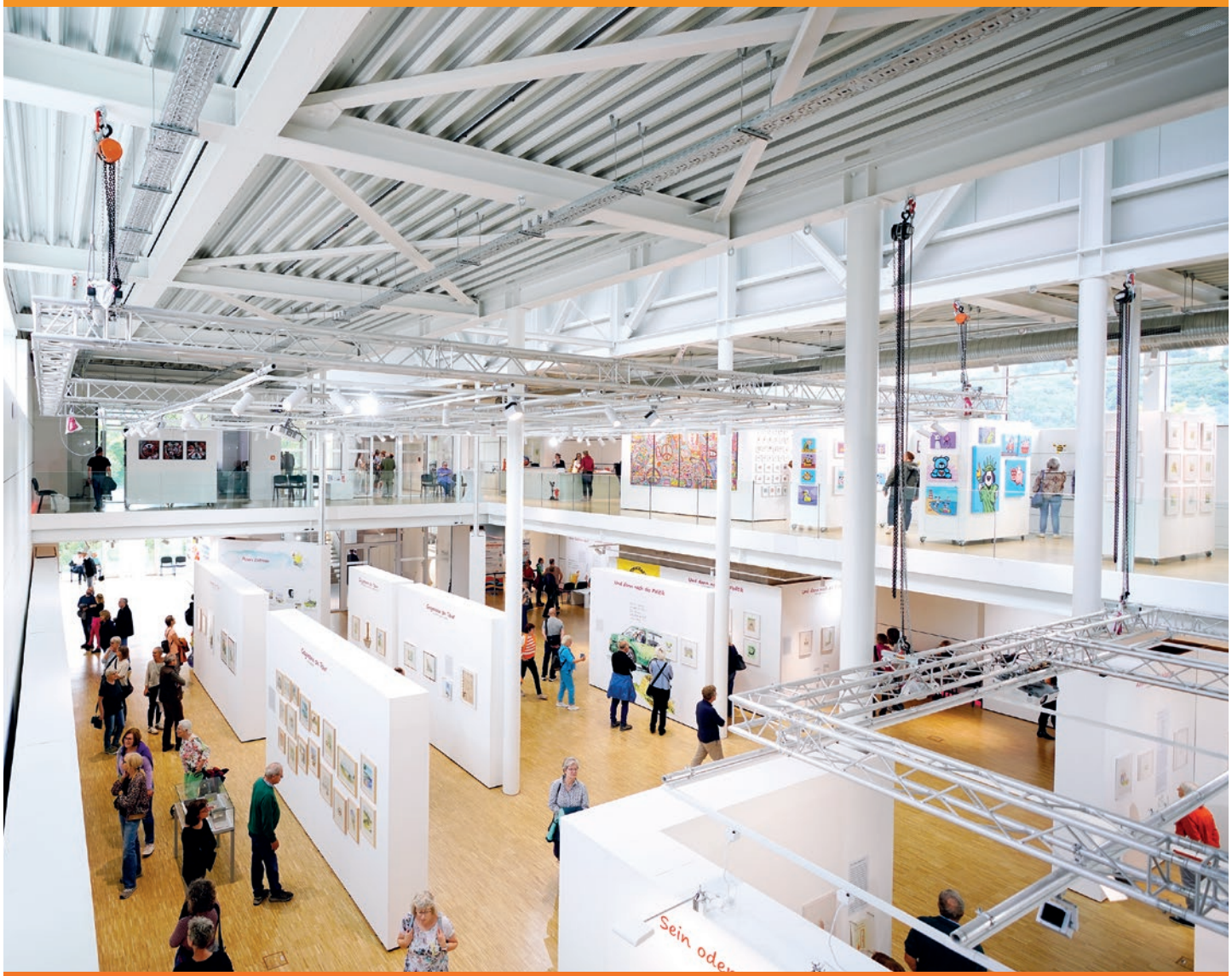
ISSUE 03

MarketPulse

Advancements in Coatings Technology



STRIKING THE BALANCE:
SLIP RESISTANCE, CLEANABILITY, AND DURABILITY IN RESIN FLOORING

REVOLUTIONISING TEMPERATURE CONTROL:
THE BENEFITS OF THERMAL INSULATED COATINGS IN THE FOOD AND BEVERAGE, AND PHARMACEUTICAL INDUSTRIES

SHERWIN WILLIAMS®

FORGE AHEAD.

STRONGER FUTURE.

Dear readers, partners, and friends,

As we launch the third issue of *Market Pulse* for the EMEAI region against the backdrop of an ever-changing world, our message is clear: Forge Ahead. The future of protective coatings is eco-friendly, high-tech, and digitally enabled, and we see this as an opportunity, not a challenge. Across EMEAI, we are investing in advanced technologies, expanding our capabilities, and strengthening partnerships to deliver solutions that meet today's demands, while anticipating tomorrow's needs. From infrastructure renewal to sustainability initiatives, our focus remains on creating coatings that protect, perform, and endure.

Why Forge Ahead?

Because perseverance is not optional: it's essential. We are channeling resources into research and development, and embracing digital tools, as well as aligning with global trends and emerging growth segments like data centres and semiconductors. These investments ensure our customers benefit from cutting-edge products and services that safeguard assets and reduce environmental impact.

In this issue, you'll find:

- **Real-life case studies**
  Discover how Sherwin-Williams solutions are making an impact, from a new flooring system for Mike Brewer's automotive showroom in England; to the application of **FIRETEX® FX6002** fire protection technology at a new art museum in Tübingen, Germany; and providing long-term offshore corrosion protection for the He Dreiht wind farm in the North Sea.
- **New and proven technologies**
  Explore how our global core portfolio is meeting the requirements of local, regional, and global customers who expect consistency no matter the location; as well as **Heat-Flex® AEB**, our newest innovation in CUI elimination; and **Dura-Plate® 301W**, an ultra-tolerant, all-season epoxy coating designed for general maintenance.
- **Expert insights**
  Gain knowledge from subject matter experts on local and global topics ranging from Blatt 100 in Germany to unified, performance-based corrosion protection standards for offshore wind, corrosion under insulation, and selecting the right linings for the biofuel transition.

Our vision is bold, and our optimism is grounded in action. Together with our partners and customers, we are building a future where innovation and responsibility go hand-in-hand.

Thank you for joining us on this journey, and, as always, we welcome your thoughts and conversations about how our coatings and resinous flooring solutions can support your goals.

Let's forge ahead toward a stronger future.

Steffen Walz, Marketing Director,
Sherwin-Williams Protective & Marine

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FIND YOUR EXPERT

Global Industry and Technology Expertise

Our Sherwin-Williams Protective & Marine experts have spent decades in the field, working alongside customers like you.

They are here to help, no matter the industry.

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or visit **protectiveemea.sherwin-williams.com**

Joao Azevedo
Segment Leader, Energy - EMEAI

Matthew Berry
Marketing Communication Manager - Energy

Roberto Campesino
Project Development Manager

Justin Hair
Key Account Manager

Michael Harrison
Global Product Director - Linings

Richard Kay
Segment Leader, Manufacturing and Processing - EMEAI

Dennis Macht
Key Account Manager - Wind Energy

Peter Moritz
Business Development Representative

Joachim Pflugfelder
Project Development Manager, HVI - Germany

Neil Wilds
Global Product Director, CUI / Testing

Matthias Winkler
Senior Key Account Manager - Wind Energy

Striking the balance: Slip resistance, cleanability, and durability in resin flooring

By **Richard Kay**, Segment Leader, Manufacturing and Processing - EMEAI

Safety, hygiene, performance. There is a lot to consider when choosing a floor for a manufacturing operation, whether that's food processing, pharmaceutical, or automotive production.

Because a highly slip-resistant surface will protect against accidents, but may be much harder to clean, while a floor with a fine texture for easy maintenance may not stand up to forklift traffic or heavy automated guided vehicles (AGVs) in the long term.

Understanding where a facility should stand on this spectrum depends on the industry and the use case.

Balancing needs

There are three main considerations for resin floor specifications: slip resistance, ease of cleaning, and durability. Yet improving one often comes at the expense of the others.

Slip resistance is a vital safety feature, protecting staff and visitors from falls. The more textured the surface, the better it grips underfoot. More textured surfaces can also help floors withstand heavy traffic from forklifts, pallet trucks, or trolleys, for example.

However, textured finishes also create small crevices where dirt and residues can collect. This makes cleaning more difficult and can lead to hygiene issues over time.

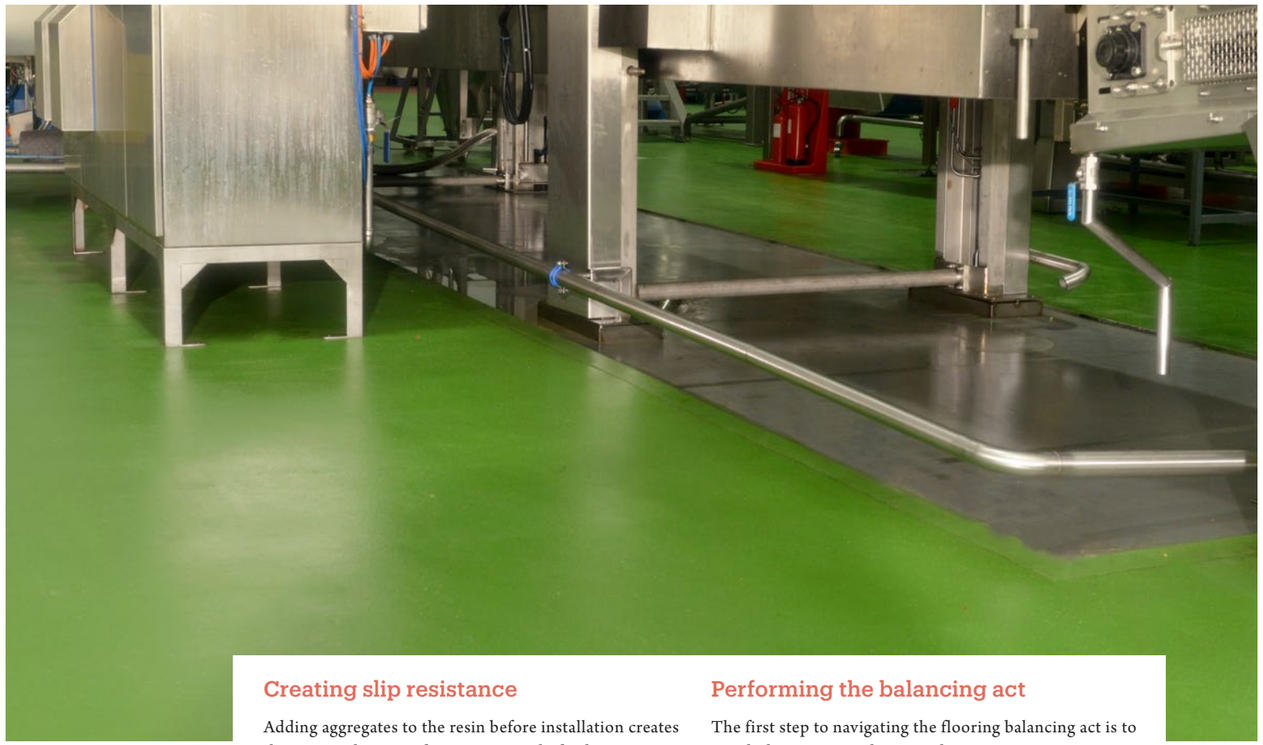
The challenge is finding the right balance for the environment in question. Both electric vehicle (EV) battery plants and bakeries, for example, have a high-slip risk, due to the use of carbon black and butter, respectively. Hygiene is important for both environments, but they are cleaned in very different ways, one wet and one dry, and this has an important impact on the degree of floor texture that can be used.

