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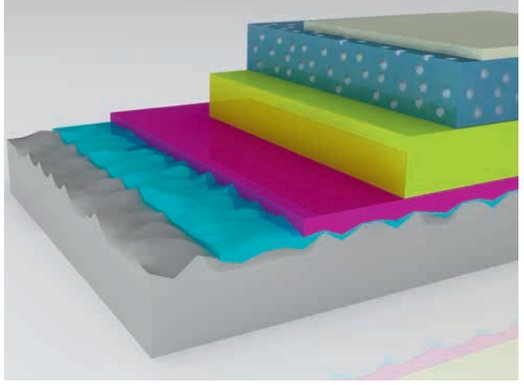
The State of the Art in Raw Materials for the Building & Construction Industry

**Bayhydrol® Bayhydur® Desmophen®
Desmodur® Desmocap® Desmoseal®**



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Bayhydrol® Bayhydur® Desmophen® Desmodur® Desmocap® Desmoseal®

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 CO_2 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.

Key trends in the construction industry

Key trends in the construction industry are influencing the market for protective building coatings:

- **More refurbishment and renovation:**
  In recent years, the construction market in Europe has experienced a clear shift from construction to renovation work. Whereas new buildings previously accounted for most construction work, it is now refurbishment and renovation.

- **Minimizing construction-site downtime:**
  The focus in many segments is increasingly on minimizing construction-site downtime and the associated loss of earnings for the owners or occupiers of buildings. These factors have led, among other things, to a greater demand for more efficient, long-lasting coating solutions.

- **Modular construction:**
  To support the above-mentioned trends, architects and construction companies are using more and more prefabricated building elements to shorten the time required at construction site and avoid possible mistakes made by workmen.

- **Greater efficiency and productivity for contractors:**
  Booming construction industries combined with the lack of skilled labor are intensifying the demand for more efficient construction processes. Innovative building chemical technologies can help to improve construction contractors' productivity.

- **Growing demand for decorative floorings:**
  As more and more end users call for customizable solutions, there is also a growing demand for high-class decorative floorings.

- **Expanding segments:**
  With the number of greenfield shopping centers, storage facilities and logistics depots continuing to rise, more and industrial and decorative floorings are required.

- **Stricter VOC regulations:**
  As stricter VOC regulations are introduced in Europe, there is a greater need for low- to zero-emission coatings.

- **Enhancing energy efficiency:**
  Most of the world's energy is consumed to heat or cool buildings. Fortunately, this is a sector where Covestro is making a significant contribution to enhancing energy efficiency. One solution to the increasing demand for more energy-efficient building shells is the use of high-quality movement or connection joint sealants.

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 poly-isocyanates, 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:

- **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 gamechanging 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/solvent-free!
- **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.

Stability, reliability and safety – with polyurethane raw materials

Since stability, reliability and safety are top priorities in the construction industry, the production of customized, high-quality construction materials has always been a key market segment for us. Consequently, we produce a comprehensive range of polyurethane raw materials for a wide range of applications in the construction industry. Covestro markets these polyurethane raw materials for manual coating, adhesive or sealant application on construction sites. Or they are used to manufacture sports and industrial flooring and coatings for roofs and many other specialist building applications. Whether they are enabling vehicle tires to grip on parking decks or simply protecting concrete patios from corrosion, the chemical formulation of polyurethane coatings can be adapted to meet your every need and, in special cases, even be enhanced with decorative designs.

This brochure explains why our products offer such outstanding quality, details the chemical properties of polyurethane products, and outlines the one- and two-component technologies used to manufacture multifunctional construction materials. These processes, along with polyurea technology, form the building blocks for the wide range of possible applications. We also describe numerous areas of application of our successful product technology, and show how the diverse capabilities of our polyurethanes can help you to resolve numerous demanding tasks.

From our position as Europe's leading manufacturer of polyurethane raw materials in both volume and technological terms, we are ideally placed to serve as your competent partner – not just through our extensive product portfolio but also through the comprehensive technical service we provide our customers in the construction industry.

All you need to know about polyurethane

Polyurethane is the term generally used for the product of reactions between polyisocyanates and polyalcohols, polyamines and/or water, whereby the latter can be in the form of liquid or moisture in the air. However, not every polyurethane formulation is suitable for the same areas of application, and careful distinctions have to be made.

With the exception of diphenylmethane diisocyanates (MDI), which are unique because of their low vapor pressure and correspondingly low volatility, monomeric diisocyanates such as toluene diisocyanates (TDI), hexamethylene diisocyanate (HDI) or isophorone diisocyanate (IPDI) are typically not used for coatings.

For industrial hygiene reasons only higher molecular weight polymers such as adducts, homopolymers, and prepolymers are used. In the production of polyurethane coating raw materials, the main goal is to achieve the lowest possible residual monomer content.

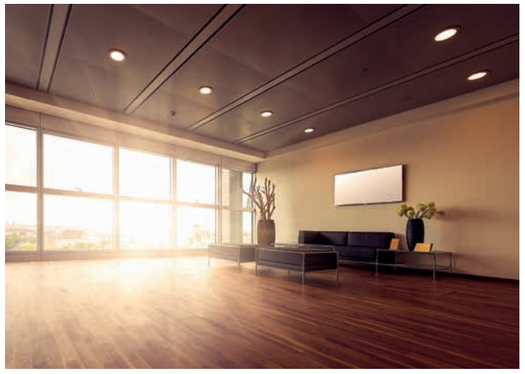
Coating materials also differ in the way they are processed. In the case of two-component (2K) technology, two components are mixed homogeneously prior to processing the structural protection product, resulting in a reaction mix that needs to be processed within a limited period of time. One-component (1K) technology, by contrast, requires no mixing to stimulate the reaction between a formulated polyisocyanate and moisture in the air, and thus permits long processing times.

2K polyurethane technologies

At Covestro, we supply three different types of 2K polyurethanes: 100% solids, solvent-based and water-based.

100% solids 2K polyurethanes

The use of 100% solids raw materials allows coatings of any thickness to be produced. With 2K polyurethane systems consisting of solvent-free polyalcohol (Desmophen®) and polyisocyanate (Desmodur®) components, it is the functionality of both these components, their molecular weight, and the chemical structure that are instrumental in determining the mechanical properties and resistance to chemicals of the reaction product. Low functionality (but of at least 2) and a high molecular weight, for example, produce plastic to elastic coatings with low chemical resistance. If, however, the functionality of reactants is high and their molecular weight low, the outcome is extremely hard coatings with excellent chemical resistance. 100% solids 2K polyurethane systems are usually hydrophobic. This largely prevents any competing chemical reaction with air moisture, which is to be avoided since it generates carbon dioxide. Although air moisture enters the reaction system through the addition of



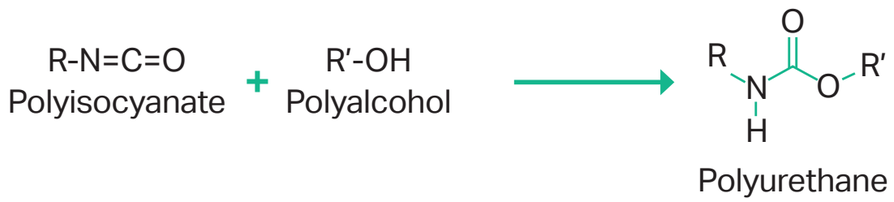
fillers and pigments, the use of water scavengers prevents the polyisocyanate coming into contact with it. Zeolites with an adsorbent effect are normally added. These types of standard polyurethane systems based on castor-oil polyalcohols and, where possible, modified polymer MDIs (Desmodur®) cure at temperatures between 5°C and 30°C, even at a relative humidity of over 90%. The result is a pore-free coating of high thickness and excellent surface quality. If higher color stability is required, aliphatic polyisocyanates based on HDI or IPDI (Desmodur® N) can be used.

