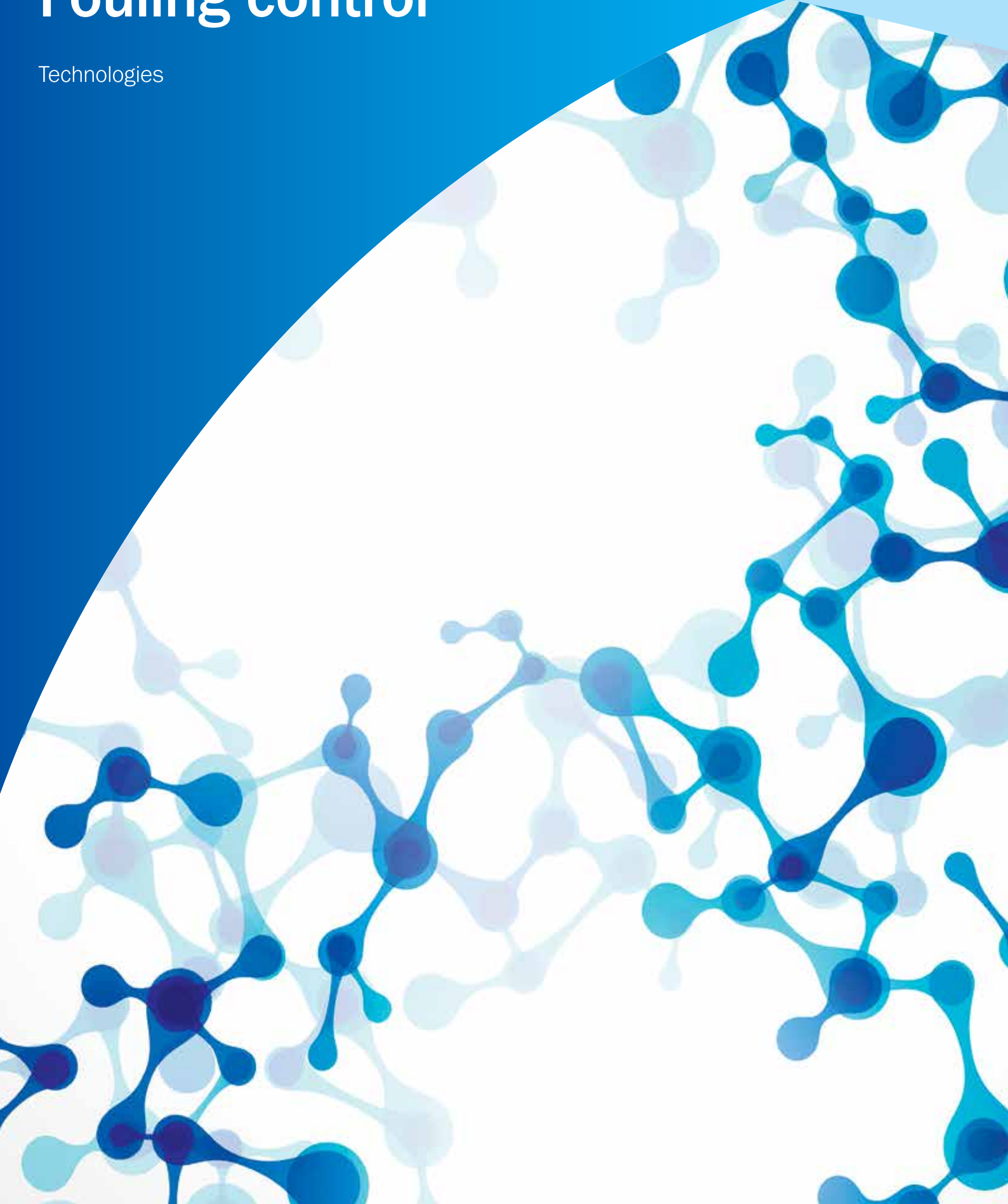


Fouling control

Technologies



Your hull was made to cut through the water. Let us help you cut through the confusion.

Use the product selector in this brochure to navigate to what's right for you.

For superior fouling control, count to three

In an ideal world, there should be nothing on your hull but water. Unfortunately, the marine environment is full of harmful organisms that create drag and corrosion, costing you time and money. Hempel has developed a broad range of fouling control products offering exceptional clean hull performance for up to 90 months.

Our products have proven to reduce fuel consumption by up to 6 per cent and significantly reduce time in dry dock. No matter what you are up against, we have fouling control products that are right for your fleet and your business.

You can choose between three categories of fouling control products:

Fouling defence

Our unique Actiguard technology gives you the best of two worlds: silicone-hydrogel and diffusion control of biocides, all in a single fouling defence coat. You can expect 6 per cent fuel savings compared to best-in-class antifoulings over the entire service interval, regardless of trading patterns and sailing speed, and a clean hull over an idle period of up to 120 days. The result is exceptional fouling control performance and lower CO₂ emissions over docking intervals of up to 90 months.

Antifouling

Our antifouling products use controlled release of biocides to keep your vessels fouling-free from 36 to 90 months, reducing fuel consumption by an average of 4 per cent. You can choose between chemically hydrolysing nano acrylate and silyl acrylate technology for optimal performance and low friction for longer periods, or zinc carboxylate and rosin technology for shorter periods. All antifoulings are reinforced with patented microfibre technology for superior mechanical strength. Whatever your business and wherever your vessel operates, you can find an antifouling solution that meets your needs.

