

Journal

26 2024 Information from

Information from Worlée-Chemie

PRODUCTS & MARKET WorléeProtect - Thin layers withick performance

PARTNERS Vencorex: Tolonate X DH5 CastleRes AK-81 Hobumt: Mergisol ME 109

EVENTS & NEWS Restructuring in R&D and application technology Review VILF Annual Conference



DEAR CUSTOMERS, PARTNERS, AND FRIENDS,

Welcome to the 26th and final edition of our WorléeJournal this year!

In this issue, we once again bring you exciting insights and the latest news from our company. Learn more about our innovative WorléeProtect product range, offering reliable protection against a wide variety of substances thanks to its unique coating properties.

Additionally, we introduce exciting products from our distribution partners Castle, Hobum, and Vencorex. Gain insights into the restructuring of our Research & Development and Application Technology departments, and meet our two new lab managers, who are bringing fresh perspectives to these areas. To wrap up, we share our impressions from this year's VILF Conference.

With this edition, we would like to sincerely thank you for your loyalty, trust, and excellent collaboration in 2024. We wish you a joyful holiday season, relaxing festivities, and a successful start to the new year!

Best regards, Joachim Freude Managing Director

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Publisher Worlée-Chemie GmbH Grusonstrasse 26, 22113 Hamburg Tel.: +49 (0)40 733 330 Fax: +49 (0)40 733 331170 EMail: Service@worlee.de www.worlee.de

Managing Directors

Reinhold von Eben-Worlée Joachim Freude

Commercial Register Hamburg, HRB 9994 USt-IdNr.: DE 811118426

Responsible: Joachim Freude Editorial Department: Alicia Aschmann, Florian Ninnemann, Katrin Langosch, Toine Biemans

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WELCOME TO THE 25TH EDITION OF OUR WORLÉEJOURNAL!

WORLÉEPROTECT - THIN LAYERS WITH THICK PERFORMANCE

Coatings should provide lasting protection and look good at the same time. But sometimes they should not be conspicuous. Or a surface needs to be subsequently sealed and should be easy to keep clean afterwards. Then the products in the WorléeProtect range are just the thing.

In addition, there is a close-meshed, isocyanatefree cross-linking.

The surfaces created by WorléeProtect products are smooth, hard and barely visible. At the same time, they are robust and resistant to a wide range of everyday and technical substances. From colored pencils to mustard, from coffee to red wine to ketchup, from hydraulic oil to brake fluid. With or without an additional anti-graffiti finish.

SPECIAL COATINGS

The products in the WorléeProtect range are characterized by a number of properties that set them apart from conventional binders (alkyds, acrylates, 2K formulations). This is due to their chemical structure and the additional components. The polymer components have a linear structure and a high density of cross-linking groups. Drying is initiated by air humidity and takes place through a subsequent combined hydrolysis and crosslinking reaction. The addition of hardeners or catalysts is not necessary. The composition, especially with the variants WorléeProtect VP-Z 3224/08 and WorléeProtect VP-Z 3224/09, ensures rapid curing. This enables high cycle rates for industrial applications or rapid further processing of the coated components for manual application. In contrast to conventional binders, which are just one of several ingredients in the formulation, the products in the WorléeProtect range are largely formulated ready for use. The active ingredient content should be adjusted to the respective area of application by dilution during packaging.

You can find out more about the products in the WorléeProtect range and their properties on the following pages.

Let Very good adhesion to glass, ceramics, mineral substrates of all kinds and existing coatings are further properties.

Let us convince you of the advantages:

- » Thin layers lead to very economical consumption
- » The coatings dry transparent-colorless
- » The coatings are highly weather-resistant
- » The coatings are resistant to a wide range of everyday and technical substances
- » The coatings are easy to clean and only tend to stain to a small extent
- » Renovation of load-bearing old coatings is possible without great effort

THE PRODUCTS OF THE WORLÉEPROTECT RANGE

WorléeProtect products are available in four standard variants. What they all have in common is a very low viscosity, a ready-to-use formulation apart from an adjustment of the active ingredient content and the achievement of highquality, robust surfaces.

