VESTAGON[®]

CROSSLINKING AGENTS FOR POLYURETHANE POWDER COATINGS





GO WITH THE ORIGINAL.



OUR VISION

CROSSLINKERS IS THE BEST PARTNER FOR A SUCCESSFUL AND SUSTAINABLE FUTURE, PROVIDING PIONEERING TECHNOLOGY AND GLOBAL REACH.



PIONEER IN ISOPHORONE CHEMISTRY

Since inventing isophorone chemistry during our search for new ways to recycle and reuse acetone, Evonik's Crosslinkers business line has continued to develop high-performance isophorone-based products that improve our customers' applications.

to meet your local market demands. and coatings.

VESTAGON® B The B grades are ε-caprolactam-blocked

VESTAGON® BF blocked PUR crosslinkers



For over 60 years we've been your reliable partner and solution provider. With our global production sites we are uniquely placed

Now, following another important breakthrough we've boosted our broad portfolio of VESTA products with our new reduced emission eCO series for more sustainable solvents, composites

POLYURETHANE (PUR) POWDER COATINGS FOR HIGH PERFORMANCE APPLICATIONS

Powder Coatings

Easy to use, environmentally friendly and cost effective: Powder coatings have become extremely popular. They find use in a wide range of applications, such as automotive, architectural, lawn and garden as well as for general metal applications. Powder coatings are the right choice, even for temperature-sensitive substrates.

Powder applications are often the most

- cost effective application, due to
- Low raw material costs
- A high transfer yield because of overspray recycling
- High coating thickness in one step
- No solvents needed
- Often no primer needed

Polyurethane Powder Coatings

PUR powder coatings show superior light stability and chemical resistance in comparison to non-PUR powder coating technologies. Another benefit is the formation of high crosslinking densities. Chemical as well as hydrogene bondings between urethane groups lead to high surface hardness while acting flexible in case of impacts from outside. Polyurethane powder coatings fulfill highest demands coming from the coatings industry like automotive and architecture.

Polyurethane systems provide

- Superior durability
- Good levelling
- High hardness
- Good flexibility
- Antigraffiti properties



Additional hydrogene bondings enable high hardness and good flexibility.

ONE SHOT MATTE PUR POWDER COATINGS SAVE TIME DURING PRODUCTION

The majority of powder coatings are matte. The production of matte powder coatings takes long because typically 2 coatings have to be be produced separately and blended afterwards (dry blend technology). VESTAGON[®] grades are appreciated worldwide for the formulation of matte polyurethane powder coatings just by using dissimilar resins (OH-No. ~ 280 blended with OH-No. ~40) in one coating (one shot matte technology).

Less steps - Lower costs

Evaluation of the Matting Optimum Polyester Ratio



Relationship between polyester ratio and gloss obtained after cure: At the lowest point of the curve, the gloss is least sensitive to deviations in the ratio between the two polyester resins in both directions.



The gloss value strongly depends on the type of polyesters used, their specific mixing ratio and the stoichiometry towards the crosslinker. As a consequence, each combination of polyesters must be tested empirically on their matting effect with the crosslinker in use. It is highly recommended to precisely adjust the ratio of the polyesters and the crosslinker to make each formulation robust in terms of gloss readings during production.



Relationship between stoichiometric ratio and gloss obtained after cure: The gloss is least sensitive to deviations at a stoichiometric ratio around 0.8:1.0.

VESTAGON[®] products are the ideal solution for light stable and weather resistant powder coating systems.

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The Evonik portfolio contains e-caprolactam blocked (VESTAGON[®] B) as well as blocking agent free grades (VESTAGON[®] BF).

Antigraffiti, optimized matting, low-temperature cure, food contact - VESTAGON[®] crosslinkers enable powder coating systems beyond your imagination.

VESTAGON® B GRADES

VESTAGON[®] B grades are ϵ -caprolactam-blocked, PUR crosslinkers providing high crosslinking densitiy and good levelling.

VESTAGON® BF GRADES

VESTAGON® BF grades are internally blocked PUR crosslinkers enabling the formulation of coatings with low emission values.

Our VESTAGON[®] B grades are blocked by using an external blocking agent. During synthesis, the reactive group is rendered inert through the formation of a relatively weak urea bond. This bond can be cleaved upon heating starting at 170°C by forming ε-caprolactam.

From linear to highly branched, Evonik provides a full range of externally blocked crosslinkers to allow formulators to meet various demands of end customers.