Solvent-based 2K polyurethanes

The solvents used in these 2K polyurethane systems (Desmodur® and Desmophen®) limit the coating thickness and prevent foaming. However, it is also possible to use more hydrophilic substances whose viscosity can be set via the volume of solvent. Solvent-based 2K polyurethane systems are mainly used in the production of topcoats. The properties of these topcoats (e.g., gloss, abrasion resistance or chemical resistance) can be adjusted to meet your needs and wishes. The exceptional properties of this type of coating, and in particular its weathering resistance in outdoor applications, has reliably protected concrete surfaces from environment-related attacks for many years. Our decades of experience in selecting binder components and formulations enable properties to be customized to your specific requirements.

Water-based 2K polyurethanes

As with any polyurethane, hydroxyl groups have to react with isocyanate groups to produce water-based polyurethane coatings. This is the chemical basis. However, this particular process has one special feature: the binders consist of a water-based dispersion (Bayhydrol®) component and a hydrophilic polyisocyanate (Bayhydur®). This means that a secondary reaction takes place between the isocyanate groups and water. Urea groups are formed during this process. The scope of this reaction is much smaller than the reaction that produces polyurethane because the reaction rate is slower. In addition, the water evaporates from the coating film relatively quickly after application. Another benefit of 2K polyurethane technology is that the crosslinking reactions can be accurately controlled by selecting suitable raw materials and additives. Pot life and curing time can also be decoupled using internally activated dispersions. Final hardness can thus be reached much more quickly at the same pot life, or the hardening reaction can take place at lower temperatures.

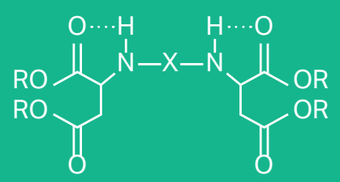


Innovative fast-curing 2K polyaspartic technology

At Covestro, we supply different types of 2K polyaspartics – from high solids to 100% solids.

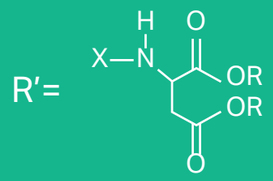
2K polyaspartics

2K polyaspartic coatings (Pasquick® technology) based on amine-functional polyaspartic acid esters (Desmophen® NH) and aliphatic polyisocyanates (Desmodur® N and E) combine the advantages of aliphatic 2K polyurethane technology with the fast-setting properties of polyurea technology. A variety of properties from flexible to hard can be achieved by selecting the right combination of binders and hardeners. In addition, this technology allows short curing times, even with a moderate working time. Furthermore, our technology allows formulations fulfilling the high requirements in line with indoor-air-quality regulations (AgBB).



General structure of aspartics

Aspartic **Aliphatic polyisocyanate** **Polyaspartic**



Reaction of aspartics with aliphatic polyisocyanate to give polyaspartics

Convenient 1K polyurethane technologies

1K moisture-curing polyurethanes

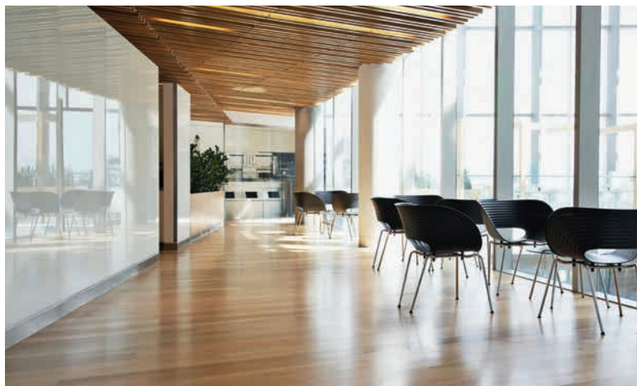
1K coatings react with water, which is present almost everywhere as substrate or air moisture. The second component needed for the hardening process is therefore delivered to your doorstep free of charge, so to speak. This avoids any uncertainty as to whether the two components are mixed homogeneously. Since carbon dioxide is produced during the hardening reaction, 1K polyurethane products based on this conventional process have to be used in low coating thicknesses, mostly in conjunction with solvents. This stops blisters forming in the coating. The use of latent hardeners triggers a type of chain reaction. Just one water molecule provides several reactive groups for the reaction with the latent hardener. As a result, less carbon dioxide is produced and significantly thicker coatings can be applied without blisters forming.

In view of the limited coating thickness, this technology is particularly suited to seals and impregnation. Depending on the prepolymer (aromatic, Desmodur® E grades) and low-viscosity aliphatic polyisocyanate (Desmodur® N) used, elastomer or duromer coating films with differing degrees of weathering resistance are formed. The underlying products penetrate well into absorbent substrates. Moreover, the end products are incredibly tough, abrasion-resistant, and highly resistant to water, chemicals and solvents.

1K polyurethane technology offers yet another attractive possibility – highly filled, mortar-like coatings that are used mainly without solvents. After hardening, these products form breathable, open-pore coatings with thicknesses of 4–10 mm. If required, a liquid-tight surface can also be created using an additional seal. Such products are commonly used in load-transforming topcoats and decorative gravels.

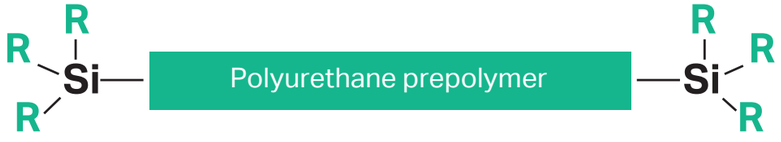
1K water-based polyurethane technology

1K water-based, high molecular weight, dispersed polyurethane can be easily applied on flooring, either manually or even industrially. The ease of application, rapid curing and good mechanical properties of these polyurethanes make them the standard technology for parquet coatings. Such systems allow formulations with low levels of VOC and good results in indoor air quality tests. Covestro supplies proven raw materials for water-based systems under the trade name Bayhydrol® UH. The combination of these products with a polyisocyanate hardener (Bayhydur®) leads to a still higher performance coating through the formation of polyurea on the surface. Highly hydrophilic polyisocyanate leads to an easy incorporation of the hardener into the polyols, resulting in highly transparent films.



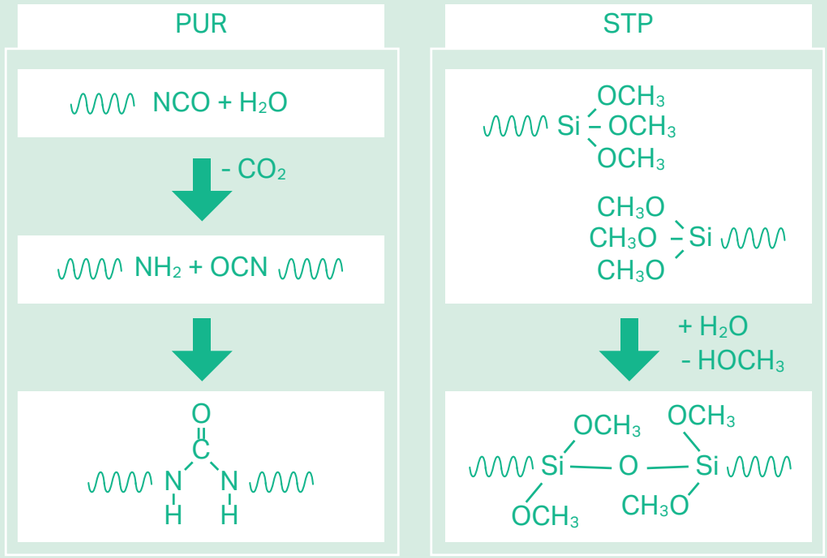
The best of both worlds – polyurethanes and silicones

Silane-terminated prepolymers (STPs) marketed under the Desmoseal® S trade name are the latest generation of polymers for moisture-curing elastic bondings and highly flexible sealants. They are based on a polyurethane prepolymer terminated by a specific and unique tri-functional alkoxy-silane end group.

