VESTAMIN®
Curing agents for epoxy resin systems

VESTA – Developed in Germany.
Available globally.

Evonik
Leading Beyond Chemistry
For more than 55 years Evonik’s Business Line Crosslinkers has been the reliable partner and solution provider in the field of isophorone chemistry. With global production sites, we are uniquely placed to satisfy our customers’ demands. Our portfolio of VESTA products showcases high performance materials that enhance the quality of our customers’ applications.

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**About us**

**Benefits at a glance**

- Good chemical resistance
- High mechanical resistance
- Enhanced toughness
- High quality surfaces

The products VESTAMIN® IPD and TMD are aliphatic and cycloaliphatic diamines from isophorone chemistry, complemented by VESTAMIN® PACM based on a different raw material source. A major use of these products is in the manufacturing of curing agents for use in epoxy resin systems. These diamines are also used as chain extenders for PUR systems and as raw material of polyamides. They are colorless liquids with low viscosity and a characteristic weak amine odor.

**PRODUCT RANGE**

<table>
<thead>
<tr>
<th>Product</th>
<th>Delivery state</th>
<th>Characteristics</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>VESTAMIN® IPD</td>
<td>liquid, 100%</td>
<td>Isophorone diamine, cycloaliphatic diamine</td>
<td>Main component for curing agent formulations, cold and heat curing of epoxy resin systems</td>
</tr>
<tr>
<td>VESTAMIN® TMD</td>
<td>liquid, 100%</td>
<td>Trimethylhexamethylene diamine, aliphatic diamine</td>
<td>Main component for curing agent formulations, cold and heat curing of epoxy resin systems</td>
</tr>
<tr>
<td>VESTAMIN® PACM</td>
<td>liquid, 100%</td>
<td>4,4’-Diaminodicyclohexylmethane, cycloaliphatic diamine</td>
<td>Main component for curing agent formulations, cold and heat curing of epoxy resin systems</td>
</tr>
</tbody>
</table>

**Specification**

<table>
<thead>
<tr>
<th>Property</th>
<th>VESTAMIN® IPD</th>
<th>VESTAMIN® TMD</th>
<th>VESTAMIN® PACM</th>
<th>Unit</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purity</td>
<td>≥ 99.7</td>
<td>≥ 99.4</td>
<td>≥ 99.0 (sum 2-nitro anilines)</td>
<td>% by wt.</td>
<td>gas chromatography</td>
</tr>
<tr>
<td>Trans-trans-4,4’- PACM</td>
<td>-</td>
<td>-</td>
<td>17.2-26</td>
<td>% by wt.</td>
<td>gas chromatography</td>
</tr>
<tr>
<td>Appearance</td>
<td>clear liquid</td>
<td>clear liquid</td>
<td>clear liquid</td>
<td>visual</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>max. 15 (APHA)</td>
<td>max. 15 (APHA)</td>
<td>max. 30 (APHA)</td>
<td>-</td>
<td>DIN EN ISO 6271</td>
</tr>
<tr>
<td>Water content</td>
<td>max. 0.3</td>
<td>max. 0.2</td>
<td>max. 0.1</td>
<td>% by wt.</td>
<td></td>
</tr>
<tr>
<td>Aminonitrile</td>
<td>&lt; 0.15</td>
<td>&lt; 0.15</td>
<td>&lt; 0.15</td>
<td>% by wt.</td>
<td>gas chromatography</td>
</tr>
<tr>
<td>Secondary and tertiary amino compounds</td>
<td>&lt; 0.15</td>
<td>&lt; 0.15</td>
<td>&lt; 0.15</td>
<td>% by wt.</td>
<td>gas chromatography</td>
</tr>
<tr>
<td>Saturated primary cyclic diamines</td>
<td>-</td>
<td>max. 0.3</td>
<td>-</td>
<td>% by wt.</td>
<td></td>
</tr>
</tbody>
</table>

**General chemical and physical coefficients**

<table>
<thead>
<tr>
<th>Property</th>
<th>VESTAMIN® IPD</th>
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<th>VESTAMIN® PACM</th>
<th>Unit</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity</td>
<td>19</td>
<td>?</td>
<td>29.6 (at 40 °C)</td>
<td>mm²/s</td>
<td>DIN 16945</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>170.3</td>
<td>158.3</td>
<td>210.3</td>
<td>g/mol</td>
<td></td>
</tr>
<tr>
<td>Amidine value</td>
<td>680</td>
<td>710</td>
<td>535</td>
<td>mg KOH/g</td>
<td>DIN 16 945</td>
</tr>
<tr>
<td>H-acte-equivalent</td>
<td>42.6</td>
<td>39.6</td>
<td>52.6</td>
<td>g/eq</td>
<td></td>
</tr>
<tr>
<td>Solidification</td>
<td>8, - 89 °C</td>
<td>(15) °C</td>
<td>-</td>
<td>°C</td>
<td>OECD 102</td>
</tr>
<tr>
<td>Boiling pt. (1013hPa)</td>
<td>253</td>
<td>236</td>
<td>320 °C</td>
<td>°C</td>
<td>OECD 103</td>
</tr>
<tr>
<td>Vapor pressure (20°C)</td>
<td>0.02</td>
<td>0.04</td>
<td>0.01</td>
<td>hPa</td>
<td>OECD 104</td>
</tr>
<tr>
<td>Flash point</td>
<td>117</td>
<td>107</td>
<td>160</td>
<td>°C</td>
<td>DIN 51758</td>
</tr>
<tr>
<td>Relative density, d20</td>
<td>0.92</td>
<td>0.87</td>
<td>0.96</td>
<td>g/cm³</td>
<td>OECD 109</td>
</tr>
</tbody>
</table>

