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Box cooler service: cleaning and maintenance to fight corrosion and fouling

Edited by **Säkaphen GmbH**, Gladbeck, Germany

Säkaphen is a company specialising in corrosion protection coatings and application services. Its global network of authorised applicators enables it to serve the maritime industry worldwide, where it has noticed increasing interest in the re-coating of box coolers as a sustainable way to lengthen these systems' service life.

B ox coolers are a specific type of heat exchanger developed as a water cooling system for vessels of any kind, from yachts and ferries to ice breakers and cargo freighters. Boasting excellent resistance to marine environments, using seawater as a coolant, and requiring limited energy to operate, they can be considered an environmentally friendly engineering choice, helping reduce a ship's carbon footprint. Since box coolers are made of various grades of alloys, ranging from aluminium-brass (CuZn2OAI) to copper-nickel (Cu-Ni) and are installed in carbon steel sea chests, however, there is considerable potential for galvanic (due to the dissimilar metallurgy) and sea water corrosion. That is why it is vital to apply a protective coating not only in the sea chest but also on the surface of the box cooler.

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Such a protective coating should be resistant to the harsh operational conditions of the marine environment, which go well beyond contact with seawater or brackish water, but also able to withstand the mechanical stress caused by the flow of water through the cooler tubes as well as vibrations and air bubbles, potentially causing cavitation.

Finally, the ideal paint product has to withstand the permanent electrical stress caused by the Impressed Current Anti Fouling (ICAF) system, which impresses an electrical current into a copper anode to reduce fouling and marine growth on the box cooler. Fouling itself, of course, is another factor potentially jeopardising a box cooler's performance.

A growing industry

Säkaphen (Glabeck, Germany) is a family-owned business with 70 years of experience in corrosion protection products and processes. Its solutions for the maritime industry include some coatings with excellent resistance to aggressive marine environments, including one, SÄKATONIT Extra AR-F, that is suitable for flooding applications. In particular, this company can maintain, clean, and repair box coolers in all designs, including round, rectangular, or stepped, thanks to its unique portfolio that includes both coating products and application services, also through a global network of authorised applicators. Together with its partners Multi Solutions (Uskedalen, Norway), a leading service provider specialising in the eco-cleaning and re-coating of box coolers in shipyards worldwide, and NGP (Straume, Norway), a specialist in box cooler re-coating and maintenance services, Säkaphen recently participated in SMM, the leading international maritime trade fair held in Hamburg (Germany) every September. While exhibiting here, they noted increasing interest in the cleaning and re-coating of box coolers as a sustainable way to lengthen these systems' service life (the expected life cycle of a box cooler is usually 15 years).

A specially developed lining: Säkatonit Extra AR-F

Säkaphen has specifically designed a coating product that is ideal for protecting box coolers: a floodable, 2-pack, cold-cured, epoxy hybrid lining called Säkatonit Extra AR-F. Its unique blend of resin and a hardener, also combined with specialised application methods, ensures a smooth hydrophobic finish offering outstanding protection against abrasion and reducing caking, fouling, and incrustation, as well as superior electrochemical insulation.



Säkaphen has specifically designed a coating product that is ideal for protecting box coolers: a floodable, 2-pack, cold-cured, epoxy hybrid lining called SÄKATONIT Extra AR-F.



A box cooler before treatment.

The same box cooler after cleaning, blasting, and coating.

The heat transfer rate of carbon steel coated with 150 microns of Säkatonit Extra AR-F is 25 W/mK, as third-party tested by 3M. In particular, when coating box coolers, it limits the adhesion of marine growth, including barnacles, and provides safe and reliable operation and, above all, protection against galvanic corrosion. Säkaphen's coating is not negatively affected by the use of Marine Growth Prevention Systems (MGPS), such as Impressed Current Anti Fouling (ICAF) systems.

Säkatonit Extra AR-F contains no biocidal filler for greener, more environmentally friendly shipping operations. The coating withstands the harsh marine environment in both warm and cold waters. Therefore, the use of box coolers combined with cleaning and re-coating with Säkatonit Extra AR-F allows companies to extend the service life of their assets, thus further improving sustainability and operating in line with UN sustainability development goals and ESG standards.