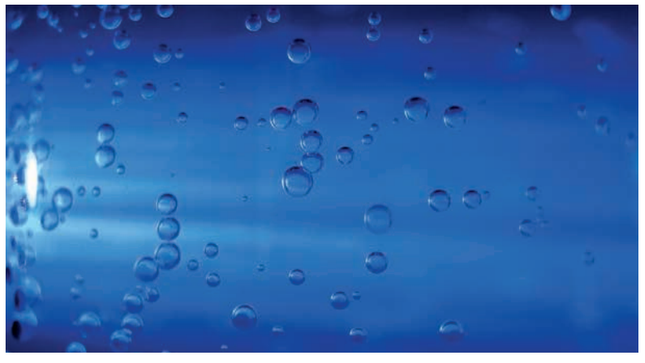


Representing so-called hybrid systems, they combine in an ideal way the advantages of poly-urethane chemistry with the chemistry of silicones in sealant and adhesive formulations.

Basic principles: crosslinking mechanism



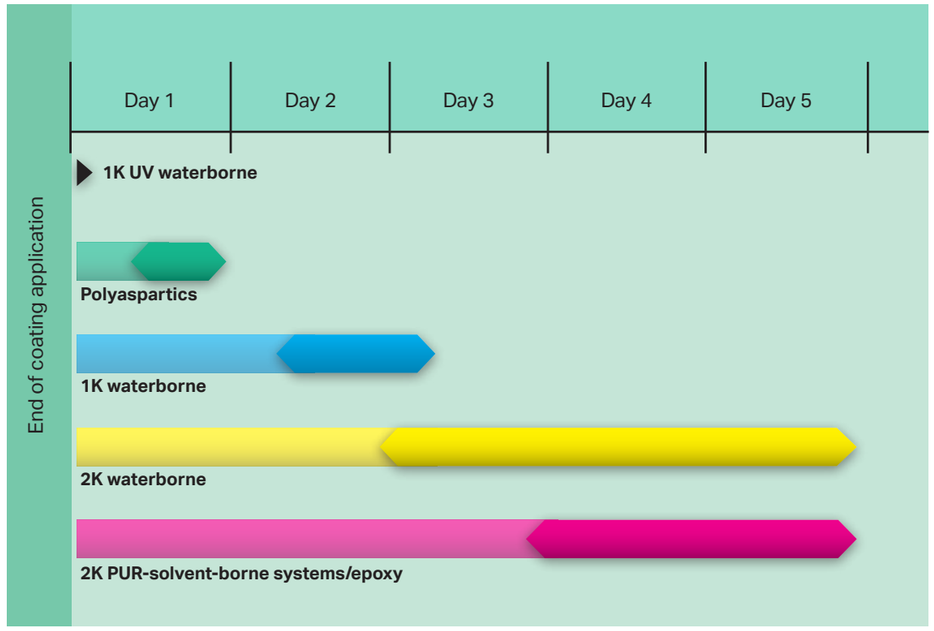
Highly productive UV technology



UV-curing polyurethane dispersions (Bayhydrol® UV) are the most promising technology where there is a need for a highly efficient coating system with a fast return-to-service of the floor.

Additional key benefits are the ease of application of a 1K waterborne system, low VOC emissions, and the high performance of the UV-crosslinked coating.

Time until ready for reuse of common on-site coating systems



Industrial flooring

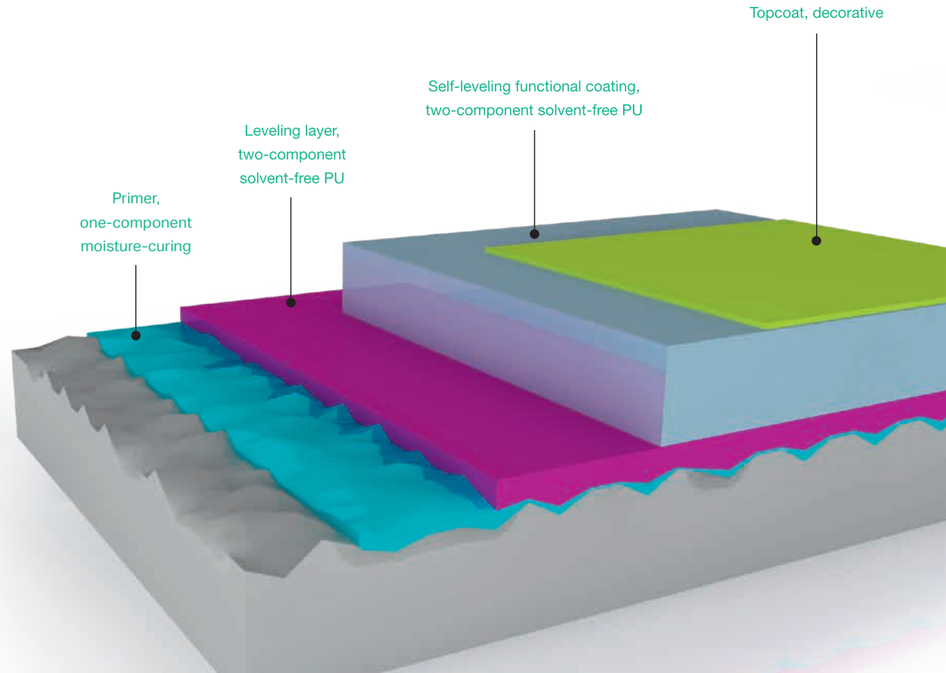
Outstanding quality for tough environments

Mechanical, dynamic and thermal stress, chemicals and water: industrial flooring in production plants and warehouses has to be extremely resistant. If the right quality standards are not met, any damage or signs of wear in the concrete substrate quickly become a safety risk, disrupt production routines and give rise to additional costs.

That is why industries such as automotive, food, pharmaceuticals, electrical engineering, metalworking and chemicals have been relying on tough to ultra-hard synthetic resin coating systems for years to provide effective protection for indoor floors exposed to extreme stresses. Thanks to a range of properties that is as broad as it is varied, polyurethane is increasingly the material of choice. Worldwide, around a quarter of the many millions of square meters of industrial flooring is coated with polyurethane as a durable and cost-effective solution.

Ease of cleaning and outstanding slip and abrasion resistance are exemplary qualities in all applications. Moreover, design-friendly polyurethane coatings can also be customized for industrial flooring to meet your specific requirements, e.g., in terms of electrical conductivity, antibacterial properties or emission behavior. What's more, the toughness of polyurethane systems even allows them be used to coat asphalt screeds.

Polyurethane coatings are capable of satisfying even the toughest of demands and thus make a substantial contribution to the long-lasting functionality of industrial flooring. They can be applied using common procedures, set new technical safety standards and even reduce machine noise – much to the delight of factory workers. And they also ensure that those omnipresent forklifts enjoy a good grip on factory floors.



