

# PPG SIGMASHIELD™ 1200

Solvent-free phenolic epoxy for ultimate protection in extreme conditions

We offer proven, long-lasting coatings for ice-going vessels that improve performance, reduce costs and lower VOC emissions.



# Solvent-free phenolic epoxy for ultimate protection in extreme conditions

Of all ship types, ice-going and ice-breaking vessels are subject to the most aggressive impact and abrasion damage to the outer shell. Consequently, the correct coating choice is vital to minimize damage, maintain vessel safety and reduce subsequent repair costs.



### Specially designed to provide ultimate resistance

We have produced a range of successful coatings for this harsh environment for many years. Based on our unrivaled experience, we have invested extensive resources to develop a technology that will provide you with the most effective protection for your vessels.

The result is our PPG SIGMASHIELD 1200 coating, the latest development in reinforced, abrasion and impact resistant coatings designed specifically for ice-going service. This newest generation of the highly successful solvent-free epoxy phenolic technology with proven anticorrosive properties and very high polymer cross-link density to improve abrasion resistance.

### Advanced technology outperforms all other systems

The PPG SIGMASHIELD 1200 system delivers enhanced mechanical, impact and abrasion resistance, which outperforms market standard products in both key laboratory tests and in service.

To ensure our solution meets all the challenges your vessels will face, we focused on four key areas in the development and testing of this advanced system:

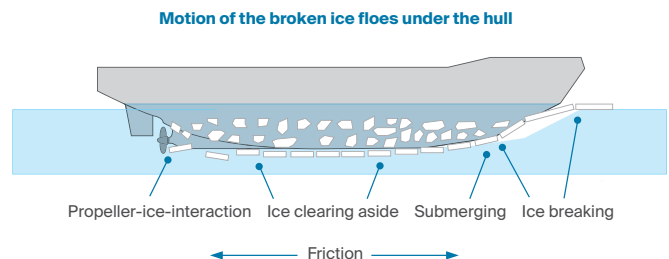
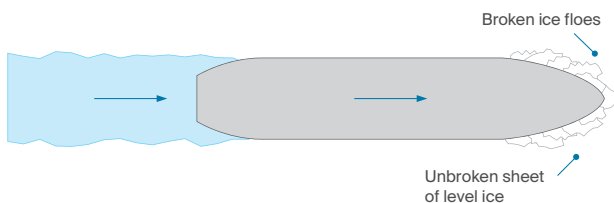
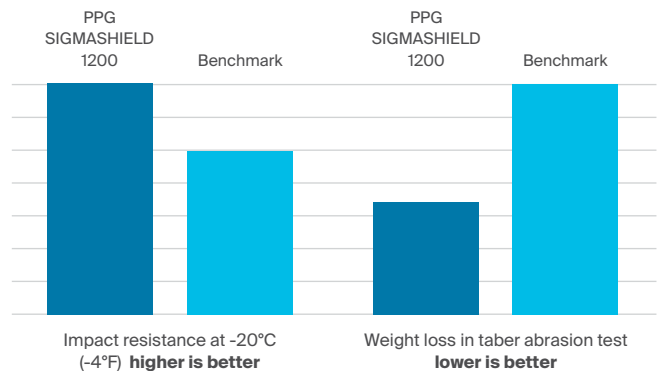
- Impact and abrasion resistance
- Anticorrosive protection
- Ease of application
- Low friction

### Superior impact and abrasion resistance

You need to be certain that any coating you choose will perform to the highest standards. The evidence of our PPG SIGMASHIELD 1200 coating is that it is as good – if not better – than existing systems. It is unquestionably superior in terms of gouge resistance ('gouging' being a potential cause of serious damage where intense pressure points are exerted on a ship's hull as it moves through ice).

### Independent testing and approval

The PPG SIGMASHIELD 1200 product's excellent performance has been confirmed by Aker Arctic Technology, a major independent testing institution, which specializes in low temperature testing at the limits of ice-going conditions. The coating has also passed independent extreme low temperature ice testing developed and conducted by a leading shipyard.