Fouling release

Our fouling release technology is based on biocide-free silicone and hydrogel, giving you a smooth hull surface that makes it difficult for fouling organisms to attach. The result is less drag, fuel savings averaging 5 per cent and lower CO₂ emissions, increasing the efficiency of your fleet and offering superb return on investment. You can use our fouling release technology on any type of marine vessel, even those currently using another type of fouling control coating.

Hempel's product selector

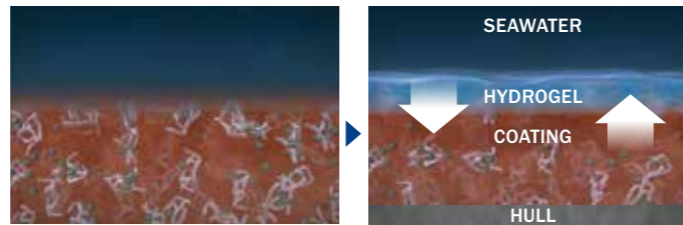
Fouling control coating matrix

	Fouling defence	Antifouling			Fouling release
	Actiguard technology	Nano acrylate technology	Silyl acrylate polymers	Rosin based	Silicone based
Low activity level	•	•	(•)	(•)	-
Flexible trading pattern	•	•	-	-	•
Instant effect on contact with water	•	•	-	(•)	•
High activity level	•	•	•	•	•
Recommended for slow steaming	•	•	(•)	(•)	-
Recommended for tropical waters	•	•	•	-	•
Microfiber-based for superior mechanical strength	-	•	•	•	-
Easy overcoating	•	•	•	•	•
Application in warm environment	•	•	•	•	•
Can be applied down to 0°C	•	•	•	•	•
Can be applied below 0°C	-	•	•	•	-
Low friction technologies	•	•	•	-	•
Full return on investment	*****	****	****	**	****
Guarantee (conditions apply)	Satisfaction/Fuel savings	Performance	Performance	Performance	Fuel savings
Docking interval up to 90 months	Hempaguard	Globic	Dynamic	-	Hempasil X3+
Docking interval up to 60 months	Hempaguard	Globic	Dynamic	Oceanic+/Atlantic+	Hempasil X3+
Docking interval up to 36 months	Hempaguard	Globic	Dynamic	Olympic+/Basic	Hempasil X3+

Hempaguard®

The industry-leading hull coating for energy efficiency

Hydrogel silicone solutions and biocidal antifoulings each have their pros and cons. That is why we combined the best of both worlds in a single product. Hempaguard uses groundbreaking Actiguard technology in a unique fouling defence coating. It has been applied to more than 1,200 vessels and delivers unmatched performance in any trading pattern.



Upon immersion of the low-friction silicone coating, a hydrogel microlayer forms at the silicone-water interface, where it acts as a physical fouling defence. Actiguard technology enables controlled release of biocide via the active hydrogel micro layer. The biocide-activated hydrogel reinforces the fouling defence, significantly extending the fouling-free period and effectively improving fuel efficiency.

What it does – and what it does for your fleet

Hempaguard coatings integrate silicone hydrogel and full biocide diffusion control in a truly unique single-coat fouling defence system that delivers best-in-class fuel savings and performance during idle periods. It delivers an average of 6 per cent fuel savings from smoothness of the technology and maximum 1.4 per cent speed loss over five years, with correspondingly lower CO₂ emissions.

You can also expect the same exceptional performance in both warm and cold waters or when switching from slow to fast steaming, giving you unlimited trading flexibility anywhere in the world. With its unique combination of silicone hydrogel and biocide diffusion, Actiguard technology gives you all these benefits in a single coating and can be applied on vessels currently using another hull coating.

How it works

Actiguard, Hempel's patented low-friction fusion technology, makes it possible to combine hydrogel fouling release with biocides. An active microlayer forms a barrier between the solid silicone binder and fouling organisms. This establishes a highly effective fouling defence barrier with a significantly longer effect than either conventional antifouling or fouling release solutions.

Performance satisfaction guarantee on Hempaguard X7

Hempel is the first hull coating manufacturer to offer a satisfaction guarantee. We believe that nothing compares with the Hempaguard fouling defence system. If you are not satisfied with the performance of our top-of-the-range Hempaguard X7 coating, we will pay for the conversion back to a conventional antifouling.

Product highlights:

- Low and high activity level
- Flexible trading pattern
- Instant effect on contact with water
- Recommended for slow steaming
- Recommended for tropical waters
- Easy overcoating
- Application in warm environment
- Can be applied down to 0°C
- Low-friction technologies
- Full return on investment
- Performance/Fuel savings guarantee
- Docking interval up to 90 months

Products:

Hempaguard X7

For flexible trading patterns. Offers 90 months sustained fouling defence with an average of 6 per cent out-of-dock fuel savings and speed loss of 1.4 per cent over the service interval. Guarantee: up to 120 idle days.

Hempaguard X5

For flexible trading patterns. Offers 36 months sustained fouling defence with an average 6 per cent out-of-dock fuel savings and 1.5 per cent speed loss over the service interval. Guarantee: up to 60 idle days.



Globic

Instant antifouling protection

A cocktail of patented technologies, Globic uses Nano acrylate technology for highly controlled self-polishing. Globic is a hydrolysing, low friction antifouling product line with extraordinary mechanical strength thanks to Hempel's microfibre technology and best-in-class biocides. The Globic line offers high fuel savings through outstanding performance for both high speed and slow steaming.

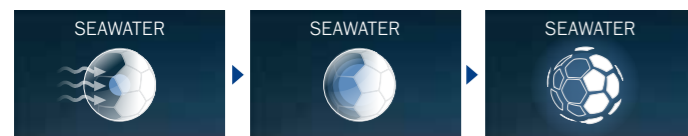
What it does – and what it does for your fleet

Designed for docking intervals of up to 90 months, Globic offers excellent return on investment and correspondingly lowers CO₂ emissions in both warm and cold waters.