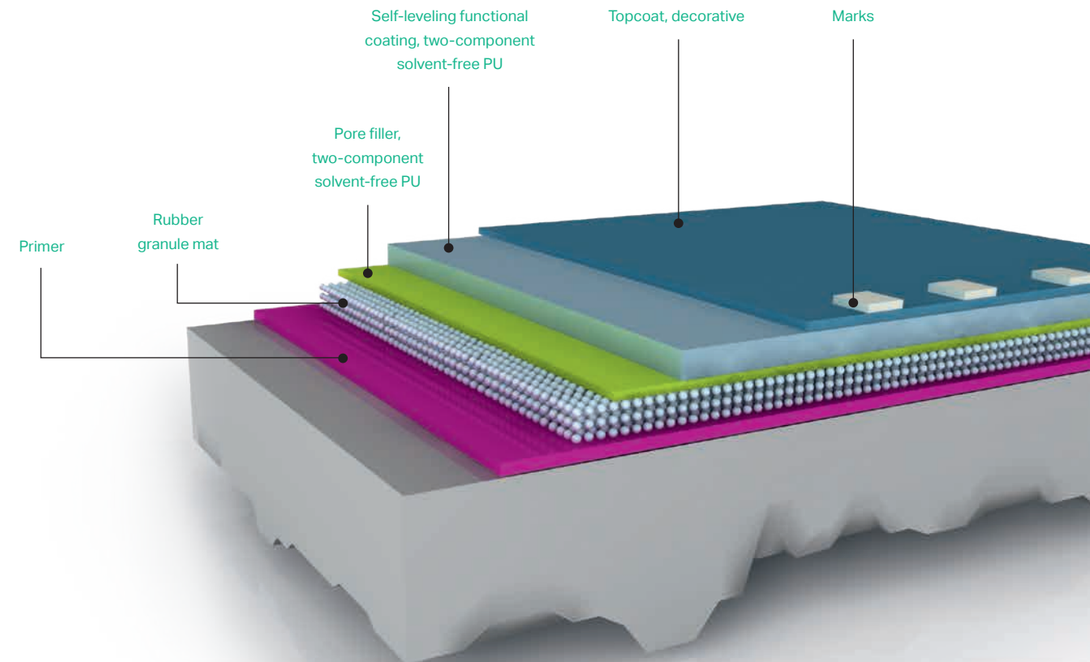
Sports flooring

A valuable and very sporty team player

Polyurethane is incredibly sporty for a plastic. When used as an elastic point or area covering for indoor or outdoor sports floors, smart polyurethane coatings ensure perfect bounce – a must-have quality for basketball or handball players, for example.

Track and field athletes also benefit from the optimal and customizable elasticity of polyurethane systems for sports halls and outdoor facilities. The good rebound properties and outstanding slip resistance of running surfaces coated in polyurethane systems help to enhance sporting achievements. Besides offering excellent elasticity, these largely wear-resistant polyurethane sports surfaces also greatly reduce the risk of injury – in any sport. Surfaces coated in this way provide excellent grip, go easy on the athletes' bodies, and cushion impact. Suitably formulated polyurethane coatings meet international quality standards for the use of plastic in sports flooring, and extend the service life of these surfaces. What's more, the variable hardness of polyurethane topcoats even meets strict physiotherapeutic requirements.

Polyurethane systems can also be used for multipurpose hall flooring. Here, multiple coatings are recommended to withstand the higher loads caused by mass events, table and chair legs, or stiletto heels. And should any damage occur, it can usually be repaired quickly and simply.



Decorative flooring

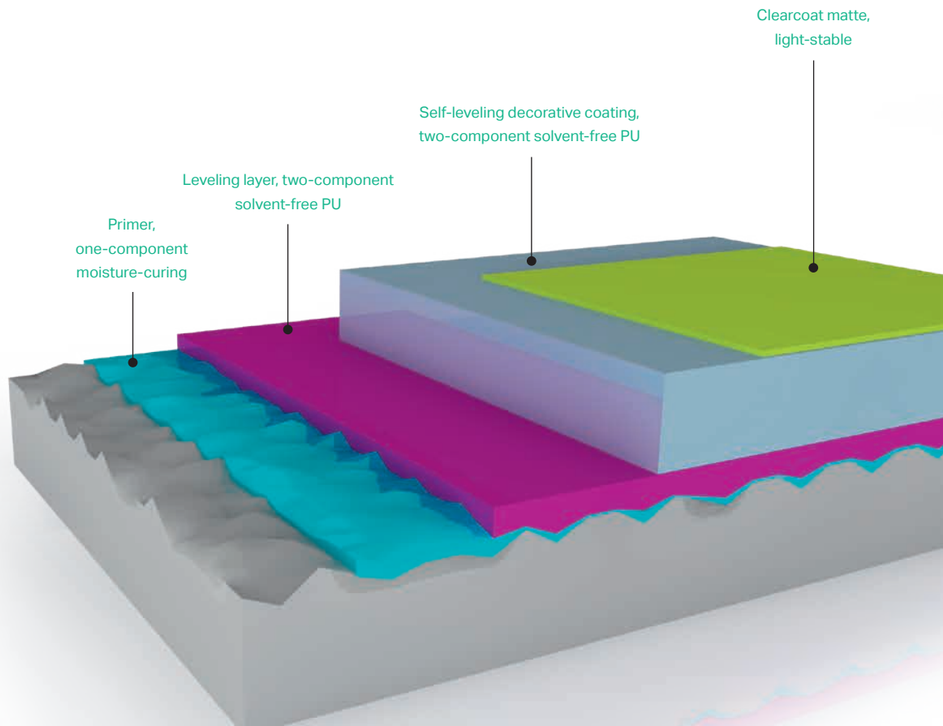
A treat for tired eyes

Ever greater demands are being made of flooring in public or commercial facilities, such as administrative buildings, offices, foyers, exhibition and concert halls, shops, and malls. And they are not just functional demands. Besides the usual considerations such as ease of cleaning, excellent durability, antiallergenic aspects, cost effectiveness and above-average safety, greater emphasis is now being placed on decorative features. As well as fulfilling their actual purpose, highly stressed large areas of flooring also have to look good.

The extensive properties of polyurethane/polyaspartics open up new possibilities for attractive and even highly artistic floor designs. Additional color chips or other design elements can easily be added to the transparent or single-color synthetic resin matrix during application.

This transforms what would otherwise be boring flooring into a stylishly designed "polyurethane carpet" that is jointless, colorful, non-yellowing and, above all, much more resilient than any textile counterparts.

Self-leveling polyurethane floor coatings allow you to combine all the advantages of polyurethane technology with decorative designs and a high degree of design flexibility. The outcome is real works of art that can withstand even heavy loads with barely a scratch thanks to the tough, impact- and chemical-resistant topcoat. And if any damage does occur, it can easily be repaired. As with other polyurethane floor coating, it just needs to be sanded down to the required level and resealed with a transparent coating.