Assessing slip risk

Slip risk can be assessed in a number of ways. In the UK, the predominant method is the pendulum test, in which a rubber slider is swung across a floor surface to simulate heel strike. The distance it travels translates to a numerical pendulum test value (PTV).

The Health and Safety Executive (HSE) mandate a minimum PTV of 36 for commonly wet areas. That may include anything from retail spaces, where customers can bring in rain, to pharmaceutical clean rooms, which are regularly cleaned with distilled water, and manufacturing environments, where oils and grease are commonplace.

In continental Europe, the 'ramp test' is commonly used. Performed by a person in a harness walking across the surface at an incline, it provides an R-Value ranging from R9 to R13, with R9 being the highest slip risk.



Right
FasTop installed at a food production plant.
© Steve Parkin

Left
A high-tech facility for dry cat food production, showcasing the pelleted feed manufacturing process.

Creating slip resistance

Adding aggregates to the resin before installation creates the texture that provides grip. Not only do the type, size, and shape of aggregate influence slip resistance, but they also play a role in the floor's durability and cleaning requirements.

Fine polymer beads produce the finest profile. The resulting floors are easy to clean but offer the least durability. It makes them suitable for lighter-duty areas only.

Quartz sand, one of the most common options, has a rounded shape that provides moderate slip resistance and good all-round performance. However, it may wear smooth, affecting PTV and ramp test results, faster than other methods under heavy use.

The triangular shape of aluminium oxide makes it much tougher than quartz sand. As such, it provides higher slip resistance and excellent strength under traffic from pallet trucks or forklifts, for example.

Bauxite offers a high crushing strength, combined with a larger aggregate for increased slip resistance. It is not as hard as aluminium oxide but provides a good balance of durability where very high slip resistance is paramount.

Performing the balancing act

The first step to navigating the flooring balancing act is to match the aggregate choice to the environment.

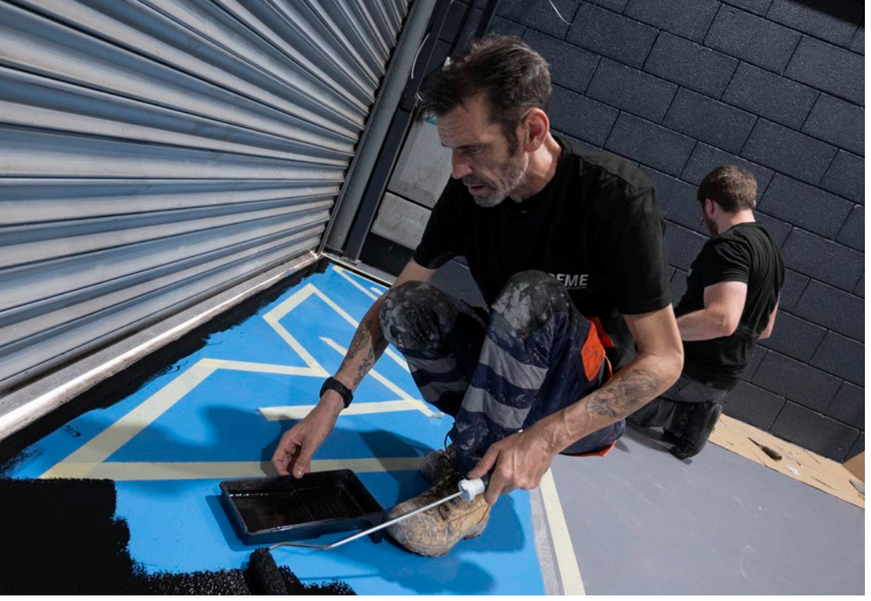
Understanding the typical hazards, whether they are flour, oils, or powders, in the relevant sector helps determine the level of texture needed. Light-duty spaces with minimal traffic may only need fine polymer beads or quartz sand, while heavy industrial sites with forklift traffic may benefit from aluminium oxide or bauxite.

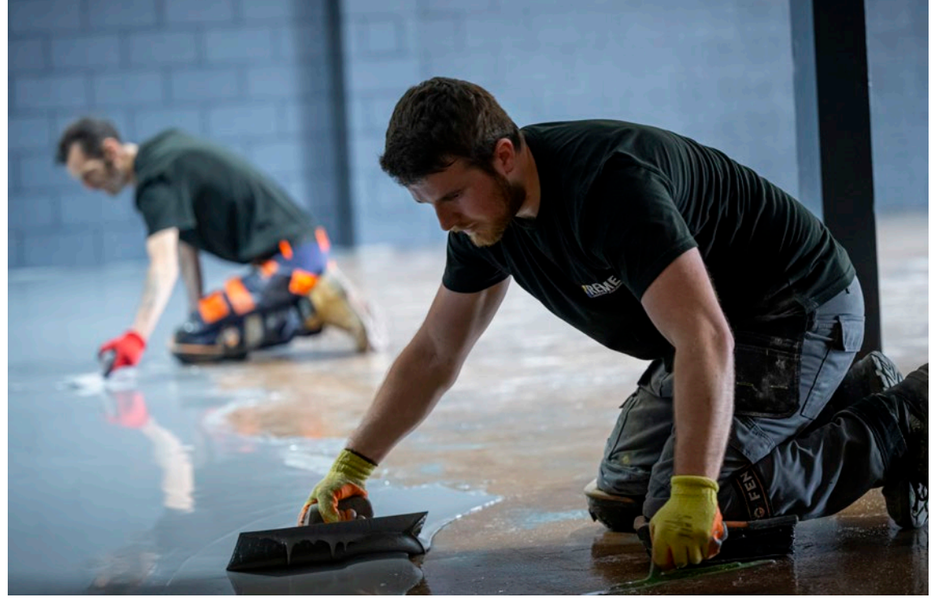
The next consideration is hygiene requirements. A highly textured floor may be the safest option, but if the facility doesn't have the right cleaning equipment, performance will quickly deteriorate. Mechanical scrubber driers with appropriate detergents are often essential for textured resin floors, and implementing building cleaning strategies at the start helps avoid operational headaches later on.

It is also a good idea to install multiple samples before starting a project, to test for the correct balance of durability, slip resistance and ease of cleaning. This gives everybody peace of mind in what is a significant investment in protecting people, equipment and the very foundation of the building.

No one-size-fits-all

Ultimately, there is no single solution that fits all industries. But by working closely with flooring specialists and aligning installation choices with day-to-day operations, facilities can strike the right balance between safety, hygiene, and longevity.





Case Study: A high-performing floor for high-performance vehicles

When **Mike Brewer**, best known for fronting TV shows such as ***Wheeler Dealers*** and ***Born Dealer***, needed to transform a grimy workshop into a high-end car dealership, he knew exactly who to call.

The Leamington Spa space, previously used to strip down industrial kitchens, came with one major sticking point: the floor. Seeped in oil and grease, the image it projected was far from the high-end feel he was looking for.

Enter REME Industrial Flooring, which used a range of Sherwin-Williams' products to build the long-lasting foundations of One Automotive's luxurious showroom.

The challenge

One Automotive's story began when Mike turned what was once a private car collection space into a dealership. Within the first few months, the family-run business was selling more than 40 vehicles a month. It was time for an expansion.

The team acquired the adjoining building, which had previously been used to strip down fast-food kitchens and was in poor condition.

"The building was disgusting," said Mike, "it stank, and the floor was soaked in oil and grease. It took a good month just to clean the walls. I knew at that point we were going to need a floor."

For a customer-facing automotive showroom and service space, presentation is critical, he said.

Above left
Resuflor™ LM is applied to create markings for walkways, entrance points and the garage door.

Above right
The finished result - a high quality finish that's aesthetically pleasing and hard wearing.

Mike needed a flooring solution that was durable enough to withstand heavy vehicles, and constant foot traffic, easy to clean, and slip resistant. It also needed to be visually striking, to reassure customers that they were buying from a premium dealership.

He got in touch with REME, which had installed the floor in the original One Automotive building, and was happy to hear they were still working with Sherwin-Williams.

"Sherwin-Williams has been in the industry for more than 50 years. You know you are going to get a floor that lasts," he said. "You could tear down the building, and the floor would still be here."

The solution

REME's install process started with substrate preparation, which involved the removal of contamination and the creation of a keyed surface, and the application of a primer coat.

Next, they used **Resuflor™ SLX**, a 2–3mm self-levelling epoxy layer, to provide a high impact resistance and a flawless, smooth base. A coating of **Resuflor™ HB** in grey and blue with aggregate added slip resistance without compromising on the look, and **Resuflor™ LM** was used to create black demarcation lines.

FIND OUT MORE

The results

The transformation was dramatic. "I walked in and was speechless. I actually got a little bit emotional thinking about how far our little company has come," said Mike.

"It looks absolutely incredible. For businesses like mine, where people come through the door, they need confidence not only in the car, but also in the surroundings. If you walk into a building that looks like this, chances are you will be reassured."

Not only has it elevated the aesthetics of the showroom, but it has also delivered on practicalities, he went on. Oil wipes away effortlessly, and the anti-slip surface keeps staff and visitors safe.

The bottom line

For Mike, the floor was more than a practical upgrade – it was a statement. By partnering with REME and Sherwin-Williams, One Automotive now has a showroom floor that reflects their reputation for excellence.

"It oozes quality," said Mike. "When customers walk through the door, they feel they're in the right place. And that means they're more likely to buy."

Left
Mike Brewer joins us for a chat about his new floor. Watch the full video on our website.

Above
Resuflor™ LM provides demarcation around the garage door.

Revolutionising temperature control: The benefits of thermal insulated coatings in the food and beverage, and pharmaceutical industries

By Richard Kay, Segment Leader, Manufacturing and Processing - EMEAI

Insulation is safety critical in food and beverage, and pharmaceutical factories, where hot pipes and equipment pose a significant burn risk to workers. Yet traditional approaches often fall short in terms of durability and longevity and can be expensive to install and maintain.

Thermal Insulation Coatings (TIC) have the potential to replace bulky materials, such as mineral wool, that can be easily damaged and pose a hygiene risk. Just a relatively thin layer of these easy to apply, easy to maintain solutions can keep exterior surfaces safe to the touch, even in the tightest of spaces.

