



Polyisocyanates and Prepolymers

Desmodur® Bayhydur® Desmotherm®
Bayhytherm® Desmoseal® Desmocap®
Baybond® Crelan®





Desmodur® Bayhydur® Desmotherm® Bayhytherm® Desmoseal® Desmocap® Baybond® Crelan®

Contents

| | | | | | |
|----|--|----|---|----|---|
| 05 | Covestro – leading in material solutions | 19 | Aliphatic, hydrophilic polyisocyanates Bayhydur®/Bayhydur® ultra | 31 | Desmodur® monomers Aliphatic diisocyanates |
| 06 | Quality & supply security – sustainability | 20 | Bayhydur® family Hydrophilic-modified polyurethane hardener | 32 | Desmodur® L family TDI- and TDI-/HDI-based crosslinkers |
| 08 | Polyisocyanates and prepolymers – grades with shining properties | 22 | Desmodur® D family Hydrophilic-modified polyurethane hardener | 33 | Desmodur® polymeric MDI products (pMDI) For coatings and adhesives |
| 10 | Desmodur® ultra/Bayhydur® ultra | 23 | Desmodur® BL family Thermally activated polyurethane hardener | 34 | Desmodur® polymeric MDI products (pMDI) For coatings and membranes |
| 11 | Desmodur® N family HDI trimer | 24 | Bayhytherm®/Desmotherm® Self-crosslinking urethane resins | 35 | Desmodur® prepolymers HDI-based/IPDI-based/TDI-based prepolymers |
| 12 | Blulogiq®: smart for several applications | 25 | Desmodur® BL/Bayhydur® BL/Baybond® XL Thermally activated polyurethane hardeners | 38 | Desmodur® and Desmoseal® M Prepolymers based on MDI |
| 13 | Desmodur® N family HDI biuret | 26 | Bayhydur® BL and Baybond® family Thermally activated polyurethane hardener and waterborne carbodiimide crosslinker | 40 | Desmoseal® S family Silane-terminated polyurethanes |
| 14 | Desmodur® N family HDI specialties | 27 | Creelan® family Powder hardeners | 44 | Desmodur® monomers Aromatic diisocyanates |
| 15 | Aliphatic polyisocyanates Desmodur®/Desmodur® ultra | 28 | Desmocap® family Blocked TDI prepolymers | 45 | Legend |
| 16 | Desmodur® Z family IPDI-based crosslinkers | 30 | Desmodur® R family | 46 | Fast-lane access to polyurethane innovations |
| 17 | Desmodur® eco N/Bayhydur® eco family PDI-based crosslinker | | | | |



Covestro – leading in material solutions

As the world's leading manufacturer of aliphatic and aromatic polyisocyanates, Covestro offers an extensive range of innovative products and solutions for the coatings and adhesives industries. As your customers become more demanding in their expectations for the quality, durability, workability and sustainability of your products, we can help you to turn these challenges into a competitive advantage. That is what drives us to push the boundaries of what is possible.

The key to creating added value for you, our customers, as well as for society and the environment is innovation. At Covestro, we innovate not only to address the key global challenges of population growth, urbanization, climate change, digitalization and increasing mobility; we innovate to have a sustainable business that enables us to live up to our business purpose of "making the

world a brighter place." In the final analysis, this comes down to developing sustainable solutions that take the entire life cycle of a product into account. We are increasing our on-site efficiency, e.g., by recycling salt and water in our production plants. We are expanding our resource base, e.g., by turning CO₂ into a raw material in the manufacturing of plastics. And we are developing materials that are more energy-efficient and save natural resources.

In our Coatings, Adhesives, Specialties (CAS) segment, we systematically develop and supply aliphatic and aromatic isocyanates and their derivatives as well as polyurethane dispersions. Our raw materials are used for coatings, adhesives, sealants and specialty products, such as elastomers, high-quality films, 3D printing products, cosmetics, textiles and medical products. The

main application areas are in the automotive, transportation, infrastructure, construction, wood processing and furniture industries. In this segment, our innovative efforts are focusing on enhancing efficiency, improving quality, boosting sustainability and environmental aspects such as reducing solvent content.

We are proud of over 80 years of groundbreaking innovations. But we are not defined by our past. Even with decades of experience behind us, Covestro remains a young enterprise. In a corporate world that can often be dull and uninspiring, we want to act in a curious, courageous, and colorful way: trying out new things, questioning established ways, and pushing boundaries – for your benefit.



What we do

As a world-leading polymer and material science company, we inspire innovation and drive growth through profitable products and technologies that benefit society and reduce the impact on the environment.

Who does all this?

It's our people! And the way we work together as one global team following a set of six elementary principles – value creation, sustainability, innovation, focus on people, safety, and fair play. This is our formula for success.



What this means for our Coatings, Adhesives and Specialties business

Quality & supply security

Our products are of outstanding quality and we offer supply security – worldwide.

Covestro, the world's leading manufacturer of aliphatic and aromatic polyisocyanates, offers an extensive range of raw materials and services for the coatings and adhesives industry. This allows the very latest technology to be used extremely effectively for a variety of applications.

Our global setup enables you to increase your competitive advantage.

What we offer:

- A global network of research & development centers where our staff are dedicated to offering solutions for the coating and adhesive industry.
- A unique setup and worldwide network of state-of-the-art production sites ensuring short lead times and supply chain flexibility.
- Outstanding product quality through fulfilling the requirements of state-of-the-art quality, environmental and safety (HSEQ) as well as energy management standards; we are proud of having enjoyed ISO 9001, ISO 14001, ISO 18001 and ISO 50001 certifications for many years.

Covestro is your reliable partner for polyurethane chemistry.

Solutions to enhance your process efficiency

Nowadays, the quality demands made on industrial processes are very high. This is equally true of the cost-cutting requirements. However, both goals can be achieved by increasing process efficiency. At Covestro, we have a wide range of solutions designed to enhance your process efficiency. Why not take advantage of our know-how? These solutions will benefit your bottom line.

Sustainability

Sustainability is at the heart of the Covestro strategy. We inspire innovation and drive growth through profitable products and technologies that benefit society and reduce the impact on the environment.

Our coatings, adhesives and specialty products and solutions contribute to sustainability through:

- **Food contact**

Any comment on food or drinking water contact for products exclusively refers to the regulation quoted in the table: please request a Declaration of Compliance before use. For any such uses which require compliance

with another judicial area or national legislation, the corresponding legal assessment needs to be performed prior to any application of a product in the field.

- **Saving energy – fast and smart**

Polyurethane systems represent a benchmark in productivity and process efficiency in many industries. We strive to further push the limits of efficiency by developing game-changing new solutions.

- **Reducing waste**

We offer solutions such as innovative 1K technologies that enable our value chain partners to use materials more efficiently and reduce waste.

- **Cutting emissions**

Bayhydur® and Desmodur® grades are key enablers for low-emission solutions in the coatings and adhesives industries – waterborne and high solids/100% solids!

- **Responsible management of natural resources**

Highly durable PU-based coatings and adhesives significantly extend the lifetime of a coated product and thus help to prolong resource use.

- **Closing the loop (circularity)**

Through economically viable products made from bio-based raw materials – with no deterioration in performance – we help our customers and value chain partners to reduce their carbon footprint and offer solutions that incorporate renewable building blocks.





Polyisocyanates and prepolymers:

Grades with shining properties



Pioneering polyurethane chemistry

Ever since Otto Bayer's discovery of the polyisocyanate-polyaddition process in 1937, Bayer – now Covestro – has pioneered polyurethane chemistry. 50 years ago, Bayer – now Covestro – developed the first applications using polyisocyanates for the coatings and adhesives sectors. We work closely with our customers to systematically advance the state of the art in polyurethane technology. Using market-oriented research and development, we specifically adapt our product portfolio to our customers' increasingly stringent requirements. Together with you, we want to continue our successful journey along this path.



Wide variety of applications

Our polyisocyanates comprise a broad range of products for one- and two-component (1K/2K) polyurethane systems used in numerous applications. Whether as crosslinkers for 2K polyurethane coatings and adhesives, blocked polyisocyanates for 1K polyurethane baking coatings or hydrophilized polyisocyanates as crosslinkers for water-reducible polyurethane systems, our products come into play wherever crosslinking is used to achieve high resistances and reliable adhesion under efficient conditions. Our solutions are in use today in a variety of applications, such as automotive OEMs, automotive refinishing and coatings for wood, industrial goods and plastics. They are also used in reactive adhesives, textile coatings, and anticorrosion coatings.

Customized properties

Gloss, leveling, scratch resistance, hardness and flexibility can be precisely adjusted by the choice of polyisocyanate and polyol. Chemical resistance, adhesion, light fastness and weather stability are additional properties that can be individually adapted to your specific requirements. Moreover, coatings with easy-to-clean, soft-touch or reflow properties can also be produced through smart formulations.

Flexibility in prepolymers




Our product range of prepolymers comprises aromatic and aliphatic NCO- and silane-terminated products. These prepolymers make a wide range of properties possible in coatings, adhesives and sealants. The typical areas of application include wood coatings, corrosion protection, floor coatings, elastic adhesives in transportation, parquet adhesives, engineered wood constructions, flexible film lamination and sealants. Prepolymers with a low fraction of non-polymer-bound components open up formulation options for producing reactive polyurethane adhesive and sealants that are not subject to labeling requirements.

Desmodur® ultra / Bayhydur® ultra

Set new standards in industrial hygiene

Safeguard your business by offering an improved industrial hygiene standard with < 0.1% residual monomer content.

Technical drop-in solution with improved industrial hygiene standard

| | CONVENTIONAL 2K PU | COVESTRO'S ULTRA LINE |
|---|-----------------------|--------------------------|
|  High-performance isocyanates technology | ✓ | ✓ |
|  Improved industrial hygiene standard | ✓ | ✓✓ |
|  No additional efforts to comply with the proposed isocyanate use restriction* | ✗ | ✓ |

* Upcoming European Union (EU) legislation

Improved industrial hygiene standards are important for the entire value chain. Covestro is committed to continually improving products and setting new standards, especially in the field of industrial hygiene. The new Ultra Line opens up the potential for further increasing product safety through a continued reduction of the specified residual monomer content.

With our new Covestro Ultra Line we are introducing a product line with the following beneficial features:

- **Further improves industrial hygiene** standards thanks to a residual monomer content of below 0.1% – in line with the safety measures recommended in the safety data sheets.
- **Can be used in the same way** as the Desmodur® and Bayhydur® predecessors **in your current formulations** so you can continue to focus on your core business.
- Makes **easy-to-use 2K PU technology available**.
- **State-of-the-art** and **technically equivalent** to our existing products.

The performance and composition of the Ultra products have not changed in any way – except for their residual monomer content (r.m.c.) specification.

Desmodur® N family

Hardeners for high-performance two-component polyurethane coatings with excellent weatherability and resistance properties. Desmodur® ultra qualities perform with < 0.1% monomer content.



