Fiber sizing – waterborne film formers and crosslinkers

Enhanced properties through unique polyurethane structure

Fiber sizing

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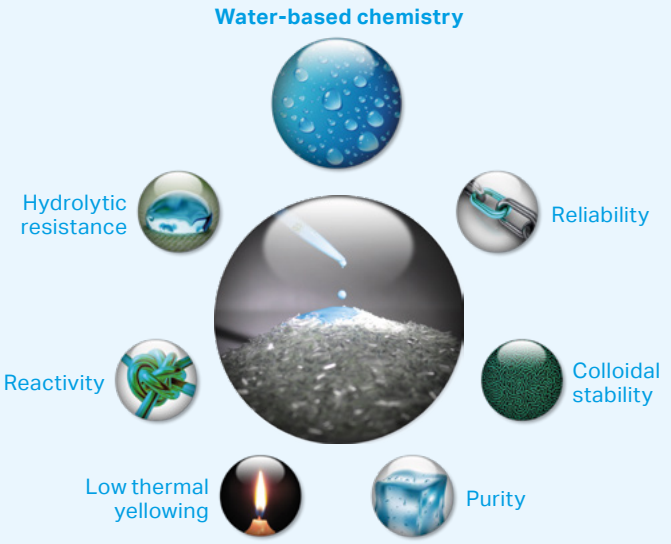
Waterborne dispersions for fiber sizing: Enhanced properties through unique polyurethane structure.

Unique features



Fiber sizing crosslinkers and film formers

- Fiber type: Glass, Carbon, Basalt
- Reinforcement: Chopped strands, Chopped strand mats, Continuous fibers
- Matrix type, e.g.: PA, PBT/PET

To fully exploit their ability to reinforce plastics, fibers are coated with sizing immediately after they have been manufactured. The sizing provides a chemical bond between the plastic matrix and fiber surface, key to the strength of the composite.

Waterborne polyurethane dispersions from Covestro are used as film formers and crosslinkers in sizing formulations for glass, carbon (virgin and recycled) and basalt fibers utilized to reinforce thermoplastic and thermoset composite materials.

The dispersions can withstand high levels of mechanical stress, exhibit exceptional heat and hydrolysis resistance and are compatible with common sizing additives as well as with a broad range of matrixes.

The product line also has grades approved for **food contact applications (EU 10/2011).**

Fiber sizing portfolio – key benefits:

- High reliability due to high product consistency
- Solely covalent-bonded emulsifiers
- Low thermal yellowing
- Crosslinking during compounding
- Hydrolytic resistance adjustable via building blocks
- Food contact-approved film formers and crosslinkers (EU 10/2011).
- Easy fiber processing

Baybond® film formers and crosslinkers for glass fiber sizing.

PUD film formers for glass fiber sizing

Product	Type	Hydrophilic character	Non-volatile content approx. (%)	Type pH-Value approx.	Comments
Baybond® PU 330	Polyester	Ionic/nonionic	30	7.3	Recommended for thermoset application.
Baybond® PU 401-A	Polyester	Ionic/nonionic	50	7.5	Universal product with balanced properties for various applications.
Baybond® PU 403	Polyester	Ionic/nonionic	39	7.0	PUD film former with crosslinker function, deblocking temperature 150°C.
Baybond® PU 404 XP	Polyester	Nonionic	50	7.0	Universal product with balanced properties for various applications. **Food contact acc. to EU 10/2011.**
Baybond® PU 405	Polyether	Ionic/nonionic	34	7.0	PUD film former with additional crosslinking function, deblocking temperature 170°C.

Product	Type	Hydrophilic character	Non-volatile content approx. (%)	Type pH-Value approx.	Comments
Baybond® PU 406	Polyether	Nonionic	34	6.5	Excellent fiber integrity and good thermo stability and hydrolysis resistance.
Baybond® PU 407	Polyester	Ionic/nonionic	40	7.0	High film tensile strength.
Baybond® PU 409	Polyester	Ionic/nonionic	50	7.5	Extremely low thermal yellowing.
Baybond® PU 415	Polyester	Ionic/nonionic	45	7.0	Balanced properties for low to mid application.
Baybond® PU 571	Polyether	Nonionic	34	6.5	Excellent fiber integrity and good hydrolysis resistance. **Food contact acc. to EU 10/2011.**
Baybond® PU 1810/1	Polyester	Nonionic	50	6.0	Outstanding thermostability. **Food contact acc. to EU 10/2011.**
Baybond® PU 2277	Polyester	Ionic/nonionic	40	7.5	High film tackiness and good fiber integrity.
Baybond® PU 2569	Polyester	Ionic/nonionic	41	8.5	High film tackiness and good fiber integrity.
Baybond® PU 2728	Polycarbonate-polyether	Ionic/nonionic	59	8.0	Excellent hydrolysis resistance.
Baybond® PU 7269	Polyether	Ionic/nonionic	30	8.5	High film tackiness and good fiber integrity.