**Packaging, storage, safety and handling**

**Packaging:** VESTAMIN® IPD, TMD and PACM are available in non-returnable drums, non returnable IBCs, cans and road tankers. VESTAMIN® IPD and TMD are also available in rail tank wagons.

**Storage:** The products are stable for at least one year when stored at temperatures below 25 °C without exposure to light and humidity. They are slightly hygroscopic and tend to form carbamates by reaction with atmospheric CO2. Therefore it should be stored free from moisture and carbon dioxide. VESTAMIN® IPD and VESTAMIN® PACM tend to crystallize at temperatures below 15 °C. As partial precipitation can cause a change in the isomer ratio of the before mentioned products in the liquid phase, it is necessary to completely liquify the entire contents by warming (max. 60 °C) and stirring.

**Safety and handling:** Please refer to our Safety Data Sheet/Material Safety Data Sheet.
**Construction**

2K epoxy systems for several application (OEM and repair applications) methods on horizontal and vertical surfaces like chemical plants, power plants, aircraft hangars, parking garages, dairies, hospitals, breweries and other segments of the food processing industry, sewage plants, secondary containment as well as construction adhesives and anchoring.

**Concrete Coatings**

- Protective and decorative thin layer application directly onto concrete
- 2K epoxy systems with special fillers offer
  - Low viscosity and good flow
  - Good wetting of the substrate
  - Wet operations (sprinkling quartz sand onto wet surface) enables different optical effects and non-slip properties

**Primer**

- Primer for ordinary and less absorbent concrete and floor surfaces
- Suitable 2K epoxy systems offer
  - Excellent wetting and penetration into the substrate
  - Adaptable reactivity (from slow to fast)
  - Processing above 5°C
  - Excellent uptake of sprinkled sand (for interlayer adhesion)

**Repair mortar/grout**

- Equalizing concrete structure for further flooring layers
- Suitable 2K epoxy systems offer
  - Low viscosity
  - High filler uptake
  - Good leveling

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Coatings

Two component epoxy systems for heavy duty corrosion protection on bridges, marine structures, pipes and tanks, chemical plants and water works in form of anticorrosive primers and high build intermediate layers.

Suitable 2K epoxy binder formulations offer
- Low viscosity and high solid content
- Adaptable speed of cure (from slow to fast)
- Spray application

VESTAMIN® provides
- Excellent adhesion to metallic substrates
- Very good corrosion protection and durability
- Excellent chemical resistance
- High build capabilities

Composites

Two component epoxy systems for rotor blades in wind energy installations, pipes in chemical processing and marine, leaf springs, pump cases, boat hulls and other marine structures, sport articles like ski, tennis rackets and surfboards, automotive applications and printed circuit boards.

Suitable 2K epoxy matrix formulations offer
- Low viscosity
- Adaptable speed of cure (from slow to fast)
- Several application methods

VESTAMIN® provides
- High mechanical strength
- Good temperature resistance performance
- Resistance to impact stress
- Excellent chemical and corrosion resistance

Doming

Two component epoxy systems for print finishing and crystal doming.

Suitable 2K epoxy binder formulations offer
- Low viscosity
- Adaptable speed of cure (from slow to fast)
- Low color index

VESTAMIN® provides
- Very good transparency and surface aspect
- Excellent mechanical resistance
- High chemical resistance
- Abrasion resistance

Electrical & Electronics

Two component epoxy systems for encapsulation of electronic circuits and ignition coils, casings and switches.

Suitable 2K epoxy binder formulations offer
- Low viscosity
- Adaptable speed of cure (from slow to fast)

VESTAMIN® provides
- High temperature resistance
- High impact strength
- High electrical resistance
- High chemical resistance

Special applications

Polyamides

Amorphous, transparent high performance polyamides for high-voltage switch castings, filter cups for water treatment, metering devices, inspection glasses, flowmeters, liquid-level indicators.

Suitable polyamides provide
- Low molding shrinkage
- High viscosity

VESTAMIN® provides
- Crystal-clear optical transparency
- High mechanical stability
- High thermostability
- Good chemical resistance and electrical properties

Chain extenders for PUR systems

PUR dispersions as well as solvent-free and solvent-borne thermoplastic PUR for wood and plastic coatings, printing inks, coatings for leather as well as artificial leather.

Suitable PUR dispersions and modified binders provide
- Good compatibility with isocyanate prepolymers
- Good applicability

VESTAMIN® provides
- UV resistance
- Good resistance against hydrolysis
- Flexibility adjustable in a wide range
- Good abrasion resistance
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