td>Carbamic acid resins</td>
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<tr>
<td>Rosin-modified phenolic resins</td>
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<td>Urea resins, unplasticized</td>
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<td>◦ ◦ ◦ ◦ ◦</td>
<td>◦</td>
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<tr>
<td>Unsaturated alkyd resins</td>
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<td>Epoxy resins, low molecular weight</td>
<td>+ + + + +</td>
<td>+ + + + +</td>
<td>◦</td>
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</tr>
</tbody>
</table>

**Compatibility Grades**: ◦ = Limited compatibility / solubility – incompatible / insoluble

*This information is based on our best knowledge and experience. We recommend conducting your own tests and experiments prior to use.*

## Solubility of POLYVEST® grades

### POLYVEST® 110
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ○
- Esters: ◦
- Alcohols: ○
- Polyester hydrocarbons: ○

### POLYVEST® 130
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ◦
- Esters: ○
- Alcohols: ○
- Polyester hydrocarbons: ○

### POLYVEST® MA 75
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ◦
- Esters: ○
- Alcohols: ○
- Polyester hydrocarbons: ○

### POLYVEST® HT
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ◦
- Esters: ○
- Alcohols: ○
- Polyester hydrocarbons: ○

### POLYVEST® EP MA 120
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ◦
- Esters: ○
- Alcohols: ○
- Polyester hydrocarbons: ○

### POLYVEST® HT
- Alcohols: ○
- Phthalate Hydrocarbons: ○
- Amine hydrocarbons: ○
- Ethers: ◦
- Esters: ○
- Alcohols: ○
- Polyester hydrocarbons: ○
Curing and chemical modification of POLYVEST® grades

<table>
<thead>
<tr>
<th>POLYVEST®</th>
<th>110</th>
<th>130</th>
<th>MA 75</th>
<th>EP MA 120</th>
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</table>

Curing and chemical modification of POLYVEST® grades via reaction of polymer backbone

**POLYVEST® 110 / 130**

- Oxidative drying
- Conversion with alcohols and polyols \( R' – OH \)
- Conversion with amines \( R – NH_2 \)

**POLYVEST® MA 75 / EP MA 120**

- Oxidative drying
- Conversion with amines \( R – NH_2 \)
- Conversion with alcohols and polyols \( R' – OH \)

**POLYVEST® HT**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**POLYVEST® Applications**

<table>
<thead>
<tr>
<th>POLYVEST®</th>
<th>110</th>
<th>130</th>
<th>MA 75</th>
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<td>Joint mortars</td>
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<td>Electrical insulations and potting compounds</td>
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</table>
| Curing and chemical modification of POLYVEST® grades via reaction of polymer backbone

**POLYVEST® 110 / 130**

- Oxidative drying
- Conversion with amines \( R – NH_2 \)
- Conversion with alcohols and polyols \( R' – OH \)

**POLYVEST® MA 75 / EP MA 120**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**POLYVEST® HT**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**Curing and chemical modification of POLYVEST® HT via hydroxyl groups**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**POLYVEST® MA 75 / EP MA 120**

- Oxidative drying
- Conversion with amines \( R – NH_2 \)
- Conversion with alcohols and polyols \( R' – OH \)

**POLYVEST® HT**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**POLYVEST® Applications**

<table>
<thead>
<tr>
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| Curing and chemical modification of POLYVEST® grades via reaction of polymer backbone

**POLYVEST® 110 / 130**

- Oxidative drying
- Conversion with amines \( R – NH_2 \)
- Conversion with alcohols and polyols \( R' – OH \)

**POLYVEST® MA 75 / EP MA 120**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**POLYVEST® HT**

- Oxidative drying
- Conversion with isocyanates (e.g. MDI, TDI, IPDI)
- Conversion with anhydrides or carboxylic acids

**Curing and chemical modification of POLYVEST® HT via hydroxyl groups**

- Oxidative drying
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- Conversion with anhydrides or carboxylic acids

**POLYVEST® Applications**

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