

Marine Antifouling Agent



 **ECONEA™**

A Marine Antifouling Agent
Designed for the Environment

Antifouling Product Information

Marine Biofouling and Antifouling Technology

As many boating enthusiasts know, the attachment and growth of aquatic organisms such as barnacles, polychaete tubeworms, bivalve mollusks, seaweed, and diatom and bacterial slime on ship and boat hulls has a considerable impact on aesthetics, vessel speed, fuel consumption, and dry-docking costs. To date, the most effective and economical method to protect a boat from these organisms is to apply an antifouling paint that releases a biocidal compound.

Since the de facto ban on the use of organotin in antifouling coatings, increasing amounts of copper-based antifouling biocides have been used. As a result, the level of dissolved copper in the waters and sediments of certain harbors and marinas has exceeded the levels recommended by water quality standards – and alternative antifouling strategies are needed to protect our marine environment.

ECONEA™ : A New Antifouling Option

Developed by Janssen PMP, ECONEA™ is a patented, metal-free antifouling agent for use in antifouling coatings on the underwater part of ship and boat hulls or static marine structures.* ECONEA™ is highly effective at controlling a wide range of invertebrate fouling organisms at significantly reduced use levels compared to conventional antifouling biocides.

At the same time, ECONEA™ offers environmental advantages. Due to its extremely rapid degradation in seawater, ECONEA™ does not accumulate in the marine environment. The breakdown products are biodegradable and do not have effects on non-target marine organisms at expected environmental concentrations from recommended use levels.

In addition, compared to conventional antifouling agents, ECONEA™ offers clear advantages in terms of color, use on aluminum substrates, and weight reduction.

* Refer to specific uses registered in each country.





How to Use ECONEA™ in an Antifouling Paint

In metal-free antifouling paints, ECONEA™ should be used at levels between 4 and 6 weight percent (on wet paint). As an alternative, ECONEA™ can be used in conjunction with copper-based products, either to reduce the copper level and retain an equal antifouling performance or to enhance the antifouling performance of copper-based paints.

Due to its extremely low solubility in water, the release rate of ECONEA™ from an antifouling paint can be tuned relatively easily, thereby providing consistent and long-lasting antifouling protection.

In order to obtain complete fouling protection, ECONEA™ should be used in conjunction with an algaecide.

Regulatory Status

Janssen PMP's strategic goal is to have worldwide registration coverage for ECONEA™ in all significant markets for antifouling products. To meet regulatory requirements worldwide, a comprehensive data set has been generated for ECONEA™, including data on:

- Effects on aquatic plants, invertebrates, fish, and other biota
- Mammalian toxicity
- Environmental effects under aerobic and anaerobic conditions
- Physical and chemical properties for the active substance
- Analytical methods at environmentally relevant concentrations

Janssen PMP will support its customers' registration efforts by providing Letters of Access to the relevant data and registration of the active substance.

Commercial Status

Major antifouling paint manufacturers around the world have already invested substantially in programs to develop ECONEA™-based antifouling paints, several of which will be commercially available in the near future. This demonstrates their commitment to the environment and their trust in the ability of ECONEA™ to provide excellent long-lasting and cost-effective antifouling performance.



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Antifouling Efficacy

ECONEA™ enables advanced formulator technology resulting in antifouling paints that perform equal to or better than currently used paints. It is highly effective at controlling an array of invertebrate fouling organisms ranging from barnacles, polychaete tubeworms, and bivalve mollusks to ascidians, hydroids, bryozoans, and sponges.

Environmental Benefits

As a metal-free antifouling agent, ECONEA™ does not accumulate in the marine environment due to:

- An extremely short hydrolytic half-life in seawater (3 hours and 15 hours at 25°C and 10°C, respectively)
- Rapid aqueous photolysis
- Rapid aerobic and anaerobic degradation in freshwater and marine environments
- A strong tendency to partition and bind to soil/sediment

Combined with the fact that its degradation products are biodegradable, ECONEA™ is an excellent choice for protecting both boat hulls and the marine environment.

Technical Benefits

COLOR

Using conventional biocides, it is difficult to formulate light- or bright-colored antifouling paints and still achieve optimal antifouling performance. These paints can also exhibit a low consistency in color throughout their in-service lifetime.

In contrast, the use of ECONEA™ allows the formulation of light- or bright-colored antifouling paints that exhibit a high consistency in color and optimal antifouling performance throughout their in-service lifetime.