Parking decks

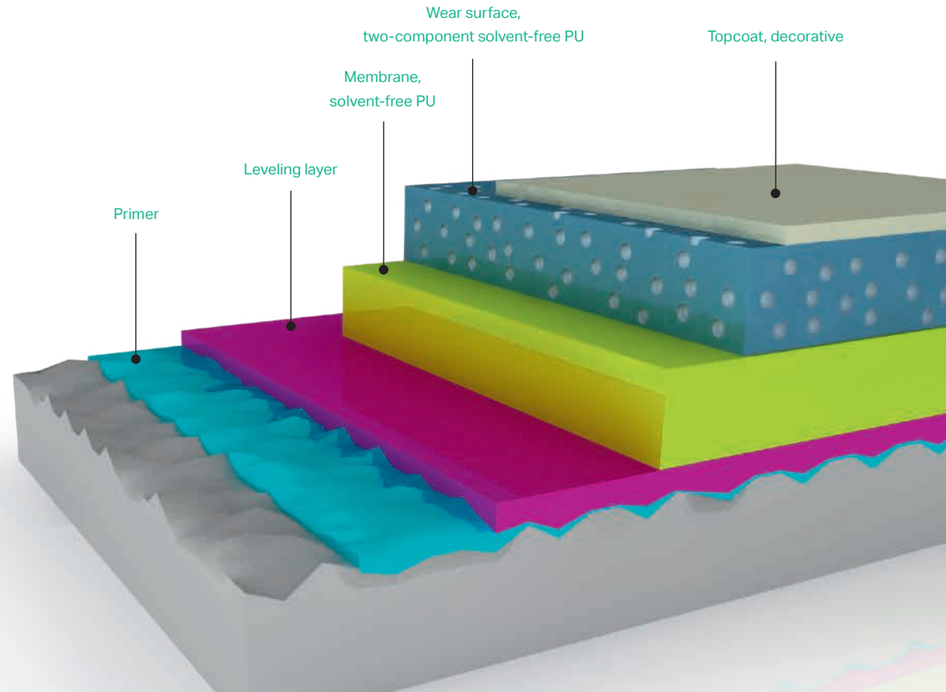
Strong and safe surfaces

At first glance you'd never think that the reinforced concrete floors of parking decks have a lot to put up with. But not only do they have to withstand the weight of cars; their lanes, entrances and exits also have to ensure vehicles can be driven safely at all times.

The exceptional slip resistance and high mechanical and dynamic load-bearing qualities of viscoplastic and abrasion-resistant polyurethane coatings make them the ideal solution for large-area application on parking deck substrates. Jointless and usually processed in combination with epoxy resin primers, they bridge the unavoidable cracks in concrete surfaces caused by consistently heavy loads while easily coping with road salt, automobile fluids, and rainwater. This ensures that the underlying steel structure is permanently protected against corrosion.

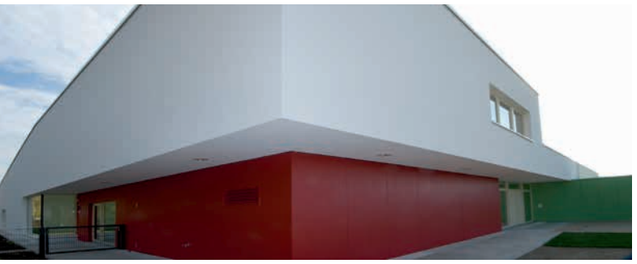
Since older cars tend to leak, the polyurethane coatings on parking decks are also useful in stopping harmful substances leaching into the soil and groundwater. So they protect the environment while providing excellent reliability, optimal surface grip even in rainy weather, no-fuss cleaning, and resistance to temperature changes and weather influences all year round. Operators of multistoried car parks thus have an extremely cost-effective technology at their disposal.

There is one more decisive advantage. While more costly high-tech systems are generally used on top and bottom decks in view of the greater stress caused by wind and weather, and on the lower levels due to more frequent parking, simpler solutions usually suffice on the intermediate levels. In each and every case, parking safety is ensured and comes complete with the wide range of decorative design options polyurethane offers.



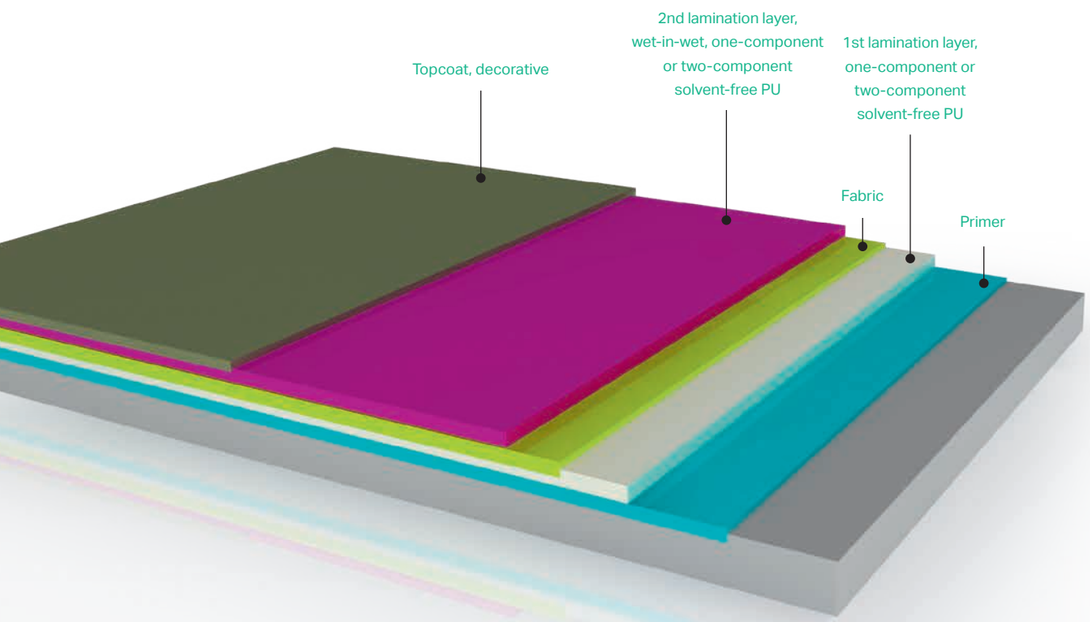
Flat roofs

Sleep soundly under a secure roof



What would a house be without a roof? By protecting the inhabitants from wind and weather, rain, frost and snow, it is a key guarantee for cozy security. That's why it's all the more important to protect the roof itself from harmful external influences by means of elastic polyurethane coating systems based on raw materials from Covestro. Flexible even at high and low temperatures, crack bridging, and consistently waterproof despite good water vapor transmission, roofing applications show polyurethane at its very best.

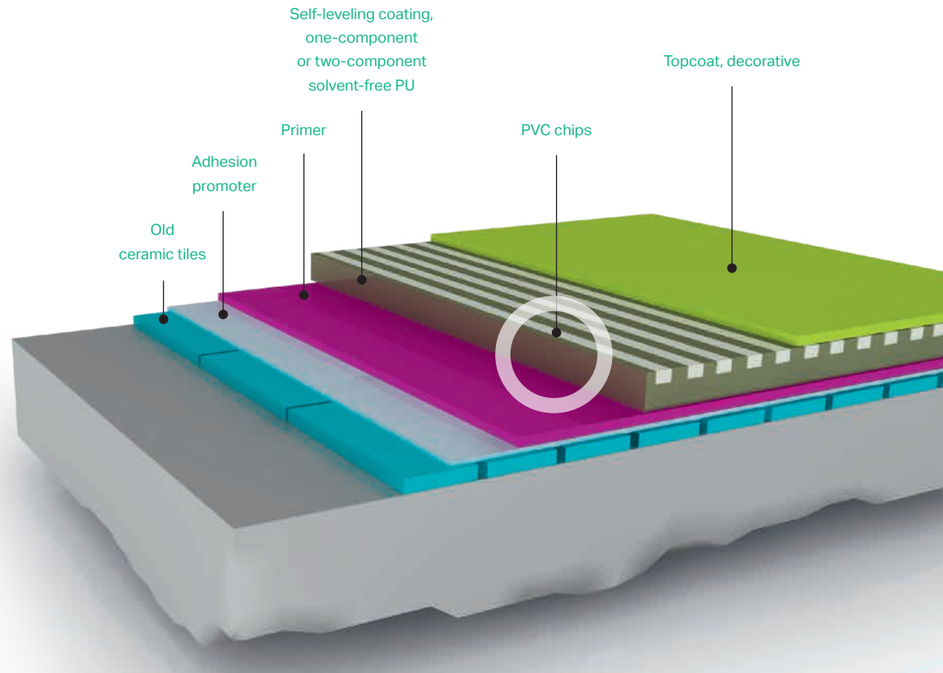
With customized formulations that meet the relevant international, national or regional legal standards, flame-retardant polyurethane coatings also help to enhance the safety of buildings. And by using light-resistant, non-yellowing raw material components, they also reflect some of the sun's rays. In a nutshell, polyurethane flat roof seals play a major role in prolonging the life of real estate and thus boost its usability and resale value.