Thermally activated PUD crosslinkers for glass fiber sizing

Product	Type	Blocking agent	Non-volatile content approx. (%)	Viscosity at 23°C approx. (mPa · s)	Calculated blocked NCO content on supply form/(resin) approx. (%)	Approx. Equivalent weight	Comments
Baybond® XL 825	HDI	Ɛ-CAP	30 in water	< 200	3.0 (10.0)	1,400	Low thermal yellowing, improved impact strength, adhesion and flexibility. Deblocking temperature approx. 170 °C.
Baybond® XL 1187	HDI	MEKO	30 in water	< 200	2.9 (9.8)	1,450	High particle size, flexible and nonionic character. Deblocking temperature approx. 150 °C.
Baybond® XL 6366	HDI	MEKO	45 in water	< 200	4.3 (12.5)	975	High solid content, high flexibility. Deblocking temperature approx. 150 °C.

Thermally activated PUD crosslinkers for fiber sizing compliant to 2011/10/EU for food contact

Product	Type	Blocking agent	Non-volatile content approx. (%)	Viscosity at 23°C approx. (mPa · s)	Calculated blocked NCO content on supply form/(resin) approx. (%)	Approx. Equivalent weight	Comments
Baybond® XL 3674	HDI	Ɛ-CAP	30 in water	< 200	2.9 (10.7)	1,310	Low thermal yellowing, improved impact strength, adhesion and flexibility. Deblocking temperature 170 °C
Baybond® XL 7270	HDI	Ɛ-CAP	30 in water	< 100	4.2 (13.1)	1,000	Improved impact strength, adhesion and flexibility. Deblocking temperature 170 °C

Film formers and crosslinkers for carbon and basalt fiber sizing.

PUD film formers for carbon and basalt fiber sizing

Product	Type	Best suited matrix	Viscosity at 23°C approx. (mPa · s)	Comments
Baybond® PU 401-A	Polyurethane based on polyester	Polyamide	< 170	High molecular weight, very good fiber integrity.
Baybond® PU 1810/1	Polyurethane based on polyester	High-temperature resins	< 100	High molecular weight, very high thermostability, compliant to 2011/10/EU for food contact.
Bayhydrol® U 2757	Polyurethane based on polycarbonate/ polyester	Epoxy	< 1500	Very low molecular weight, OH functional, COOH functional, good solubility.
Dispercoll® U 53	Polyurethane based on polyester	(Strengthen adhesion between fibers)	< 600	High molecular weight, semi-crystalline film, high adhesion between fibers, melts at 50-60 °C
Impranil® DLV/1	Polyurethane based on polycarbonate/ polyether	Epoxy	< 50	Very high molecular weight, COOH functional.

Thermally activated PUD crosslinkers for carbon and basalt fiber sizing

Product	Type	Best suited matrix	Viscosity at 23°C approx. (mPa · s)	Comments
Baybond® XL 6366	Thermolatent urethane crosslinker	Temperature dependent	< 200	Very low molecular weight, thermolatent urethane groups with normal reactivity.
Baybond® XL 7270	Thermolatent urethane crosslinker	Temperature dependent	< 100	Very low molecular weight, thermolatent urethane groups with low reactivity, low thermal yellowing, food contact acc. to EU 10/2011.
Bayhydrol® UV 2687/1	Polyurethane dispersion, acrylic functional	Vinyl/Unsaturated polyester	< 500	Very low molecular weight, acrylate functional (radical crosslinking), very low yellowing, high Tg.
Bayhydrol® UV 2689/2	Polyurethane dispersion, acrylic functional	Vinyl/Unsaturated polyester	< 2.500	High molecular weight, acrylate functional (radical crosslinking), high crosslinking density, low physical drying.
Bayhydur® BL XP 2706	Thermolatent urethane crosslinker	Temperature dependent	< 2.500	Very low molecular weight, COOH functional, thermolatent urethane groups with high reactivity, low thermal yellowing.
Bayhydur® BL 2867	Thermolatent urethane crosslinker	Temperature dependent	< 1.500	Very low molecular weight, thermolatent urethane groups with high reactivity, very low thermal yellowing.

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