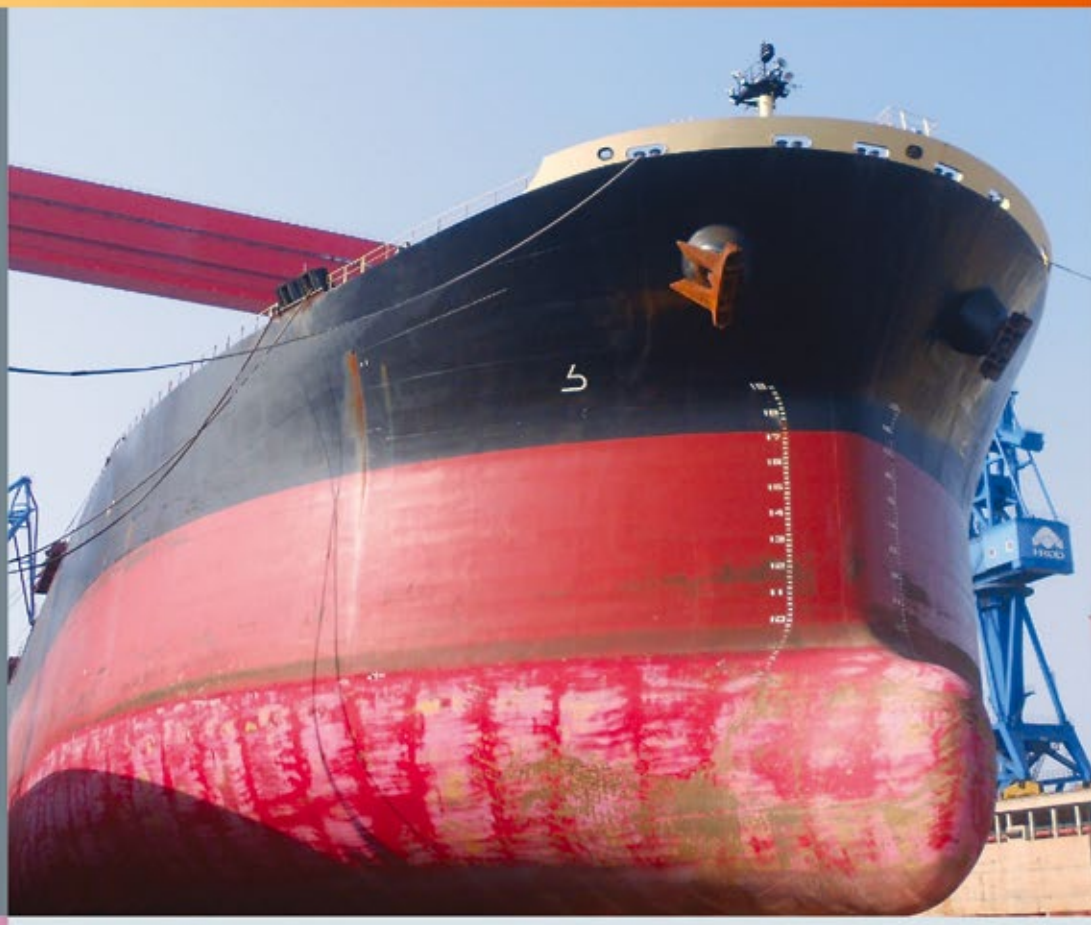
100 years

NIPPON PAINT'S ANTI-FOULING

Catalogue NO. NPMC-018-E5

The World's First TBT-Free Hydrolyzing Self-Polishing Antifouling

Ecoloflex SPC



NIPPON PAINT MARINE

ECOLOFLEX SPC

The first TBT-free hydrolyzing self-polishing antifouling in the world, which contains a special acrylate copolymer developed with our patented technology as the basic resin, and cuprous oxide as the main biocide. The product has been applied to far over 20,100 ships (As of February 2016). We are challenging constantly to improve the performance more and more.

EXCELLENT ANTIFOULING PERFORMANCE

By reconstruction of the resin synthesis and structure, together with improved formulation technology, the actions of polishing take place evenly and continuously and the leaching of biocide gradually proceeds in a controlled manner, thereby excellent antifouling performance can be expected.

LONG-TERM SHIP'S OPERATION

The leaching of biocide steadily and continuously proceeds, as long as the paint film exists, by which long-term operation will be ensured with excellent antifouling performance of existing paint film thickness.