Balconies & patios

A climate-stable fountain of youth

Like roofs, balconies and patios are exposed to fluctuating climatic conditions – not only day and night, but also from season to season. Load-bearing concrete substrates and their steel reinforcements can be effectively protected against corrosion caused by moisture penetration and also given a design boost by applying an all-over layer of polyurethane membranes. In addition to exemplary weathering stability, the mechanical resistance of the protective coating is particularly important. On the one hand, it has to ensure that balcony chairs and tables do not damage the coating; on the other hand, the higher slip resistance required for greater safety should not mean the furniture sticks to the floor. Meeting both demands is absolutely no problem with polyurethane coatings. And if the owner opts for a light-fast aliphatic system, it will also provide added protection against premature aging by the sun.

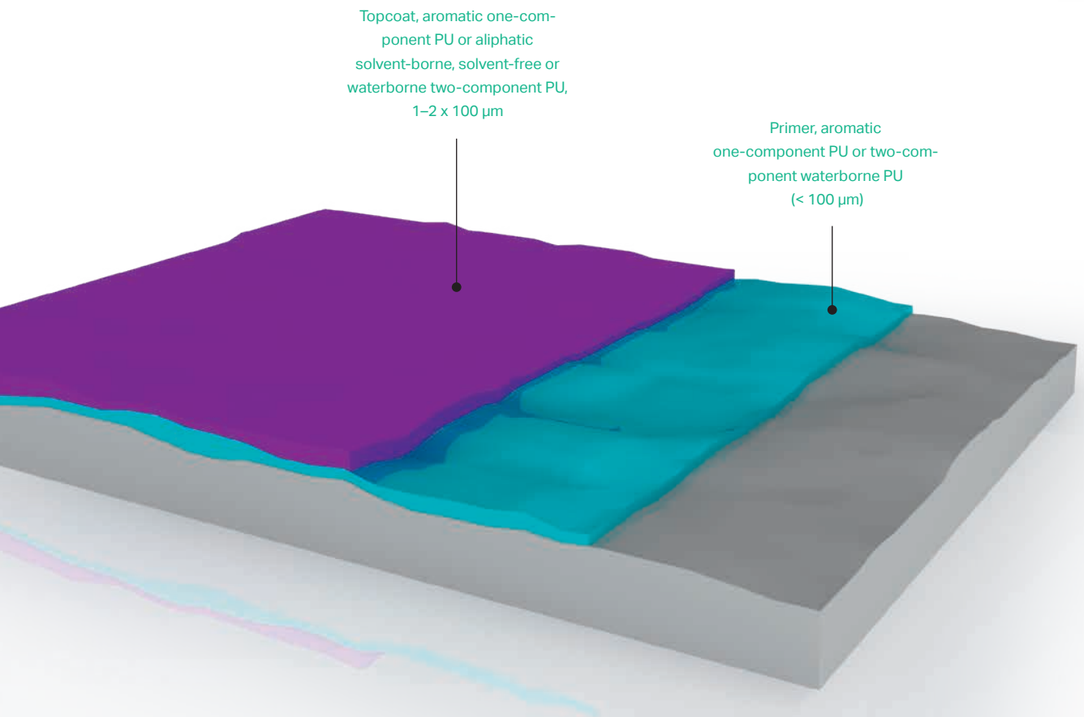


Garages & basements

Absolutely indestructible in everyday use

Polyurethane floor applications are increasingly used in houses to protect basements and garages from wear and tear and premature aging as well. Since the concrete floor of garages has to withstand heavy loads and aggressive automobile fluids, it makes perfect sense to use hydrolysis- and chemical-resistant polyurethane floor coatings with a wide range of mechanical, dynamic and thermal properties. Since nobody wants car tires to leave unsightly prints on the garage floor, even if the car is left standing for lengthy periods, this is where comparatively hard polyurethane systems of the kind used in automobile showrooms come into their own.

Polyurethane coatings are also ideal because they harden and dry quickly after processing, produce hardly any emissions during application, are available in attractive colors, and are slip-resistant, resilient and easy to maintain in everyday use.



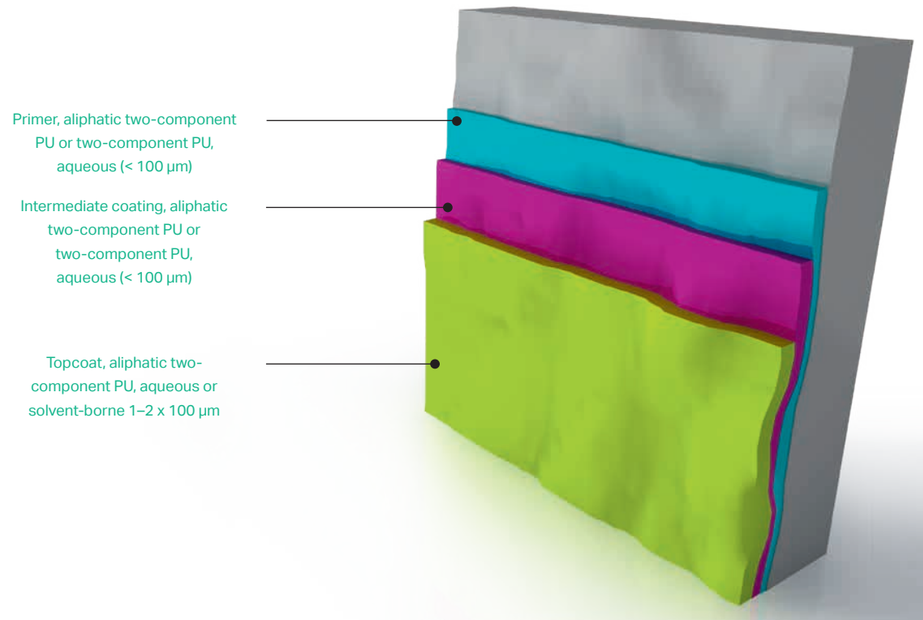
Walls & facades

A fine solution – inside or out

High-quality polyurethane systems have an equally impressive track record as protective surface coatings for interior walls and exterior facades. That is why formulations with high crosslinking densities, optimized chemical resistance, and ease of cleaning are chosen over competing but less effective technologies, for example in public buildings such as hospitals, nursing homes, schools and kindergartens.

Public authorities also choose such easy-to-clean solutions for outdoor areas. The impressive weathering resistance and sealing properties of polyurethane systems – even in driving rain – and their good water vapor diffusion properties are all excellent reasons for selecting high-quality polyurethane construction materials based on raw materials from Covestro.