USE ON ALUMINUM SUBSTRATES

Aluminum ship and boat hulls are susceptible to galvanic corrosion in the presence of certain metal-based antifouling paints. However, ECONEA™ is ideal for use on all types of boat hulls. Because it is a metal-free compound, it will not induce galvanic corrosion on aluminum hulls.

WEIGHT REDUCTION

The specific gravity of ECONEA™ is much lower than that of conventional metal-based products. Because ECONEA™ also requires lower use levels to achieve similar protection, there is a substantial reduction in weight for both the paint in the can as well as on the boat hull.



Antifouling Product Information

PRODUCT INFORMATION

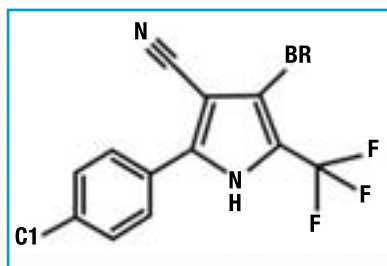
PRODUCT DESCRIPTION

ECONEA™ is a metal-free antifouling agent for use in antifouling coatings to be applied on the underwater part of ship and boat hulls or static marine structures.*

ECONEA™ Active Substance

Common name (ISO): Tralopyril
Chemical name: 2-(p-chlorophenyl)-3-cyano-4-bromo-5-trifluoromethyl pyrrole
CAS number: 122454-29-9
Molecular formula: $C_{12}H_5BrClF_3N_2$
Molecular weight: 349.5

Structural formula:



Chemical and Physical Data

Product Specifications¹

Appearance: Beige to slightly brown powder
Assay (HPLC): min. 90.0 wt. %

Typical Physical Properties²

Melting point (DSC): Onset 252.3°C; Peak 253.4°C
Degradation point (DSC): No decomposition has been observed at temperatures below 400°C.
Relative density: 1.714 at 20°C
Pour density: 0.521 g ml⁻¹
Tap density: 0.647 g ml⁻¹
pH: 5.16 at 22°C (0.1% w/v dispersion in distilled water; pH distilled water 5.12)
Dissociation constant: pK_a = 7.08 at 25°C
Vapor pressure: 1.9 x 10⁻⁸ Pa at 20°C; 4.6 x 10⁻⁸ Pa at 25°C
Partition coefficient: log P_{ow} = 3.5



Solubility in Water and Organic Solvents

Solubility in Water

Column elution	Solubility, in milligrams liter ⁻¹ , at 20°C
Distilled water (resultant pH 4.9)	0.17
Artificial seawater (resultant pH 8.1)	0.16

Solubility in Organic Solvents

	Solubility, in grams liter ⁻¹ , at 20°C
Acetone	300.5
Ethyl acetate	236.0
Methanol	109.1
<i>n</i> -Octanol	85.2
<i>n</i> -Heptane	7.2
Xylene	5.6

Chemical Stability and Compatibility

ECONEA™ exhibits an excellent thermal stability, both as a dry powder and when dispersed or dissolved in an organic solvent. In addition, it has been demonstrated that ECONEA™ is chemically compatible with cuprous oxide, cuprous thiocyanate, and all major organic and organo-metallic antifouling biocides, as well as zinc oxide and ferric oxide, two common constituents of antifouling paint.

ECONEA™ hydrolyzes in aqueous media. Hence, formulators should be sure to verify the in-can stability of ECONEA™ in water-based antifouling paints.

Shelf Life

When stored at an ambient temperature in the original sealed container, ECONEA™ has a shelf life of five years.

Application of ECONEA™

In light of its excellent thermal stability, ECONEA™ can be added during one of the early stages of the paint manufacturing process, together with the pigments and fillers. To date, there are no indications that ECONEA™ has an effect on the wet-state or dry-film properties of antifouling paints.

Analytical Methods

Detailed methods for analytical quantification of ECONEA™ active substance in antifouling paint and in seawater, down to ppb levels, are available upon request.

¹ Product specification parameters are subject to constant monitoring. Only the parameters that are included in the latest edition of the Product Specification Report for ECONEA™ are binding.

² Typical physical properties provide additional information on the product, but are not subject to constant monitoring and are, hence, not binding.

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Our Mission

Janssen PMP is committed to enhancing wellness and preventive health care through innovative and sustainable technologies, delivery systems, and products that protect people by inhibiting the propagation and transmission of pathogens, allergens, and contaminants in their surroundings.

Janssen PMP is the Preservation and Material Protection Division of Janssen Pharmaceutica NV, a member of the Johnson & Johnson Family of Companies.



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JANSSEN PMP

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