Alternative Approaches to Fouling Prevention on Leisure Boat Hulls: Biocide-Free Paint Innovations

Santiago Arias
11 September 2025

Short introduction

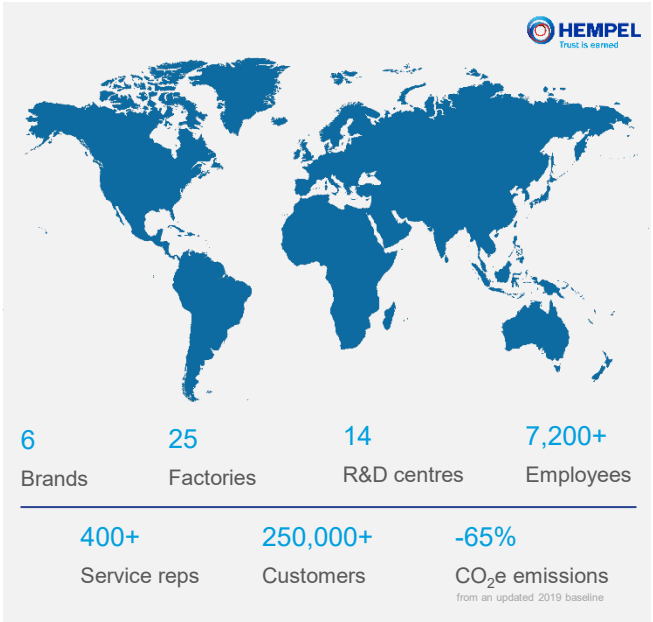
Founded 1915 in Copenhagen, Denmark

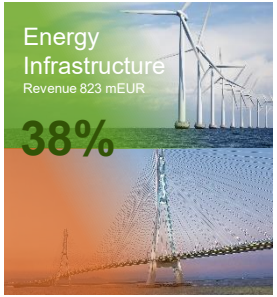
A leading global supplier of marine protective coatings

It is majority owned by the Hempel Foundation

SCIENCE BASED TARGETS

Signed up for the Science Based Targets in 2022





* Numbers as of 31 December 2024.

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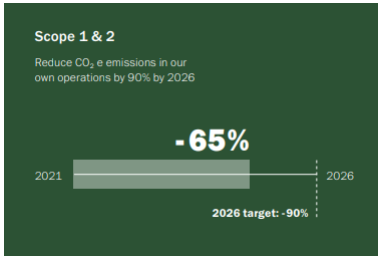
Reduction of Scope 1 and 2

We are the most ambitious and best performer in industry



Paint Company	Reduction of Scope 1-2 reported in 2024
Hempel	65
Company A	41
Company B	30
Company C	19
Company D	16
Company E	13

Hempaguard, the benchmark
fuel-saving hull coating

Hempaguard

Innovative
ActiGuard® technology

5,000+
applications

Trusted
5th generation of the Hempel Silicone Technology

Acknowledged by ABS
Silicone coatings are being verified by ABS, Lloyd's, etc., as one of the best investments for energy efficiency enhancements.

DNV Validated performance
The Hempaguard X7 performance claims have been validated by DNV in 2024

Recommendations from 2023

There is technology available with proven / demonstrated performance to fulfil performance demands on Fouling control solutions for Yachts in Europe.

There is legislation experience on how to do it

We just need to do it

What is new from 2023 to 2025

Biocide free solutions works in North America

More yachts applied

Infinity : Paint refresher

Marine biofouling and the role of biocidal coatings in balancing environmental impacts. 2023

BIOFOULING 2023, VOL. 39, NO. 6, 661–681 https://doi.org/10.1080/08927014.2023.2246906

The future use [of biocides] is not guaranteed due to their bioaccumulation and toxicity concerns to non-target species. (pg. 674)