TICs, then, are emerging as a safer, smarter alternative to conventional insulation systems.

Thermal insulation: Why it matters

In the world of food and beverage, and pharmaceutical manufacturing, where hot pipes and machinery are ubiquitous, insulation plays a critical role in workplace safety.

Just a few seconds of incidental contact with a hot surface, whether that's a pipe, ductwork, or tank, is enough to blister and burn skin. Such injuries, which can be severe or even life-threatening, are extremely distressing to workers, their families, and their colleagues. They can also leave companies vulnerable to absence-related drops in productivity and, in some cases, legal action.

First and foremost, effective insulation is key to keeping people safe as they go about their duties. It creates a barrier that reduces heat transfer from hot surfaces to the skin.

In addition, it helps minimise heat loss or gain, ensuring products stay within safe temperature ranges, and keeps energy consumption and costs to a minimum.

Yet traditional approaches, such as mineral wool cladding, come with challenges. When condensation penetrates the barrier, the 'dry' insulation becomes 'wet'.

This can create major hygiene problems with traditional insulation harbouring bacteria such as listeria that can lead to major problems in busy food and pharmaceutical factories. It also poses the threat of Stainless-steel Stress Corrosion Cracking (SCC), that can create major failure and extended downtime in very busy environments. What's more, conventional methods are expensive to install due to them needing to be welded around pipework to maintain a hygienic seal. They can be fragile, necessitating frequent repairs, and risk-based inspections, in which materials are removed to inspect for signs of SCC, are not only labour-intensive, but also tend to require the wholescale shut down of production processes.

The TIC revolution

TICs are an innovative new approach with the potential to replace systems such as mineral wool. Long-established in the oil and gas industry as a means of burn protection, they are made from materials such as aerogels and epoxy compounds that form a thin, low-conductivity barrier to resist temperature flow.

They work by lowering the skin stimulation temperature, i.e. both the surface temperature and the rate of heat transfer, of surfaces, thereby reducing the risk of burns and all their consequences.

But they also are easy to clean and resistant to mould, bacteria, and contaminants, which enhances hygiene and quality standards.

Applied onsite, by brush or spray, for fast seamless coverage on pipework, tanks and associated equipment, TICs provide long-lasting protection from heat, corrosion, and abrasion. They are quick and easy to install, even in small or difficult to reach areas, and treated installations can be moved from risk-based to visual only inspection.

All of this drastically reduces costs and downtime, making TIC a safe and cost-effective long-term alternative to conventional methods.

Safer, cleaner, more cost-effective

TICs are redefining how the food and beverage, and pharmaceutical industries manage heat-related risk mitigation. By directly reducing surface temperatures, they help eliminate burn hazards at source, improving equipment safety, while also reducing installation and maintenance costs.

Unlike traditional materials, like mineral wool, thermal coatings offer consistent, safe-to-touch surfaces without the risk of degradation, water ingress, or contamination. They are easier to maintain, better suited to hygienic environments, and more adaptable to complex equipment layouts.

In short, TICs provide a practical, proven, cost-effective safety solution in high-risk, high-performance food and beverage, and pharmaceutical environments.

Top right
Pipes and fittings at a craft modern brewery.

Top left
Heat-Flex TIC applied to a protein digester during a customer trial, which was ultimately successful. The entire tank is now coated in Heat-Flex AEB.

Opposite page
An offshore rigger climbs a wind turbine monopile.

Left
Wind turbines in an offshore wind farm in the North Sea.

The urgent need for standardised corrosion protection in offshore wind

By **Joao Azevedo**, Segment Leader, Energy - EMEAI

Driven by the shift from fossil fuel to renewable energy, the offshore wind industry is riding a wave of rapid growth.

Billions of euros are being poured into offshore wind farms, in a bid to meet net-zero goals and reduce reliance on fossil fuels. But as the pace of construction accelerates, so too does the urgency to solve one of the sector's most overlooked technical challenges: corrosion protection.

Wind turbine foundations, whether monopiles or jackets, are exposed to some of the most aggressive environmental conditions imaginable. Rising from the seabed, they endure saltwater immersion, strong currents, wave impacts, and fluctuating splash zones, all without regular maintenance.

Yet, despite numerous efforts, there is still no globally accepted standard for corrosion protection in this sector. Fabricators face a maze of rules and guidelines that shift in line with the project at hand, all of which adds complexity and cost.

The industry is relying on outdated or unproven methods that increase the risk of leaving multi-billion-dollar investments vulnerable to premature degradation.

The case for corrosion protection

Offshore wind structures are fundamentally different from those used in the oil and gas industry. While oil platforms are regularly staffed, maintained, and built with redundancy in mind, offshore wind installations are largely unmanned, widely dispersed, and expected to run with minimal maintenance for more than 30 years.

This presents a corrosion protection challenge. On an unmanned structure, a small failure in a coating system can often go unnoticed, leading to increased repair costs and extended downtimes in the long run. Yet foundations are constantly exposed to extreme marine conditions, with oxygenated splash zones, shifting sea beds, salt spray, and biological growth all playing a part in accelerating degradation. What's more, the scale of the structures means they experience a much higher degree of flexing than oil and gas installations.

The solutions in place today are often inconsistent, repurposed from industries with entirely different performance expectations. Many developers still rely on standards or product specifications that were originally designed for oil and gas installations. But these approaches could benefit from being adapted to the realities of offshore wind.

The story so far: A trial-and-error journey

In the early years of offshore wind, the logical starting point was the application of existing standard tools covering the corrosion protection of steel structures in offshore environments, such as ISO 12944-9, its predecessor ISO 20340, and NORSOK M-501. Yet while these provided a useful baseline, they were never designed with offshore wind in mind.

These standards prescribe the design and prequalification of coating systems for offshore environments to be of "high durability", which is defined as a minimum of 15 years. This is a far cry from the 30-plus years expected from offshore wind foundations in most projects. It meant that coatings, especially in the high-risk splash zone, may start to fail earlier than expected, as these standards alone may not be enough to protect installations and investments.

In response, Germany introduced a more tailored approach. The vgbe/BAW standard stipulated stricter performance-based testing, aimed at better reflecting the unique challenges. While a step in the right direction, however, adoption has been largely regional. What's more, some of the prescribed testing methods and material requirements are not optimally suited to test modern, solvent-free coatings.

Realising the limitations of such lab-based standards, there has been a move to analyse field data, to determine which coatings perform best under real-world offshore conditions. This influenced the development of ISO 24656:2022, covering the design of cathodic protection systems in offshore wind, which classifies coatings based on perceived long-term performance in aggressive marine environments.

ISO 24656, however, is intended as a classification tool, rather than a design or specification standard for coating systems. Unfortunately, some in the industry have misunderstood its purpose, using it as a *de facto* coatings specification document. Many have taken the compositional requirement of a minimum 20% glass flake content in coatings as being synonymous with maximum performance. As such, performance testing to adopt more innovative, possibly more effective, modern alternatives has largely been ignored.

The current state of corrosion protection design is defined by fragmentation, and over-reliance on legacy practices. Standards from oil and gas are not fully adapting to the offshore wind needs, while newer guidelines often focus too much on coating composition, based on 'real-world performance' that can be challenged.

Developers and contractors may feel obligated to specify certain compositions or application methods simply because they are written into outdated guidelines, regardless of whether better technologies exist. The lack of specific international standardisation leads to higher costs and longer fabricator lead times, due to the need to navigate different specifications and rules.

A smarter path forward

The industry needs a holistic, performance-based, and forward-thinking standard for corrosion protection. In short, a tailor-made standard for offshore wind.

The first step is removing compositional requirements. They rely on old coating formulas and ad-hoc un-scientific "track record evidence" that limit innovation. Instead, standards should focus on real-world durability over the target monopile lifespan. This would allow manufacturers to propose the best way to achieve those goals.

We also need to improve and standardise coating pre-qualification testing. Updated versions of vgbe/BAW and NORSOK M-501 (Rev 7), which have started to incorporate more realistic testing protocols, are a step in the right direction. But the real game-changer may come in the form of ISO/AWI 25249, a new international standard currently in development specifically for offshore wind foundations.

We believe that this should aim for 25 to 35-plus year durability benchmarks, consider splash zone testing, and be universally adopted across asset owners and project specifications to streamline quality assurance and procurement. Emerging standards should also consider how coatings are applied and inspected, and how they work under real world fabrication conditions – not just in a lab. Systems with fast curing times, solvent-free formulas, and easy-to-inspect finishes, for example, are essential to ensuring consistent performance across global production sites.

As a key pillar of the renewable energy transition, offshore wind must also consider the environmental footprint of its protective systems. Coating technologies that reduce the need for cathodic protection, steel thickness allowances, and energy-intensive maintenance operations can make a significant difference here. Where possible, materials with lower embodied carbon and reduced environmental hazards, such as alternatives to high-metallic zinc or aluminium systems, should be prioritised.

Standardisation: The missing piece

If offshore wind is to realise its full potential, corrosion protection cannot be an afterthought. The cost of inadequate protection is measured not just in steel loss and repair bills, but in downtime, lost energy production, and undermined investor confidence.

The solution is clear. We, as a sector, must move away from outdated oil and gas feedback, adopt performance-based testing, and unify the industry under a robust, internationally recognised framework. It should be designed specifically for offshore wind and also cover application and sustainability factors.

Because it is only with smarter testing, improved application and inspection strategies, and a focus on sustainability, that we can ensure offshore wind remains a long-term, reliable source of energy.

Protecting the future of renewable energy from the foundations up

By Dennis Macht, Key Account Manager - Wind Energy
and Matthias Winkler, Senior Key Account Manager - Wind Energy

Offshore wind is playing a vital role in delivering clean, reliable power at scale. And with the foundations of these mammoth structures being exposed to some of the harshest environments imaginable, protecting them from corrosion is tantamount to protecting our energy security.

Given positive experiences on previous projects in collaboration with EnBW, Steelwind Nordenham steel fabricators turned to Sherwin-Williams when working on He Dreih, Germany's largest wind farm and a showcase for modern, sustainable infrastructure.

Our renewable future

The EnBW offshore wind farm 'He Dreiht' comprises 64 turbines with a total capacity of 960 megawatts, and is one of the first wind farms in Germany to be built without government subsidies

Covering an area of around 90 kilometres near the island of Borkum in the North Sea, it is one of Europe's largest energy transition projects. By spring 2026, it will be able to supply 1.1 million households with renewable energy. It plays an integral part in the country's future energy plans, making its protection from the elements a crucial consideration.

Matthias Winkler, at Sherwin-Williams, said: "Offshore wind monopiles are exposed to aggressive environmental conditions every day.

Rising from the seabed, these steel structures encounter saltwater immersion, strong currents, wave impacts, and fluctuating splash zones, all of which leaves them highly vulnerable to corrosion."