All products in the WorléeProtect range also have a high cross-linking density. This results from the chemical structure of the polymer and molecular compo- 2 h. Particularly noteworthy is the resisnents.

The products differ in their drying behavior and their laver thickness tolerance. W'Protect 1619 and W'Protect 1626 require 3 h to 4 h at room temperature until the surface appears tack-free:

WorléeProtect VP-Z 3224/08 and WorléeProtect VP-Z 3224/09 achieve tack-free adhesion much faster in 1.5 h to tance to ethanol achieved guickly with WorléeProtect VP-Z 3224/08 and WorléeProtect VP-Z 3224/09 at 24 hours. With WorléeProtect 1619 and Worlée-Protect 1626 this is only the case after several days.

Product	Delivery Form	Drying to track-free	Special features
WorléeProtect 1619	39 % in n-Propanol	3 h to 4 h	up to 10 µm dry film thickness, easy-to- clean
WorléeProtect 1626	40 % in n-Propanol	3 h to 4 h	bis zu 10µm dry film thickness
WorléeProtect VP-Z 3224/08	39 % in n-Propanol	1,5 h to 2 h	fast drying up to 30 µm dry film thickness, easy-to-clean, fast ethanol resistance
WorléeProtect VP-Z 3224/09	40 % in n-Propanol	1,5 h to 2 h	fast drying up to 30 µm dry film thickness, fast ethanol resistance



The drying data were determined in a standard climate (20 °C and 50 % humidity).

Various silanes are also included as reactive thinners.

Instructions for use

In order to achieve the recommended thin dry film thicknesses of up to 10 µm or up to 30 µm, it is advisable to dilute the product up to 1:1 and apply it using a spray gun or a commercially available microfiber wipe. Application by dipping or flooding is also possible. The easiest way to adjust the active ingredient content is with n-propanol.

The tools used should be cleaned immediately after application. Our technical application department will be happy to provide advice on adjusting the spray gun.

Excessively thick layers, especially with WorléeProtect 1619 and WorléeProtect 1626, can lead to cracking as the coating ages. WorléeProtect VP-Z 3224/08 and WorléeProtect VP-Z 3224/09 are more tolerant in this respect.

WORLÉEPROTECT -A CLEAN AFFAIR

The key feature of the WorléeProtect range is the stain and dirt resistance of the surfaces. The WorléeProtect 1619 and WorléeProtect VP-Z 3224/08 variants also have a pronounced easy-to-clean feature.

The faster drying of the WorléeProtect VP-Z 3224/08 and WorléeProtect VP-Z 3224/09 variants compared to W'Protect 1619 and Worlée-Protect 1626 also leads to significantly earlier resistance to ethanol in the latter types.

The picture clearly shows how the surface of the WorléeProtect coating has difficulty absorbing the paint. The markings can be removed with a dry cloth or, in stubborn cases, with the aid of a little ethanol.

The described properties are retained even after more than 3000 hours of exposure to QUV-A radiation.

WorléeProtect-coated surfaces are not only resistant to colored pencils. Even everyday and technical substances cannot harm the coating. These include:

- » Mustard » Ketchup
- » Red wine
- » Coffee
- » Hydraulic oil
- » Brake fluid

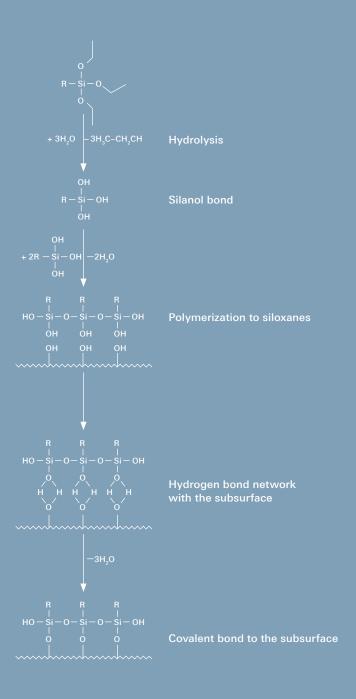






the surface of the WorléeProtect coating has difficulty absorbing the paint

Illustrations: Permanent markers are easy to wipe off (left). Even after QUV exposure, tags and graffiti don't stand a chance (right).