Until environmentally friendly technologies perform at the level of classic antifouling coatings, their potential toxicity has to be weight against the reduction of GHG emissions and prevention of IAS. Ultimately, biocidal AF coatings should be phased out to avoid loss of biodiversity and costly wastewater treatment. However, currently, their performance and costs are unmatched. The most promising available alternative, which balances the environmental impact with the toxicity of biocides, are FR coatings containing low amount of booster biocides. (pg. 674)

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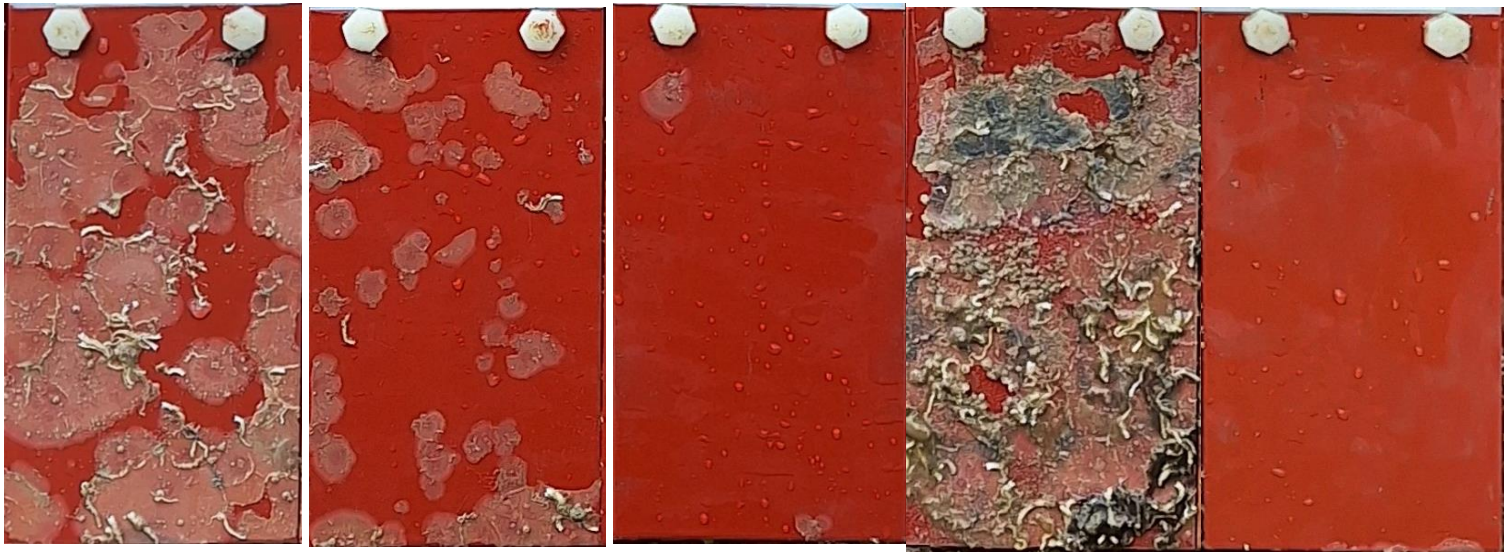
Not all the Silicones are the same

Raft performance after 4 months in Singapore



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Silic One: Fuel Savings

USA

- Outback 50: great "before and after" data
- Top speed:
  - +4.4% speed
  - -7.1% fuel burn
- 8 – 14 knot range: 17 – 20+% lower Fuel Burn

Average 20% less Fuel Burn in 8 – 14 knot range

Approx 7% less Fuel Burn at 20 knots (with higher speed)

Claim of 5% Fuel Savings = Conservative

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Silic One Speed Improvements

USA

- Outback 50: average 5% improvement
- Mainship Pilot 30: “Had no problems reaching a top speed of 24 knots. Previously, even with a clean bottom we were getting about 22.”
- Tartan 37: “Just short of 1 knot speed improvement. Boat handling much better!”
- Fountain 47: “With Silic One we increased top speed of our boat from 89 knots to 94 knots”
- Nimbus 405C: “Cruising speed of our Nimbus 405C increased by 3 knots.”
- Overmarine factory (Mangusta): “By applying Hempel’s Silicone systems, we gain 3-4 knots of speed”