# Exceptional anticorrosive protection

## Exceptional anticorrosive protection

Under extreme conditions, no coating can provide 100% protection. A degree of damage is inevitable; therefore, the focus must be to minimize this damage and, should the substrate be exposed, reduce any subsequent coating damage.

In contrast to other competitive systems benchmarked, the PPG SIGMASHIELD 1200 system exhibits excellent performance in combination with cathodic protection, significantly reducing the creep corrosion process from the damaged area.

Corrosion test with Cathodic protection		PPG SIGMASHIELD 1200	Benchmark
1-Day Cure	Blisters along scribe	None	Blisters
	Corrosion resistance	Excellent	Fair
2-Day Cure	Blisters along scribe	None	Blisters
	Corrosion resistance	Excellent	Fair

\*after 6 months' exposure in seawater with impressed current CP (-1050 mv)



Vessel after 2.5 Years' service in ice



Hull after 3 years' service in ice





### Ease of application ensures greater productivity

When developing our systems, we also focus on making the application as simple as possible to reduce your maintenance schedule and costs.

Under normal conditions, the PPG SIGMASHIELD 1200 coating can be applied by cold, single-feed airless spray equipment, as opposed to the hot, twin-feed system specified and used by the benchmark technology. Available in standard and low temperature grades to broaden the application window, the coating is suitable both for new-building block stage and dry dock application.

### Lower VOC contributes to a greener environment

As the PPG SIGMASHIELD 1200 coating is 100% solids and solvent free, it lowers overall VOC emissions as well as reducing the risk of fire and explosion. The system also conforms to the latest international environmental and safety standards.

Corrosion test with cathodic protection	PPG SIGMASHIELD 1200	PPG SIGMASHIELD 1200 LT	Benchmark
Application equipment	Single-feed airless spray (min 60:1)		Hot, twin-feed airless spray (insulated lines)
Min. material temp for application.	15°C (59°F)		45 – 50°C (113 – 122°F)
Volume solids	100%	100%	95%
Pot life (20°C/68°F)	1 hr	30 min	5 min
Dry to handle	16 hrs	12 hrs	48 hrs

### Low friction reduces fuel consumption and costs

We understand the pressure that you face to manage operating costs wherever possible. That is why the efficient application of our coating was an integral part of its development.

The result is that our PPG SIGMASHIELD 1200 coating is so smooth that it has a lower frictional coefficient than the market standard. This means that your vessel will move through ice with less frictional resistance, reducing its fuel and engine load, and consequently saving costs.

Type of ice	Friction coefficient
Salt Water ice	0.007
Fresh Water ice	0.009
FGX ice	0.019

\*Results of friction measurements for the PPG SIGMASHIELD 1200 coating

## Independent testing confirms proven cost savings

To help you make your decision about the best system for your vessel, the proof of any coating system for such harsh operating conditions is how it performs when tested by authoritative, independent testing organizations.

Our PPG SIGMASHIELD 1200 system has been recognized and approved as an abrasion-resistant, low-friction ice coating by the international classification authorities on the basis of independent examination and testing.



## PPG SIGMASHIELD 1200 – the ultimate coating for ice-going vessels

Our PPG SIGMASHIELD 1200 system has an unrivaled range of proven benefits for your ice-going vessels.

Its advanced technology delivers enhanced mechanical, impact and abrasion resistance, which outperforms market standard products. Vessels operate with less frictional resistance, reducing fuel and engine load, which will reduce your costs. The system is also easy to apply by cold, single-feed airless spray equipment to lower your maintenance schedule and costs.

- Outstanding impact and abrasion resistance
- Excellent cathodic protection and creep resistance
- Standard and low temperature versions
- Single-coat application by single or twin feed equipment
- 100% solids and solvent free that lowers overall VOC
- Recognized by Lloyd's Register as an abrasion resistant ice coating
- Recognized by Aker Arctic Technology as a low-friction surface coating for ice-breaking ships





“ The kinetic friction of PPG SIGMASHIELD 1200 paint against ice is lower compared with the standard in this market segment.”

**Aker Arctic Technology**

“ These values demonstrate the very low friction coefficient for PPG SIGMASHIELD 1200 in ice resulting in higher speed or lower fuel consumption compared to other hull coating systems.”

**Aker Arctic Technology**





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