HDI trimer

| | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY APPROX. | COMMENTS |
|---|----------------------------|--|--|------------------------------|--------------------------|--|
| Desmodur® ultra N 3300 | 100 | 3,000 | 21.8 | 195 | 3.5 | Outstanding weather stability and gloss retention, non-yellowing; for automotive OEM, automotive refinishing, plastics and industrial coatings, structural coatings and topcoats. |
| Desmodur® ultra N 3600 | 100 | 1,200 | 23.0 | 185 | 3.2 | Low-viscosity crosslinker for lightfast 2K PUR coatings (high solids/waterborne, e.g., in combination with Bayhydur® types) for automotive refinishing, automotive OEM and industrial applications; also for structural coatings and topcoats. Recommendable for aliphatic cast systems. |
| Desmodur® N 3800 | 100 | 6,000 | 11.0 | 380 | 3.8 | For highly elastic coatings with excellent weather resistance; combination with suitable polyisocyanates allows adjustments of the elasticity using the same polyol mill base. Especially suitable for plastic coatings. |
| Desmodur® N 3900 | 100 | 730 | 23.5 | 180 | 3.2 | Low-viscosity crosslinker for lightfast 2K PUR coatings (high solids/waterborne, e.g., in combination with Bayhydur® types) for automotive refinishing, automotive OEM, transportation and plastics finishing applications. Recommendable for aliphatic cast systems. |
| Desmodur® XP 2675 | 100 | 16,000 | 20.0 | 210 | 3.9 | 100% supply form of Desmodur® N 3790 BA. |
| Desmodur® ultra N 3689 SN NEW | 88.5 in SN | 325 | 20.3 | 207 | 3.2 | Special supply form of Desmodur® ultra N 3600. |
| Desmodur® ultra N 3390 BA/SN | 90 in BA/SN | 550 | 19.6 | 215 | 3.5 | Special supply forms of Desmodur® ultra N 3300 for different applications. Other supply forms also available. |
| Desmodur® ultra N 3380 BA/SN | 80 in BA/SN | 150 | 17.4 | 241 | 3.5 | |
| Desmodur® ultra N 3368 BA/SN | 68 in BA/SN | 45 | 14.8 | 284 | 3.5 | |
| Desmodur® ultra 2822 | 55 in BA/SN | 15 | 12.0 | 350 | 3.5 | |
| Desmodur® N 3790 BA | 90 in BA | 1,800 | 17.8 | 235 | 3.9 | High functional crosslinker for fast-drying, weather-stable and non-yellowing 2K PUR coatings for automotive refinishing and industrial applications. |
| Desmodur® blulogiq 3190 NEW | 90 in BA | 650 | 19.1 | 214 | 3.5 | Thermolatent crosslinker for solvent-borne 2K PUR systems with standard reactivity at ambient conditions but acts as a highly catalyzed crosslinker at elevated temperatures. Baking temperature of 75°C or higher recommended. Especially for high-gloss spray coatings. |

Blulogiq®: smart for several applications

From efficiency to low temp – without compromising appearance

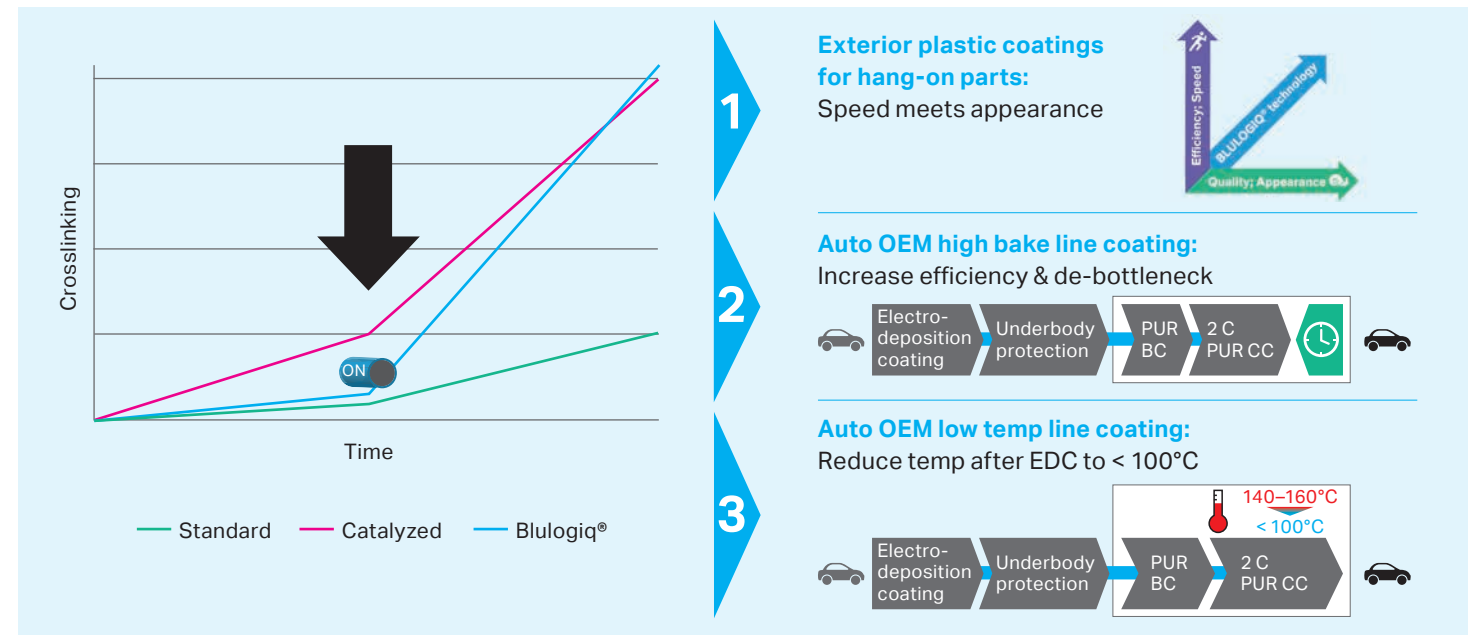
Blulogiq® technology:

The unique thermolatent hardener technology invented by Covestro addresses several needs, urgencies and unsolved problems of the coatings industry. Blulogiq® delivers the possibility to incorporate the separation of levelling as well as curing-on-demand into a 2K PU system.

Key benefits

- Boosts process efficiency of OEM plastic and metal applications.
- Almost no reaction during leveling – fast crosslinking at > 75°C enables very good appearance.
- Crosslinking speed at 90°C is comparable to a 140°C noncatalyzed process.
- Improved early resistance properties enable better post-processing like: earlier & easier polishing, more robust handling, less damage during transport.
- Little formulation modification required for plastic applications – just replace the hardener and conventional catalyst.

Thermolatency combined with proven high-performance 2K PU technology



Desmodur® N family

| HDI biuret | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY APPROX. | COMMENTS |
|-----------------------------|----------------------------|--|--|------------------------------|--------------------------|---|
| | | | | | | |
| Desmodur® N 100 | 100 | 10,000 | 22.0 | 190 | 3.8 | Weather-stable and non-yellowing topcoats. Very good compatibility with highly branched polyols. |
| Desmodur® N 3200 | 100 | 2,500 | 23.0 | 185 | 3.5 | Lower viscosity than Desmodur® N 100; especially for weather-stable and non-yellowing high solids coatings, structural coatings and topcoats. |
| Desmodur® N 75 MPA/X | 75 in MPA/X | 250 | 16.5 | 255 | 3.8 | Special supply forms of Desmodur N 100 for different applications. Other supply forms available. |
| Desmodur® N 75 MPA | 75 in MPA | 250 | 16.5 | 255 | 3.8 | |
| Desmodur® N 75 BA | 75 in BA | 160 | 16.5 | 255 | 3.8 | |

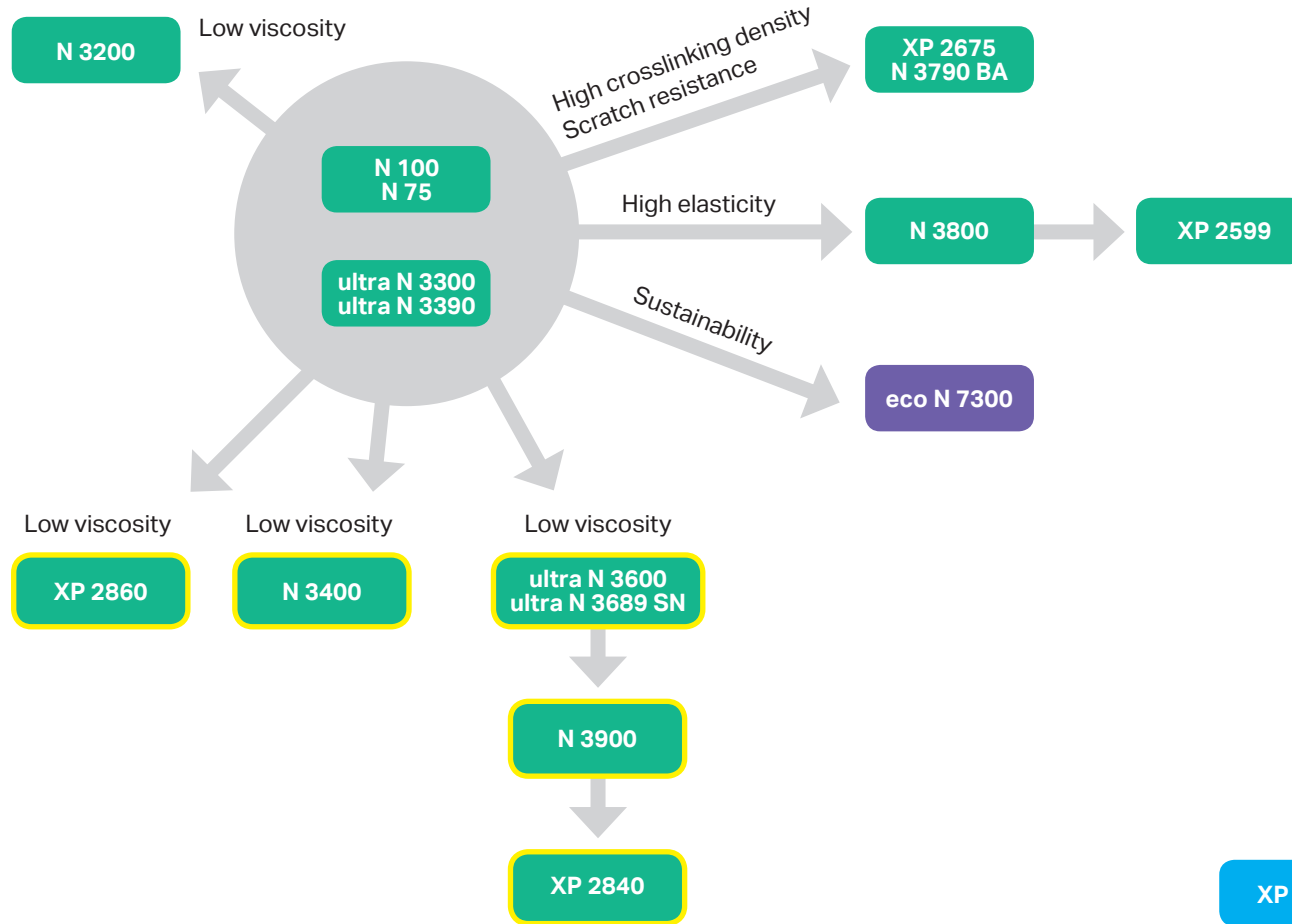


Desmodur® N family

| HDI specialties | TYPE | SUPPLY FORM | NCO CONTENT ON | | FUNCTIONALITY | COMMENTS | |
|--------------------------|----------------------|-------------|-------------------|----------------|---------------|----------|--|
| | | APPROX. [%] | SUPPLY FORM | APPROX. [%] | APPROX. | | |
| | | | VISCOSITY AT 23°C | EQUIVALENT | | | |
| | | | APPROX. [mPa · s] | WEIGHT APPROX. | | | |
| Desmodur® N 3400 | Uretdione | 100 | 150 | 21.8 | 195 | 2.5 | Extremely low-viscosity crosslinker for waterborne and solvent-borne 2K PUR coatings; also for moisture-curing 1K PUR systems, for topcoats in many construction applications. |
| Desmodur® XP 2840 | Uretdione/ Trimer | 100 | 500 | 23.0 | 185 | 3.0 | Low-viscosity crosslinker for waterborne and solvent-borne 2K PUR coatings; also for moisture-curing 1K PUR systems. |
| Desmodur® XP 2860 | Allophanate | 100 | 500 | 20.0 | 215 | 2.5 | Flexible, low-viscosity crosslinker for weather-stable high solids and waterborne 2K PUR coatings (e.g., in combination with Bayhydur® or Desmodur® types), especially for industrial, automotive refinishing, transportation and plastic coatings. Recommendable for flexible aliphatic cast systems. |