What's more, polyurethane products offer outstanding protection against carbonation. Their use in protective coatings for bridges, train stations, underpasses or administrative buildings prevents corrosion in the steel reinforcements of the concrete so no dangerous fragments can break off the facades. In other words, polyurethane raw materials from Covestro are crucial for safe and sustainable construction materials.



Parquet

Wood at its natural best

High-performance parquet adhesives

Parquet adhesives not only have to offer the necessary mechanical properties; they also need to comply with the indoor air-quality requirements for applications in enclosed rooms. That is why solvent-free reactive adhesives based on polyurethane and its hybrids are the raw material of choice. They do not cause the wood to swell, display good adhesive qualities, and are available as low-emission formulations.

Key benefits of polyurethane technology:

- Outstanding flexibility
- Good initial strength
- Good adhesive strength
- Good adhesion to wood and concrete
- No moisture expansion, as no water from the adhesive can impact the substrate
- Low VOC possible

We offer a broad range of raw materials for such applications under the brand names Desmodur® E, Desmoseal® M and Desmoseal® S – from products suitable for screed priming, raw materials for 1K or 2K polyurethane adhesives to silane-terminated polyurethanes for formulating low-emission, soft-elastic hard parquet adhesives.

All the formulated binder systems are easy to process and form a tough bond on substrates such as concrete, ceramic, stone and various nonabsorbent substrates.

Coatings that enhance the beauty of wood

Polyurethane dispersions have been in use for years and nowadays they are one of the leading technologies for parquet coatings. The clear advantages include outstanding mechanical properties, mild odor, ease of application and rapid curing.

The choice of the right Bayhydrol® UH grade allows the formulation of coatings with the necessary hardness, elasticity, abrasion, black-heel mark resistance and chemical resistance. Introducing fatty acids into the chain increases the crosslinking, resulting in greater chemical and black-heel mark resistance. Film properties can be enhanced by adding a polyisocyanate to produce a high-quality 2K coating. We offer these hydrophilic polyisocyanates under the brand name Bayhydur®.

Bayhydrol® UV grades are the binders of choice for the formulation of coatings for UV on-site.

Joint sealants

The seal of quality

The polyurethane sealants based on the Desmoseal® product range are characterized by a high degree of elasticity and cohesion. They can be painted over, are easy to apply, and capable of withstanding the everyday challenges presented in a wide variety of application areas. Key challenges include mechanical loads caused by, for example, traffic, which shifts the relative positions of floor slabs, or seasonal temperature fluctuations, which cause structural components to expand or shrink. Such movements obviously affect the shape and size of the relevant joints and the sealant in each joint is subjected to constant tensile, compression, peel or shear stresses.

Key benefits of sealants based on Desmoseal® raw materials:*

- Long-lasting elasticity, even at low temperatures
- Good adhesive strength, adhesion to different substrates and flank adhesion
- Simple to process (1K formulations)
- Good extrudability
- Weather-resistant
- Extremely malleable
- Excellent elastic recovery
- Odorless
- Low shrinkage during curing
- Overcoating possible
- Bubble-free curing due to low NCO content or silane crosslinking
- Highly reactive
- Can be formulated with amines or low levels of tin catalysts
- Excellent mechanical properties:
  - Tensile strength > 2 MPa
  - Elongation at break up to 1,200%
  - Shore hardness as low as A15
  - Modulus at 100% as low as 0.2 MPa

* The specific properties depend on the formulation chosen.

The Desmoseal® S range is made up of silane-terminated prepolymers (STPs) and used for sealants that combine the outstanding properties of polyurethane with those of silicone-based sealants. The inherent good cohesion of polyurethanes combined with the well-known good adhesion of silicones results in a unique profile of beneficial properties. STPs are usually formulated as 1K sealants, but can, if required, be formulated as 2K systems to modify certain properties. The chemical structure is a polyurethane backbone with silane end groups.

Typical applications for sealants based on Desmoseal® products:

- All kinds of connection joints, e.g., around windows, doors, roller blind housings, facades, metal housings, indoor and outdoor plastic components, etc.
- Edge joints on parquet flooring

PRODUCTS	KEY FIGURES (SUPPLY FORM)						TECHNOLOGY					APPLICATION AREA									
	SUPPLY FORM [%]	VISCOSITY AT 23°C [mPa · s]	VISCOSITY AT 25°C [mPa · s]	OH CONTENT [%] IN RELATION TO SUPPLY FORM	NCO CONTENT [%] IN RELATION TO SUPPLY FORM	EQ WEIGHT [g/mol]	1K MOISTURE-CURING		2K	1K STP	1K UV	INDUSTRIAL FLOORING	SPORTS FLOORING	DECORATIVE FLOORING	PARKING DECKS	WATER-PROOFING MEMBRANES	GARAGES & BASEMENTS	WALL & FASSADES	PARQUET	SEALANTS
HDI- and IPDI-based							1K PUR														
Desmodur® N 3200	100	2,500			23.00	185			●					●		●					
Desmodur® ultra N 3300	100	3,000			21.80	195	●	●	●					●		●					
Desmodur® ultra N 3600	100	1,200			23.00	185			●			●	●	●		●	●				
Desmodur® N 3800	100	6,000			11.00	380			●				●			●	●				
Desmodur® N 3900	100	730			23.50	180	●	●	●			●	●	●	●	●	●	●			
Desmodur® N 100	100	10,000			22.00	190			●				●	●	●	●	●	●			
Desmodur® N 75 MPA	75	250			16.50	255			●				●	●	●	●	●	●			
Desmodur® N 75 MPA/X	75	250			16.50	255			●				●	●	●	●	●	●			
Desmodur® Z 4470 MPA/X	70	1,500			11.90	360			●					●	●	●					
Desmodur® Z 4470 SN	70	2,000			11.90	360			●					●	●	●					
Desmodur® XP 2838	100	3,000			21.00	200			●					●		●					
Desmodur® XP 2840	100	500			23.00	185		●	●					●		●					
Desmodur® XP 2860	100	500			20.00	215			●				●	●	●	●	●				●
Prepolymers based on aliphatic isocyanates																					
Desmodur® E 2863 XP	100	1,400			11.00	380			●			●	●	●	●	●	●				
Desmodur® XP 2599	100	2,500			6.00	700	●	●	●				●			●					
Desmodur® XP 2617	100	4,250			12.50	335		●	●					●							●
Desmodur® VPLS 2371	100	9,800			3.70	1,100		●	●						●	●					●
Desmodur® XP 2406	80	7,000			2.80	1,500	●		●						●	●					
Polymeric MDI products/ prepolymers based on MDI																					
Desmodur® VL	100		90		31.50	135	●		●			●	●		●		●				
Desmodur® VL R 10	100		120		31.50	135	●		●			●	●		●		●				
Desmodur® VL R 20	100		200		31.50	135	●		●			●	●		●		●				
Desmodur® VL 50	100		23		32.50	130	●		●			●	●		●	●	●				●
Desmodur® VH 20 N	100		280		24.50	170	●		●			●	●		●	●	●				
Desmodur® XP 2551	100		66		32.00	130			●			●	●		●	●	●				
Desmodur® E 20100	100	1,100			15.70	265		●													
Desmodur® E 21	100		5,400		16.00	260		●				●	●		●	●	●	●			
Desmodur® E 22	100	2,800			8.60	490		●				●	●		●	●	●				
Desmodur® E 23	100	1,800			15.40	270		●				●	●		●	●	●	●			
Desmodur® E 29	100		220		24.00	175		●				●	●		●	●	●	●			
Desmoseal® M 280	80	33,000			2.10	2,000	●	●	●							●					●
Desmodur® E XP 2723	100		1,500		15.40	270	●	●	●												●
Desmodur® E XP 2727	100	800			15.25	275			●			●	●		●	●	●	●			
Desmodur® E XP 2762	100	2,800			15.90	265	●	●	●												●