BENEFITS

- High crosslink density
- High glass transition temperature
- Excellent antigraffiti properties
- Excellent durability
- Good levelling





Although the total content of reactive groups is similar to E-caprolactam blocked grades, their functionality is somewhat lower. The use of branched polyesters with a higher hydroxyl content can compensate for this.





R = Polyester backbone

PUR Crosslinkers (blocked)

	Supply Form	NCO content	Tg	Remarks
VESTAGON [®] B 1400	Pellets/Flakes	12.5-14.0 % bwt	~52°C	For coatings with good chemical resistance
VESTAGON [®] B 1530	Pellets/Flakes	14.8-15.7 % bwt	~48°C	Like B 1400 but excellent durability

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UR Crosslinkers (blocking agent free)							
	Supply Form	NCO content	Tg	Remarks			
VESTAGON [®] BF 1320	Coarsely ground	13.5-15.0 % bwt	~75°C	Higher functionality than VESTAGON® BF 1540			
VESTAGON® BF 1321	Coarsely ground	14.0-15.5% bwt	~77°C	Lower melt viscosity compared to BF 1320. Particularly suitable for flat matte PUR powder coatings			
VESTAGON [®] EP-BF 1350	Coarsely ground	12.5-14.0 % bwt	~61°C	For polyurethane coatings with Class A surfaces			
VESTAGON [®] BF 1540	Granules	15.2-17.0 % bwt	~84°C	High content of reactive groups; good choice for standard coatings			

Our VESTAGON® BF grades are blocking agent free. During synthesis the reactive groups are rendered inert through the formation of a relatively weak uretdione ring. This bond can be cleaved upon heating starting from 160°C. Special low temperature curing grades starting from 120°C are available.

APPLICATIONS

Automotive Coatings

Powder coated rims, assembly parts and automotive trim must withstand chemical attacks e.g. from acid rain and brake fluids. Furthermore, they have to be UV and stone chip resistant.

VESTAGON® B 1530

Is a PUR crosslinker imparting superior chemical resistance.

VESTAGON[®] EP-BF 1350 Is a blocking agent free crosslinker imparting superior levelling.



BENEFITS

- High crosslink density
- High glass transition temperature
- Excellent durability
- · Good levelling

Coatings for Decorative Metal Surfaces

For sublimation technology to achieve good image sharpness, the coating must withstand high temperatures without changing its morphology or becoming soft. This is why high Tg polyurethanes are suited to this technology.



VESTAGON[®] BF 1320

Is an internally blocked PUR crosslinker for high production reliability.

VESTAGON[®] BF 1321

Is comparable to VESTAGON[®] BF 1320 but for lowest possible gloss readings.

BENEFITS

- One shot matte technology
- Excellent gloss control
- Good sharpness of images
- Production reliability

APPLICATIONS

Antigraffiti Coatings

PUR powders are particularly useful in antigraffiti applications and whiteboards, where a high crosslinking density and coatings Tg enable resistance to antigraffiti, board markers and repeated cleaning.

VESTAGON® B 1530

Is the preferred grade for highly crosslinked polyurethane powders providing a functionality of about 3.

VESTAGON[®] BF 1540

Is a blocking agent free alternative to VESTAGON® B 1530, and requires higher OH-containing polyesters.

Household Appliances

PUR technology boost chemical resistance and appearance in coatings for household appliances. Hybrids can be reinforced by imparting PUR technology. It is possible to apply those systems even on surfaces able to withstand conditions being found at washers.

VESTAGON[®] B 1400

Is a cost effective highly branched crosslinker with good overall properties.

VESTAGON[®] BF 1540

Is a blocking agent free alternative to VESTAGON® B 1400, and requires higher OH-containing polyesters.

Metal Rim Coatings

Scratch resistance and impact resistance make polyurethane coatings as the material of choice to color metal parts like frames for bicycles, scooters and motorcycles.

VESTAGON® B 1530

Enables the formulation of highly crosslinked coatings with a good levelling.

VESTAGON[®] BF 1320

Enables the formulation of low emission powder coatings and matting.



BENEFITS

- Excellent durability
- Good chemical resistance
- Resistance to high pressure cleaning
- Resistance to graffiti remover



BENEFITS

- Good chemical resistance
- Suitable for most industrial applications
- Good mechanical properties





BENEFITS

- Scratch resistance
- Impact resistance
- Abrasion resistance
- Weatherability

DISCOVER MORE!

Further useful documents and information are available. www.evonik.com/crosslinkers

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