Demonstrated Speed Improvement

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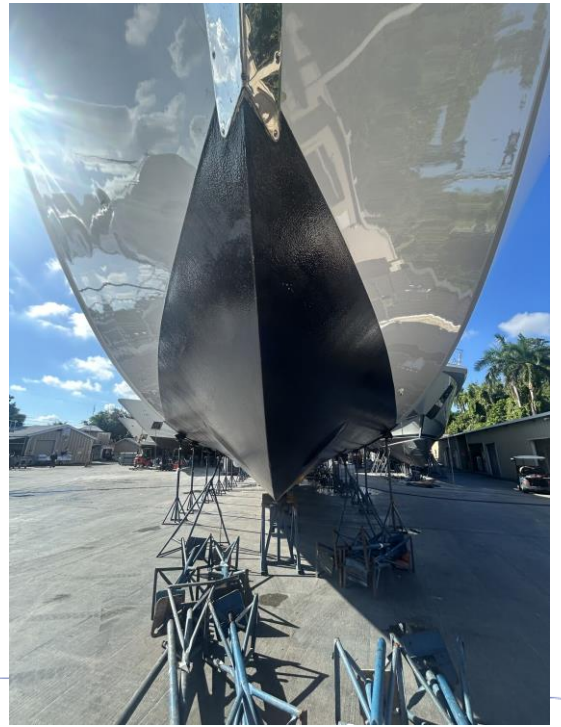
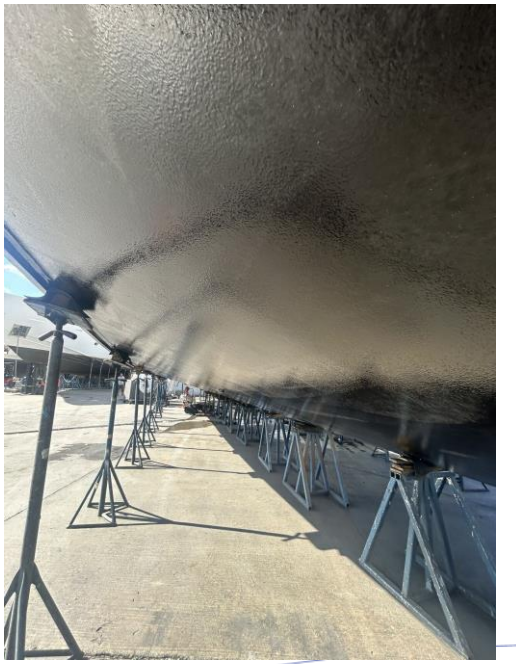
Hempel Silic One.

A 105’ Mangusta just hauled after 9 months in Florida waters — and the results speak for themselves.