Offshore wind facilities are expected to run with minimal maintenance for more than 30 years. A small failure in a coating system, then, can often go unnoticed until it is too late, leading to increased repair costs and expensive extended downtimes.

"The monopiles are the backbone of the entire wind farm. If they fail, the turbines fail."

Coatings and challenges

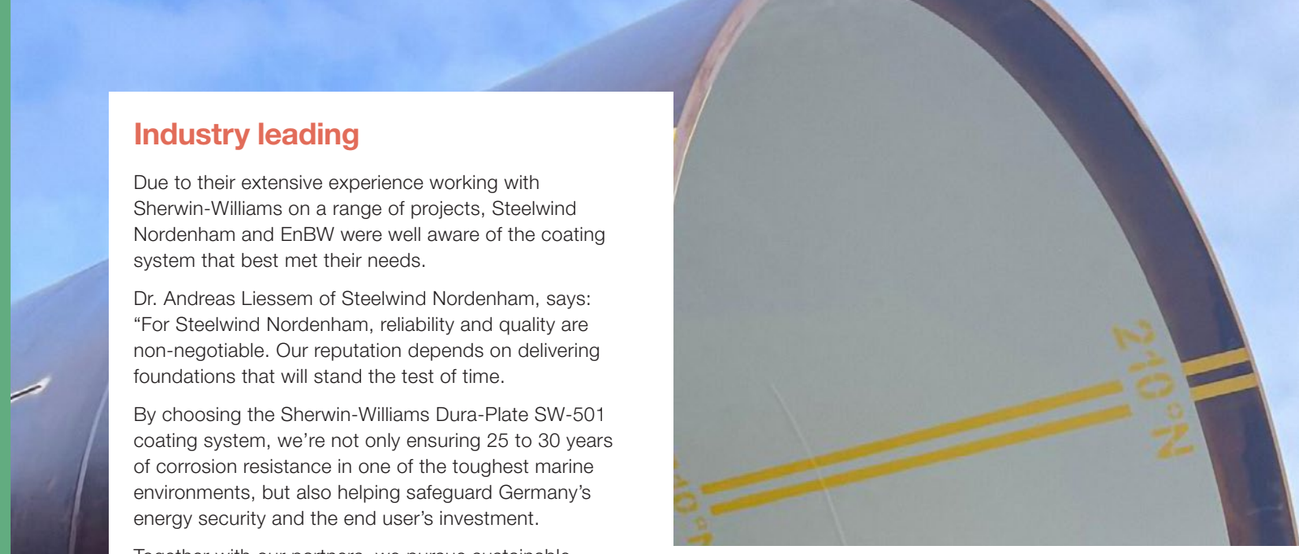
Protecting monopiles from corrosion, then, is not just a technical necessity. It is a matter of safety, sustainability, and energy reliability.

Corrosion protection coatings act as a barrier between the metal and its environment, preventing corrosive elements like water, oxygen, and salts from reaching the surface. Sherwin-Williams' **Dura-Plate® SW-501** Series is a 100% solvent-free and benzyl alcohol-free high-build epoxy coating that forms a dense, impermeable layer over the steel surface. With outstanding structural integrity, these coatings offer long-term protection for turbine investment while delivering safety and reliability well beyond their expected service life.

Choosing the right coating, however, can be challenging. Traditional options are not designed to withstand the decades of light-touch maintenance that is central to the wind farm business model. Rather, they are based on the very different needs of manned oil and gas platforms.

Many contain Volatile Organic Compounds (VOCs) and harmful solvents that can evaporate into the air, threatening applicator safety. VOCs can also contaminate water, necessitating time and resource-sapping post-application treatment before installation.

Some coatings can be difficult or slow to apply, reducing build efficiency. Others do not meet relevant standards and regulations, such as VGBE-S-021-02-2023, NORSOK M-501 or ISO 12944-9 2018.



Industry leading

Due to their extensive experience working with Sherwin-Williams on a range of projects, Steelwind Nordenham and EnBW were well aware of the coating system that best met their needs.

Dr. Andreas Liessem of Steelwind Nordenham, says: "For Steelwind Nordenham, reliability and quality are non-negotiable. Our reputation depends on delivering foundations that will stand the test of time.

By choosing the Sherwin-Williams Dura-Plate SW-501 coating system, we're not only ensuring 25 to 30 years of corrosion resistance in one of the toughest marine environments, but also helping safeguard Germany's energy security and the end user's investment.

Together with our partners, we pursue sustainable solutions that create long-term value", he continues.

Application of the 100% solvent-free coating system took place at Steelwind Nordenham's advanced fabrication facility in northern Germany, where the massive steel monopiles, each measuring up to 71 metres in length and weighing approximately 1,350 tons, were produced.

Steelwind's applicator partner, Robert Krebs GmbH from Hamburg, used manual airless spraying to ensure consistent film build and surface coverage across the vast steel structures.

Matthias Winkler notes: "Despite the scale and complexity of the task, the project was completed smoothly and without any application issues. This is testament to both the product's ease of use, and the professionalism of the project partners."

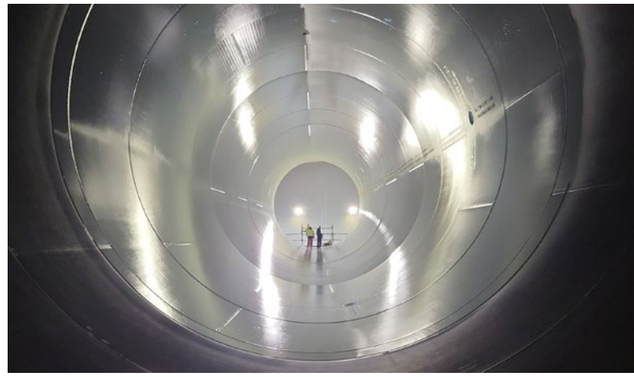
Close collaboration between all three partner companies ensured the system met all regulatory and client requirements. As part of the He Dreiht offshore wind project, Steelwind Nordenham once again relied on the proven protective coating Dura-Plate SW-501 this time on a foundation of exceptional size. The application process went smoothly and impressed with outstanding surface quality.

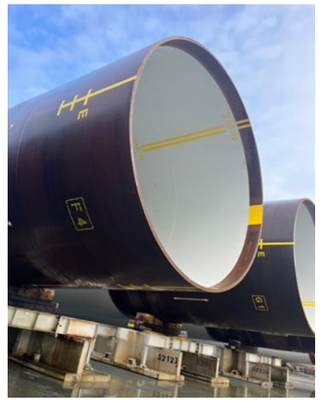
Dura-Plate SW-501 exceeded expectations in two key areas: excellent handling during application and superior surface finish after curing. This confirmed the coating as a reliable solution for demanding offshore structures and highlighted its role in a long-term corrosion protection strategy.

Secure energy future

Coating technology is fundamental to building a sustainable energy future, helping to ensure steel monopiles will stand strong beneath the waves for decades to come.

By protecting the very structures that anchor our clean energy infrastructure, the industry is helping to secure not just the longevity of wind farms, but the reliability of renewable power for generations to come.





Monopiles are coated at the applicator facility, before being transferred to the docks and continuing their journey offshore.

Images courtesy of Christian Petschke, Robert Krebs GmbH

Sherwin-Williams expands global core product offering for customers worldwide

No matter where you are in the world, you can rely on consistent quality and performance standards with Sherwin-Williams' expanded line of Global Core products. In 2025, an inorganic zinc primer, epoxy primer, epoxy intermediate coat and urethane topcoat were all added to our range of universal products, which offer asset owners, engineers, specifiers and applicators compatibility, colour matching, and performance confidence across multiple regions.

These versatile coatings can be used in various combinations and with other products to create multi-layer coating systems for corrosion protection and aesthetics, for a wide range of applications in markets including commercial infrastructure, bridge and highway, energy, manufacturing and processing, and water and wastewater. Each product is easy to apply, while meeting the requirements of local, regional, and global customers who expect consistency no matter their location.

Each product meets the strict requirements of the ISO 12944:2018 and NORSOK M501 standards. These global standards define the minimum performance characteristics of coatings in an array of service environments, including the most severe C5 and higher conditions noted in ISO 12944:2018. Adhering to these international standards enables the third-party validated coatings to be specified and used around the world, as they will feature the same chemistry, technical data sheet information, coating performance data, standard colours and application characteristics, regardless of where they are manufactured or sold. All in all, these characteristics make the Global Core coatings particularly advantageous for use in multiregional projects.

"Consistency enables uniformity – which are both key characteristics customers look for in coating systems when operating around the globe," said Sean Grady, senior global product director at Sherwin-Williams Protective & Marine. "For example, a project featuring structural steel may be engineered in one region, with the steel fabricated and coated in another, before being shipped elsewhere to be erected. Along the way, the initial specifiers, original coating applicators and final touch-up crew must be able to select the same coatings regardless of their location. Our Global Core products offer the same formulations and performance characteristics worldwide, allowing us to service projects wherever materials are needed."

The new coatings offer enhanced productivity and greater ease of application. They all have fast drying times, enabling the prompt application of subsequent coats and rapid handling of assets for delivery to job sites. This faster job throughput is further enhanced by application ease, including easy sprayability and tolerance, as well as standard mixing ratios, which minimise the potential for errors. The coatings' broad performance versatility also enables applicators to stock fewer additional products, helping them to optimise their inventory operations.

The expanded line of Global Core products from Sherwin-Williams Protective & Marine that are available at the same quality and performance standards around the globe include an inorganic zinc primer (**Zinc Clad® 2500**), epoxy primer (**Macropoxy® 4600**), epoxy intermediate coat (**Macropoxy® 2600**) and urethane topcoat (**Acrolon® 7700**).

These versatile coatings can be used in a wide range of applications: in the commercial infrastructure, bridge and highway, energy, manufacturing and processing, water and wastewater, and other markets.

The expanded Sherwin-Williams Global Core range now includes:

Macropoxy® 4600 – Corrosion Inhibitive Epoxy Primer

Approved for ISO 12944 service environments of up to C5, **Macropoxy 4600** offers a cost-effective anti-corrosion primer option for protecting carbon steel. The high-solids, multi-functional epoxy zinc phosphate coating enables fast applications, cures and asset handling – with no sweat-in time, dry-to-handle times of just three hours and a minimum recoat window of two hours – to enhance productivity. It also features a low-temperature cure, which means the product will dry faster at lower temperatures and will continue to cure even if it is moved outside during the winter months.

Macropoxy® 2600 – Epoxy

In a traditional three-coat system, a high-build intermediate coat is a necessity to build film thickness as a barrier to protect the anti-corrosive layer below. **Macropoxy 2600** offers just that, along with notable application efficiencies. The high-solids epoxy has a simple 4:1 mix ratio with no sweat-in time. dries fast, cures at low temperatures and has a rapid minimum recoat time of two hours, enabling applicators to move quickly to the final top coating step. Adding to the ease of application, both Macropoxy 2600 and Macropoxy 4600 share the same catalyst, enabling applicator inventory efficiencies, as shops only need to stock one hardener. Designed to withstand the most aggressive ISO 12944 C5 environments and higher in its original form, Macropoxy 2600 is also available in a formulation featuring micaceous iron oxide flakes for enhanced overcoating properties and barrier protection.