EXCELLENT SMOOTHING AND ROUGHNESS CONTROL

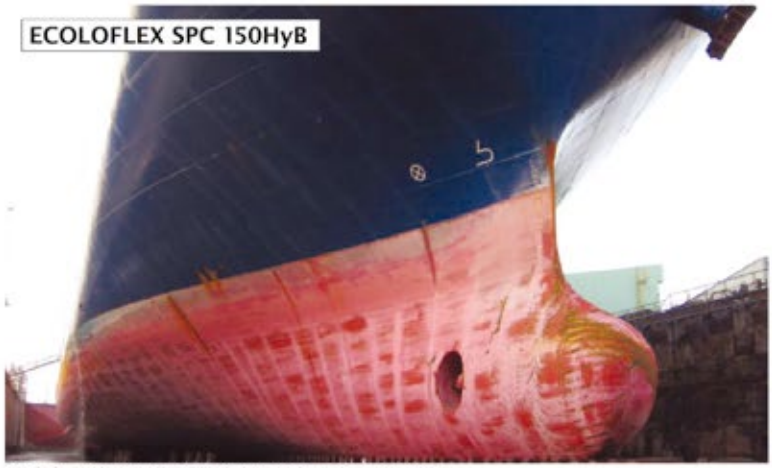
The self polishing mechanism results in excellent smoothing and roughness control, along with the smoothness of the surface without the accumulation of the skeleton layer.

PROTECT THE OCEANS FROM POLLUTION

TBT-Free "ECOLOFLEX SPC" will protect the oceans from pollution. "ECOLOFLEX SPC" will coexist with the environment of the earth.

Ecoloflex

*VLCC *299,990DWT *16knots *30 months



*PCC *21,447DWT *20knots *30 months

*Pelagic fishery boat *499GT *16knots *18 months

*LNG *69,594DWT *16knots *30 months

SPC

ECOLOFLEX SPC

ECOLOFLEX SPC

ECOLOFLEX SPC provides stable long-term antifouling performance and realizes fuel cost reduction and regular service.

ANTIFOULING MECHANISM OF ECOLOFLEX SPC

By the chemical reaction (Hydrolysis) which occurs when the paint film contacts seawater, the surface layer of the paint film gradually leaches out in a controlled manner and Copper Acrylate Copolymer is released. As the fresh active paint surface is always exposed as long as the ECOLOFLEX SPC paint film exists, long-term antifouling performance and service period can be ensured.

POLISHING MECHANISM OF ECOLOFLEX SPC

Polishing mechanism works by the leaching of biocide with the chemical reaction (Hydrolysis) and the physical motion of seawater. This motion of seawater will reduce the surface roughness and the surface friction resistance, resulting in excellent smoothing/roughness control, which leads to reduced fuel consumption and long-term service period. The polishing rate differs with ship's operating condition, i.e., seawater temperature, seawater pH, speed and trade route/history etc.

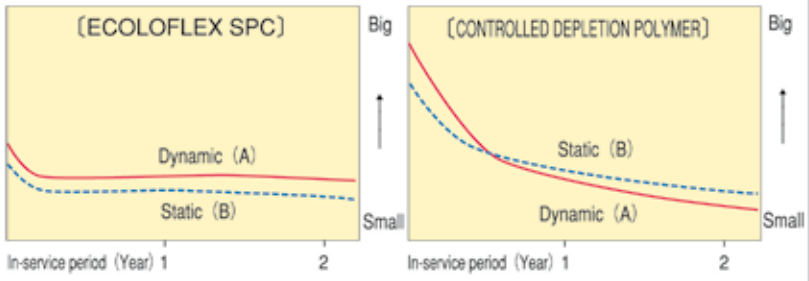
ANTI ROUGHNESS	ANTI FOULING
• Achieved excellent smoothing/roughness control • Prevents unneccessary accumulation of paint film	• Active surface is always exposed to seawater • Controlled and effective leaching of biocide • Antifouling life is directly proportional to the paint film thickness
• Long-term anti-corrosive performance • High level application control	• ECOLOFLEX SPC hydrolysis reaction and polishing mechanism • ECOLOFLEX SPC system suitable for ships type and operating conditions • Long-term and stable release of biocide

ANTIFOULING MECHANISM OF CONTROLLED DEPLETION POLYMER TYPE

This type of A/F paint was developed for the tin-free requirement, and consists of special water soluble or water swellable resins. On contact with seawater, these special synthetic resins dissolve/swell/bond with water. The motion of seawater against the surface of paint film removes the loosely adhering dissolved/swelled/bonded layer and releases the biocides from the paint film. But this cannot match the smoothing property and controlled biocide release of hydrolysis A/F's. Controlled depletion polymer can be categorized as "self-polishing A/F", but it is based on a technology which cannot avoid thick leached layer build-up (150~200μm thick) after service.