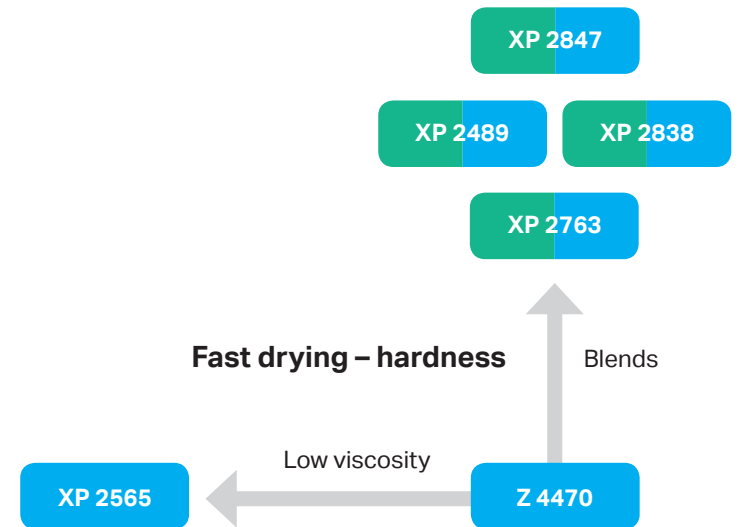


Aliphatic polyisocyanates Desmodur® / Desmodur® ultra*



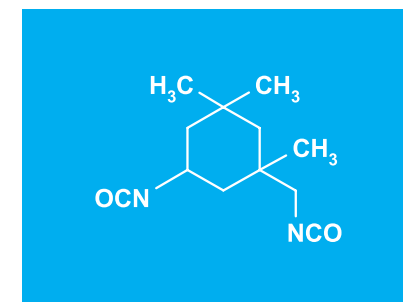
* ultra: < 0.1% residual monomer content

- HDI polyisocyanate
- IPDI polyisocyanate
- HDI/IPDI polyisocyanate blend
- PDI polyisocyanate
- Also suitable for 2K wb



Desmodur® Z family

Fast-drying two-component polyurethane coatings with high chemical resistance.

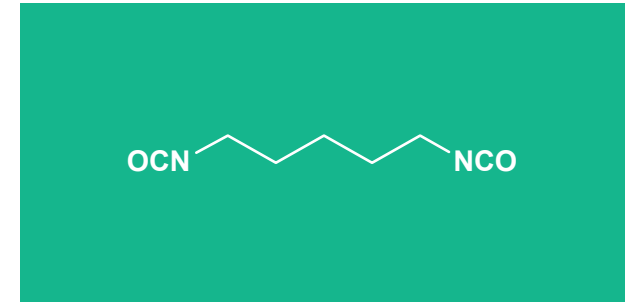


IPDI-based crosslinkers

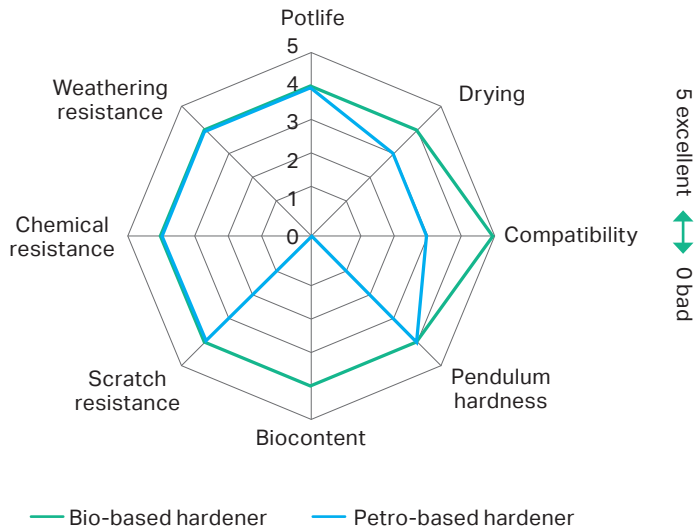
| | TYPE | SUPPLY FORM APPROX. [%] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY APPROX. | COMMENTS |
|-------------------------------|----------|-------------------------|--|------|---------------------------|-----------------------|--|
| | | | VISCOSITY AT 23°C APPROX. [mPa · s] | | | | |
| Desmodur® XP 2489 | HDI/IPDI | 100 | 22,500 | 21.0 | 200 | 3.2 | Good weatherability, gloss and improved resistance; especially for 100% solids applications, e.g., in-mould coating. |
| Desmodur® XP 2838 | HDI/IPDI | 100 | 3,000 | 21.0 | 200 | 3.0 | Crosslinker for lightfast 2K PUR systems; mainly used as a binder for 100% solids decorative floor coatings. |
| Desmodur® XP 2763 | HDI/IPDI | 86 in BA | 2,100 | 10.2 | 412 | 3.0 | Crosslinker for weather-stable 2K PUR and polyaspartic coatings; longer pot life and extended application window, reduced dependency of humidity with polyaspartic coatings. |
| Desmodur® XP 2847 | HDI/IPDI | 76.5 in BA | 140 | 15.9 | 264 | 3.5 | Very low viscous, HDI/IPDI-polyisocyanate with excellent chemical and weather resistance. |
| Desmodur® Z 4470 SN | IPDI | 70 in SN | 2,000 | 11.9 | 360 | 3.5 | Fast-drying hardeners for lightfast 2K PUR coatings with high chemical and weathering resistance. For automotive OEM, refinish and industrial applications. Due to its high hardness, Desmodur® Z is recommended to be combined with Desmodur® N products. |
| Desmodur® Z 4470 MPA/X | IPDI | 70 in MPA/X | 1,500 | 11.9 | 360 | 3.5 | |
| Desmodur® Z 4470 BA | IPDI | 70 in BA | 600 | 11.9 | 360 | 3.5 | |
| Desmodur® XP 2565 | IPDI | 80 in BA | 2,800 | 12.0 | 350 | 2.5 | Crosslinker for weather-stable, fast-drying high solids and waterborne 2K PUR coatings, e.g., in combination with Bayhydur® types, for automotive refinish and transportation applications. |

Desmodur® eco N / Bayhydur® eco family

Two-component polyurethane bio-based coatings with excellent weatherability and resistance based on bio-based **pentamethylene diisocyanate (PDI)**.

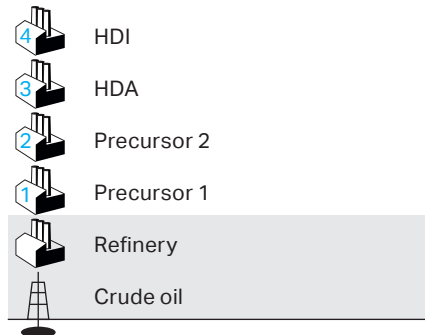


Desmodur® eco N 7300

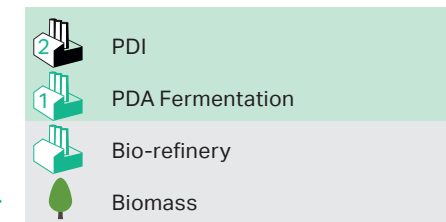


- **Bio-based** and significantly **improved carbon footprint** cradle-to-gate in comparison to HDI, based on Life-Cycle-Assessment studies conducted according to ISO 14040/14044 Standards.
- Bio-based process with significant improvement on **energy efficiency**.

4-step petro-based synthesis



2-step bio-based synthesis



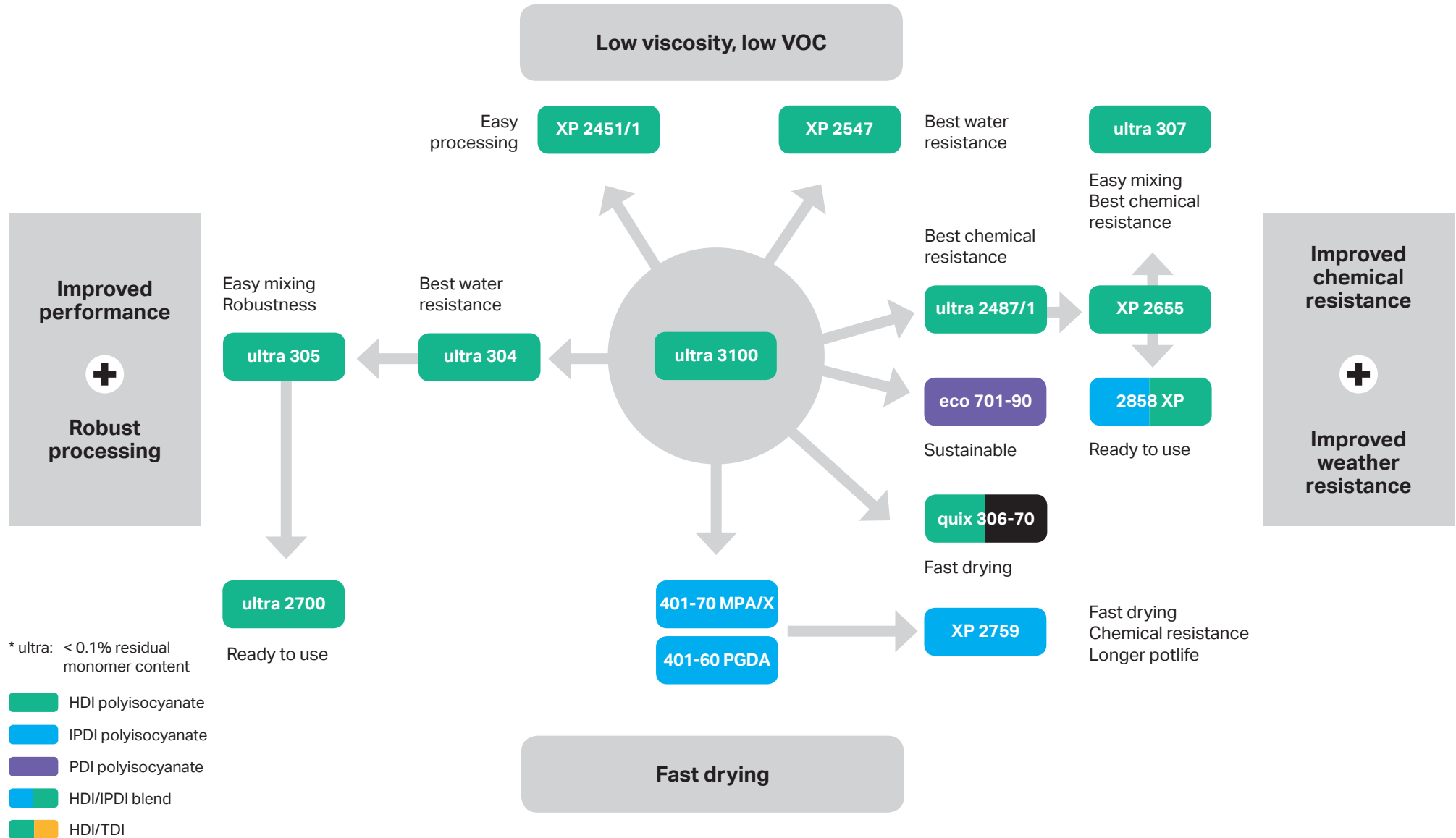
PDI-based crosslinker

| | SUPPLY FORM APPROX. [%] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | | FUNCTIONALITY APPROX. | | BIO-BASED CONTENT ON SUPPLY FORM [%]* | COMMENTS |
|---|-------------------------|--|---------------------------|-----------------------|-----|---------------------------------------|---|
| | | VISCOSITY AT 23°C APPROX. [mPa · s] | EQUIVALENT WEIGHT APPROX. | | | | |
| Desmodur® eco N 7300 NEW | 100 | 9,500 | 21.5 | 195 | 3.7 | 71 | Contains renewable carbon. Outstanding weather stability and gloss retention, non-yellowing; for automotive OEM, automotive refinish, plastics and industrial coatings, structural coatings and topcoats. |
| Bayhydur® eco 701-90 NEW | 90 in PGDA | 5,000 | 17.9 | 232 | 3.6 | 61 | Ionically modified (sulfonic acid) crosslinker for 2K WB coatings containing renewable carbon. Highest chemical resistance, easy mixing and high gloss. |