Acrolon® 7700 – Urethane Topcoat

A durable finish coat of **Acrolon 7700** over a high-performance anti-corrosion system offers both enhanced aesthetics and additional protection for steel assets. This two-component, high-solids acrylic polyurethane has excellent resistance to atmospheric exposures and maintains gloss and colour, even in highly corrosive environments. With reduced dry times, Acrolon 7700 allows applicators to rapidly move assets through shops for accelerated throughput. Acrolon 7700 also offers applicators ease of application with lower operating pressures, a wider range of film build requirements with no reduction needed and a simple 4:1 mix ratio to minimise opportunities for errors.

Zinc Clad® 2500 – Inorganic Zinc Primer

Zinc Clad 2500 makes faster priming, handling, and delivery of new construction assets possible with the inorganic zinc primer is heavily loaded with zinc silicate and is applied to bare-blasted steel in a fabrication shop environment. It provides excellent protection against corrosion, all the way up to ISO 12944 CX environments, and also meets the requirements of slip B for bolted connections. Superior application characteristics provide greater transfer efficiency, less waste, and less time spent cleaning up dry spray. The thin-film coating cures quickly, with a 45-minute dry-to-handle time and a dry-to-recoat time of as little as four hours, both of which enable shops to accelerate throughput, maximise productivity and rapidly ship coated assets. This fast delivery pace also helps to accelerate construction schedules for enhanced builder productivity.

Corrosion Under Insulation (CUI) is retiring after years of bad behaviour

by Neil Wilds, Global Product Director – CUI / Testing

Most people in the industry are all too familiar with Corrosion Under Insulation's (CUI) rap sheet. They know it seeks insulated storage tanks that need to be maintained at elevated temperatures out and insidiously undermines their integrity.

And they know the costly consequences. Because traditional insulation systems take a lot of work to install. Pieces of mineral wool have to be cut and fitted to the asset, pinned and banded in place. Then, cladding has to be installed over the mineral wool or other insulating material.

After all that, the system is quite effective at maintaining elevated temperatures in the tank – that is, until inevitable happens and the insulation gets wet. Moisture is the nefarious enabler of CUI. In a matter of months, the moisture will make its way past the cladding, and into the insulation material, causing the insulating properties of the whole system plummet. When the mineral wool reaches 10% water by volume, the loss in R-value can be as great as 85%.

Moisture is laughing maniacally at this point. It has already reached the tank surface and brought along a witch's brew of minerals and electrolytes. In this warm environment, the moisture has nowhere to go, and, with a little time, CUI will show up.

This villainous pair have performed their vile act countless times, to the chagrin of engineers, installers and asset owners. But now, the latest generation of Thermal Insulative Coatings (TICs) (**Figure 1**) have emerged to put an end to their reign. The TIC **Heat-Flex® Advanced Energy Barrier (AEB)** from Sherwin-Williams Protective & Marine, for example, can maintain operating temperatures up to 177°C (350°F), with excursions to 204°C (400°F). In these temperature ranges, the insulating properties of Heat-Flex AEB are comparable to a traditional system when newly applied, before it inevitably becomes wet).

TICs offer many benefits over traditional systems, but the main one is that moisture and CUI are given no asylum. First, the closed-cell structure of the coating film minimises the amount of moisture the coating can actually absorb. Therefore, any absorbed moisture will barely affect the coating's thermal performance. Second, even when TICs absorb moisture, it dissipates through heating and evaporation within 24 hours.

So, however regrettable, CUI's notorious role in the storage tank industry is becoming obsolete.

Application and safety considerations

In addition, TICs are significantly easier, faster and safer to apply than bulky exterior insulation systems.

With traditional systems, the work may have to be performed in close proximity to hot assets, because plant processes cannot be shut down during installation. When applying a single-component TIC like Heat-Flex AEB, however, applicators can stand at a safe distance from assets and spray the material onto the surface.

Once a single coat of the TIC is applied, the surface temperature of the asset will be reduced instantaneously, thereby removing any risk of burns. With Heat-Flex AEB, assets can be maintained at up to 148°C (300°F) during coating applications, which enables processes to continue running.

Application methods for TICs

Heat-Flex AEB is part of a coating system with an approved primer (**Figure 2**), and, like any system, it requires a clean substrate so it can adhere properly and deliver long-term service. Usually, some type of blasting is required to remove old coatings and any contaminants from the surfaces.

For a primer layer, Sherwin-Williams recommends a CUI-mitigation primer like **Heat-Flex® ACE** (Advanced CUI Epoxy) or **Heat-Flex® 750**. Heat-Flex AEB can serve as the functional TIC topcoat, or another product can be applied to improve aesthetics and durability.

When applying Heat-Flex AEB, multiple layers will be required, with a period for curing between them. Typically, you will be aiming for 5,000 to 6,250µm (200 to 250 mils) dry film thickness (DFT) per coat, and, in most applications, you'll need only two to three coats to achieve the coating system's target minimum of 70% heat retention.

Heat-Flex AEB is a single-component coating, so the OMA process applies: open, mix, apply. Simply stir the material as directed and spray it on with no need for quality control checks.

No second acts for moisture and CUI

As a second-generation TIC, Heat-Flex AEB is a breakthrough technology that sprays on in layers, eliminating the arduous and sometimes dangerous application of mineral wool insulation and cladding. More importantly, for applications with temperatures of 177°C (350°F) or below, TICs are more effective at containing heat than traditional systems because once mineral wool inevitably becomes wet, its efficiency as an insulator greatly decreases.

While most operators have learned to live with wet insulation and the risk of CUI, there is now another option. Moisture and CUI are no longer the titans they once were, acting in bold defiance of the operator's every effort. They will soon be toothless relics, living only in the mythology of an earlier era.

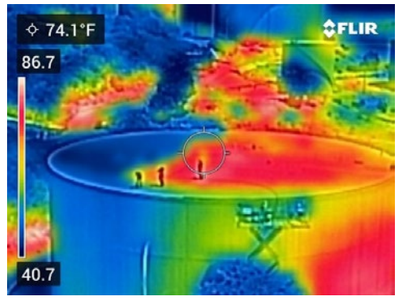


Figure 1

FLIR imaging of this ground storage tank being covered with a TIC demonstrates how well the coated areas (blue and green) retain heat compared to the noncoated areas (red and yellow).

Figure 2

Like storage tanks, heater treaters can be covered with TICs in place of traditional insulation systems to maintain process heat. This unit was first primed with Heat-Flex ACE for corrosion protection (top) and then covered with the TIC Heat-Flex AEB (middle) to lock in process heat before being top coated (bottom) for aesthetic and durability purposes.

Choosing the Right Linings in the Biofuel Transition

How SAF Feedstocks and Refined Fuels Challenge Tank Protection and Product Integrity

Michael Harrison, Global Product Director – Linings, and Justin Hair, Key Account Manager

As the energy industry ramps up sustainable fuel production, refiners are confronting new questions about whether their storage tanks can handle both shifting raw materials and the refined products they yield.

Keeping tanks in peak condition is essential to maintaining the flow of refining and fuel distribution. Yet with lipid-based feedstocks varying by market availability, producers must ask: will existing linings stand up to these commodities – both before and after refining?

The answer starts with careful material selection. Linings for raw material tanks must resist the aggressive acids in biofeedstocks, while those for refined biofuels must be compatible enough to avoid product contamination. An additional complexity is that tanks may also be needed for traditional, fossil feedstocks as demands fluctuate.

These priorities are especially critical in aviation, where Sustainable Aviation Fuel (SAF) demand is growing. Recent testing has assessed how different lining materials perform with both lipid-based feedstocks and SAF. While focused on aviation, the findings apply broadly across biofuel processing – offering refiners a clearer path to selecting linings that protect both their assets and their products.

In addition to safeguarding performance, selecting the right lining early in a project can prevent costly midstream retrofits. Replacing or repairing tank linings often requires taking critical storage assets offline, which can disrupt supply chains and fuel delivery schedules. A thorough review of lining compatibility up front helps tanks stay in service longer and keep maintenance intervals predictable.

Changing feedstocks bring new lining challenges

Biofuels have a much lower carbon footprint than fossil fuels, with a net reduction in carbon dioxide (CO_2) emissions when burned. That environmental advantage – and the push for industry-wide emission cuts – is driving demand. The International Energy Agency (IEA) reports that the biofuels market is expanding by roughly 6% each year.[1]

This growth, however, brings operational challenges. Biofuel feedstocks behave differently from traditional crude oils. Fossil fuels are corrosive because of inorganic sulphurous and sulfuric acids, while lipid-based feedstocks are even more aggressive due to fatty acids. Their corrosivity increases at higher storage temperatures and with longer storage times. Linings in biofeedstock tanks must be compatible with these conditions to avoid costly, premature failures.

At the opposite end of the process, corrosion risk is minimal – but product purity is a topmost consideration. In refined biofuel storage, the priority is to prevent the lining from leaching contaminants into the fuel. Following API RP 652: *Linings of Aboveground Petroleum Storage Tank Bottoms*, Fifth Edition (2020), Section 6.7.1 – *Selecting Internal Linings for Tanks Storing Alternate Fuels* – can help specifiers address both scenarios.

Still, because biofuels introduce feedstocks and products not seen in conventional oil service, decades of data for crude oil exposures do not directly apply. Proven long-term performance records for biofeedstocks remain limited, so updated testing and specifications are necessary to guide decisions on whether a tank should be relined.

Time and temperature effects on lining performance

The surest way to determine if a lining can handle an unfamiliar biofeedstock is to test it, both in the lab and in operating conditions, to see how it performs in theory and in practice.

Sherwin-Williams Protective & Marine recently carried out laboratory testing on three of its linings to measure corrosion resistance in different lipid-based feedstocks (vegetable oil, beef tallow and vegetable oil with Free Fatty Acids [FFAs]) added to simulate the higher acidity of waste cooking oil.

The products included:

- **Nova-Plate® UHS** – a solvent-free, ultra-high-solids novolac amine epoxy, traditionally rated for crude oil exposure up to 130°C (266°F)
- **Magnalux™ 2100FF** – a novolac glass flake-reinforced vinyl ester, acid-resistant, rated to about 100°C (212°F) for crude oil
- **Nova-Plate® 360** – a high-performance, inert, flake-reinforced novolac tank lining

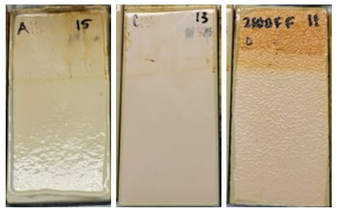
An isothermal test following NACE TM-0174, Procedure B, immersed coated steel panels for 15 months at 60°C (140°F), 71°C (160°F), and 82°C (180°F) (**Figure 1**). The results showed a direct relationship between temperature and degradation rate. Higher storage temperatures accelerated lining breakdown, confirming that heat intensifies the corrosive effects of lipid-based feedstocks.