LEACHING SPEED OF ANTIFOULING IN DYNAMIC/STATIC CONDITION (See diagram)

(A) Dynamic : (Dynamic+Static condition) n cycle test (B) Static : Static condition

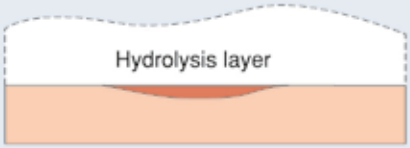


ECOLOFLEX SPC

Immediatery after application

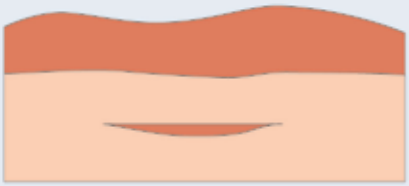
Self polishing mechanism results in excellent smoothing/roughness control, along with complete fouling control.

In-Service period



The leaching of biocide gradually proceeds in a controlled manner, which leads to reduced fuel consumption.

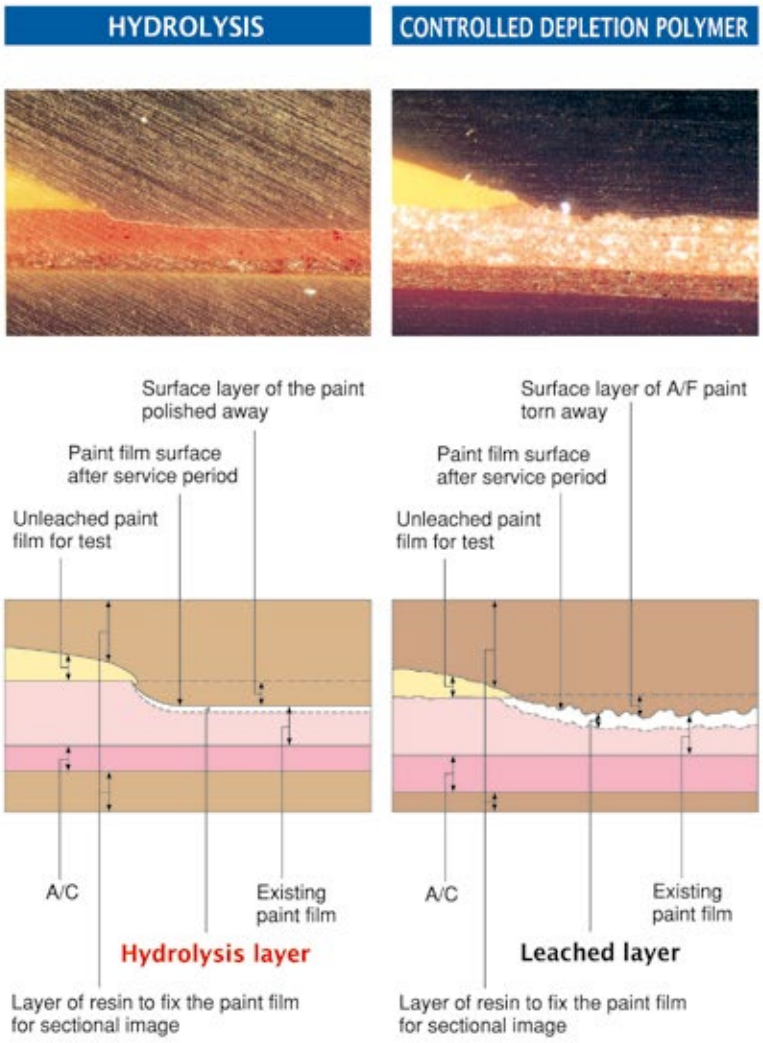
Subsequent docking(s)