Directly water-activated hydrolysing Nano acrylate technology means that Globic starts working as soon as the hull meets the water, ensuring full antifouling protection from day one. Globic is entirely independent of water friction, making it highly efficient even for slow steaming and long idle periods. Furthermore, Nano acrylate technology ensures very low hull roughness and constant self-smoothing to deliver the highest possible return on investment.

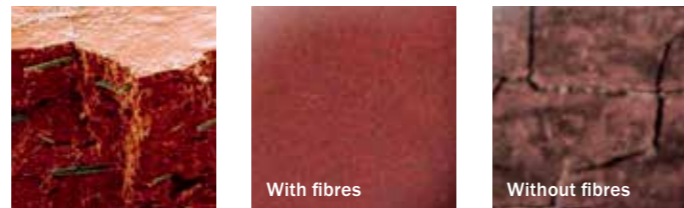
How it works

The Globic range features Hempel's specially designed water-activated Nano acrylate technology using Nano-capsules to control polishing. When seawater comes into contact with the Nano-capsules, it penetrates the hydrophobic outer shell. The hydrophilic inner core swells and breaks through the outer shell, enabling controlled polishing. Consistent self-polishing and a constantly thin leach layer ensure uniform biocide release over the entire docking interval. Unlike other premium antifouling technologies, Nano acrylate technology provides immediate antifouling protection without the need for water friction. Hempel's microfibre technology adds unmatched mechanical properties to withstand mechanical stress and avoid cracking.



Nano acrylate technology allows seawater ions to penetrate the hydrophobic shell and hydrolyse the hydrophilic core. The core swells until the shell fractures, exposing the hydrolysed core polymer, which is then solubilised to enable polishing through slow, controlled and predictable diffusion.

Hempel's microfibre technology



The microfibrils run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibrils. The coating without microfibrils showed severe cracking.

Product highlights:

- Low activity level
- Flexible trading pattern
- Instant effect on contact with water
- High activity level
- Recommended for slow steaming
- Recommended for tropical waters
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Low friction technologies
- Full return on investment
- Performance guarantee
- Docking interval up to 90 months

Products:

Globic 9500M Supreme antifouling performance for all operating conditions, with maximum speed loss of 2.5 per cent.

Globic 9500S Supreme antifouling performance for new outfitting and beyond. Enhanced protection against hard fouling.

Globic 9000 Is a premium hydrolysing nano acrylate antifouling for up to 90-month service intervals with a maximum speed loss of 3 per cent.

Globic 8000 Is a top-tier hydrolysing nano acrylate antifouling for up to 90-month service intervals. Designed to meet the highest expectations of very high performance, great operational flexibility and return on investment with fuel savings averaging 4.0 per cent.

Globic 7000 Is a high-tier hydrolysing nano acrylate antifouling for up to 60-month service intervals. Designed to meet the highest expectations of higher performance, high operational flexibility and return on investment with fuel savings averaging 4.5 per cent.

Globic 6000 Is a mid-tier hydrolysing nano acrylate antifouling for up to 60-month service intervals. Designed to meet high expectations for high performance and return on investment with fuel savings averaging 5.0 per cent.

**90
MTH**
DOCKING
INTERVAL

Dynamic

Best-in-class Silyl acrylate for higher speed and activity level

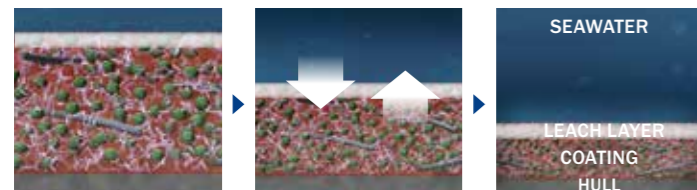
Using the most advanced Silyl acrylate technology, Dynamic is Hempel's chemically hydrolysing low friction antifouling line for up to 90-month service intervals. Controlled polishing with exceptionally low leach layers and best-in-class biocides combine with low surface roughness and high volume solids to make Hempel's Dynamic line the top antifouling choice in the Silyl acrylate category.

What it does – and what it does for your fleet

Constant refinement over the past 10 years is your assurance of a high-performing solution for all vessel types and trading patterns. Exceptionally good film formation, optimised with the self-smoothening effect of the Silyl acrylate binder, means lower water friction for significant fuel savings and correspondingly lower CO₂ emissions. This, along with its microfibre-reinforced mechanical properties, long track record and proven protection, makes Dynamic a great choice for predictable performance, high fuel savings and higher return on investment.

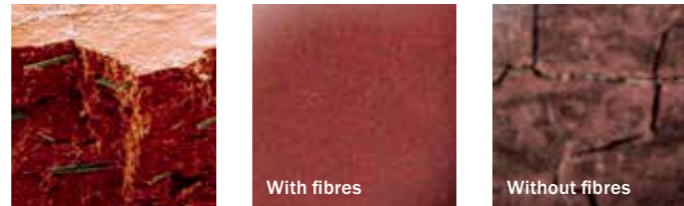
How it works

Silyl acrylate film is relatively impermeable. Seawater penetrates only the first few microns of the coating, allowing only a few microns to undergo hydrolysis/polishing at a time. The result is a highly stable and predictable polishing rate for the docking period.



Seawater penetrates the outer layer, starting hydrolysis. As the level of hydrolysis rises, the polymer (light grey) starts to become soluble, forming a leach layer and releasing the biocide (green). The leach layer is progressively eroded from the surface, exposing a fresh coating layer underneath.