Exposure duration was equally important. At all temperatures, none of the linings showed degradation after six or 12 months. By 15 months at higher temperatures, however, some systems displayed varying levels of damage. In nearly all cases, deterioration began at the vapour-liquid interface: an area where vapours, heat and oxygen combine to create a particularly aggressive environment.

The differences in performance reflected each product's chemistry and tolerance for alternative acidic conditions. Lipid-based feedstocks naturally change composition when stored, becoming more acidic over time. This process is accelerated by elevated temperatures. As FFAs increase, they can eventually surpass the lining's resistance threshold. If tanks are not maintained or cycled frequently enough, this can lead to failure.

These findings underscore why time and temperature are critical factors in lining selection, especially for facilities storing feedstocks in warmer climates or for extended periods. They also help explain why laboratory data must be paired with realistic field conditions to give owners the clearest picture of expected service life.

Partnering closely with lining manufacturers during the specification phase can help in consideration of key details about anticipated feedstocks, storage durations and operating temperatures. Owners can draw on both laboratory data and field experience to select the most resilient option. These collaborations can improve confidence in the chosen system and streamline inspection and maintenance planning over the tank's service life.



Exposure: 60°C (140°F)

Exposure: 71°C (160°F)

Exposure: 82°C (180°F)

Figure 1

Isothermal testing per NACE TM-0174, run for 15 months, showed a direct link between exposure time, temperature and lining degradation – with damage appearing first at the vapour-liquid interface. These panels, coated with three different linings, were immersed in vegetable oil (+DI water) at varying temperatures. No degradation was observed at any temperature after six or 12 months.

1. IEA (2023), Tracking Clean Energy Progress 2023, IEA, Paris https://www.iea.org/reports/tracking-clean-energy-progress-2023, License: CC BY 4.0

Cyclical testing mirrors field realities

In service, biofeedstocks are rarely stored for months on end. Tank turnover often occurs within 30 days, meaning linings are not subjected to the prolonged, static exposures of long-term lab tests. To better reflect real-world conditions, Sherwin-Williams conducted cyclic testing alongside static exposures.

Over six months, steel panels coated with the three test linings, plus an uncoated grit-blasted control, were immersed in vegetable oil and water at 82°C (180°F). Every 30 days, 75% of the oil was replaced, for a total of 16 cycles to date. A control set was left in continuous exposure at the same temperature for comparison. The cyclic test panels performed significantly better than those under continuous exposure (**Figure 2**).

Corrosion was most severe in the vapour space above the oil, where uncoated panels developed pitting from rancid oil vapours – a common threat to internal tank roofs. At the oil-water interface near the panel bottoms, FFAs concentrated in the aqueous layer, accelerating corrosion on unprotected steel. These conditions highlight why both the underside of roofs and tank floors require careful protection.

Detailed analytical testing of the oils throughout the programme also measured how oil chemistry changed. In cycled exposures, FFA concentrations rose only slightly compared to the steep increases seen in static exposure. This difference helps explain the improved performance in the immersed portions and supports expectations of better results in the field when tanks are regularly emptied and refilled.

Specifying linings for both parts of the process

The purpose of lining storage tanks in biofuel service is twofold: to protect the steel and to protect the stored material. The priority changes depending on whether the tank is holding aggressive biofeedstocks or refined biofuels. Some linings can perform well in both environments, while others are suited only to the cleaner, less corrosive refined fuel side. API RP 652, Section 6.7.1, outlines how to verify compatibility for a given product and service.

Front-end feedstock storage: Among the three tested products, the novolac glass flake-reinforced vinyl ester (Magnalux 2100FF) offered the strongest resistance in both continuous and cyclic exposure, typically showing only discoloration. This is due to its high tolerance for organic acids, which are more aggressive than the FFAs formed during lipid degradation. The ultra-high-solids novolac amine epoxy (Nova-Plate UHS) and the flake-reinforced novolac (Nova-Plate 360) both performed well under cyclic exposure but showed reduced tolerance in continuous testing where rising FFA concentrations at elevated temperatures led to significant corrosion. In the cyclic testing that more closely reflected field conditions, the flake-reinforced novolac (Nova-Plate 360) was the clear second-best performer, with no degradation in the cyclic exposures.

Refined fuel storage: Independent testing confirmed that the flake-reinforced novolac (Nova-Plate 360) does not contaminate SAF or other fuels. It exceeded the stringent requirements of EI Standard 1541 for SAF, passing resistance and purity evaluations, including gum formation, corrosivity and thermal stability. Its long history of success with conventional aviation fuels further supports its suitability for refined SAF storage.

These results give tank owners clear options. The vinyl ester (Magnalux 2100FF) delivers the highest resistance to aggressive feedstocks across a wide temperature range. The (Nova-Plate 360) flake-reinforced novolac's strong cyclic exposure performance and proven refined fuel compatibility allow operators to simplify specifications, in some cases using one lining across both ends of the process, provided service conditions are suitable.

Exposure: Eight months of cyclic exposure

Exposure: Six months of continuous exposure

Figure 2

In cyclical testing (top), panels were immersed in vegetable oil and water at 82°C (180°F) for 30 days, then had 75% of the mixture replaced before the next cycle. A control set in continuous exposure with no cycling (bottom) showed much greater corrosion damage – even after shorter total exposure times.

Specifying for service with certainty

As aviation and other industries work to reduce net fuel-related emissions, biofuel production will continue to expand. That growth makes it necessary for processors to equip tanks for both ends of the refining process that can safely store raw and refined biobased materials.

The test results outlined here, along with EI Standard 1541 certification for SAF, give operators confidence that the recommended linings will resist corrosion and avoid product contamination. That assurance supports more precise specifications, whether it means selecting a glass flake-reinforced novolac vinyl ester for the most aggressive feedstock service, or using a flake-reinforced novolac across both ends of the process to streamline maintenance and simplify lining strategies.

By applying these lessons, operators can reduce uncertainty, extend maintenance intervals and keep fuel moving to where it's needed most.

All images courtesy of The Sherwin-Williams Company

Innovations in Corrosion Protection for Steel Structures

Joachim Pflugfelder, Project Development Manager, HVI - Germany

Corrosion on steel and steel composite bridges causes billions of euros worth of damage every year and impairs the function of these important infrastructures in rail, road and waterway transport. More efficient corrosion protection can help to remedy this situation, which is why the ZTV-ING 4-3 regulations were expanded in 2024 to include the new Blatt 100. In spring 2025, the regulations were introduced by the German Federal Ministry of Digital and Transport.

Modern transport infrastructure would be inconceivable without steel and composite bridges. These construction methods are versatile, involve a high degree of industrial prefabrication, are economical, and have a long service life. Due to its low weight, good load-bearing properties and the large spans required, steel is widely used in large bridge construction. However, smaller bridges can also enjoy the benefits of steel, with steel composite bridges generally being used in the medium-span range.

The Federal Ministry of Digital and Transport (BMDV) is focusing on ensuring the quality of the existing rail, road, and waterway networks, as well as eliminating bottlenecks through new construction and expansion. According to the German Paint Institute, corrosion on structures in Germany costs €220,000 per minute – or €120 billion per year. To limit the costs of steel and composite bridge construction, steel surfaces are protected from corrosion damage with high-quality coating materials.

The Deutsche Bahn (DB) rail network has an aging infrastructure. There are around 25,700 railway bridges in Germany. Of these, 4,900 are steel, with an average age of 86.4 years. With a rating of 2.55 (adequate structural condition), they have the worst average condition rating of all bridge types in the DB network.

Above left
The revised ZTV-ING 4-3 standard stipulates that corrosion protection coatings for steel structures must provide protection for more than 50 years.

Above right
With pilot projects such as the replacement of the Grimma Mulde Bridge, Sherwin-Williams is putting its innovative anti-corrosion coatings through their paces in practice in accordance with the requirements of Blatt 100.

There are around 52,600 bridges in the federal highway network, of which approximately 4,200 are steel and steel composite. The number of these with condition ratings of 2.5 (adequate structural condition) to 4.0 (unsatisfactory structural condition) has increased significantly over the last 20 years. Despite their small number compared to concrete bridges, these types of structures are of particular importance in large-scale bridge construction and represent a considerable economic investment volume of around €10 billion.

The Federal Waterways and Shipping Administration is responsible for around 1,600 bridges, of which approximately 660 are steel and steel composite bridges.

At the same time, the volume of traffic is steadily increasing. In the case of road bridges, this is due to the sharp increase in freight traffic, the increase in permissible total weights and axle loads, and the significant rise in the number of approved heavy goods transports.

Economic development in Germany depends on a functioning, efficient and safe infrastructure. And will require considerable investment in the maintenance and expansion of infrastructure in Germany in the coming years. Speaking in May 2023, transport minister, Volker Wissing, said that 4,000 motorway bridges would be renewed or renovated by the end of the decade.

Left
Coatings in accordance with Blatt 87, 94 and Blatt 100 were used in the renovation of the listed railway viaduct in Chemnitz.

Innovations in ZTV-ING 4-3 corrosion protection of steel structures

In view of scarce financial and human resources, solutions that enable more efficient and economical corrosion protection for steel and steel composite structures are needed. To this end, the Federal Highway Research Institute (BASt), which is responsible for updating the applicable regulations, has revised ZTV-ING 4-3 on behalf of the BMDV. In 2025, the new Blatt 100 replaced Blatt 87, 90, 94, 95 and 97 for 2-component coating systems and Blatt 89, 91, 92 and 93 for 1-component products. Only Blatt 81, 84, 85, 86, 50 and 100 are included in the regulations.

The focus is on the following objectives:

- Coating with extremely long protection duration (C5 extremely high, protection duration more than 50 years). Extension of the planned repair intervals to 50 years, i.e. partial/full renewal once every 100 years. To date, repairs have been carried out every 33 years in accordance with Blatt 87, i.e. partial/complete renewal twice in 100 years.
- Higher cost-effectiveness: at least three layers (EP zinc dust primer, EP/PUR intermediate coating with number of layers as specified by the manufacturer, PUR topcoat) with target coating thicknesses on steel of at least 400µm for exterior surfaces and 320µm for interior surfaces, as well as 240µm on hot-dip galvanised and spray-galvanised steel. To date, Blatt 87 specifies an EP zinc dust primer, two EP intermediate coats and a PUR topcoat with 320µm on steel.
- Sustainability/environmental protection: Volatile Organic Compounds (VOC) reduction to a maximum of 200g/m² per system.
- Higher colour stability.
- Better Life Cycle Analysis (LCA) than duplex systems for bridge structures.