* Based on results of ¹⁴C/total C according to ASTM D 6866

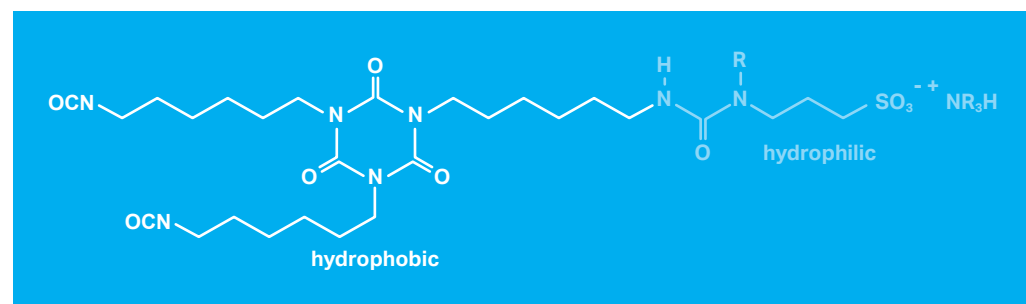


Aliphatic, hydrophilic polyisocyanates Bayhydur®/Bayhydur® ultra*



Bayhydur® family

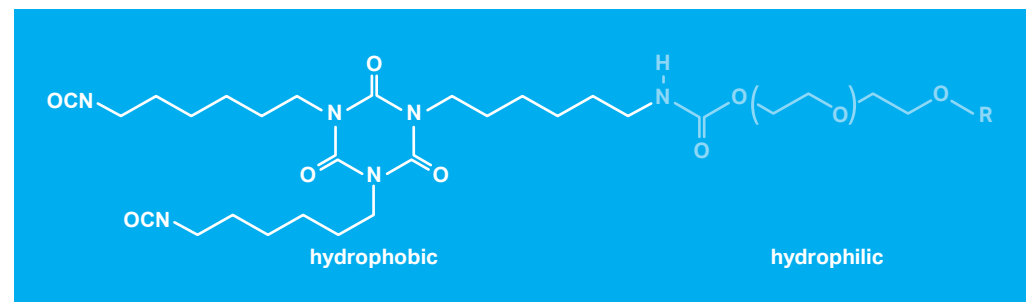
The key to easy and reliable application of waterborne two-component polyurethane systems. Bayhydur® ultra qualities perform with < 0.1% monomer content.



Hydrophilic-modified polyurethane hardener

| | TYPE | SUPPLY FORM APPROX. [%] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | | FUNCTIONALITY APPROX. | | COMMENTS |
|---|------|-------------------------------------|--|------|-----------------------|-----|--|
| | | VISCOSITY AT 23°C APPROX. [mPa · s] | EQUIVALENT WEIGHT APPROX. | | | | |
| Bayhydur® ultra 3100 | HDI | 100 | 2,800 | 17.4 | 240 | 3.1 | Polyether-modified, standard. Versatile and economical. |
| Bayhydur® ultra 304 | HDI | 100 | 4,000 | 18.2 | 230 | 3.8 | Polyether-modified. Versatile use and improved mixing. Excellent water and weathering resistance. |
| Bayhydur® ultra 305 | HDI | 100 | 6,500 | 16.2 | 260 | 4.0 | Polyether-modified. Easiest mixing and high gloss. |
| Bayhydur® ultra 307 NEW | HDI | 100 | 6,000 | 20.3 | 207 | 3.4 | Ionically modified (sulfonic acid) hardener with low monomer content. Highest chemical resistance, easy mixing. Indoor-air-quality compliant and very fast curing. |
| Bayhydur® XP 2451/1 | HDI | 100 | 800 | 20.3 | 205 | 3.0 | Polyether-modified, standard. Low viscosity, suitable for 100% solids formulations, Indoor-air-quality compliant. |
| Bayhydur® ultra 2487/1 | HDI | 100 | 5,400 | 20.6 | 205 | 3.4 | Ionically modified (sulfonic acid). Highest chemical resistance and very fast curing. |
| Bayhydur® XP 2547 | HDI | 100 | 650 | 22.5 | 185 | 3.0 | Ionically modified (sulfonic acid). Highest chemical resistance, low viscosity, suitable for 100% solids formulations. |
| Bayhydur® XP 2655 | HDI | 100 | 3,500 | 20.8 | 205 | 3.2 | Ionically modified (sulfonic acid). Highest chemical resistance, easy mixing. Indoor-air-quality compliant and very fast curing. |
| Bayhydur® ultra 2700 | HDI | 65 in PGDME | 75 | 10.6 | 400 | 4.0 | Ready to use hardener based on Bayhydur® ultra 305. Easiest mixing and high gloss. |

Bayhydur® family



Hydrophilic-modified polyurethane hardener

| | TYPE | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY APPROX. | COMMENTS |
|--|----------|-------------------------|-------------------------------------|--|---------------------------|-----------------------|---|
| | | | | | | | |
| Bayhydur® 2858 XP | HDI/IPDI | 70 in PGDA | 500 | 13.3 | 315 | 3.4 | Ionically modified (sulfonic acid) ready-to-use hardener. Fast drying, easy mixing, high chemical resistance. |
| Bayhydur® 401-70 MPA/X | IPDI | 70 in MPA/X | 600 | 9.4 | 440 | 2.9 | Polyether-modified, standard type. Fast drying, good chemical resistance. |
| Bayhydur® 401-60 PGDA | IPDI | 60 in PGDA | 1,100 | 8.0 | 525 | 2.9 | Supply form of Bayhydur® 401-70 without aromatic solvents. |
| Bayhydur® XP 2759 | IPDI | 70 in MPA | 6,500 | 11.0 | 380 | 3.1 | Ionically modified (sulfonic acid). Fast drying, easy mixing, high chemical resistance. |
| Bayhydur® eco 701-90 NEW | PDI | 90 in PGDA | 5,000 | 17.9 | 232 | 3.6 | Ionically modified (sulfonic acid) crosslinker for 2K WB coatings containing renewable carbon. Highest chemical resistance, easy mixing and high gloss. |
| Bayhydur® quix 306-70 NEW | HDI/TDI | 70 in MPA | 250 | 13.5 | 311 | 3.3 | Fastest drying and good chemical resistance, specially designed for wood coatings. |



Desmodur® D family

Hydrophilic hardener for largely pH-neutral aqueous polymer dispersions in adhesive applications. Desmodur® ultra qualities perform with < 0.1% monomer content.

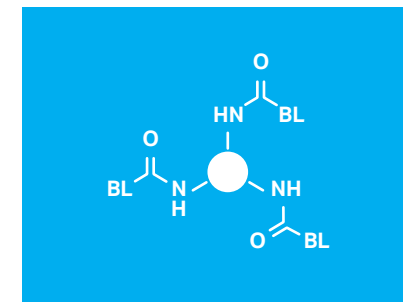


| Hydrophilic-modified polyurethane hardener | TYPE | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | COMMENTS |
|--|------|-------------------------|-------------------------------------|--|---------------------------|---|
| | | | | | | |
| Desmodur® ultra DA-L | HDI | 100 | 3,000 | 20.0 | 210 | Crosslinking agents for OH-functional dispersions, e.g., polyurethane, polyvinyl acetate, polyacrylate or synthetic rubber dispersions. Improved resistance to heat, water, plasticizers and many solvents. |
| Desmodur® ultra DN | HDI | 100 | 1,250 | 21.8 | 195 | |

| Hardeners for latent-reactive adhesives | TYPE | SUPPLY FORM APPROX. [%] | Tg [°C] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | COMMENTS |
|---|------|-------------------------|---------|--|---------------------------|---|
| | | | | | | |
| Desmodur® Z 2589 | IPDI | micronized powder | 65 | 17.0 | 250 | After suitable deactivation, Desmodur® Z 2589 can be used in combination with Dispercoll® U as a curing component for one-component latent-reactive polyurethane dispersion adhesives, for the formulation of latent-reactive adhesive layers or for the formulation of latent-reactive film. |
| Dispercoll® BL XP 2514 | TDI | 40 in water | | 9.0 | 465 | Dispercoll® BL XP 2514 can be used as the crosslinking component in combination with Dispercoll® U for the formulation of one-component, latent-reactive polyurethane dispersion adhesives. |

Desmodur® BL family

Solvent-borne grades for 1K PU stoving systems with high-performance properties. The aliphatic grades are light-stable and weather-resistant.

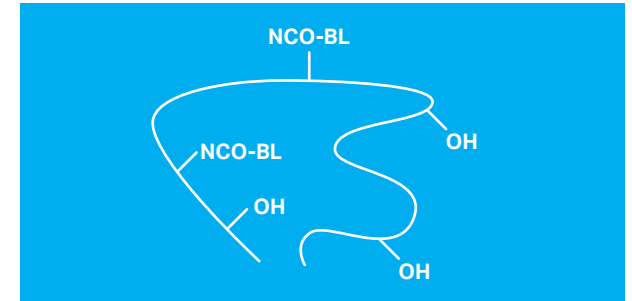


Thermally activated polyurethane hardener

| | TYPE | BLOCKING AGENT | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | EQUIVALENT WEIGHT APPROX. | CALCULATED BLOCKED NCO CONTENT ON SUPPLY FORM APPROX. [%] | COMMENTS |
|----------------------------|---------------------|----------------|-------------------------|-------------------------------------|---------------------------|---|--|
| | | | | | | | |
| Desmodur® BL 3475 | HDI/IPDI | DEM | 75 in SN/BA | 1,000 | 510 | 8.2 | Highest reactivity, transesterification of blocking agent. |
| Desmodur® BL 3370 | HDI | DEM/DIPA | 70 in MPA | 3,800 | 470 | 8.9 | Highest reactivity. |
| Desmodur® PL 340 | IPDI | DMP | 60 in BA/SN | 600 | 575 | 7.3 | Lower thermal yellowing, high chemical resistance. |
| Desmodur® PL 350 | HDI | DMP | 75 in MPA/SN | 4,300 | 400 | 10.5 | Lower thermal yellowing, more flexible. |
| Desmodur® BL 3575/1 | HDI | DMP | 75 in MPA/SN | 3,600 | 400 | 10.5 | Lower thermal yellowing and lowest color value. |
| Desmodur® BL 3175 | HDI | MEKO | 75 in SN | 3,300 | 380 | 11.1 | Standard grade, more flexible. |
| Desmodur® BL 4265 | IPDI | MEKO | 65 in SN | 11,000 | 520 | 8.1 | Standard grade, high chemical resistance, higher hardness. |
| Desmodur® BL 5375 | H ₁₂ MDI | MEKO | 75 in SN/MPA | 4,000 | 470 | 8.9 | Highest flexibility, as additive for stoving systems to improve flexibility and adhesion. |
| Desmodur® BL 2078/2 | IPDI | ε-CAP | 60 in SN | 1,750 | 600 | 7.0 | Polyurethane crosslinker with Food Contact Notification, FCN No. 695*, used as additive to improve performance of polyester/melamine coatings for interior can coatings, higher film thickness possible. |
| Desmodur® BL 3272 | HDI | ε-CAP | 72 in MPA | 2,700 | 410 | 10.2 | Higher film thickness possible. |
| Desmodur® BL 1100/1 | TDI | ε-CAP | 100 | 43,000 | 1,400 | 3.0 | 1K stoving primer with high film thickness and good stone-chip resistance, coil coating primer in combination with cycloaliphatic diamines for 1K stoving primers possible. |
| Desmodur® BL 1265/1 | TDI | ε-CAP | 65 in MPA/X | 20,000 | 875 | 4.8 | 1K stoving primer for stone-chip resistance primer (hard elastic), coil coating primer, combination partner for Desmodur® BL 1100 to improve hardness and cold-resistance. |