Hempel's microfibre technology



The microfibres run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibres. The coating without microfibres showed severe cracking.

Product highlights:

- Low activity level
- High activity level
- Recommended for slow steaming
- Recommended for tropical waters
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Low friction technologies
- Full return on investment
- Performance guarantee
- Docking interval up to 90 months

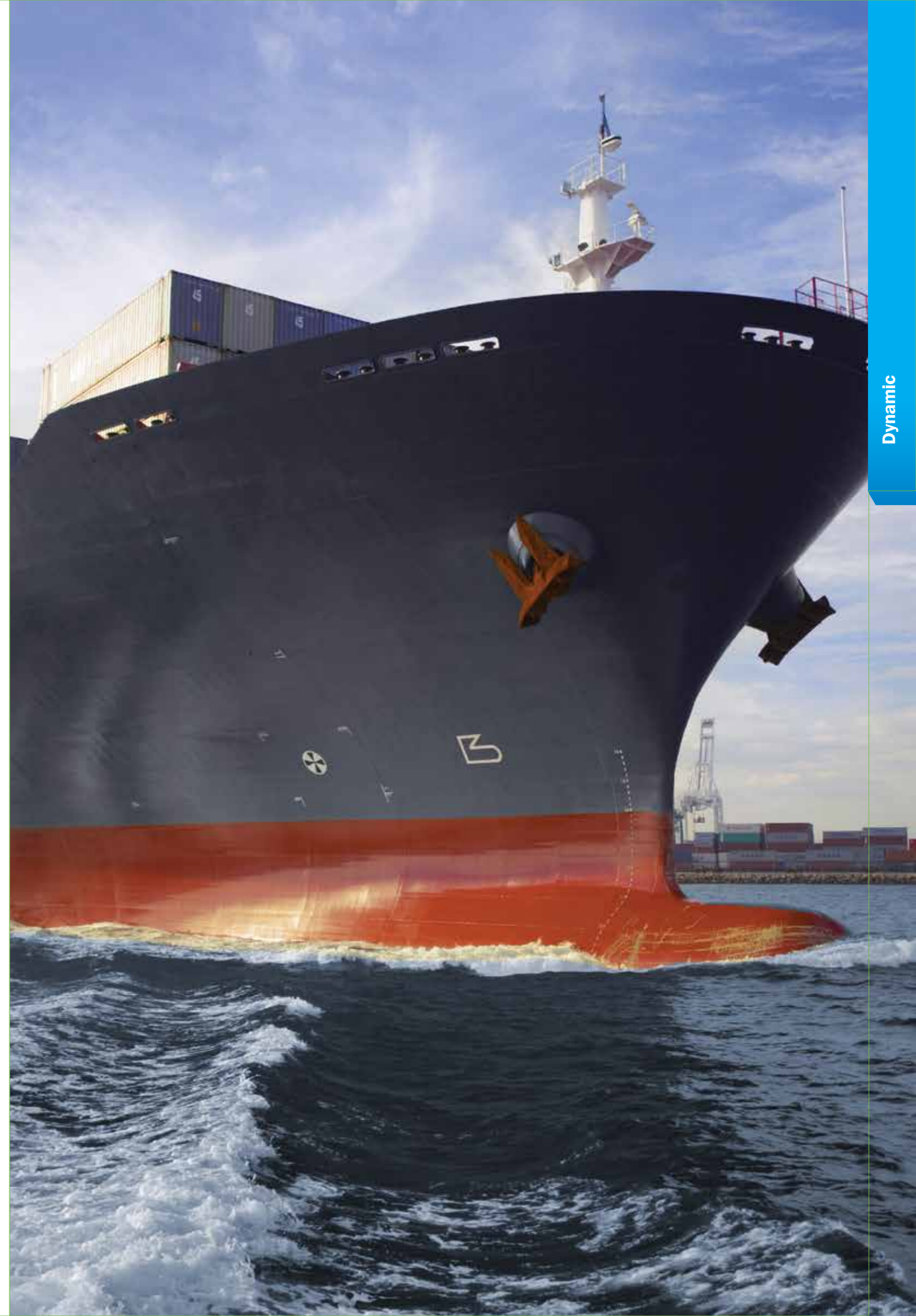
Products:

Dynamic 9000

Dynamic is a best-in-class premium hydrolysing Silyl acrylate antifouling for up to 90-month service intervals. Designed to meet the highest expectations for higher performance and return on investment with fuel savings averaging 4.1 per cent.

Dynamic 8000

Dynamic 8000 is a top-tier hydrolysing, Silyl acrylate based antifouling for up to 90-month service intervals. Designed to meet high expectations for performance and cost with fuel savings averaging 3.6 per cent.



Oceanic+

A cost effective antifouling with unmatched mechanical strength

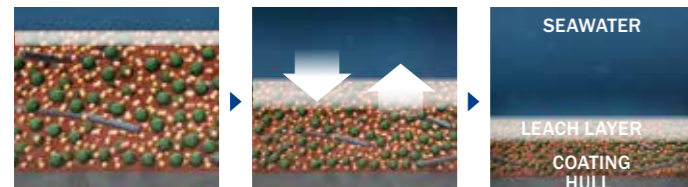
Built on proven zinc carboxylate technology, Oceanic+ is a budget-friendly antifouling solution for docking intervals of up to 60 months. Designed for operators looking for a reasonably priced product without compromising on quality, Oceanic+ offers excellent application properties, microfibre-reinforced mechanical properties and effective self-polishing.