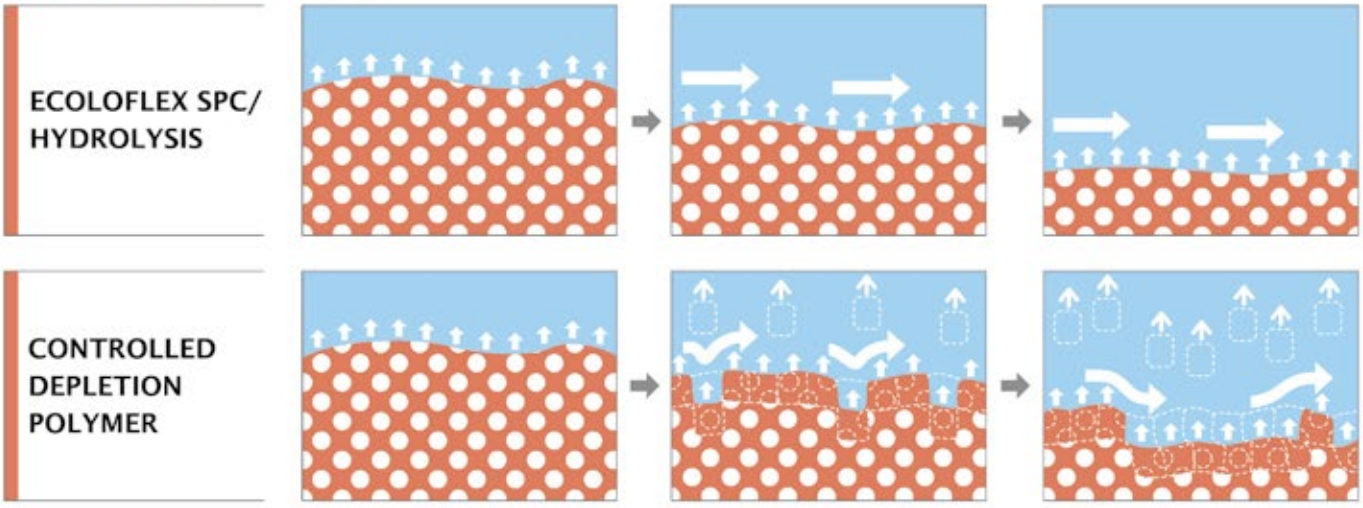
As the remaining paint film makes complete surface by re-application, there are no need to carry out over-all application of A/C

COMPARISON OF ECOLOFLEX SPC WITH CONTROLLED DEPLETION POLYMER TYPE

	Hydrolysis	Controlled depletion polymer
Surface Condition of Paint Film	The fresh active paint surface is always exposed, as the motion of seawater polishes away the leached layer with on skeleton layer.	The paint surface swells and the swelled layer is physically removed from the surface by the motion of seawater and the actions of swelling and removal take place unevenly and discontinuously with no smooth paint surface.
Leaching of Biocide	As long as the paint film exists, long-term stable release of biocideis maintained.	The leached layer is physically removed with some reduction of surface roughness control and thick leached layer hinders antifouling property, as the biocides leach out earlier.
Term of Antifouling Performance	Antifouling life is proportional to the film thickness and long term service period is expected.	Antifouling life is not proportional to the film thickness and there are limits of ability.
Smoothing and Roughness Control	Surface roughness is reduced by the motion of seawater and the surface becomes smooth.	Not smooth enough in-service period.
Overcoatability	As antifouling property of the remaining paint film is maintained enough, only the polished amount of ECOLOFLEX SPC needs to be applied. A certain minimum amount of film thickness is remained.	As the leached layer is thick and its film strength declines, detachment may occur within the swelled/leached layer on repeated dockings.



ANTIFOULING MECHANISM



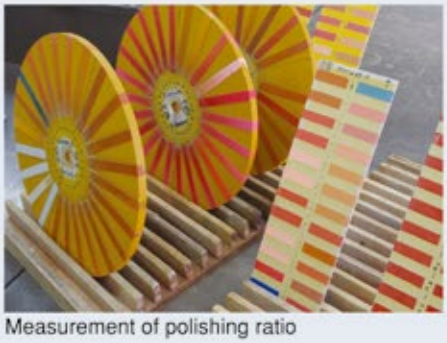
ECOLOFLEX SPC HyB SERIES

Tin Free Hydrolysis Type Antifouling Paint

ECOLOFLEX SPC HyB was developed to further improve the performance and predictability of antifouling paint to new levels. It enables 60 months service life by providing very accurate polishing rates and cotrolling the thickness of hydrolysis. This has been achieved by combining in a unique hybrid the ultra-reliability of Copper acrylate and the Silyl resins. Both new buildings and repair vessels have verified ECOLOFLEX HyB antifouling efficiency. Thanks to the resin's superb performance and reliability, this resin forms the basis for our unique LF-Sea Low-Friction fuel saving antifouling product.