The new Blatt 100 pursues a performance-oriented approach. This means that, in principle, every coating system must meet a defined set of test requirements, regardless of the substrate, composition of the coating material, or time of application. The previously prescribed standard formulations, testing of the composition and properties in the delivery and processing state, are no longer required. They have been replaced by identity testing and testing of the properties in the dry film state. In the latter case, the testing of the adhesion of subsequent layers on coatings artificially weathered for 5 and 30 days is particularly noteworthy. This test was included in Blatt 100 because, in practice, adhesion problems repeatedly occur between the factory-applied intermediate coating and the topcoat applied on site.

The performance-oriented approach allows for a free-system design, more combinations and a lower VOC content in line with a modern and innovative generation of coating materials. The basis for this continues to be the proven epoxy resin and polyurethane binders.

To be approved in accordance with Blatt 100, corrosion protection coatings must undergo the following additional tests:

- **Additional test for thermal resistance (temperature during asphalt installation):** Test procedure to simulate the thermal stress on the underside of road plates during the installation of mastic asphalt protective layers. The thermal stress is applied using 290°C hot G24 hard cast iron (grain size 0.6 – 1mm).
- **Additional test for mechanical load-bearing capacity:** Test procedure for simulating grit impact and stone chips. The impact test is carried out in accordance with DIN EN ISO 6272-1, with individual impact tests using a 1kg, 20mm hemisphere at test temperatures of 5°C and 23°C. The evaluation is based on visual abnormalities, such as cracks and a pore test.

Compared to conventional coating systems, coating materials according to Blatt 100 must withstand more stringent test requirements and longer test times before they can be listed in the compilation of tested coating materials according to TL KOR Steel Structures for use on structures and components of federal transport routes and published on the BASt website.

Below
The coating system received a ZiE certification in accordance with Blatt 100 for the Moselblick viewing platform. The primer and intermediate coat were already applied at the factory, while the weld seams and topcoat will be applied on site after installation.

Areas of application of Blatt 100

The requirements for a coating system are defined in Blatt 100 for individual applications in four modules.

Module 100-A

Corrosion protection system on steel is considered the basic module for most applications, i.e., for factory and construction site coatings for initial protection as well as for repairs, partial and complete renovations in existing structures. In addition, Module 100-A is used for recoating weathered intermediate coatings, for welded joints, and for repairing transport and assembly damage. Here, corrosivity category C5 must be extremely high, and a protection period of over 50 years must be fulfilled. External surfaces must have a total Dry Film Thickness (DFT) of greater than or equal to 400µm, internal surfaces a total DFT of greater than or equal to 320µm. Welded joints on construction sites and repairs to transport and assembly damage to the base coating can now be repaired once, with the primer based on epoxy resin binder and zinc dust EP-Zn (R). This is a change in philosophy, as, previously, two layers of zinc phosphate primer were required. Approval for Module 100-A is a prerequisite for the approval of Modules 100-B, - C and/or -D.

Module 100-B

Corrosion protection on steel with surface-tolerant primer is valid for repairs, partial and complete renovations of existing structures that cannot be prepared to surface preparation grade Sa 2½ (e.g. old riveted steel components). The coating system also has a corrosivity category of C5 extremely high, whereby a protection period of more than 25 years has been specified due to the construction and the resulting poorer surface preparation. External surfaces must be finished with a total DFT of greater than or equal to 440µm, and internal surfaces with a total DFT of greater than or equal to 360µm.

Module 100-C

Corrosion protection system on hot-dip galvanising is to be used for factory coatings and complete refurbishment of hot-dip galvanised components and surfaces (duplex system). Here, the corrosivity category C5 is extremely high and a protection period of over 50 years is required. The total DFT must be greater than or equal to 240µm.

Module 100-D

Corrosion protection system for spray galvanising refers to factory coatings, complete renewal for spray-galvanised components and spray-metallised surfaces. As with Module 100-C, the corrosivity category C5 is extremely high and a protection period of over 50 years is required. The required total DFT is greater than or equal to 240µm.

Overall, the latest update of ZTV-ING 4-3 is expected to simplify planning and tendering, reduce the susceptibility to errors and lower testing costs for corrosion protection.

Marcell Collette from the Federal Ministry of Digital and Transport, spoke at a corrosion protection conference held by Autobahn GmbH in December 2024, explaining: “Within just two years, the federal regulations were fundamentally revised and converted to the modular structure of Blatt 100. At the same time, several manufacturers rose to the challenge of developing high-performance products in accordance with Blatt 100 under stricter testing criteria and had them tested and listed. This is a mammoth task that could only be solved successfully and quickly with the cooperation of all parties involved. This deserves special respect and very special thanks.

The development of Blatt 100 marks the beginning of a new era in the history of corrosion protection, which, in addition to cost savings in the billions, will also simplify planning and tendering practices and reduce traffic restrictions during the service life of our engineering structures.”

Above left
Bridge components for the Chemnitz viaduct, coated with Blatt 100 at the factory, are installed overnight.

Above
The Repacor SW-1000 two-component repair coating developed by Sherwin-Williams for corrosion protection meets the requirements of Blatt 100.

Need for stricter test criteria due to longer protection period

Test	Blatt 87, 94, 95, 97	Blatt 100
Identity	Composition	Identity test
without stress	-	Determination of base values
Colour fastness	2000 hours	3000 hours
Heat resistance	Blatt 94 as required	Yes
Long-term stability	12 months	60 months
Moisture resistance	1200 hours	1440 hours
Salt spray resistance	2160 hours	3000 hours

Pilot applications according to Blatt 100

With the update of ZTV-ING 4-3, the industry is being called upon to develop appropriate innovative coating materials and systems. Sherwin-Williams is the first listed manufacturer of Blatt 100 to have a large number of coated objects to its name. The products and systems have been in practical use for years and are continuously tested to ensure they meet the requirements of Blatt 100.

A major pilot project for corrosion protection coating in accordance with Blatt 100 is the 361 metre long replacement of the Mulde Bridge near Grimma. The structure is an important link on the A14 motorway between Leipzig and Dresden, and in the trans-European transport network. The existing bridge is 50 years old and so dilapidated that it must be replaced to maintain traffic safety. In January 2021, approval was granted in individual cases for the coating system in accordance with Blatt 100, and coating work began in June 2023. The **Zinc Clad® R** primer, edge protection and the first intermediate coat with **Macropoxy® EG-1 Plus**, as well as the second intermediate coat with **Acrolon® ZP-1 VHS**, were applied at the plant in Zwickau. The weld seams and transport damage to the outer surfaces were protected on site with the same products and the topcoat **Acrolon 2230 VHS** in accordance with Blatt 100. Those on the inner surfaces were protected in accordance with Blatt 87. The two bridges on the A9 motorway are expected to be completed in December 2027. The planners anticipate 50,000 vehicles crossing the bridge every day.

Above
The Repacor SW-1000 coating can be applied with a spatula and provides long-term corrosion protection after just one coat of 500µm. It can then be covered with a suitable topcoat.

Above right
Thanks to the simple application properties of Repacor SW-1000, repair work can be carried out quickly and easily, even in areas that are difficult to access.

Comparative long-term tests between different corrosion protection systems from Sherwin-Williams are being carried out on the traffic sign bridges on the A9 between Marktschorgast and Bayreuth-Nord:

- Duplex coating with Blatt 87 on hot-dip galvanising.
- Blatt 100 coating of tightly welded steel girders with Macropoxy products (primer and first intermediate coat) and Acrolon coatings (second intermediate coat and topcoat.)
- Hot-dip galvanising as a stand-alone corrosion protection system without additional organic coatings.
- Spray galvanising of tightly welded steel girders with the highest quality zinc-aluminium alloy currently available on the market (ZnAl 22) as a stand-alone corrosion protection system without additional pore-closing coating (sealing) and/or organic coatings.

To this end, regular surface inspections, layer thickness measurements, tear-off and cross-cut tests, and a general assessment of the condition are carried out on specified areas measuring 400cm². System-related design requirements and special features as well as occupational health and safety and environmental protection issues are also taken into account. This allows the protective effect and surfaces of the corrosion protection systems used to be compared, providing insights into the practical suitability, performance and cost-effectiveness of the systems examined.

As part of the refurbishment of the listed Chemnitz railway viaduct, Deutsche Bahn also carried out comparative tests on Sherwin-Williams coatings in accordance with Blatt 87, 94 and 100. Part of the 33,000m² riveted and filigree surface was repaired on site, mainly with Blatt 100 Module B, and replacement structures were coated with Blatt 100 Module A at the factory.

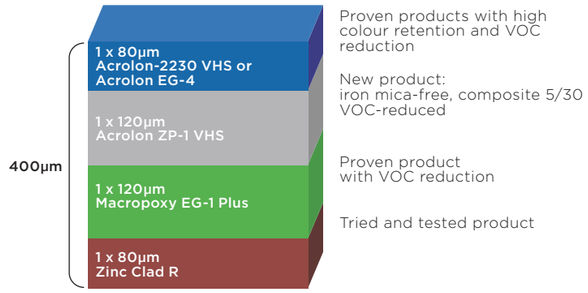
Pilot projects with Repacor SW-1000 based on Blatt 100

The 2K repair coating **Repacor™ SW-1000** developed by Sherwin-Williams for corrosion protection is another highly innovative, high-performance product that meets the requirements set out in Blatt 100. The trowelable product is currently being tested for practical suitability, performance and cost-effectiveness on various structures and components as part of individual building approvals. The pilot projects initiated in the federal highway sector are being monitored by the BASt.

- The new B173/A73 bridge over the railway line at Breitengüßbach was given initial protection with a coating system in accordance with Blatt 97. The repair work had to be carried out at low temperatures in winter, so it was not possible to apply Blatt 97 in accordance with the regulations. For this reason, the repair coating Repacor SW-1000 with a layer thickness of 500µm was applied, followed by a PUR topcoat. This reduced the application time to one to two days, whereas five days are usually required for a coating in accordance with Blatt 97.
- At the Mühlenfließ bridge located on the A10 motorway, the existing structure was inspected as part of the non-destructive testing of the weld seams for the repair of smaller areas in a highly corrosive atmosphere. Once again, it was not possible to achieve a standard-compliant surface preparation, so the repair coating Repacor SW-1000 was applied to the existing structure with a total target layer thickness of 500µm. This made it possible to achieve at least the same level of protection as was originally achieved by Blatt 87/97, while simultaneously saving the time required to apply the standard five-layer coating system.
- Repacor SW-1000 has also proven itself under extreme conditions in a coking plant. Previous coatings on the gusset plates, each applied three times, were unable to withstand the moisture, heat, acidic atmosphere and coke dust deposits and had rusted away within 18 months. A single coat of Repacor SW-1000 with a layer thickness of 800µm, on the other hand, has already achieved a service life of six years without any impairment of its protective properties and has since been approved by the owner for use in the smelter.

