

Coatings for ice-trading vessels

Protecting vessels that trade in ice

Latitude brings leeway

Operating sea going vessels in ice has been a necessity for many countries who's territories lie North of Latitude 66° 33' 44" (the Arctic Circle).

Access to sea going ports in these areas is often only possible with the use of ice-breaking vessels that pave the way for transit of ice class vessels (with varying degrees of ice readiness depending on class).

To a lesser extent, operations in the Antarctic region have also been undertaken for many years, but these have been limited to international research rather than commercial trade.

A number of factors now make operations in the Arctic sea area necessary, but also economically attractive.

First there is the continued exploration and production of oil and gas in the Arctic. This requires structures and vessels to support operations.

The transportation of produced oil and gas means that there is increased demand for tankers and LNG carriers that meet class rules for operating in these harsh conditions.

Secondly, with the now accepted gradual reduction in ice at the Polar caps, there is more of an opportunity to exploit the shorter transit routes from Europe to the Asia via the Northern Sea route.

Vessels trading in cold climates face a number of challenges including dealing with cold temperatures, ice and operating in sensitive ecological environments and in extremely remote areas. The correct coating choice is critical for asset protection and safe operations.





130 years of ice experience

International® has supplied specialist marine coatings for vessels trading in ice conditions for over 130 years with an impressive track record of over 7,500 ice-class vessels coated.

This experience, has seen us working with significant operators and has put us in a strong position when it comes to discussing coating solutions for vessels trading in ice.

Intershield®163 Inerta 160 is by far the most widely known coating specifically designed to protect the hulls of ice trading vessels.

17 ice-class LNG's have been built to exceeding design standards, 65% of these vessels have been coated with Intershield®300 from Newbuilding.

Specialist corrosion protection

The vast majority of vessels trading globally (including those trading in ice conditions) are made from grades of mild steel, which for many decades has been the material of choice due to it being strong, relatively inexpensive and more durable than any other mainstream construction material.

However, one of the main drawbacks of steel is that it corrodes, and the marine environment is one of the most aggressive for the corrosion of steel.

Steel vessels are generally designed and built to last 25 years to 40 years meaning that the integrity of the hull and other critical areas such as ballast tanks needs to be maintained. In other words, the corrosion potential from operations in sea water has to be controlled.

Applications of anticorrosive coatings are still the most effective way of preventing the corrosion of steel in the marine environment.

The performance of an anticorrosive coating is governed by a number of factors:

- The quality of the coating formulation and the raw materials used
- The ability to perform in the marine environment which is often dominated by wet and dry cycling conditions
- Compatibility with any additional protection such as a cathodic protection system

But none of these matter if the coating has been damaged.

The ability of the coating to withstand mechanical events such as fender damage or anchor chain damage often determines the performance of an anticorrosive system used for normal ship operations, however trading in ice brings a different mechanical challenge.

A vessel trading in multi-year ice or first year ice is subjected to huge forces of impact and abrasion from the ice.

Vessel design often takes this into account and many classes call for strengthened hulls.

Specialist coatings designed for ice in these harsh conditions give the ship operator confidence and peace of mind that the considerable investment in the asset is being protected from corrosion; internally by quality water ballast tank coatings that perform in all temperature conditions and externally by coatings that remain intact even after repeated exposure to the mechanical challenge of ice.





Pristine image

The Arctic environment is a pristine ecological environment, one of the last to be relatively untouched by man, and vessel operators who choose to trade in these waters are under the scrutiny of environmentalists and NGOs.

Portraying a good image does not necessarily say 'protecting the environment', but a well maintained vessel, that is rust free and with coatings intact does give the image of a professional, responsible and safety conscious operator.

Good quality anticorrosives help preserve the condition of the hull but it is good quality cosmetic finishes that help to display the image of a responsible and professional owner operating high specification, well designed vessels.



It is a common misconception that the effect of the exposure to the sun's rays is worse in warm climates than it is in cold climates.

The degradation of a coated surface is accelerated by the effect of UV exposure coupled with moisture in the air.

Cold bright climates (often the case in arctic environments) are also extremely severe for coatings.

Cosmetic finishes are available in a variety of technologies. In the marine environment these range from simple alkyd technology, up to polyurethane and polysiloxane technologies.

For the ultimate in finish quality, the longevity of colour and gloss from high performance coatings is the best option for the image conscious operator.

Fouling control

Fouling control for vessels trading in ice is often overlooked due to a common misunderstanding that the fouling challenge in cold water or ice climates is very low and so there is no need for protection.

However, this is not strictly the case, the challenge is different, but it is still there. Even in arctic environments there is still a risk of fouling on poorly protected vessels which may impact on the fuel consumption of the vessel.

This in turn leads to more emissions in these pristine ecological environments, in addition to growing concern of translocation of invasive marine aquatic species.

Some ship operators use the following table as a guide for protecting their vessel from fouling.

	<i>Hull</i>	<i>Sea Chest</i>
Year round operation in ice covered polar waters	Abrasion resistant low friction ice coating No antifouling system	Abrasion resistant coating Compliant with the AFS Convention. Thickness of antifouling system to be decided by ship owner.
Intermittent operation in ice covered polar waters	Abrasion resistant low friction ice coating. In sides above bilge keel max thickness of antifouling system 75 µm [to protect hull between application of antifouling system and next anticipated voyage to ice-covered waters]. In bottom area thickness to be decided by ship owner. Composition of antifouling system should be decided	Compliant with the AFS Convention. Thickness of antifouling system to be decided by ship owner.
Category B & C vessels	Compliant with the AFS Convention. Thickness of antifouling system to be decided by ship owner.	Compliant with the AFS Convention. Thickness of antifouling system to be decided by ship owner.



Keeping you ahead of legal requirements

For vessels trading year round in ice-covered polar waters, the only requirement as recommended by the International Maritime Organisation (IMO) is to protect niche areas of the hull with a compliant AFS Convention coating.

The main sections of the underwater hull only need protection from the ice using an abrasion resistant low friction ice coating.

For vessels with intermittent operations in ice covered polar waters the recommendation is that for vertical sides above the bilge keel an antifouling coating of 75microns is needed to protect hull when the vessel is trading in non-ice covered waters.

For the flat bottom areas, turn of the bilge and niche areas, an antifouling system compliant to AFS Conventions is needed.

For other categories of vessel designed for either operation in polar waters at least in medium or thin first year ice, then the fouling control system can be specified as a 'normal' conventional global trading vessel.

International Paint can offer the full range of fouling control products including foul release coatings and biocidal antifoulings, all compliant with the IMO AFS convention.



International Paint Ltd is part of AkzoNobel, the Netherlands based company serving customers throughout the world with coatings and chemicals.

International Paint Ltd,
Stoneygate Lane, Felling
Gateshead, NE10 0JY
United Kingdom

ISO Logo
to be supplied

Call: +44 (0)191 469 6111

Fax: +44 (0)191 495 2003

Send an email:

marine.communications@akzonobel.com

Visit our website:

www.international-marine.com

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