R — Si — Oh I OH

A STRONG BOND

The special properties of the products in the WorléeProtect range are due to the close-meshed cross-linking of the components and the good adhesion of the coating. Objects made of metal, glass and ceramics, for example, have oxide or hydroxide groups on their surface. The air around us contains a certain amount of moisture.

Parallel to the cross-linking reaction described above, a hydrogen bridge network is formed on the surface of the substrate from the silanol units and functional groups created by hydrolysis. These hydrogen bonds lead to a preformation of the subsequent covalent bonds between the surface and the coating. Here, too, water is released during bond formation, which sub-sequently contributes to the formation of further siloxane bridges.

As described above, the water produced during the curing process is repeatedly consumed by the ongoing reaction. The network formation therefore continues even after the formation of a closed surface. The reaction described is illustrated in the diagram shown here (after B. Arkles, Chemtech 1977, 7(12), 766-778). The combination of polymer components with many alkoxysilyl groups, reactive diluents and catalytically active units leads to a close-meshed network with high stability; siloxane bridges are among the strongest covalent chemical bonds.

TOLONATE[™] X DH5 FOR HIGH-PERFORMANCE PU COATINGS





HDI trimer for 1K heat activated polyurethane formulations with excellent outdoor resistance Vencorex expands its portfolio of blocked aliphatic polyisocyanates with the introduction of TolonateTM X DH5, based on HDI.

This new development is typically used as a cross linker of hydroxylated polymers notably polyesters to prepare high-performance one component polyurethane systems.



NEW	Tolonate™ X DH5	Tolonate™ D2	
Viscosity at 25°C, mPa.s	2 300	3 250	
NCO available after deblocking %	10.2	11.2	
Solid content %	73	75	
Solvent	MPA	Solvesso 100	
Deblocking temperature	160 - 180 °C	140 - 160 °C	

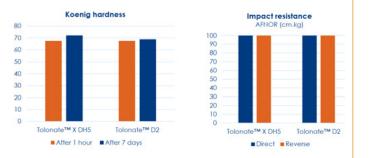
Main properties of blocked Tolonate[™] grades:

Tolonate[™] X DH5 und Tolonate[™] D2:

» Excellent flexibility

- » High abrasion resistance
- » Superior adhesion
- » Outstanding durability

Blocked Tolonate[™] grades provide an excellent balance between flexibility and hardness.



WorléeJournal 2024 | PARTNERS

Tolonate[™] X DH5 enables the production of coating systems for a variety of demanding applications, it is suitable for can and coil coatings as well as in OEM applications and general industry, as it provides durable and robust surfaces that can withstand external influences.

Coil coatings based on Tolonate[™] X DH5 can be applied in high film thicknesses (up to 70µm) without defects (e.g. blisters), which provide a better metal protection compared to alternative solutions.

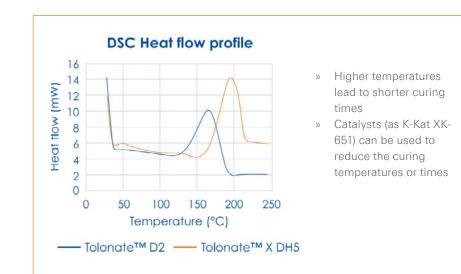
In addition, Tolonate[™] X DH5 exhibits excellent thermal yellowing resistance under long exposure to high temperatures, making it the ideal choice for white topcoats.



Key Benefits of Tolonate[™] X DH5:

- » High film thickness achievable -
- » Excellent thermal yellowing resistance bideal for white topcoats

better metal protection



Curing of Tolonate[™] X DH5

Typical curing conditions:

- » 165°C min., 10-40 min without catalyst
- » 165°C min., 5-30 min with 0,3% catalyst on solids resin
- » proper crosslinking for coil coating: 232°C peak metal temperature with 0,3% catalyst on solids resin

Applications

- » Coil coatings: primer and topcoat for building, transport, appliances
- Can coatings: » basecoat and clearcoat, for food and beverage, bottle caps
- OOEM coatings: » mainly primer

» General industry: glass and metal coatings

Please contact us and find out more about the new product Tolonate™ X DH5, samples and product information are available on request. Contact: Nicole Leister | +49 40 73333-2503 | NLeister@worlee.de

New sales partnership



WORLÉE EXPANDS ITS PORTFOLIO WITH THE PRODUCT CASTLERES AK-81 FROM CASTLE CHEMICALS.