* See page 7

Bayhytherm® / Desmotherm®



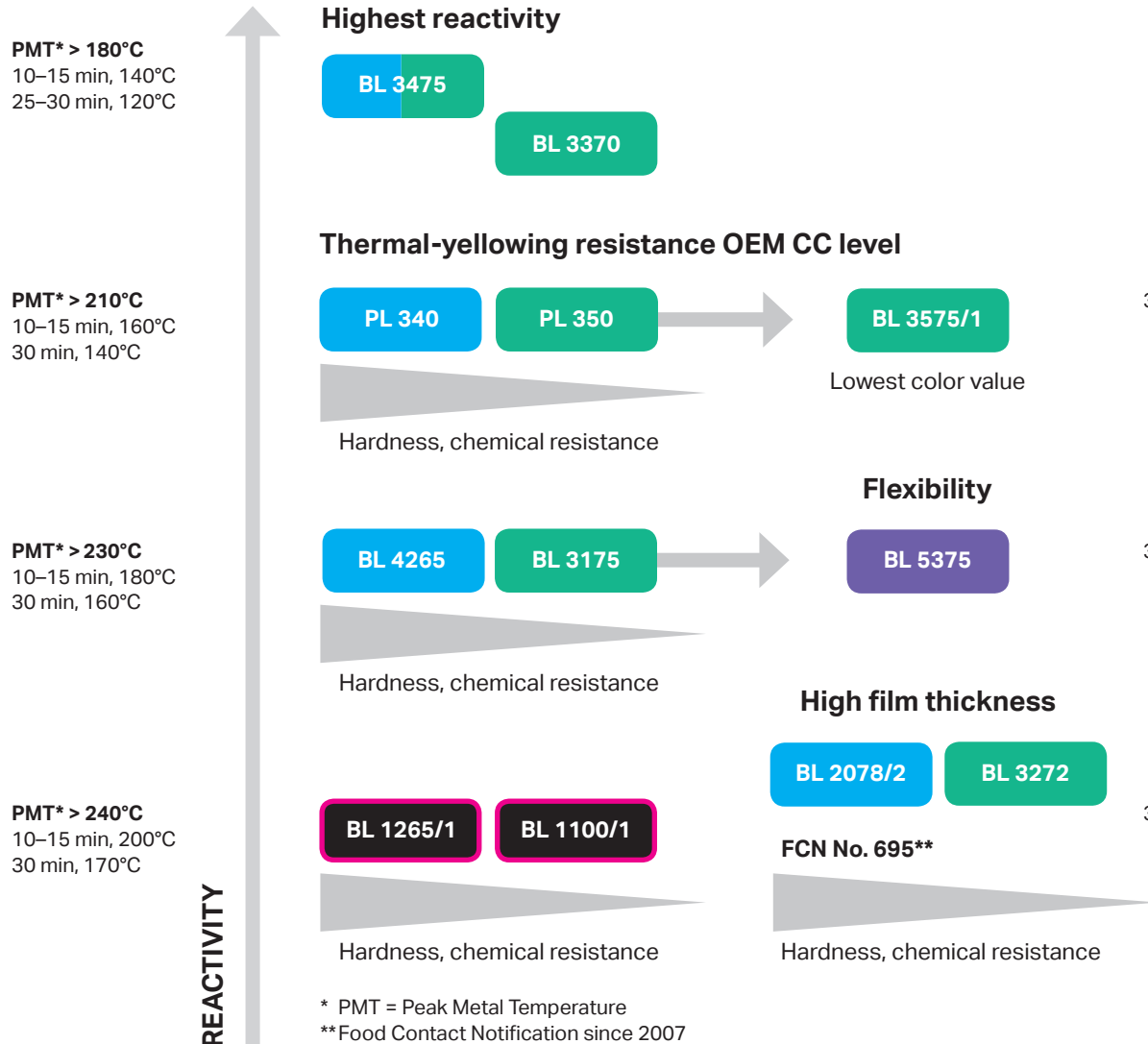
Self-crosslinking urethane resin

| | | TYPE | BLOCKING AGENT | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | COMMENTS |
|---------------------------|------------|------|----------------|-------------------------|-------------------------------------|---|
| Bayhytherm® 3246/1 | NEW | HDI | DMP | 46 in water/PnB/SN | 800 | For waterborne 1K PUR stoving coatings. |
| Desmotherm® 2170 | | MDI | DEM | 70 in BA/SN/IB | 2,000 | For solvent-borne 1K PUR stoving coatings (primer and primer surfacer). |

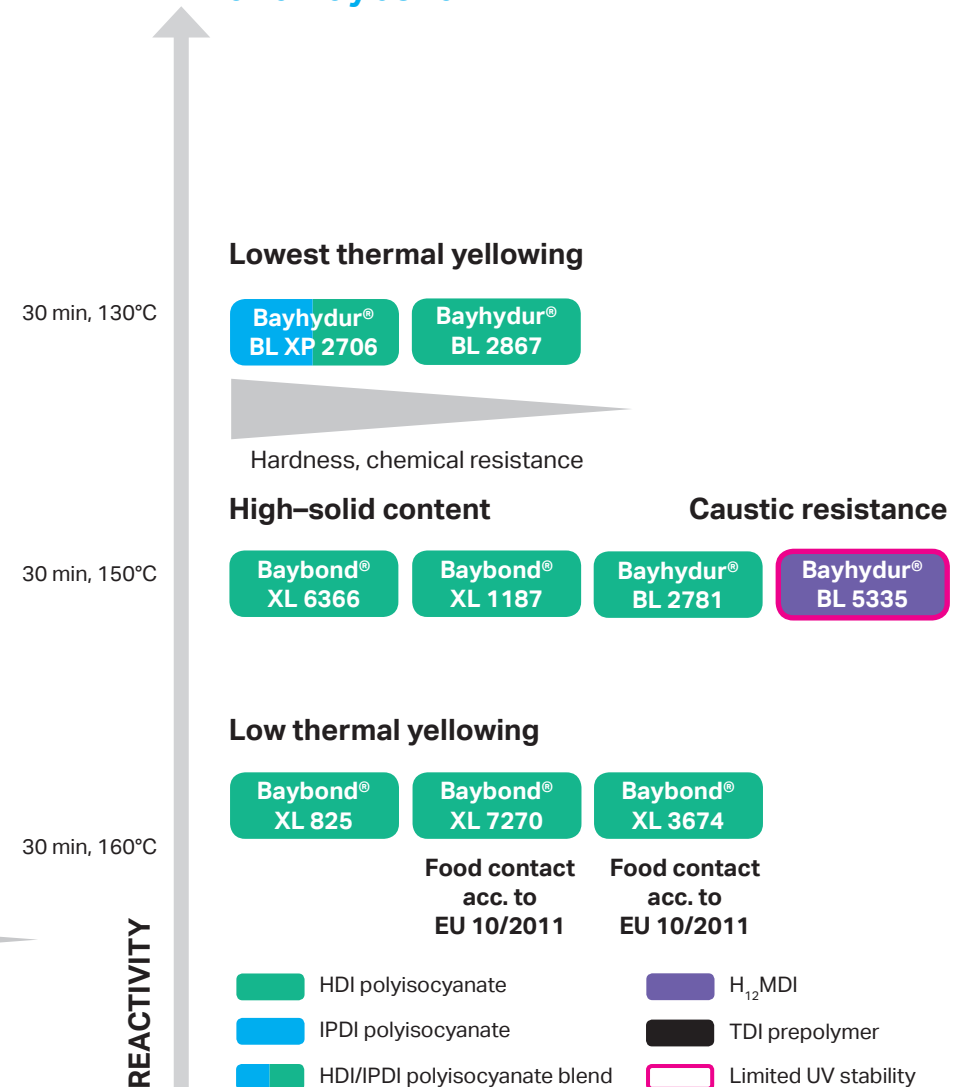


Thermally activated PU hardeners Desmodur® BL / Bayhydur® BL / Baybond® XL

Solvent-borne Desmodur® BL

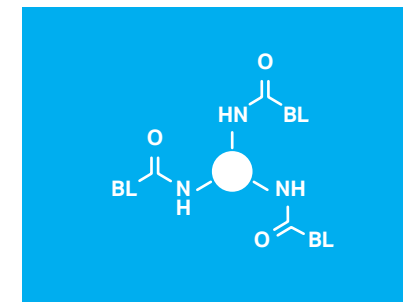


Waterborne Bayhydur® BL and Baybond® XL



Bayhydur® BL and Baybond® family

Waterborne grades for water-based 1K PU stoving systems with high-performance polyurethane properties. The aliphatic grades are light-stable and weather-resistant.



Thermally activated polyurethane hardener

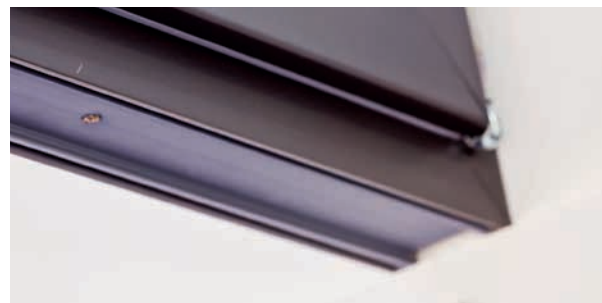
| | TYPE | BLOCKING AGENT | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | EQUIVALENT WEIGHT APPROX. | CALCULATED BLOCKED NCO CONTENT ON SUPPLY FORM APPROX. [%]/(ON RESIN [%]) | COMMENTS |
|---|-----------------------------|----------------|-------------------------|-------------------------------------|---------------------------|--|--|
| | Bayhydur® BL XP 2706 | HDI/IPDI | DMP | 40 in water | < 2,500 | 1,275 | 3.3/(8.2) |
| Bayhydur® BL 2867 NEW | HDI | DMP | 38 in water | < 1,500 | 960 | 4.4/(11.5) | High reactive, good chemical resistance, high flexibility and outstanding adhesion. |
| Bayhydur® BL 2781 NEW | HDI | MEKO | 37 in water | 4,900 | 1,200 | 3.5/(9.5) | High flexibility, good adhesion. Neutralized with DMEA. |
| Bayhydur® BL 5335 | H ₁₂ MDI | MEKO | 35 in water/MPA/X | < 200 | 1,680 | 2.5/(7.1) | High flexibility, Caustic resistance, limited UV stability. |
| Baybond® XL 6366 | HDI | MEKO | 45 in water | < 200 | 975 | 5.6/(12.5) | High solid content, high flexibility. |
| Baybond® XL 1187 NEW | HDI | MEKO | 30 in water | < 200 | 1,450 | 2.9/(9.8) | High particle size, flexible and non-ionic characters. |
| Baybond® XL 825 | HDI | ε-CAP | 30 in water | < 200 | 1,400 | 3.0/(10.0) | Low thermal yellowing, improved impact strength, adhesion and flexibility. |
| Baybond® XL 7270 | HDI | ε-CAP | 30 in water | < 100 | 1,000 | 3.9/(13.1) | Low thermal yellowing, improved impact strength, adhesion and flexibility, food contact acc. to EU 10/2011.* |
| Baybond® XL 3674 | HDI | ε-CAP | 30 in water | < 200 | 1,310 | 3.2/(10.7) | Food contact acc. to EU 10/2011.* |

Waterborne carbodiimide crosslinker

| | TYPE | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | FUNCTIONAL GROUPS APPROX. | EQUIVALENT WEIGHT APPROX. | |
|--|--------------------------|-------------------------|-------------------------------------|---------------------------|---------------------------|-----|
| | Desmodur® XP 2802 | Carbodiimide | 40 in water | 30 | 1 mmol - N = C = N - /g | 210 |

Crelan® family

Solid blocked polyisocyanate crosslinkers for polyurethane powder coatings with high chemical resistance and smooth surfaces.