What it does – and what it does for your fleet

A high-performance biocide package means that Oceanic+ offers high reliability and flexibility for vessels operating in different trading areas. The main binder component is zinc carboxylate, which on immersion in seawater undergoes a predictable ion-exchange process to form the more soluble sodium carboxylate. This results in excellent polishing control compared to gum rosin type paints. These advantages together with Hempel's microfibre technology make Oceanic+ an attractive cost-efficient solution that delivers excellent fouling control performance and top-of-the-line mechanical strength.

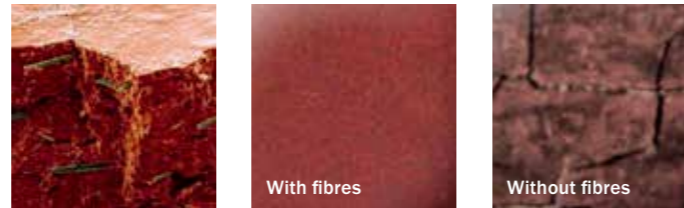
How it works

Natural gum rosin is the most common raw material in antifouling coatings and has been used for more than 100 years. Oceanic+ uses synthetic rosin treated to make it more resistant to cracking. Unlike gum rosin, synthetic rosin enables more precise control of polishing because it does not vary in quality from year to year or batch to batch. Combined with an insoluble co-binder, the rosin progressively dissolves into the sea. The remaining insoluble co-binder frame is then eroded by surface shear stress.



Seawater penetrates the coating and hydrates the rosin (yellow) and biocide (green). The rosin dissolves and the biocide leaches out of the coating. An insoluble 'hard' polymer structure remains, weakened in the absence of synthetic rosin, and is physically eroded by the ablative effect of surface water currents. Over time, the zinc carboxylate makes sure the leach layer remains low while releasing a controlled level of biocide.

Hempel's microfibre technology



The microfibrils run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibrils. The coating without microfibrils showed severe cracking.

Product highlights:

- Low activity level
- Instant effect on contact with water
- High activity level
- Recommended for slow steaming
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Full return on investment
- Performance guarantee
- Docking interval up to 60 months

Products:

Oceanic+

Designed for effective antifouling for up to 60-month docking intervals, Oceanic+ is a hydrolysing antifouling based on zinc carboxylate binder. With a strong biocide package and stable polishing Oceanic+ offers fuel savings averaging 1.5 per cent.



Atlantic+

Reliable long-term performance that ensures operational flexibility

Atlantic+ is a powerful antifouling solution for mid- to long-term service intervals for all vessel types. It keeps performing throughout the service interval, for up to 60 months.

Atlantic+ contains Hempel's strong biocide mix and a proven binder system, complemented by patented microfibre technology. It delivers unparalleled performance for its price range, as well as superior mechanical strength, using binder technology that has been proven for over a decade.

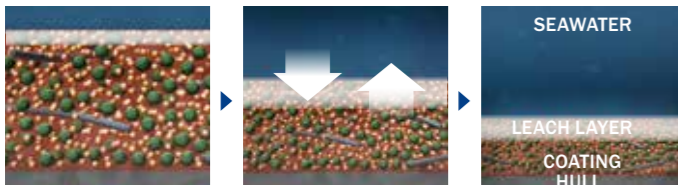
What it does – and what it does for your fleet

The efficient biocide package means that Atlantic+ is an effective solution in different water temperatures and during different vessel operations.

As a result, it delivers full fouling protection for vessels engaged in global trading. It is built on a tried and proven ingredient that both helps improve antifouling performance and offers effective self-polishing and smoothing characteristics.

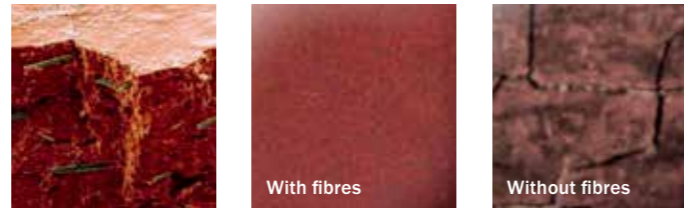
How it works

Atlantic+ utilises proven binder technology and effective release of biocides, which ensures progressive and controlled polishing in all trading conditions.



Seawater penetrates the coating and activates the binder (yellow) and biocide (green). The binder dissolves and the biocide leaches out of the coating and polishes stably.

Hempel's microfibre technology



The microfibres run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibres. The coating without microfibres showed severe cracking.

Product highlights:

- High to low activity levels
- Instant effect on contact with water
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Performance guarantee
- Docking interval up to 60 months

Products:

Atlantic+ is a mid-tier antifouling with a powerful biocide package and excellent mechanical strength, providing good performance up to 60 months.



Olympic+

Reliable performance with impressive value for money

Olympic+ is an affordable and powerful solution for short-term service intervals. Despite being one of Hempel's most cost-effective antifouling, Olympic+ contains patented microfibres and natural binder properties that deliver excellent mechanical strength and make sure the coating's antifouling properties keep performing throughout a 36-month service interval.

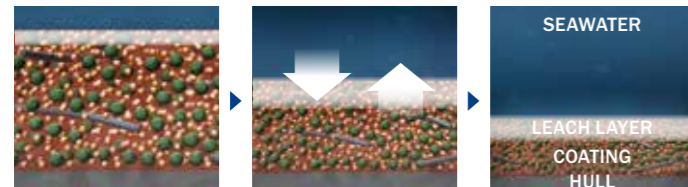
What it does – and what it does for your fleet

Olympic+ has been tried and tested for more than 10 years, combining reliable performance with impressive value for money. The effective biocide package means that Olympic+ is a very versatile solution for different water types, vessel types and vessel speed, delivering excellent protection in worldwide trading.