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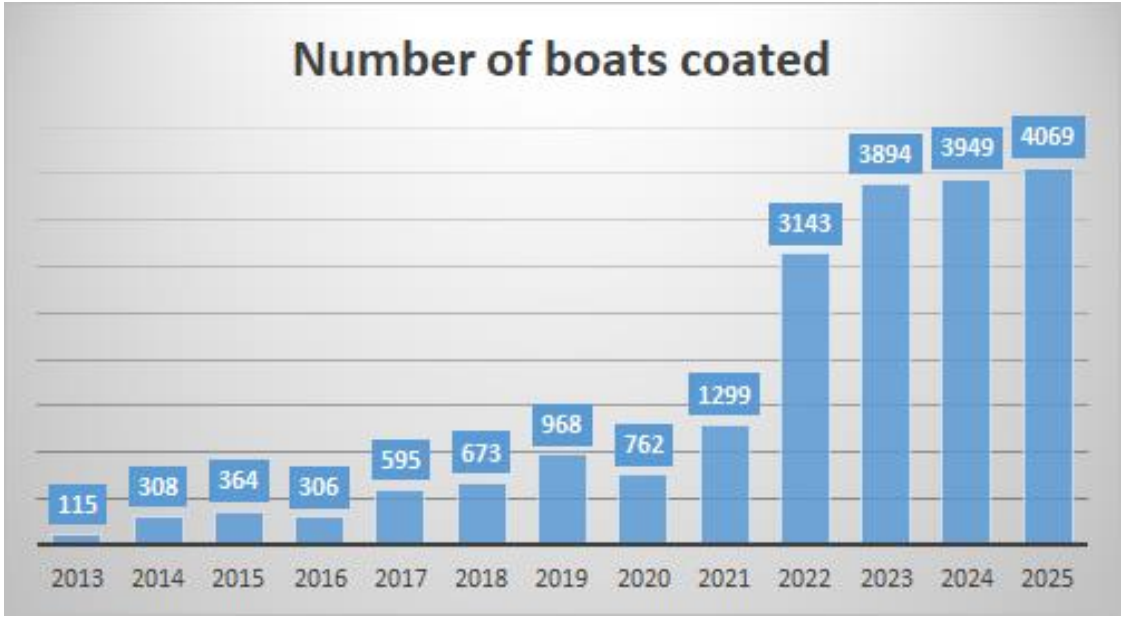
Yacht biocide free references

More than 20,000 applications in the last 13 years



8 months

Types of waters

- Mediterranean
- Atlantic
- Baltic Sea
- North Sea
- Brackish waters
- Pacific
- Gulf of Mexico
- Gulf of California

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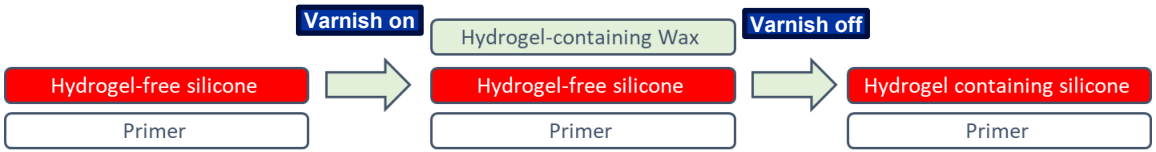
Infinity is a „recharger” for

Hempel’s Silic One system

Concept

- Hydrogels may leave the silicone coating or lose effect over time
- Can we enrich the silicone with fresh hydrogel ?
- Yes with a Water borne hydrogel containing varnish
- “Varnish on/Varnish off"–> replenished silicone



3 easy steps

Apply

Dry (24h)

Wash off

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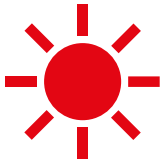
Sustainability assessment: Full system life cycle 3 years duration

Sustainability gains Infinity compared with a standard biocide free paint solution:

42% less paint and waste



50% less VOC emissions

47% less total carbon footprint

Silicon hydrogel (mainly use in contact lenses)

- No hazardous
- No PFAS

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Acute Tox. 4	H302 Harmful if swallowed.
Acute Tox. 4	H332 Harmful if inhaled.
Eye Dam. 1	H318 Causes serious eye damage.
Aquatic Acute 1	H400 Very toxic to aquatic life.
Aquatic Chronic 1	H410 Very toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:
The substance is classified and labelled according to the GB CLP regulation.

Hazard pictograms:

GHS05 GHS07 GHS09

Cuprous oxide MSDS

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Regulation (EC) No 1272/2008 as amended

This substance does not meet the criteria for classification according to Regulation (EC) 1272/2008 as amended.

Hazard summary Not available.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Hazard pictograms	None.
Signal word	None.
Hazard statements	The substance does not meet the criteria for classification.

Silicon hydrogel MSDS

Conclusions from 2025

There is technology available with proven / demonstrated performance to fulfil performance demands on Fouling control solutions for Yachts in Europe and USA.

There is legislation experience on how to do it

We just need to do it

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Trust is earned

Thank you.