Powder hardeners

| | TYPE | SUPPLY FORM APPROX. [%] | T _g [°C] | EQUIVALENT WEIGHT APPROX. | STANDARD BAKING CYCLE | COMMENTS |
|---------------------------|---|----------------------------|---------------------|------------------------------|--------------------------|---|
| Crelan® EF 403 | Internally blocked linear IPDI polyisocyanate | Flakes | 40–55 | 310 | 15 min at 180°C | For emission-free powder coatings with outstanding leveling and pigment wetting and for special one-shot matte coatings. |
| Crelan® UI | Blocked linear IPDI polyisocyanate | Flakes | > 60 | 365 | 15 min at 180°C | For powder coating with good leveling and good pigment wetting or to improve coating properties of hybrid systems. |
| Crelan® VP LS 2256 | Blocked linear IPDI polyisocyanate | Flakes | 48–58 | 280 | 15 min at 180°C | For high chemical resistance powder coatings with easy-to-clean properties and standard powder coatings with good overall properties. |

Desmocap® family

Blocked aromatic urethane resins for flexibilization of epoxy systems.

| Blocked TDI prepolymers | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | COMMENTS |
|---|----------------------------|--|---|
| | | | |
| Desmocap® 14 CNB NEW | 100 | 30,000 | For elastic coatings and sealants; for flexibilization of epoxy resins. Target applications: industrial flooring, parking decks. Alternative to Desmocap® 11: cashew nut shell liquid as blocking agent. |
| Desmocap® 12 | 100 | 40,000 | For elastic coatings and sealants; for flexibilization of epoxy resins. Stronger flexibilizing effect than Desmocap® 11. Target applications: industrial flooring, parking decks, pourable joint sealants. |
| Desmocap® 11 | 100 | 100,000 | For elastic coatings and sealants; for flexibilization of epoxy resins. Target applications: industrial flooring, parking decks. |
| Desmocap® 1190 | 90 in Adimoll® DO | 30,000 | For elastic coatings and sealants; for flexibilization of epoxy resins. Target applications: industrial flooring, parking decks. |



Luft-Wasser
Wärmtauscher

GEA Ecoflex

Luft-Wasser
Wärmtauscher 10

Desmodur® R family

Hardeners for reactive, high-performance 2K PUR industrial adhesives.



Desmodur® R: color of the dried adhesive film

| | TYPE | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | NCO CONTENT ON SUPPLY FORM APPROX. [%] | EQUIVALENT WEIGHT APPROX. | COMMENTS |
|---------------------------|---|-------------------------|-------------------------------------|--|---------------------------|---|
| Desmodur® RC | TDI isocyanurate | 35 in EA | 3 | 7.0 | 600 | Especially pale-colored adhesives. |
| Desmodur® ultra RN | TDI/HDI isocyanurate | 40 in EA | 11 | 7.2 | 585 | Especially pale-colored adhesives. Lower discoloration. |
| Desmodur® RE | Triphenylmethan-4,4',4''-triisocyanate | 27 in EA | 3 | 9.3 | 450 | Highly effective crosslinker for adhesives based on Desmocoll®, natural or synthetic rubber. Suitable as primer on metal substrates. |
| Desmodur® RFE | Tris (p-isocyanatophenyl) thiophosphate | 27 in EA | 3 | 7.2 | 583 | Crosslinker with very universal suitability for adhesives based on Desmocoll®, natural or synthetic rubber. Suitable as primer on glass substrates. |



Desmodur® monomers

Covestro is the leading company that offers you the complete range of aliphatic and aromatic monomeric diisocyanates (monomers) as well as oligomeric isocyanates (polyisocyanates) and NCO-functional prepolymers. Especially the monomers are widely used as building blocks

- to create a diverse portfolio of polyurethane dispersions (PUDs),
- to modify acrylic/alkyd polymer to improve properties such as faster drying or better UV stability,
- to create urethane acrylates or use them for other urethanizations,
- to create a diverse portfolio of thermoplastic polyurethanes (TPU) with different characteristics,
- to create a diverse portfolio of low and high Tg-cast polyurethanes (CPU) with different characteristics for industrial CPUs, electrical encapsulation, label doming etc.

| | TYPE | EQUIVALENT WEIGHT APPROX. | | FUNCTIONALITY | COLOR INDEX [HAZEN] | COMMENTS |
|--------------------|---------------------|-------------------------------------|-----|---------------|---------------------|--|
| | | VISCOSITY AT 23°C APPROX. [mPa · s] | | | | |
| Desmodur® H | HDI | 3 | 84 | 2 | ≤ 30 | Raw material for Desmodur® N family, building block. |
| Desmodur® I | IPDI | 10 | 111 | 2 | ≤ 30 | Raw material for Desmodur® Z family, building block. |
| Desmodur® W | H ₁₂ MDI | 30 | 131 | 2 | ≤ 30 | Building block. |



Desmodur® L family

Aromatic crosslinker for coatings and adhesives. Desmodur® ultra qualities perform with < 0.1% monomer content.



TDI-based crosslinkers

| | TYPE | VISCOSITY AT 23°C APPROX. [mPa · s] | | EQUIVALENT WEIGHT APPROX. | | FUNCTIONALITY APPROX. | GEL TIME WITH DESMOPHEN® 1300 X [h] | DRYING STAGE 3 WITH DESMOPHEN® 1300 X [min] DIN EN ISO 9117/5 | COMMENTS |
|-----------------------------------|--------------|--|----------------------------------|------------------------------|-----|--------------------------|--|--|---|
| | | SUPPLY FORM APPROX. [%] | NCO (SUPPLY FORM) APPROX. [%] | | | | | | |
| Desmodur® ultra L 75 | Adduct | 75 in EA | 1,600 | 13.3 | 315 | 2.7 | 9.5 | 240 | Ultra-low monomer grade of Desmodur® L 75. |
| Desmodur® L 75 | Adduct | 75 in EA | 1,600 | 13.3 | 315 | 2.7 | 9.5 | 240 | Crosslinker for use in anti-corrosion coatings, industrial coatings, wood and furniture finishes, concrete coatings as well as solvent-borne adhesives. |
| Desmodur® L 67 MPA/X | Adduct | 67 in MPA/X | 1,600 | 11.9 | 350 | 2.7 | 13 | 255 | |
| Desmodur® L 67 BA | Adduct | 67 in BA | 600 | 11.9 | 350 | 2.7 | 17 | 180 | |
| Desmodur® ultra IL BA | Isocyanurate | 51 in BA | 2,000 | 8.0 | 525 | 4.5 | 2 | 6 | Very hard and very fast-drying coatings for wood, furniture and paper. |
| Desmodur® ultra IL EA | Isocyanurate | 51 in EA | 700 | 8.0 | 525 | 4.5 | 3.5 | 5 | |
| Desmodur® ultra IL 1351 BA | Isocyanurate | 51 in BA | 1,300 | 8.0 | 525 | 4.5 | 2.5 | 6 | |
| Desmodur® IL 1451 BA | Isocyanurate | 51 in BA | 250 | 7.4 | 565 | 4.8 | 3 | 8 | See Desmodur® ultra IL 1351 BA but with improved compatibility. |

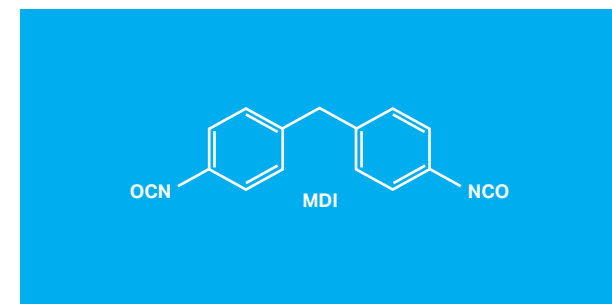
TDI-/HDI-based crosslinkers

| | TYPE | VISCOSITY AT 23°C APPROX. [mPa · s] | | EQUIVALENT WEIGHT APPROX. | | FUNCTIONALITY | GEL TIME WITH DESMOPHEN® 1300 X [h] | DRYING STAGE 3 WITH DESMOPHEN® 1300 X [min] DIN EN ISO 9117/5 | COMMENTS |
|------------------------|--------------|--|----------------------------------|------------------------------|-----|---------------|--|--|---|
| | | SUPPLY FORM APPROX. [%] | NCO (SUPPLY FORM) APPROX. [%] | | | | | | |
| Desmodur® HL BA | Isocyanurate | 60 in BA | 2,200 | 10.5 | 400 | 4.4 | 3 | 12 | Fast-drying coatings for wood, furniture, metal, plastic and paper with better elasticity than Desmodur® IL and better lightfastness. |
| Desmodur® HL EA | Isocyanurate | 60 in EA | 1,100 | 10.5 | 400 | 4.4 | 4 | 10 | |

These products represent only a selection of the TDI-based products primarily used in coating applications. Additional TDI-based products can be found, for example, on the Covestro CAS website: www.coatings.covestro.com

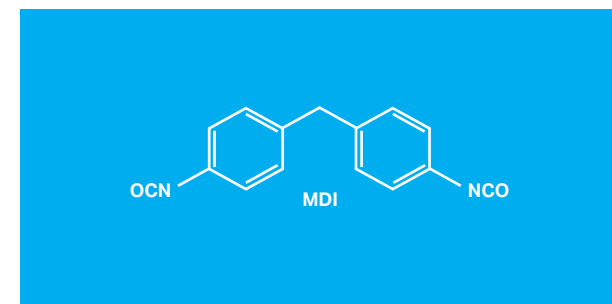
Desmodur® polymeric MDI products (pMDI)

For coatings and adhesives.



| For adhesives | VISCOSITY AT 25°C APPROX. [mPa · s] | NCO (SUPPLY FORM) APPROX. [%] | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY | GEL TIME WITH CASTOR OIL [min] | COMMENTS |
|---------------------------|--|----------------------------------|------------------------------|---------------|-----------------------------------|---|
| | | | | | | |
| Desmodur® VK 5 | 23 | 32.5 | 130 | 2.2 | 60 | Building block for prepolymers, high 2,4'-MDI content, good compatibility with polyethers. |
| Desmodur® VK 10 | 90 | 31.5 | 135 | 2.6 | 40 | 1K and 2K adhesives, high 2,4'-MDI content, low pMDI content, good compatibility with polyethers. |
| Desmodur® VK 10 L | 90 | 31.5 | 135 | 2.6 | 50 | 1K and 2K adhesives, high 2,4'-MDI content, low pMDI content good compatibility with polyethers, lower reactivity than Desmodur® VK 10. |
| Desmodur® VL R 10 | 120 | 31.5 | 135 | 2.8 | 45 | Standard 2K adhesives, low viscosity. |
| Desmodur® VKS 20 | 200 | 31.5 | 135 | 2.9 | 45 | Standard 2K adhesives, low acidity. |
| Desmodur® VKS 20 F | 200 | 31.5 | 135 | 2.9 | 40 | Standard 2K adhesives, high acidity. |
| Desmodur® 44V40 L | 300 | 31.0 | 135 | 3.0 | 50 | Standard 2K adhesives, high functionality. |
| Desmodur® 44V70 L | 680 | 31.3 | 135 | 3.2 | 50 | Standard 2K adhesives, highest functionality. |

Desmodur® polymeric MDI products (pMDI)