Olympic+ contains rosin, a tried and proven ingredient that not only helps improve antifouling performance, but also offers effective self-polishing and overcoating options.

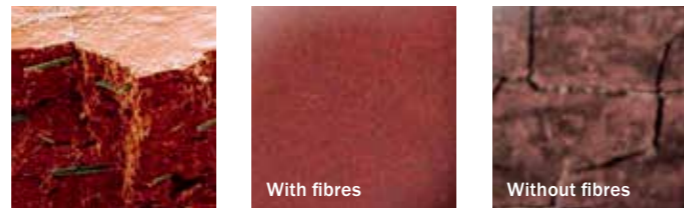
How it works

Olympic+ uses gum rosin for stable polishing and effective leaching of biocides. Combined with an insoluble co-binder polymer, the rosin is progressively dissolved into the sea. The remaining insoluble co-binder frame is then eroded by surface shear stress.



Seawater penetrates the coating and hydrates the rosin (yellow) and biocide (green). The rosin dissolves and the biocide leaches out of the coating. An insoluble 'hard' polymer structure remains, weakened in the absence of rosin, and is physically eroded by the ablative effect of surface water currents. Over time with steady rosin and biocide release, the leach layer becomes thicker. No coating remains at the end of the docking interval.

Hempel's microfibre technology



The microfibres run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibres. The coating without microfibres showed severe cracking.

Product highlights:

- Low activity level
- Instant effect on contact with water
- High activity level
- Recommended for slow steaming
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Full return on investment
- Performance guarantee
- Docking interval up to 36 months

Products:

Olympic+

Olympic+ is a rosin-based antifouling with an effective biocide package, excellent mechanical strength and multiple polishing rates for good performance up to 36 months.



Basic

The economic choice for reliable performance

Basic offers an excellent price to performance ratio. Its formulation makes it the optimal choice for short-term service intervals at a very cost-effective level. Basic has a stable polishing rate and an effective biocide package to ensure predictable performance. Furthermore, it contains patented microfibrils and natural binder properties that deliver best-in-class mechanical strength. You can be sure of reliable performance for up to 36 months.

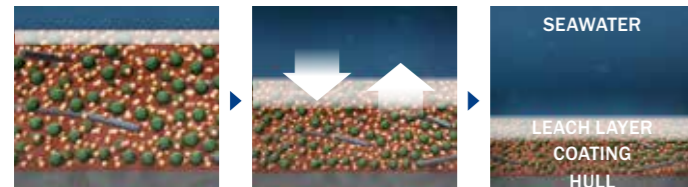
What it does – and what it does for your fleet

Basic is the preferred choice for short service intervals when you are looking for an effective and budget-friendly solution. Basic consists of rosin and effective biocides that ensure controlled polishing and leaching. It performs well in different water types and at different sailing speeds.

Basic contains rosin, a tried and proven ingredient that not only helps improve antifouling performance, but also offers effective self-polishing and overcoating options.

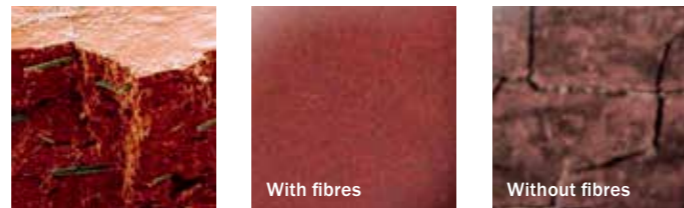
How it works

Basic uses gum rosin for stable polishing and effective leaching of biocides. Combined with an insoluble co-binder polymer, rosin is progressively dissolved into the sea. The remaining insoluble co-binder frame is then eroded by surface shear stress.



Seawater penetrates the coating and hydrates the rosin (yellow) and biocide (green), which dissolves and leaches out of the coating. An insoluble 'hard' polymer structure remains, weakened in the absence of rosin, and is physically eroded by the abrasive effect of surface water current. Over time with steady rosin and biocide release, the leach layer becomes thicker. At the end of the docking interval there will be no coating left.

Hempel's microfibre technology



The microfibrils run close to the surface to ensure best-in-class mechanical strength.

Coating condition after exposure to a cyclic blister box test: No failures were observed on the panel reinforced with microfibrils. The coating without microfibrils showed severe cracking.