PRODUCTS	KEY FIGURES (SUPPLY FORM)						TECHNOLOGY					APPLICATION AREA								
	SUPPLY FORM [%]	VISCOSITY AT 23°C [mPa · s]	VISCOSITY AT 25°C [mPa · s]	OH CONTENT [%] IN RELATION TO SUPPLY FORM	NCO CONTENT [%] IN RELATION TO SUPPLY FORM	EQ WEIGHT [g/mol]	1K MOISTURE-CURING: 1K PUR	1K MOISTURE-CURING: 2K	1K STP	1K UV	INDUSTRIAL FLOORING	SPORTS FLOORING	DECORATIVE FLOORING	PARKING DECKS	WATER-PROOFING MEMBRANES	GARAGES & BASEMENTS	WALL & FASSADES	PARQUET	SEALANTS
Prepolymers based on TDI																			
Desmodur® E 1160 MPA/X	60	550			5.4	775												●	
Desmodur® E 1361 MPA/X	61	250			6.8	615												●	
Desmodur® E 1660	60	1,600			5.3	792												●	
Desmodur® E XP 2605/1	50	350			4.3	975												●	
Desmodur® E 14	100	6,800			3.30	1,270		●	●			●			●	●				●
Desmodur® E 15	100	7,000			4.40	955	●		●			●			●	●				
Blocked TDI-prepolymers																			
Desmocap® 11	100	100,000							●			●			●		●		●	
Desmocap® 1190	90	30,000							●			●			●		●		●	
Desmocap® 12	100	40,000							●			●			●		●		●	
Desmocap® 14 CNB	100	30,000							●			●			●		●		●	
Waterdispersible polyisocyanates																			
Bayhydur® XP 2547	100	650			22.50	650			●			●	●	●	●	●	●	●		
Bayhydur® XP 2451/1	100	800			20.30	207			●			●	●	●	●	●	●	●		
Bayhydur® ultra 3100	100	2,800			17.40	240		●	●									●	●	
Bayhydur® ultra 305	100	6,500			16.20	260			●										●	
Bayhydur® ultra 2700	65	77			10.6	400			●										●	
Bayhydur® 2858 XP	70	500			13.3	316			●										●	
Bayhydur® eco 701-90	90	5,000			17.9	230			●										●	
Aqueous acrylic polyol dispersions for waterborne 2K																			
Bayhydrol® A 2457	40			2.7					●			●	●	●	●	●	●	●		
Bayhydrol® A 2542	50			3.8					●			●	●	●	●	●	●	●		
Bayhydrol® A 2546	41			4.1					●			●	●	●	●	●	●	●		
Bayhydrol® A 2646	50			3.8					●			●	●	●	●	●	●	●		
Bayhydrol® A 242	42			2					●			●		●				●		
Bayhydrol® A 2846	40			1.5					●										●	
NH-reactive resins, aspartics for coatings																			
Desmophen® NH 1220	100		90			234			●					●						
Desmophen® NH 1420	100		1,450			276			●			●		●	●	●	●			
Desmophen® NH 1422	100		1,450			276														
Desmophen® NH 1423	100		1500			270			●			●		●	●	●	●			
Desmophen® NH 1520	100		1,400			290			●					●						
Desmophen® NH 2850 XP	100		100			290			●			●		●	●	●	●			

PRODUCTS	KEY FIGURES (SUPPLY FORM)						TECHNOLOGY					APPLICATION AREA								
		VISCOSITY AT 23°C [mPa · s]		OH CONTENT [%] IN RELATION TO SUPPLY FORM		EQ WEIGHT [g/mol]	1K MOISTURE-CURING			1K STP		INDUSTRIAL FLOORING		DECORATIVE FLOORING		WATER-PROOFING MEMBRANES		WALL & FASSADES		SEALANTS
Polyols – the reactive partners	SUPPLY FORM [%]		VISCOSITY AT 25°C [mPa · s]		NCO CONTENT [%] IN RELATION TO SUPPLY FORM		1K PUR		2K		1K UV		SPORTS FLOORING		PARKING DECKS		GARAGES & BASEMENTS		PARQUET	
Desmophen® 1100	100	30,500		6.50					●				●						●	
Desmophen® 1200	100	23,500		5.00					●				●						●	
Desmophen® C 1100	100	3,200		3.30		500		●	●			●	●	●	●	●				●
Desmophen® C 1200	100	16,500		1.70		1,000		●	●			●	●	●	●	●				●
Desmophen® VPLS 2249/1	100	1,900		15.50					●				●							
Desmophen® VPLS 2328	100	800		8.00					●				●	●	●	●				
Desmophen® 650 MPA	65	20,000		5.30		320			●			●	●	●	●		●	●		
Desmophen® 651 MPA/X	65	25,000		5.50		310			●			●	●	●	●		●	●	●	
Radiation curing polyurethane dispersions																				
Bayhydrol® UV 2280	39										●								●	
Bayhydrol® UV 2282	39										●								●	
Bayhydrol® UV 2317/1	37										●								●	
Bayhydrol® eco UV 2877	40										●								●	
Aqueous high molecular weight polyurethane dispersions																				
Bayhydrol® UH 240	40						●		●										●	
Bayhydrol® UH 340/1	40						●		●										●	
Bayhydrol® UH 2557	35						●		●										●	
Bayhydrol® UH 2558	37						●		●										●	
Bayhydrol® UH 2593/1	35						●		●										●	
Impranil® DLU	60						●									●				
Silan-terminated polyurethanes																				
Desmoseal® S XP 2458	90	35,000								●						●			●	
Desmoseal® S XP 2636	100	40,000								●										●
Desmoseal® S XP 2749	100	4,500								●									●	
Desmoseal® S XP 2774	100	50,000								●						●				●
Desmoseal® S XP 2821	100	20,000								●									●	
Desmoseal® S 2876	100	25,000								●									●	

Abbreviations used in tables

1K	=	One-component
2K	=	Two-component
3K	=	Three-component
BA	=	Butyl acetate
BG	=	Butyl glycol
CNB	=	Cashew nut shell liquid blocked
DPGDME	=	Dipropylene glycol dimethyl ester
EA	=	Ethyl acetate
EDIPA	=	Ethyldiisopropylamine
EP	=	Epoxy resin
HDI	=	Hexamethylene diisocyanate
MDI	=	Diphenylmethane diisocyanates (methylene diphenyl diisocyanate)
MEK	=	Methylethylketone
MFT	=	Minimum film formation temperature
MPA	=	1-methoxypropyl acetate-2
MIBK	=	Methyl-isobutyl ketone
NMP	=	N-methyl pyrrolidone
PAC	=	Polyacrylate
PDI	=	Pentamethylene diisocyanate
PnB	=	Dowanol PnB
PUR	=	Polyurethane
SN	=	Solvent naphtha 100
TDI	=	Toluene diisocyanate
TriEtA	=	Triethanolamine
TSCA	=	Toxic Substance Control Act (U.S. Agency for Toxic Substances & Disease Registry)
UA	=	Unsaturated acrylate
UP	=	Unsaturated polyester
VOC	=	Volatile organic compounds
X	=	Xylene

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 CO_2-based materials that do not sacrifice high performance.

Join us to shape the future!