Worlée takes over the distribution of the product CastleRes AK-81 from the company Castle Chemicals in the DACH region.

CastleRes AK-81 is a urea aldehyde condensation resin that is widely used in the paint and coatings industry as an excellent grinding resin for pigment dispersions. In combination with the binder, it provides a higher gloss, improved hardness, adhesion and resistance to yellowing, depending on the specific application.

In the technical application studies in the Worlée laboratories, CastleRes AK-81 showed very good wetting and dispersing properties with all tested pigments.

The very good rubout results achieved in the test series indicate a stable and homogeneous distribution of the pigments.

The pigment concentrates with CastleRes AK-81 also showed an optimal viscosity profile, which speaks in favour of efficient processing.

In the low shear range, the samples exhibited higher viscosities, which reduces settling of the pigments during storage. In the low shear range, samples exhibited higher viscosities, reducing

pigment settling during storage. In contrast, lower viscosities were measured in the high shear range, which enables easy pumping and dosing of the concentrates.

Due to its excellent solubility, it can be used in a broad range of coating systems. It is suitable for various applications such as interior and exterior industrial metal coatings, automotive OEM coatings, air and oven drying alkyd resins and universal pigment pastes.

CastleRes AK-81 fits perfectly into our existing portfolio of resins and additives for the paint and coatings industry and we looking forward to a successful partnership with Castle Chemicals.

Take a look at the product CastleRes AK-81 from our distributor Castle Chemicals and do not hesitate to contact us for further information!

Contact: Kerstin Mütze | +49 40 73333-2502 | KMuetze@worlee.de

MERGISOL ME 109

Mergisol ME 109 is an epoxidized fatty acid ester based on sunflower oil and is mainly used to reduce the viscosity of higher viscosity epoxy resin systems.

Despite its natural origin, the bio-based reactive diluent is colorless and offers an environmentally friendly alternative to common reactive diluents, which are increasingly being viewed critically due to their reclassification as CMR substances (carcinogenic, mutagenic or toxic to reproduction).

Mergisol ME 109 is a high-performance alternative to conventional reactive diluents and offers similar processing properties, mechanical properties and chemical resistance. This means that it can be used in existing applications with only minor adjustments. bio-based reactive diluent from Hobum for sustainable and environmentally friendly epoxy resin solutions

HOBUM OLEOCHEMICALS

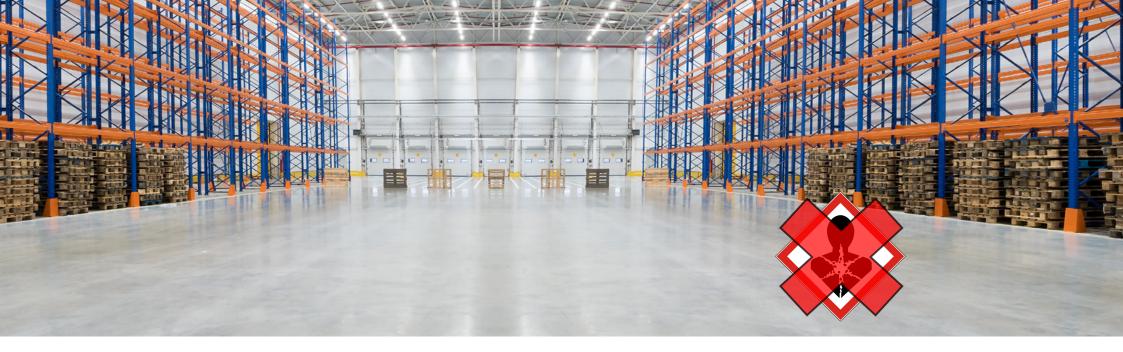
FORMULATIONS

To evaluate the reactive diluents, various formulations were tested. The raw materials and compositions used are shown in the following table. An unfilled standard bisphenol A resin was used as the A component, combined with two different bio-based EP hardeners from Hobum as the B components. The hardeners differ in their chemical structure: Merginamid A 282 is a polyaminoamide adduct, while Merginamid A 2425 is an IPDA adduct.