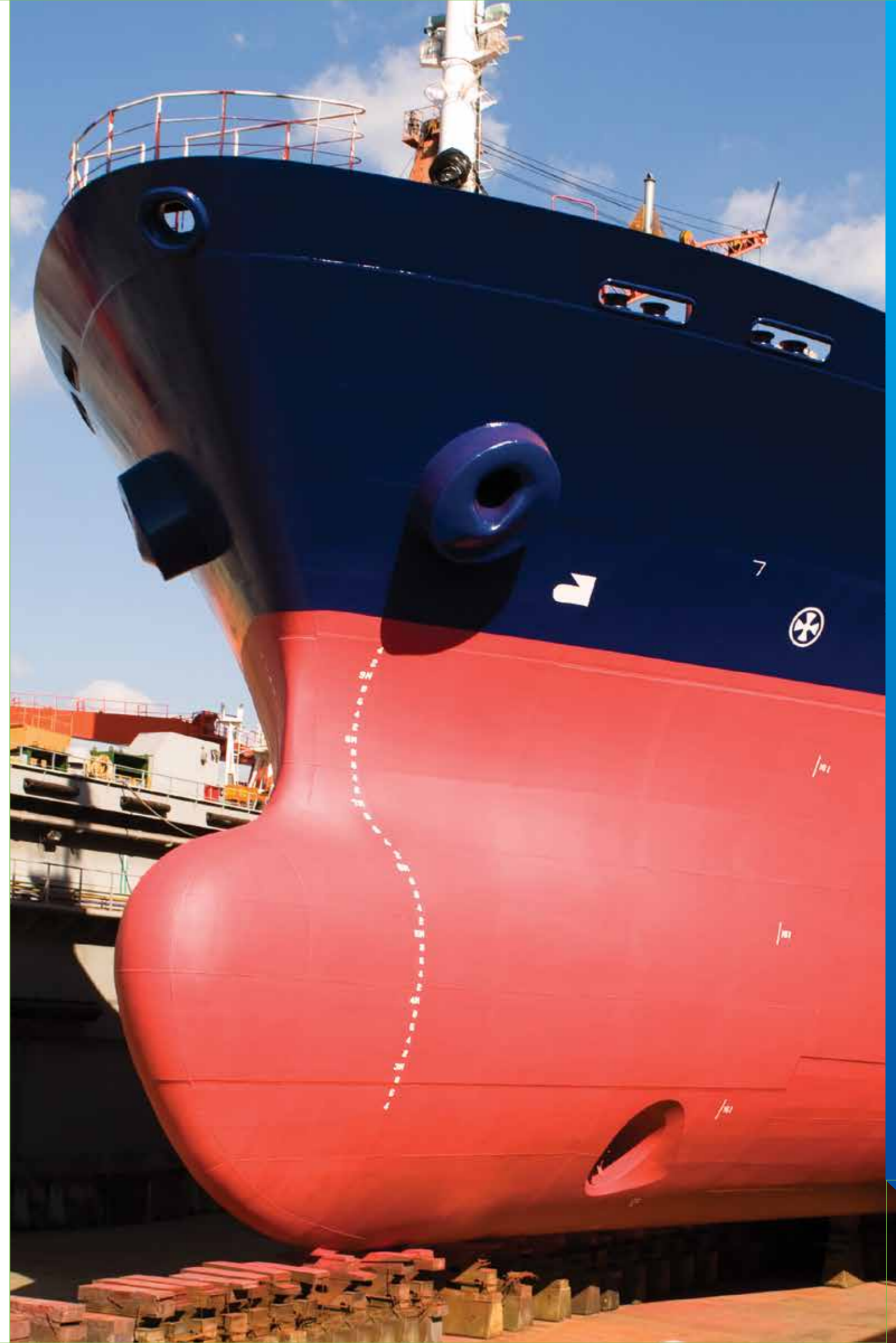
Product highlights:

- Low activity level
- Instant effect on contact with water
- High activity level
- Recommended for slow steaming
- Microfibre-based for superior mechanical strength
- Easy overcoating
- Application in warm environment
- Can be applied below 0°C
- Full return on investment
- Performance guarantee
- Docking interval up to 36 months

Products:

Basic

It is a rosin based antifouling with a good biocide package, excellent mechanical strength, and multiple polishing rates for good performance up to 36 months.



Hempasil X3+

Biocide free silicone enhanced hydrogel

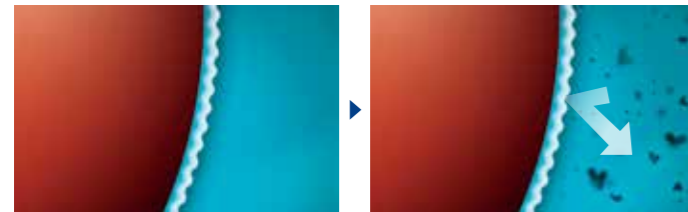
Hempasil X3+ is the leading fouling release solution when it comes to reducing fuel consumption. Based on a smooth silicone binder it utilizes an invisible silicone-based hydrogel microlayer that makes it very difficult for organisms to attach to the hull.

What it does – and what it does for your fleet

Hempasil X3+, our fouling release flagship, is completely biocide-free. Not only does Hempasil X3+ reduce fuel consumption and other GHG over the entire service interval, but also cuts CO₂ emissions. It can be used on any type of marine vessel, even vessels currently using another hull coating. Hempasil X3+ can be applied on existing antifouling and fouling release coatings.

How it works

Together with the pure silicone composition, the unique hydrogel technology sets Hempasil X3+ apart from conventional fouling release coatings. The hydrogel tricks fouling organisms into thinking the hull is a liquid instead of a solid surface, thus greatly reducing their ability to settle. The inherent self-cleaning properties of the silicone beneath the hydrogel layer keep the hull surface smooth over the entire service interval.



Unique, non-reactive polymers form a hydrogel layer between the steel and seawater.

Fouling organisms perceive the hull as a liquid and are consequently unable to attach to the hull.