Repacor SW-1000 now has an extensive track record as a cartridge-delivered corrosion protection coating, both in the offshore sector and on steel bridges, which confirms the improved cost-effectiveness of the repair coating compared to a conventional coating in various applications. Sherwin-Williams is therefore endeavouring to ensure that the application of corrosion protection from cartridges is regulated as part of the update of ZTV-ING 4-3.

Coating from Sherwin-Williams according to Blatt 100

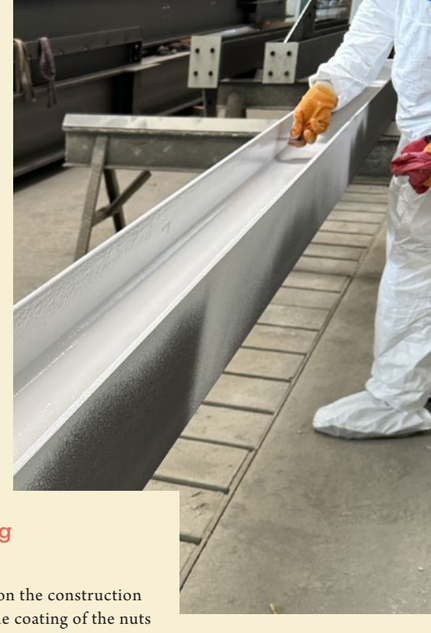


Pilot applications of Sherwin-Williams corrosion protection systems according to Blatt 100

- Moselblick B50 rest area viewing platform
- Beckertal Bridge Chemnitz Viaduct
- Replacement construction A60, AS Mainz-Finthen – AK Mainz Süd
- Husum Spieker
- Leine Bridge Schwarmstedt
- Mulde Bridge Grimma
- Footbridge over the Alfbach, Höllenthal
- Traffic sign bridge Marktschorgast

Pilot applications of Repacor SW-1000 according to Blatt 100

- Gusset plates Coke classification plant Ruhr area
- Luitpold Bridge Passau
- Elbe bridge Wittenberg
- New bridge construction Breitengüßbach B173/A73
- Overhead line pylon bases
- Viewing platform at Moselblick Zeltingen service station
- Brandenburg Mühlenfließ bridge
- Pipeline supports in Leuna



Sherwin-Williams' innovative fire protection coating selected for new Tübingen art museum

By Roberto Campesino, Project Development Manager and Peter Moritz, Business Development Representative

Innovative fire protection technology and cutting-edge art and architecture have come together in Germany. The steel structure of the New Art Museum Tübingen (NKT), which opened in March 2025, has been equipped with Sherwin-Williams' passive fire protection coating, FIRETEX® FX6002, extending the load-bearing capacity of the building by one hour in the event of fire.

Bernhard Feil and Stephen Hamann, initiators of the NKT project and managing directors of Art 28 GmbH & Co. KG, are breaking new ground. The new building is intended to create a popular exhibition venue for the works of world-renowned artists, while also providing a platform for the stars of tomorrow. The new hotspot for contemporary art also focuses on multimedia culture, with additional rooms for film screenings, talks and music.

FIRETEX FX6002: The most economical passive fire protection system for the NKT

The two building owners commissioned Eisele Architekten & Ingenieure, in Villingen-Schwenningen, to plan and deliver the project. The fire resistance classification of the steel girders in the new building was set at R60 in accordance with the specifications of the state building regulations. This ensures the steel structure can withstand fire exposure for at least 60 minutes. The planners awarded the contract for the manufacture of the steel girders and the application of the fire protection coating to Stahlbau Münch GmbH in Brigachtal.

The steel construction company has been using fire protection coatings from Sherwin-Williams for many years, and our experts calculated the most economical steel girder passive fire protection from the available product range. **FIRETEX FX6002** was selected due to its comparatively low material consumption for R30 to R120 requirements and its extremely fast drying properties.

Above
The steel girders of the New Art Museum in Tübingen are coated with FIRETEX FX6002. This enables them to withstand fire exposure for 60 minutes.

Below right
The component-specific coating thicknesses for the passive fire protection system specified by Sherwin-Williams were also checked using magnetic induction measurement.

Certification for the application of FIRETEX FX6002

In accordance with the General Building Approval Z-19.11-2095 of the German Institute for Building Technology, fire protection coatings may only be applied by specialists who have undergone intensive training by the manufacturer of the intumescent coating to familiarise themselves with the mode of action and processing of the respective reactive fire protection system. As FIRETEX FX6002 is new to the German market and was used here for the first time at NKT, applicators from Münch received comprehensive training from the Sherwin-Williams Technical Services Department and were able to practice applying the coating in shop.

2-component airless spraying system: A future-proof investment

The steel girders underwent surface preparation, at the steel construction company's continuous blasting plant, to a cleanliness level of Sa2½. Girders intended for use on the exterior of the NKT's structure were then primed with FIRETEX C69. For steel construction entrepreneur Stefan Münch, there was no question about the capabilities of the innovative FIRETEX FX6002 fire protection coating. That is why he invested in the 2-component airless spray system required for the application without hesitation.

FIRETEX FX6002 consists of a base component and an additive component, to which a catalyst is added. These components are supplied in separate containers and must be mixed according to the manufacturer's instructions before application. The quick-drying 2K epoxy base coat for FIRETEX fire protection coating systems can be recoated after just 30 minutes. The subsequent fire protection coating of the steel girders with FIRETEX FX6002 was carried out by specialists from the steel construction company Münch in accordance with the required layer thicknesses calculated by Sherwin-Williams experts, which vary depending on the profile type of the individual steel girders. Finally, dry film thicknesses of 500µm to 2500µm were achieved. The exterior components of the building were coated twice with the fast-drying **Acrolon 7300** topcoat at the factory to protect them from the elements.

Stefan Münch has found that a high throughput is required for the professional operation of the 2-component airless spraying system. This was the case in the NKT construction project, as 687 steel girder main profiles with an area of 4,000m² were coated with fire protection in the factory. Managing director, Stefan Münch, said: "FIRETEX FX6002 has a very fast drying time of one hour. That's why we used two employees to coat the steel girders – one to mix the components and one to operate the spraying system to ensure an uninterrupted, continuous processing process."

Completion of the coating on the construction site

After the steel beams were installed on the construction site, Sherwin-Williams supervised the coating of the nuts and bolts on site. Stahlbau Münch is now certified for the future processing of FIRETEX FX6002.

NKT builders had the highest expectations for visually perfect steel girder surfaces, and they are visible inside the building. As such, these areas were finished with Acrolon 7300 topcoat by a painting contractor.

Construction sign

Project: New Art Museum Tübingen, Germany

Client: Art 28 GmbH & Co. KG, Tübingen

Planning and implementation: Eisele Architects & Engineers, Villingen-Schwenningen

Fire protection coating contractor: Stahlbau Münch GmbH, Brigachtal

Coating system manufacturer: Sherwin-Williams, Vaihingen/Enz

Products: FIRETEX C69, FIRETEX FX6002, Acrolon 7300

Right
The FIRETEX FX6002 fire protection coating is applied using a 2-component airless spray system.

Above left
To achieve a visually perfect surface, the visible steel beams in the New Art Museum in Tübingen were finished with an Acrolon 7300 topcoat.

Above centre
The steel structure of the New Art Museum in Tübingen, consisting of 687 steel beams and covering an area of 4,000m², is protected with the passive fire protection coating FIRETEX FX6002.

Above right
Checking the layer thicknesses of the fire protection coating specified by Sherwin-Williams.

Photos: Sherwin-Williams Coatings Deutschland GmbH, Stahlbau Münch GmbH, Eisele Architects & Engineers

Power through the elements

By Matthew Berry, Marketing Communication Manager – Energy

Performing coatings maintenance on steel assets across the oil and gas, marine, offshore, infrastructure and industrial sectors is challenging enough in perfect conditions.

Yet the European winter brings its own unique conditions that threaten to thwart crucial maintenance plans – increasing costs, and downtime, introducing uncertainty into daily schedules, and leaving operations at the mercy of the weather.

Traditional coatings systems struggle with the low temperatures and high humidity of the cold and damp winter months bring, and this limits the durability and expected lifespan of new coatings systems. And should the conditions worsen while the maintenance work is in progress, the risk of incomplete curing increases dramatically, potentially leading to early failure.

On cold or damp days, the environmental conditions frequently fall outside the required application criteria for coating systems. Maintenance work grinds to a halt and there is no choice but to watch and wait, regardless of the operational impact and the extra costs that can build up.

The condition of the asset presents more challenges. Existing damaged coatings need to be removed, and the substrate underneath may have lost its roughness profile from the original abrasive blasting surface preparation. If using Ultra High Pressure (UHP) water jetting as surface preparation method, the resulting bare metal surfaces may be very smooth with low roughness profile and flash rust may form rapidly even in mild damp conditions.

Unconventional substrate conditions like these can greatly impact the effective adhesion of new coatings systems, resulting in premature failures and costly further maintenance later down the line.

Meanwhile, application teams need to navigate complex geometry on site. Asset features like pipes, valves and confined spaces all make it difficult for teams to manoeuvre and ensure the new coating is applied evenly and effectively across every inch of your asset's surface.

That's why Sherwin-Williams developed **Dura-Plate® 301W**, our groundbreaking epoxy maintenance coating designed to provide the robustness and versatility needed to regain control over winter maintenance works.

Offering a unique combination of features, Dura-Plate 301W is highly tolerant to temperature, humidity and less-than-perfect surface conditions. Its game-changing cold curing technology enables application at temperatures as low as 0°C without dew point restrictions, extending maintenance windows.

High surface tolerance enables application over damp or flash-rusted steel, with high adhesion over low surface profile roughness. Surfaces can be prepared with UHP water jetting for a cleaner, safer surface preparation process compared to abrasive blast cleaning. Application with airless spray equipment, brush or roller allows applicators to adapt to the specific on-site conditions for a fast and easy application process.

All these benefits empower asset owners to reduce downtime and the lower costs of corrosion protection maintenance, while offering long term durability and corrosion protection.

Dura-Plate 301W is ideal for use on a wide range of assets including offshore platforms, ships, steel bridges, refineries and storage tanks, including tank roofs thanks to its high flexibility with 4% average elongation.

Over 15 million square metres of steel have been protected with the Dura-Plate 301 series. Start a conversation with a member of our team today and discover how Dura-Plate 301W can transform your maintenance operations in the colder months and beyond.

Opposite
A snow covered oil refinery in winter.

THE SHERWIN-WILLIAMS DIFFERENCE

Sherwin-Williams Protective & Marine delivers world-class industry subject matter expertise, unparalleled technical and specification service, and unmatched regional commercial team support to our customers around the globe. Our broad portfolio of high-performance coatings and systems - including protective liquid and powder, fire protection and resinous flooring - excel at combating corrosion and help customers achieve smarter, time-tested asset protection. We serve a wide array of markets across our rapidly growing international distribution footprint, including Bridge & Highway, Energy, High Value Infrastructure, Manufacturing & Processing, Marine, Rail, Power and Water & Wastewater.

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