OVERVIEW OF PROPERTIES OF MERGISOL ME 109 COMPARED TO C12-C14 GLYCIDYL ETHER

Product	Labeling	Viscosity at 25 °C [mPa*s]	Amount to adjust to 1500mPa*s [%] ¹	Viscosity immediately after hardener addition [mPa*s]	
				A282 ²	A2425 ³
Mergisol ME 109	()	20,5	17	1.900	750
C12-C14	🔅 🚸	8,7	13	1.950	700

¹Bisphenol A resin, Viscosity at 25 °C approx. 10.000 mPa*s ²Merginamid A 282, Viscosity at 25 °C approx. 2.000 mPa*s ³Merginamid A 2425, Viscosity at 25 °C approx. 300 mPa*s



FORMULATIONS

Raw Material	C12-C14 + A282	C12-C14 + A2425	ME 109 + A282	ME 109 + A2425
Bisphenol A resin	100	100	100	100
Mergisol ME 109			17	17
C12-C14 Glycidyl ether	13	13		
Total	113	117	117	117
Viscosity / mPas	1500	1500	1500	1500
Merginamid A282	66,6		67,5	
Merginamid A2425		55,2		55,8
Total	179,6	168,2	184,5	172,8

⁴The same tests with Mergisol ME 309 showed no differences in properties..

THINNER EFFECT AND MIGRATION

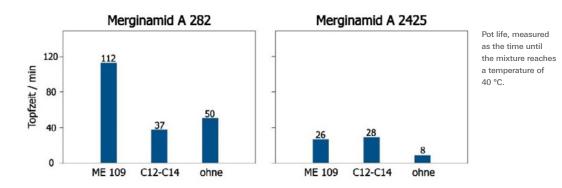
Tests in the HOBUM laboratories have shown that Mergisol ME 109 effectively reduces the viscosity of highly viscous epoxy resins. With an application concentration of 17 % Mergisol ME 109, a viscosity comparable to that of 13 % C12-C14 glycidyl ether was achieved. No migration of Mergisol ME 109 was observed at this application concentration. Even after 6 weeks in the oven at 50 °C, the reactive diluent remained in the test specimen and did not migrate to the surface.

INFLUENCE OF MERGISOL ME 109 ON PRODUCT PROPERTIES

Formulations with Mergisol ME 109 offer comparable reactivity, hardness and chemical resistance to formulations with C12-C14 glycidyl ether, despite the higher amount used.

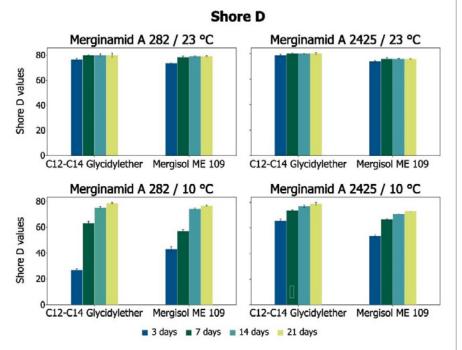
POT LIFE

The use of Merginamid A 282 as a hardener showed that the pot life was significantly extended by Mergisol ME 109 compared to C12-C14 glycidyl ether. For Merginamid A 2425, the pot lives with Mergisol ME 109 and C12-C14 glycidyl ether were similar, but significantly longer than without reactive diluent.



HARDNESS DEVELOPMENT

In combination with Merginamid A 282, there was no significant difference in the Shore D hardness compared to C12-C14 glycidyl ether, despite the higher concentration of Mergisol ME 109 used. In combination with Merginamid A 2425, there were smaller differences in the Shore D hardness, with the samples with C12-C14 glycidyl ether showing slightly higher values.



Shore D hardness of the samples after 3, 7, 14 and 21 days of curing time using C12-C14 glycidyl ether and Mergisol ME 109 at different temperatures and with different EP hardeners.