Accelerated test by drum rotor

Field test



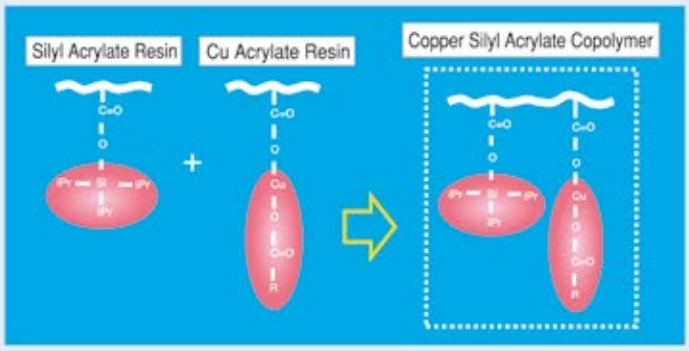
Measurement of polishing ratio

FEATURE

ECOLOFLEX SPC HyB series possess progressive patented technology of metal-contained acrylate copolymer and silyl acrylate copolymer. This technology ensures long term and stable self-polishing which makes the fresh active coating surface constantly exposed to sea water, resulting in excellent antifouling performance.

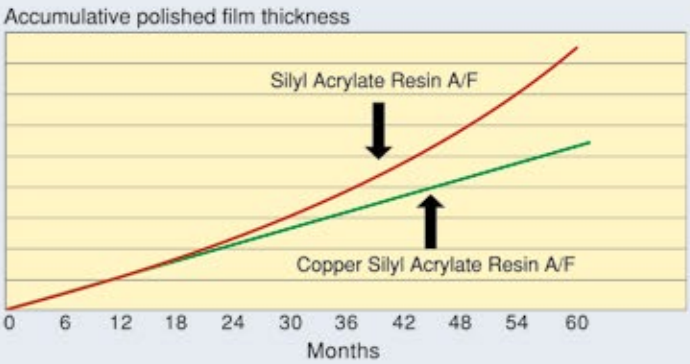
COPPER SILYL ACRYLATE COPOLYMER

Copper silyl acrylate copolymer is developed by combined with metal-contained acrylate resin for covering weak point of silyl acrylate resin.



POLISHING PROPERTY OF SELF-SMOOTHING A/F

This graph shows the expected polishing properties over time. As for silyl acrylate A/F, its polishing tends to be increased significantly after around 2 years. ECOLOFLEX SPC HyB constantly provides linear and stable polishing property for the long term.



Paint Applied Vessels

*Ferry *799GT *13knots *12 months

*Cargo *498GT *11.6knots *15 months

*LPG *698GT *12.5knots *24 months

*Chemical Tanker *498GT *11knots *15 months

*VLCC *314,014DWT *15knots *30 months

*BC *170,907DWT *14knots *30 months

*PCC *21,700DWT *20.7knots *24 months

*LPG *49,649DWT *17knots *36 months

NIPPON PAINT started research and development of antifouling paints early on and got antifouling paint for patent in 1911. And then NIPPON PAINT succeeded in providng Japan's first domestic antifouling paints.
(Quoted : 100th anniversary of foundation of NIPPON PAINT)

SAFETY PRECAUTIONS

This product is slightly more toxic than the other paints of ordinary use. Inhaling of the vapours and skin contact with the paint might cause poisoning and a rash. Therefore, when handling, please refer to the following precautions.

HANDLING AND STORAGE OF OUR PRODUCTS

1 Application must be conducted in an area equipped with local air exhausters and free from flame.
2 Take the preventive measures to electrostatic discharge.
3 While painting and drying, ventilate thoroughly and avoid inhaling the fumes or gases. During the application outdoors, seal the air vent etc. of houses in neighbourhood to keep the fumes or gasses out.
4 When handling, protect your skin wearing, for example, organic gas protection mask, air-supplied respirator, hood, safety glasses, long-sleeved work clothing, towels, gloves, aprons, and so on.
5 After the application, rinse your mouth and wash hands thoroughly so that the paint and so on are removed.
6 Keep the container closed and store at temperatures below 40℃.
7 Soak the paint dust and slag in water until they are disposed.
8 Store any product in the place out of children's reach.
9 Avoid suspending of the container. If necessary, use an appropriate device and lift it vertically.
10 Do not use the products for improper purposes.

EMERGENCY PROCEDURE

1 If a fire involving paint does occur, use CO_2, foam or dry chemical extinguisher.
2 If the paint and so on get in your eyes, wash off with water and take medical advice from a doctor immediately.
3 If the paint splashed on your skin, wash off with soap and water. When you feel pain or find any change in the appearance of the skin, consult a doctor immediately.
4 If you feel sick after inhalation of fumes, gases etc., lie quietly and, when necessary, consult a doctor immediately.
5 If you swallow the paints by mistake, consult a doctor immediately.
6 If the contents spill out of the container, wipe it with a piece of cloth and soak in water.

WHEN DISPOSING, TREAT THE WASTE MATERIALS AS INDUSTRIAL WASTES.

For detailed information, please refer to the Safety Data Sheet (SDS).
Please consult us beforehand when you are going to export them.

NIPPON PAINT MARINE

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