For coatings and membranes

| | VISCOSITY AT 25°C APPROX. [mPa · s] | NCO (SUPPLY FORM) APPROX. [%] | EQUIVALENT WEIGHT APPROX. | FUNCTIONALITY | GEL TIME WITH CASTOR OIL [min] | COMMENTS |
|-------------------------------|--|----------------------------------|------------------------------|---------------|-----------------------------------|---|
| | | | | | | |
| Desmodur® VL 50 | 23 | 32.5 | 130 | 2.2 | 60 | Very low viscosity; same applications as Desmodur® VL but better compatibility with polyethers and lower reactivity; more flexible. |
| Desmodur® VL 51 | 21 | 32.5 | 130 | 2.2 | 50 | Very low viscosity; same applications as Desmodur® VL but better compatibility with polyethers and lower reactivity; more flexible. |
| Desmodur® VP.PU 60RE11 | 21 | 32.5 | 130 | 2.2 | 45 | Very low viscosity; high 2-ring content. |
| Desmodur® XP 2551 | 66 | 32.0 | 130 | 2.5 | 50 | Crosslinker primarily for polyol emulsions. |
| Desmodur® VL | 90 | 31.5 | 135 | 2.6 | 40 | Crosslinker for 100% solids coatings, sealants and membranes. |
| Desmodur® VL R 10 | 120 | 31.5 | 135 | 2.8 | 45 | Higher reactivity than Desmodur® VL; for 100% solids spray coatings and membranes. |
| Desmodur® VL R 20 | 200 | 31.5 | 135 | 2.9 | 45 | Higher reactivity than Desmodur® VL; for 100% solids spray coatings and membranes. |
| Desmodur® VKS 20 F | 200 | 31.5 | 135 | 2.9 | 40 | Lower reactivity than Desmodur® VL R 20; for 100% solids coatings and membranes. |

Desmodur® prepolymers

Prepolymers based on aliphatic diisocyanates display good weather stability and are color-stable. These unique properties are important for applications such as corrosion protection or non-yellowing coatings and adhesives. Desmodur® ultra qualities perform with < 0.1% monomer content.



| Prepolymers based on HDI | NCO (SUPPLY FORM) APPROX. [%] | MONOMER CONTENT [%] | EQUIVALENT WEIGHT APPROX. | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | FUNCTIONALITY | DRYING TIME (MOISTURE CURING SYSTEM) 23°C/50% r.h. [min] | COMMENTS |
|--------------------------------|----------------------------------|---------------------------|------------------------------|----------------------------|--|---------------|--|---|
| | Desmodur® XP 2617 | 12.5 | < 0.5 | 335 | 100 | 4,250 | 2 | |
| Desmodur® E 2863 XP | 11.0 | < 0.3 | 380 | 100 | 1,350 | 2.2 | N/A | Highly elastic prepolymer for waterproofing membranes, floor coatings, suitable combination with aspartic esters. |
| Desmodur® XP 2599 | 6.0 | ≤ 0.3 | 700 | 100 | 2,500 | 4 | 3,500 | 2K coatings and 2K adhesives. |
| Desmodur® E 3265 MPA/SN | 10.4 | ≤ 0.26 | 405 | 65 in MPA/SN | 1,200 | 4.2 | 3,100 | Anti-corrosion coatings, good weather stability, non-yellowing, 1K application. |
| Desmodur® ultra E 3370 | 9.8 | ≤ 0.1 | 420 | 70 in MPA/SN | 1,400 | 4 | 4,900 | Anti-corrosion coatings, good weather stability, non-yellowing, 1K application. |

Prepolymers based on IPDI

| | | | | | | | | |
|----------------------------|-----|-------|-------|-----------|-------|---|---------|---|
| Desmodur® VPLS 2371 | 3.7 | < 2.0 | 1,100 | 100 | 9,800 | 2 | 11,500 | 1K construction coatings, 1K sealants. |
| Desmodur® XP 2406 | 2.8 | < 0.5 | 1,500 | 80 in MPA | 7,000 | 2 | > 5,800 | Elastic coatings and sealants with very good weather stability. |

Desmodur® prepolymers

Prepolymers are NCO-functional reaction products of aromatic or aliphatic isocyanates and polyols, such as polyethers or polyesters. The wide variability of the isocyanate content and functionality enables the viscosity of the prepolymers and the mechanical properties of the finished products to be precisely adjusted.



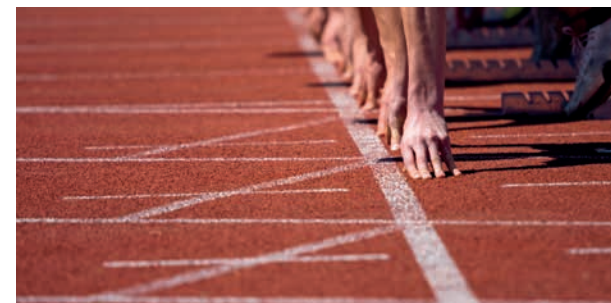
Prepolymers based on TDI

| | NCO (SUPPLY FORM) APPROX. [%] | EQUIVALENT WEIGHT APPROX | SUPPLY FORM APPROX. [%] | VISCOSITY AT 23°C APPROX. [mPa · s] | FUNCTIONALITY | MONOMER CONTENT [%] | DRYING TIME (MOISTURE CURING SYSTEM) 23°C/50% r.h. [min] | COMMENTS |
|-------------------------------|----------------------------------|-----------------------------|----------------------------|--|---------------|------------------------|--|---|
| | | | | | | | | |
| Desmodur® E 1361 MPA/X | 6.8 | 620 | 61 in MPA/X | 500 | 2.8 | ≤ 0.4 | 120 | Fast-drying 1K moisture-curing coatings. |
| Desmodur® E 1361 BA | 6.8 | 620 | 61 in BA | 250 | 2.8 | < 0.5 | 90 | Fast-drying 1K moisture-curing coatings. |
| Desmodur® E 1160 MPA/X | 5.4 | 780 | 60 in MPA/X | 550 | 3 | ≤ 0.4 | 740 | 1K moisture-curing coatings. |
| Desmodur® E 1660 | 5.3 | 790 | 60 in BA | 1,600 | 2 | < 0.5 | 25 | Very fast-drying 1K moisture-curing coatings in combination with other Desmodur® E types. |
| Desmodur® E 15 | 4.4 | 955 | 100 | 7,000 | 2 | < 0.5 | 2,800 | 2K elastic park deck coatings, 1K sealants. |
| Desmodur® E XP 2605/1 | 4.3 | 975 | 50 in BA | 250 | 3.7 | ≤ 0.4 TDI < 1.0 MDI | 25 | Very fast drying, for parquet and furniture. |
| Desmodur® E 14 | 3.3 | 1,270 | 100 | 6,800 | 2.5 | < 0.5 | 1,400 | 2K elastic park deck coatings, 1K sealants, flexibilization of anti-corrosion systems. |



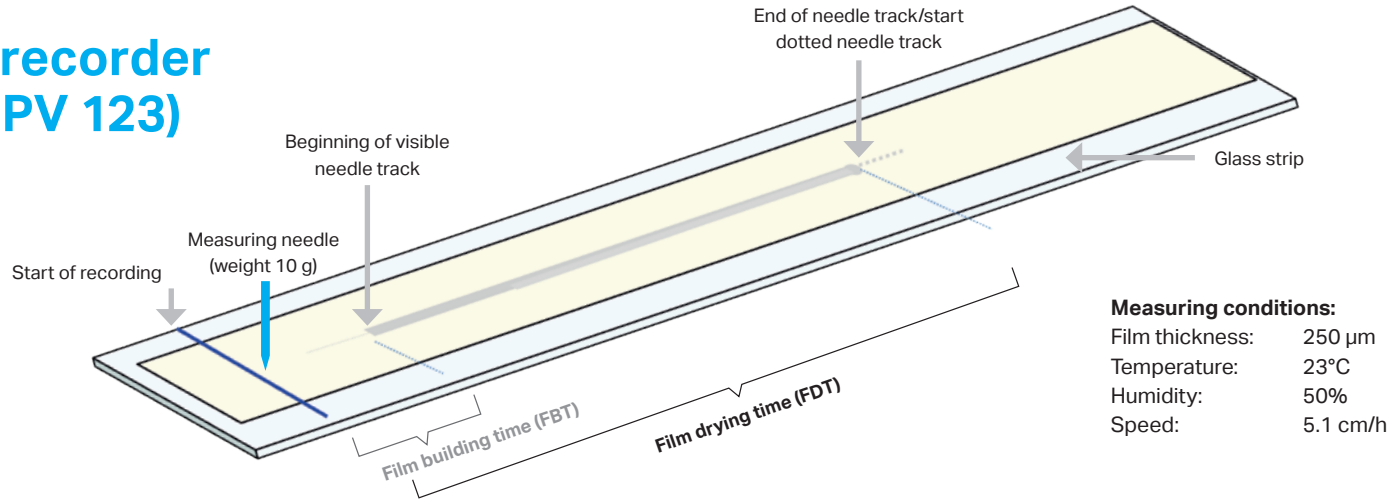
Desmodur® and Desmoseal® M

Prepolymers are the reaction products of aromatic or aliphatic isocyanates and polyols, such as polyethers or polyesters. The wide variability of the building blocks, isocyanate content and functionality enables the viscosity of the prepolymers and the mechanical properties of the final products to be precisely adjusted.