CHEMICAL RESISTANCE

In terms of chemical resistance, the samples with Mergisol ME 109 showed no significant differences compared to C12-C14 glycidyl ether. The resistance of the prepared samples to various substances was tested in accordance with DIN EN ISO 2812-3. The evaluation was carried out after 24 hours, after the samples had been stored at room temperature for 7 days to ensure complete curing.

MERGISOL ME 109 AND MERGISOL ME 309

ether

The Mergisol product family includes two variants that differ only in their inherent color:

- » Mergisol ME 109: Transparent, ideal for applications with high colour requirements
- » Mergisol ME 309: Cost-effective alternative for all other applications



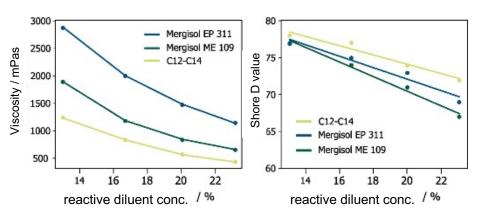
Appearance of Mergisol ME 109 and Mergisol ME 309 compared to C12-C14 glycidyl

OUTLOOK: NEW DEVELOPMENT MERGISOL EP 311

Mergisol EP 311 is based, like the other two Mergisol types, on an epoxidised fatty acid ester from sunflower oil. The difference lies in the ester residue, which offers better compatibility in some systems, but is accompanied by a reduced diluent effect.

The influence on the Shore D hardness remains comparable or is even less strongly influenced than with Mergisol ME 109.

Mergisol EP 311 is therefore a good alternative if there are compatibility problems with Mergisol ME 109. However, it should be noted that Mergisol EP 311 is an experimental product that is currently not yet REACH-registered. Registration is planned.



Dilution effect (left) and Shore D hardness after 7 days of storage at room temperature (right) depending on the concentration of reactive diluent.

The bio-based reactive diluents from Hobum offer a sustainable alternative to common petrochemical reactive diluents and thus support the development of high-performance, solvent-free epoxy resin systems.

Please do not hesitate to contact us and find out more about the Mergisol-types. We would be happy to provide you with samples and product information. Contact: Julie-Christine Saget | Tel.: +49 40 73333-2509 | E-Mail: JSaget@worlee.de

SUSTAINABILITY & INNOVATION:

Sustainability is a core objective at Worlée Chemie. Together with our Research and Development department and Application Technology team, we are fully committed to creating a product portfolio that combines innovation with ecological responsibility. Over the coming years, we aim to develop numerous new, sustainable products—driven by our own ideas and inspired by the creative collaboration with our customers and partners.

SHAPING THE FUTURE TOGETHER AT WORLÉE CHEMIE

To meet these goals, Lars Ossenschmidt (Head of Innovation, R&D, and Application Technology) and his team have initiated several changes this year.

"I am proud that we have been able to strategically strengthen the area of waterbased products. With Ms. Caroline Matthiesen taking over as Head of Application Technology for waterbased polyurethane dispersions, alkyd emulsions, and polyester polyols as of October 1, 2024, we are gaining an experienced colleague who will advance this key area in close collaboration with her team and our R&D department," says Lars Ossenschmidt.

Solvent-based systems, however, remain a central component of our portfolio. Developments in the field of (ultra) high solid systems and entirely solvent-free solutions continue to be of great importance to us. To actively shape these future-focused areas, Ms. Melanie Schmidt took over responsibility for this segment on September 1, 2024. "I am confident that she and her team will successfully meet these challenges," adds Lars Ossenschmidt.

"It brings me great joy to welcome Ms. Matthiesen and Ms. Schmidt to our team. Their expertise and team spirit are already enriching us in unique ways. Our R&D and Application Technology team now consists of over 30 colleagues who not only provide expert guidance to our customers but also work together to develop innovative products and frequently act as problem-solvers. I am grateful to be part of this outstanding team and look forward to shaping the future of the chemical industry in an active and sustainable way with everyone involved," Lars Ossenschmidt concludes.

To introduce both colleagues in more detail, we spoke with them about their new positions and ideas, offering fascinating insights in the following interview. What was your previous area of responsibility at Worlée, and why did you decide to take on responsibility for a technical area?