Product highlights:

- Flexible trading pattern
- Instant effect on contact with water
- High activity level
- Recommended for tropical waters
- Easy overcoating
- Application in warm environment
- Can be applied down to 0°C
- Low friction technologies
- Full return on investment
- Fuel savings guarantee

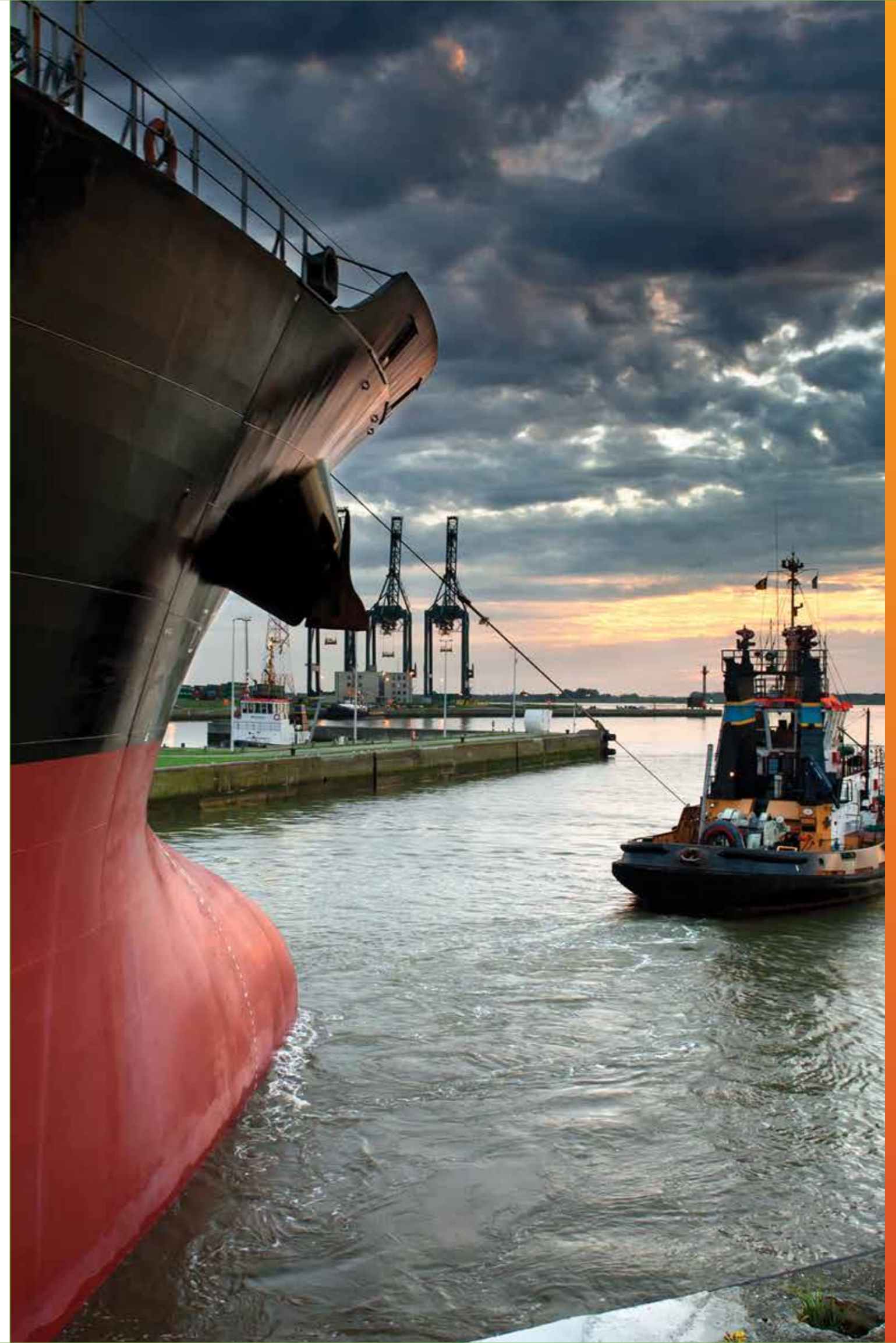
Products:

Hempasil X3+

Hempasil X3+ is a third generation fouling release coating with high solids content and can be used on vessels with sailing speeds down to 8 knots with docking intervals over 60 months.



Hempasil X3+ can be used on any type of marine vessel and it is the only fouling release system that can be applied down to 0°C.



Your trusted partner

Helping you get it right first time

Finding the right hull coating is about maximising fuel savings. Getting there is about understanding the balance between many different factors. The right choice means short payback time and years of energy-efficient sailing, while the wrong one may haunt you for a whole service interval. As a technology leader with a complete range and more than a century of experience, Hempel is a trusted partner for owners and operators all over the world seeking the perfect coating for a specific need.

Assessment

Choosing the right coating requires an understanding of many interdependent factors including the expected trading pattern, sailing speed, and level of activity.

- How much can you realistically expect to save on fuel over the service interval?
- Will you operate the vessel or do you have plans to charter it out?
- How can you save money on overcoating at the next docking?



Application

Correct application requires insight, thoroughness and commitment to quality. Incorrect application can undermine performance from the start.

- You can be sure the coating is suitable for the application climate and process.
- You can depend on the promised coverage.
- You can ask for a Hempel coating advisor to be present during application.



Performance

Documented performance is nice to have, but will it also apply to your particular vessel?

- All Hempel coatings are supported by a performance guarantee.
- We can assist you in documenting fuel efficiency over the service interval.
- Your local Hempel contact will keep in close touch to answer any questions.

“Because the only thing on your hull should be water!”



Fouling control

As a world-leading supplier of trusted coating solutions, Hempel is a global company with strong values, working with customers in the protective, marine, decorative, container and yacht industries. Hempel employs 6,700 people in 80 countries and has 28 factories, 15 R&D centres and more than 150 stock points worldwide.

Across the globe, Hempel's coatings protect surfaces, structures and equipment. They extend asset lifetimes, reduce maintenance costs and make homes and workplaces safer and more colourful.

Hempel was founded in Copenhagen, Denmark in 1915. It is proudly owned by the Hempel Foundation, which ensures a solid economic base for the Hempel Group and supports cultural, social, humanitarian and scientific purposes around the world.

Hempel A/S

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