

ANTIFOULING COATINGS FOR VESSELS

What’s Available?

Due to restrictions and voluntary reductions in use of organotin-based coatings, effective substitutes are continually being sought. Most of the coatings replacing organotin contain copper (usually cuprous oxide) and/or organic biocides. These coatings are generally considered poor or stopgap alternatives, because they still release toxins. They appear to create similar environmental problems as the organotin coatings, although not at same the level.

Research continues as coating manufacturers search for a more ideal antifouling paint. In the meantime, there are some effective alternatives available that can reduce the severity of environmental impacts. This technical brief compares and discusses International’s Intersleek 425, SeaLifeMarine’s Sealife 1000, and Epaint’s SN-1.

Preconditioning: SN-1 and Sealife 1000 are compatible with many other coatings and can be applied over previously painted surfaces that are clean, in relatively good condition, and properly prepared. Proper preparation usually involves creating a clean, dry surface. Sn-1 can be applied to bare metal hulls, both steel and aluminum. SeaLife 1000 can be applied to bare steel, but a prime coat is required on aluminum to buffer the copper/aluminum salt water reaction. Intersleek 425 is a complete coating system which first requires a clean blast with an aluminum or metal-free abrasive.

Application: Once the surface is prepped for coating, all three may be applied by roller, brush, or spray. However, pot life dictates that roller or brush application of Intersleek 425 is for touch-up only.

Cure: As with all coatings, cure time is affected by temperature and humidity. However, typically coated vessels are ready for launch between 6 and 24 hours after application.

Advantages

These coatings have all demonstrated successes in preventing fouling, and they do so without the release of long-term toxic or hazardous chemicals to the environment. The U.S. EPA has listed each of these coatings as “environmentally compatible”.

- Intersleek creates a non-stick, self-cleaning surface to which organisms have difficulty attaching. It has been shown to reduce fuel consumption and improve ship speed. Intersleek does well at preventing hard fouling (e.g., zebra mussels) and is very easy to clean compared with traditional ablative coatings. The coating is also very durable.

Highlights	
<u>Product:</u>	Antifouling coatings
<u>Technologies:</u>	Coating chemistry
<u>Applications:</u>	All will cover steel or aluminum, and one or more will also cover wood or fiberglass hulls
<u>P2 Benefits:</u>	No toxic material released during lifespan Low VOC or HAP emissions Low or no hazardous material during removal

- Sealife 1000, like copper ablative coatings, has a high level of cuprous oxide; however, the material is bound in the coating instead of being released during product life. The dispersion rate is actually similar to that of drinking water in home copper pipes.
- SN-1 acts by photo chemically combining sunlight and water to produce hydrogen peroxide (H2O2), which continually bleaches the hull and discourages fouling. The H2O2 rapidly breaks down into water and oxygen and does not accumulate in the tissue of marine animals. SN-1 can be re-applied over previous coats of SN-1 a few times without stripping down to the substrate, by simply roughing up the surface and reapplying the coating

Benefits: Each of these products exceeds current regulatory standards and look to meet standards for the foreseeable future. Existing equipment is suitable for application. Finally, they have demonstrated effectiveness in retarding both soft fouling (e.g., algae) and hard fouling.

Limitations

- Intersleek’s main disadvantage is the upfront cost. Total application cost can be almost double that of current copper-based coatings. Although, its longevity, reduced cleaning and disposal costs, and improved fuel consumption, make it very competitive overall. It is more difficult to apply and touch-up. Finally, ice is very destructive to Intersleek, so it may not be appropriate if icy conditions are common.
- SeaLife 1000 contains cuprous oxide and therefore will likely become regulated waste when it is removed.
- SN-1 passes federal volatile organic compound limit (VOC) standards, at 399 grams per liter, but may or may not pass local regulations.

The quick reference table below shows coating properties for the three products discussed. Standard coating tests, such as pencil hardness and solvent resistance, are not generally applied to antifouling coatings**.

Quick Reference Table: Properties of Antifouling Coatings						
Property	Intersleek 425		SeaLife 1000		E-paint SN-1	
Chemical type	Epoxy, silicone elastomer		Solvent-borne Marine Paint		Solvent-borne Marine Paint	
Available colors	Black, Gray, White, Yellow		Red, Black, Green, Brown, Dark Blue, Light Blue, Gray		Black, Navy Gray, White	
Shelf Life	1 year minimum above 77° 2 years minimum below 77°		2 years minimum		2 years minimum	
Pot Life	50°F 2 hours 59°F 90 minutes 77°F 60 minutes		NA		NA	
VOC's	254 grams per liter		130 grams per liter		399 grams per liter	
Reduction	Not normally necessary		Thin with Xylene only if necessary		For spray applications only thin with E-paint 13 solvent	
Applied thickness α = dry film thickness	Base coat	5 mils	Roller	1.2-1.6 mils	Roller	1.2-1.6 mils
	Tie Coat	4 mils	Brush	1.2-1.6 mils	Brush	1.2-1.6 mils
	Topcoat	6 mils (8.3)	Spray	2.0-7.8 mils	Spray	2.0-7.8 mils
Recommended number of coats	Two base coats One tie coat One topcoat		Two coats		Three coats	
Drying time @ 77°						
Touch	3 hours		4 hours		2 hours	
Hard	5 hours		8 hours		8 hours	
Solids by: Weight	NA		78%		75%	
Volume	72%		64%		56%	
Applied coating life span	3 to 5 years		4 years		1 to 2 years	
Clean-up	International GTA822		Mineral spirits or paint thinner		Xylene	

Who Is Using These Products?		
Intersleek 425	SeaLife 1000	E-paint SN-1
U.S. Coast Guard Condor Marine Services Fullers Northland	See field test link below	U.S. Coast Guard

Information Sources and Additional Resources

- International Protective Coatings http://www.international-marine.com/default_flash.htm
- SeaLife Marine Products, Inc. <http://www.sealifemarine.com/products.php>
- E-paint / SN-1 <http://www.epaint.net/>
- U.S. Coast Guard Training Center <http://www.uscg.mil/hq/capemay/>
- U.S. Navy Office of Naval Research <http://www.estcp.org/documents/techdocs/199502.pdf>
- SeaLife 1000 Field Tests <http://www.biotech-authority.com/FieldTest.htm>

** Prepared by the Pacific Northwest Pollution Prevention Resource Center (www.pprc.org). This information is intended for general reference only and is not a complete statement of the capabilities of each product. Contact vendors for additional information on these products, or others that offer environmental benefits. Published December 2002.