> Melanie Schmidt: Previously, I worked in application technology for waterborne systems at Worlée for 2.5 years. In this role, I independently tested the new and further developments of our products and maintained close communication with colleagues in research and development. Additionally, I managed customer projects autonomously, which allowed me to appreciate the value of external collaboration.

Applying for the position of team leader for solvent-based systems and thereby taking responsibility for a new area was not a spontaneous

decision. While waterborne systems have been my main focus in recent years, solvent-based systems are not unfamiliar to me. Throughout my career, I have repeatedly worked with solvent-based coating systems.

For me, it is essential not to lose touch with practical work. I enjoy working at the lab bench, tackling various tasks with diverse products. At the same time, I realized that I could leverage my strengths—organization, communication, and expertise—in this new role. My goal is to combine both aspects in the future. I look forward to working with a great team because only together can we continue to develop exciting products for the future and support our customers on their journey toward innovative solutions.

Caroline Matthiesen: In my previous position at Worlée, I worked in export management, where I was primarily responsible for the technical and commercial support of our international colleagues, partners, and customers. I found it particularly exciting to learn about different cultures and markets.

The decision to take on responsibility for a technical area arose from my passion for technical issues and my motivation to develop new products in collaboration with our research and development department. Furthermore, after completing my training as a chemical laboratory technician, I spent four years working in application technology for waterborne systems. This experience, combined with my sales background, made the idea of a responsible role in application technology very appealing. I wanted to contribute to developing innovative solutions and shaping the company's long-term success.

Melanie Schmidt: It is evident that, in the spirit of environmental consciousness and due to various regulations, solvent-based products in the painting and construction sector are gradually being replaced by waterborne binders. However, there are still many areas where solvent-based or 100% systems will continue to be used in the future. In the coming years, I foresee further developments toward products with an increasing share of renewable raw materials.

We regularly notice this trend through customer inquiries from the European market. That's why Worlée focuses on incorporating such raw materials in new developments.

My previous work in the waterborne area taught me the importance of close communication and collaboration with our customers. For Worlée, this means developing faster and more precisely, with the customer involved in new developments right from the start. With creative ideas, curiosity, and vision, I aim to work on many exciting projects and new technologies in the coming years. Close communication with different teams and customers is very important to me to ensure projects are completed successfully and efficiently.



Caroline Matthiesen: |

currently see the growing demand for sustainable, eco-friendly products and solutions as one of the most exciting and challenging trends in the industry. These products must not only reduce the ecological footprint but also meet the requirements of consumers and regulatory bodies.

This presents companies with significant challenges but also opportunities to position themselves as pioneers in innovation and sustainability. Additionally, the advancing digitization of processes requires continuous adaptation to new technologies and the development of more efficient workflows, all while the demand for sustainable products gains increasing prominence.

Through my previous experience at Worlée, particularly in the application technology for waterborne systems, I have gained valuable expertise in formulating eco-friendly and sustainable coating systems. My additional experience in international sales has provided fascinating insights into what different markets are focusing on, what challenges customers face, and how these align with our own goals. I want to use these insights to contribute actively to the development of sustainable solutions, helping the company get closer to our vision of becoming the most sustainable and reliable global raw material partner.

Which developments or changes in the industry do you find particularly exciting or challenging, and how do you intend to leverage your experience at Worlée to address them?

VILF ANNUAL CONFERENCE 2024: NETWORKING, INNOVATION, AND TALENT DEVELOPMENT

From November 14 to November 15, 2024, it was that time of the year again—the VILF Annual Conference took place in Neu Ilsenburg under the theme "BLACKBOX."

With around 600 individual members and over 100 corporate members from the paints and coatings industry, the VILF Association serves as a platform for professional exchange, networking, and further education. Each year, the association's annual conference is held in the fourth quarter. A total of five colleagues represented Worlée at the conference, both at our booth and during the sessions. Additionally, we showcased our company at the "Job Dating" event, where VILF members had the opportunity to connect with young professionals.

The VILF Annual Conference was once again a great success, and we are already looking forward to next year!