"Over the years, we have consistently experienced the exceptional quality of Säkaphen's coatings, particularly in preventing galvanic corrosion," confirms Egil Fallmayr, Business Development Manager at Multi Solutions. "Their cold-cured epoxy paint enables us, as service partners for various box cooler manufacturers, to offer vessel owners a reliable solution during drydock periods. This paint provides excellent protection for box cooler pipe bundles and is ideal for such applications. Säkaphen's support from the beginning has been crucial to our success. Finally, the significant life extension their coating offers is not only a major cost-saver for vessel owners but also contributes to environmental protection."

Serving the Seven Seas: a global network of specialised applicators

When it comes to application services, be they performed at the customers' premises, in drydock, at its German workshop, or at the site of one of its worldwide authorised applicators, Säkaphen can handle the whole process, from inspection and surface cleaning to coating (or re-coating) and testing. Its network of partners and authorised applicators enables the company to serve the maritime industry from the North Sea (UK, Scandinavia) to the Persian Gulf (Dubai), from the Atlantic Ocean (Ghana to South Africa) to the Indian Ocean (Malaysia, Australia). "We operate on a global scale, ensuring localised support and seamless service delivery across the globe, bringing expert applicators directly to the clients," says Atle Falk, Chief Commercial Officer at NGP.

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"Such regional focus allows for quick response times, reducing downtime and operational inefficiencies for customers. As part of Säkaphen's network, we can bring extensive expertise in box cooler re-coating worldwide."

"We are lucky to have so many highly qualified partners operate as authorised applicators of Säkaphen's coatings," states Christoph Fischer-Zernin, the Commercial Director of Säkaphen. "While we support them with our coating products and know-how in application processes and inspection procedures, they enable us to reach a wide client base worldwide and in the most diverse industries with reliable services of the highest quality."

A success case: protecting 31 box coolers in Norway

A few years ago, for example, Säkaphen was contacted by a Scandinavian vessel operator to provide a box cooler re-coating solution that was suitable for all the geographical regions in which its fleet of offshore supply vessels operated. Ideally, that had to be done without shipping the box coolers to Europe. Locations included Rio de Janeiro, Singapore, Eastern Europe, Scandinavia, and the Middle East. Due to the high investment costs per location, the large number of potential docking sites, and above all, the unavailability of curing ovens, it soon became clear that the best solution would be a cold-cured coating. Therefore, this was required to have a pot life long enough to allow the paint to be applied on the whole box cooler surface but, at the same time, a curing speed fast enough to achieve feasible processing times. Moreover, the application process had to work under various environmental conditions, ranging from colder temperatures in Scandinavia (10 °C) to elevated temperatures in South America or the Middle East (38 °C), and potentially at



Coated box coolers in drydock.

elevated humidity (up to 80%). Last but not least, the application procedure had to be simplified to allow cleaning and re-coating of the box coolers around the world in or near the respective drydock location chosen by the vessel operator for this 5-year class renewal project. Säkaphen's Säkatonit Extra AR-F ticked all the boxes. Some months ago, Säkaphen had the opportunity to check its product's performance on the occasion of some of these box coolers' subsequent 5-year class maintenance milestone. Its coating product proved to guarantee excellent performance: marine growth was less than expected thanks to the hydrophobic surface formed by the lining, and any barnacles and fouling traces were easily removed. Mechanical damage was minimal and largely caused by routine handling of the box coolers during service. Neither the Marine Growth Prevention System (MGPS) nor erosion had had a negative effect on the coating. "Afterwards, more and more box coolers treated with Säkatonit Extra AR-F have reached their next 5-year class renewal milestone and have been subjected to inspection," notes Fischer-Zernin. "They have all shown equally good results, making our customers consistently satisfied with our linings and services."

A few years ago, a Scandinavian vessel operator approached Säkaphen for a box cooler re-coating solution that could work across all the regions where its offshore supply vessels operated, without needing to ship the coolers to Europe. Due to the high investment costs per location, the large number of potential docking sites, and above all, the unavailability of curing ovens, it soon became clear that the best solution would be a cold-cured coating.

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