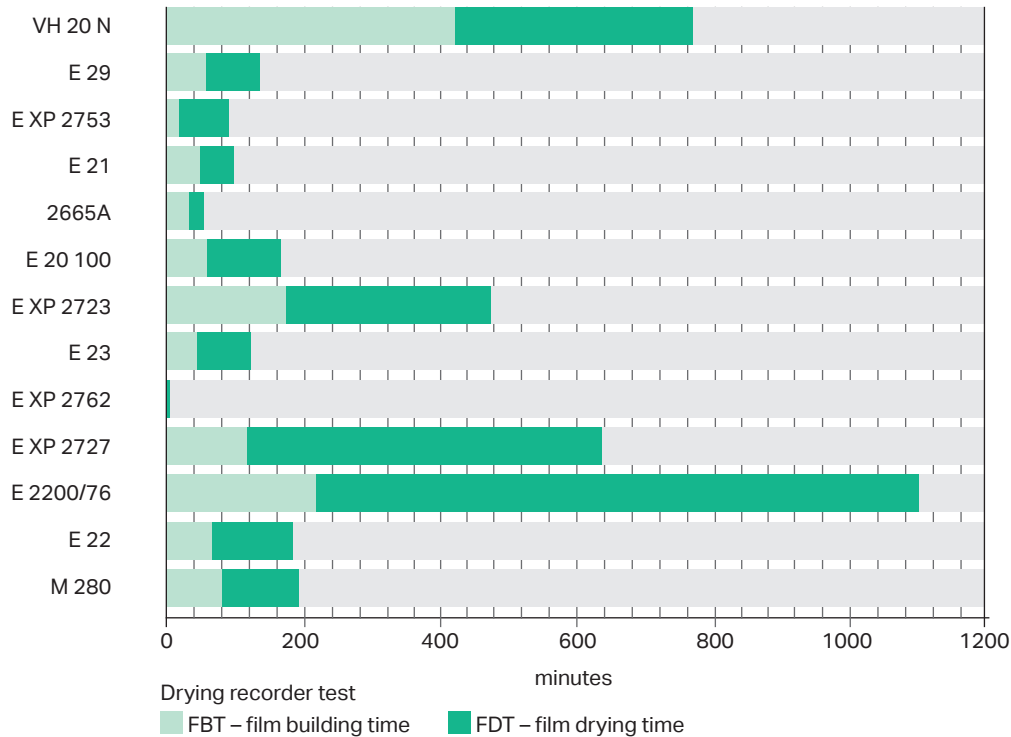


| Prepolymers based on MDI | NCO (SUPPLY FORM) APPROX. [%] | EQUIVALENT WEIGHT APPROX | VISCOSITY AT 23°C (* 25°C) APPROX. [mPa · s] | FUNCTIONALITY | DRYING TIME (MOISTURE CURING SYSTEM) 23°C/50% r.h. [min] | COMMENTS |
|-----------------------------|----------------------------------|-----------------------------|---|---------------|--|--|
| | | | | | | |
| Desmodur® VH 20 N | 24.5 | 173 | 280* | 2.1 | 770 | Gymnasium floors, storage-stable at low temperatures. |
| Desmodur® E 29 | 24.0 | 175 | 220* | 2.2 | 140 | 1K primer for flooring applications, binder for corrosion protection. |
| Desmodur® E XP 2753 | 21.5 | 195 | 400 | 2.2 | 100 | Corrosion protection, e.g., pipe coatings. |
| Desmodur® 2665A | 16.3 | 255 | 4,500* | 2.7 | 65 | 1C wood bonding (D4) – higher reactivity compared to E 21, 2K adhesives. |
| Desmodur® E 21 | 16.0 | 260 | 5,400* | 2.8 | 110 | 1K wood bonding (D4), 2K adhesives, binder for corrosion protection. |
| Desmodur® E 20100 | 15.7 | 265 | 1,100 | 2.0 | 180 | 1K resin for sealing of water-conveying cracks in structures above and below ground, raw material for injection systems. |
| Desmodur® E XP 2723 | 15.4 | 270 | 1,500* | 2.3 | 480 | 1K assembling adhesives, 2K adhesives. |
| Desmodur® E 23 | 15.4 | 270 | 1,800 | 2.1 | 130 | 1K wood bonding (D4), 2K flexible packaging adhesives, binder for corrosion protection. |
| Desmodur® E XP 2762 | 14.3 | 295 | 4,500 | 2.1 | 15 | 1K wood bonding (D4) – higher reactivity compared to E 23, 2K adhesives. |
| Desmodur® E XP 2727 | 15.3 | 275 | 800 | 2.0 | 640 | 1K and 2K binder for corrosion protection. |
| Desmodur® E XP 2715 | 15.1 | 280 | 950 (70°C) | 2.0 | – | Precursor for low monomer 1K PUR hot melts. |
| Desmodur® E 2190 X | 14.3 | 295 | 1,100* | 2.8 | 115 | 90% supply form of Desmodur® E 21 in xylene. |
| Desmodur® E 2200/76 | 9.9 | 425 | 2,750* | 2.0 | 1,100 | Flexible packaging. |
| Desmodur® E 22 | 8.6 | 490 | 2,800 | 2.0 | 190 | 1K bonding of rubber pellets, 2K adhesives. |
| Desmoseal® M 280 | 2.1 | 2,000 | 33,000 | 2.7 | 200 | 1K sealants, 1K elastic adhesives. |

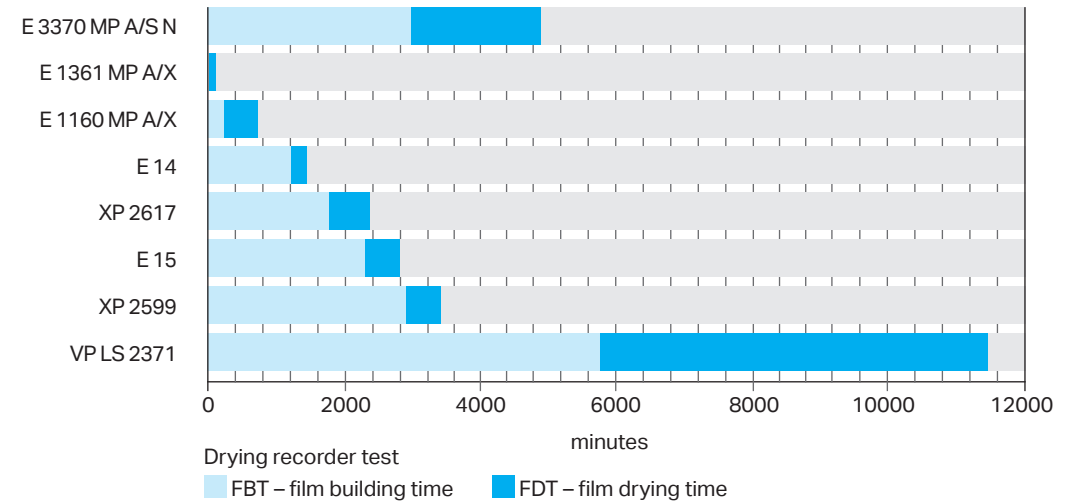
BK 10 drying recorder (test method PV 123)



NCO prepolymers for reactive adhesives: Reactivity of MDI-based prepolymers



NCO prepolymers for reactive adhesives: Reactivity of prepolymers based on TDI, HDI, IPDI



Desmoseal® S family

Silane-terminated polyurethanes (STP) combine the advantages of a polyurethane backbone and silane-based curing mechanism, such as excellent cohesive strength and good adhesion properties. They cover the complete application range from low modulus sealants up to structural adhesives.



| Silane-terminated polyurethanes | SOLID CONTENT [%] | PLASTICIZER | VISCOSITY AT 23°C APPROX. [mPa · s] | MOLECULAR WEIGHT | COMMENTS |
|--|-------------------|-------------|-------------------------------------|------------------|---|
| | | | | | |
| Desmoseal® S XP 2774 | 100 | – | 50,000 | Very high | For low modulus sealants with very high elongation. |
| Desmoseal® S XP 2636 | 100 | – | 40,000 | High | For low modulus sealants and elastic adhesives with high elongation. |
| Desmoseal® S XP 2458 | 90 | Mesamoll | 35,000 | Medium | Elastic adhesives and high-modulus sealants with medium elongation. |
| Desmoseal® S 2876 NEW | 100 | – | 25,000 | Medium | Elastic adhesives and high-modulus sealants with medium elongation. |
| Desmoseal® S XP 2749 | 100 | – | 5,100 | Low | For plasticizer-free adhesives with high hardness. |
| Desmoseal® S XP 2821 NEW | 100 | – | 20,000 | Low | For structural adhesives with high tensile strength and lap shear strength. |



Desmoseal® S XP 2774

For low-modulus sealants with excellent elastic recovery. Covestro offers a new starting formulation which has been classified according to ISO 11600–F–25 LM (ift Rosenheim*).



| | |
|--|--|
| Film drying time (drying recorder 100 µm wet) | 2:30 h |
| Shore A hardness according to DIN ISO 7619-1 | 20 |
| Elongation at break according to DIN 53504 | 800% |
| Tensile strength according to DIN 53504 | 3.0 N/mm ² |
| Tensile stress at 100% elongation according to DIN 53504 | 0.2 N/mm ² |
| Elastic recovery according to DIN EN ISO 7389 (B) | 74% |
| Resistance to flow according to DIN EN ISO 7390 | < 1 mm |
| Secant tensile modulus according to DIN EN ISO 8339 (23°C) (–20°C) | 0.32 N/mm ² 0.38 N/mm ² |
| Tensile properties at maintained extension according to DIN EN ISO 8340 | No failure |
| Adhesion/cohesion properties at variable temperatures according to DIN ES ISO 9047 | No failure |
| Adhesion/cohesion properties at maintained extension after water immersion according to DIN EN ISO 10590 | No failure |
| Loss of volume according to DIN EN ISO 10563 | 1.7% |

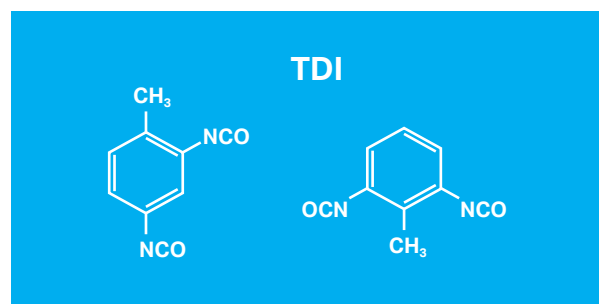


* Detailed information on formulation and ift test report available on request



Desmodur® monomers

For coatings and adhesives.



| Monomeric TDI products | NCO APPROX. [%] | 2,4-TDI CONTENT [%] | VISCOSITY AT 25°C APPROX. [mPa · s] | FUNCTIONALITY | EQUIVALENT WEIGHT | HC MAX./ACIDITY MAX. [mg/kg Cl]/[mg/kg HCL] | COMMENTS |
|---------------------------|-----------------|------------------------|--|---------------|----------------------|--|--|
| | | | | | | | |
| Desmodur® T 65 N | 48 | 67.0 | 3 | 2 | 87 | 100/40 | |
| Desmodur® T 80 | 48 | 80.5 | 3 | 2 | 87 | 100/40 | Stabilizer: Irganox® 1076 FD. |
| Desmodur® T 100 | 48 | ≥ 99.0 | 3 | 2 | 87 | 20/20 | Stabilizer: Irganox® 1076 FD. |
| Desmodur® T 100 SP | 48 | ≥ 99.0 | 3 | 2 | 87 | 50/50 | Stabilizer: Irganox® 1076 FD, for prepolymers with improved storage stability. |

| Monomeric MDI products | NCO APPROX. [%] | VISCOSITY AT 25°C APPROX. [mPa · s] | FUNCTIONALITY | EQUIVALENT WEIGHT | COMMENTS |
|-------------------------------|-----------------|--|---------------|----------------------|--|
| | | | | | |
| Desmodur® 44 M liquid | 33.6 | 4 (40°C) | 2.0 | 125 | Flexible packaging, hot melts, sealants; additional supply forms: fused and flakes. |
| Desmodur® 44 MC liquid | 33.6 | 4 (40°C) | 2.0 | 125 | Hot melts, sealants, prepolymers with improved storage and color stability; additional supply forms: fused and flakes. |
| Desmodur® LS 2424 | 33.6 | 12 | 2.0 | 125 | Flexible packaging, hot melts, approx. 55% 2,4'-MDI/45% 4,4'-MDI. |
| Desmodur® 2460 M | 33.6 | 12 | 2.0 | 125 | Flexible packaging, hot melts, approx. 55% 2,4'-MDI/45% 4,4'-MDI color stabilized. |
| Desmodur® CD-S | 29.5 | 35 | 2.1 | 142 | Hot melts, sealants, modified monomeric MDI, liquid at room temperature, storage-stable at low temperatures. |



Legend

Solvents

| | |
|-------|-----------------------------------|
| BA | Butyl acetate |
| SN | Solvent naphtha 100 |
| MPA | Methoxypropyl acetate |
| X | Xylene |
| EA | Ethyl acetate |
| PGDME | Dipropylene glycol dimethyl ether |
| PGDA | Propylene glycol diacetate |
| IB | Isobutanol |

Isocyanates

| | |
|---------------------|----------------------------------|
| HDI | Hexamethylene diisocyanate |
| IPDI | Isophorone diisocyanate |
| PDI | Pentamethylene diisocyanate |
| H ₁₂ MDI | Dicyclohexylmethane diisocyanate |
| TDI | Toluene diisocyanate |
| MDI | Diphenylmethane diisocyanate |

Blocking agents

| | |
|-------|---------------------|
| DEM | Diethylmalonate |
| DIPA | Diisopropylamine |
| DMP | Dimethylpyrazole |
| MEKO | Methylethylketoxime |
| ε-CAP | ε-Caprolactam |

Fast-lane access to polyurethane innovations

At Covestro, innovation is in our DNA. Ever since Otto Bayer discovered polyurethanes in 1937, we have been driving polyurethane innovations in coatings and adhesives as well as in other application areas. As our partner, you enjoy fast-lane access to polyurethane innovations, and can help us in developing the next generation of polyurethanes to meet the industry's upcoming challenges and needs. What can we offer you?

- Powerful know-how on both established and new polyisocyanates, as well as on new polyurethane hybrid technologies.
- The prospect of new application technologies to enable efficient processes.
- More sustainable, biomass- or CO₂-based materials that do not sacrifice high performance.

Join us to shape the future!







Covestro Deutschland AG
Business Unit Coatings,
Adhesives and Specialties
51365 Leverkusen
Germany

www.coatings.covestro.com
cas-info@covestro.com

This information and our technical advice – whether verbal, in writing or by ways of trial – are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. The information is provided by Covestro without assumption of any liability. If any of the above mentioned regulations change after the date of declaration, this declaration is no longer valid. Covestro will strive to keep this information up-to-date. Our advice does not release you from the obligation to verify the information provided – especially that contained in our safety data and technical information sheets –, to check for updates of any information provided by us and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

Edition: 2019 · Order No.: COV00086497 · Printed in Germany

