inhibispheres®

FUTURE PROOF YOUR COATINGS

inhibispheres®

ABOUT US

Ceramisphere Pty Ltd is a privately owned microencapsulation company based in Sydney, Australia. We have been operating since 2007 using a technology developed at the Australian Nuclear Science and Technology Organisation.

Our technology is covered by a strong portfolio of patents and has been developed across a range of fields including both healthcare and industrial applications. Ceramisphere is collaborating with market-leading companies, from paint and coating manufacturers to end users like Airbus Group, to develop products, which incorporate its technology.

Inhibispheres®

Inhibispheres® are submicron ceramic particles which can provide specific functionalities to classic coating formulations. Active materials, such as corrosion inhibitors, can be incorporated inside the 'Smart Particles', which can then simply be mixed into a paint or coating formulation. The particles are mechanically resistant, can survive paint formulation processes (e.g. mixing, grinding, extrusion) and will not adversely affect the mechanical properties of the coating.

Manufacturing

Ceramisphere has established a manufacturing facility in Mt Kuring Gai, 30km north of Sydney. This plant is fully automated with state of the art equipment. Products are supplied spray dried in 20 kg bags.

Contact Details

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HELPING YOU

We Provide an Environmentally Friendly Solution:

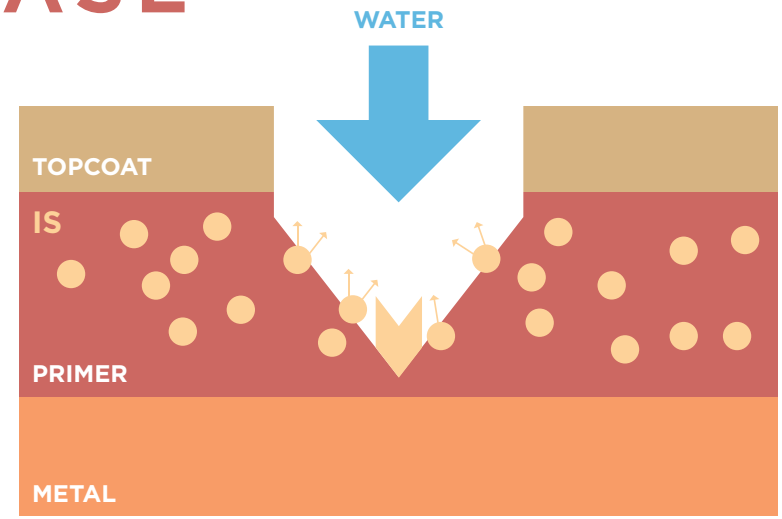
- Replacement of toxic chemicals (e.g. chromates) by more environmentally friendly alternatives.
- Sustained release means 10-30 times less active required than classical pigments for the same performance.
- Possibility to design metal free systems (purely organic inhibitors).

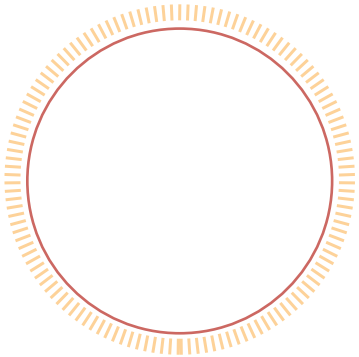
Easy to Use:

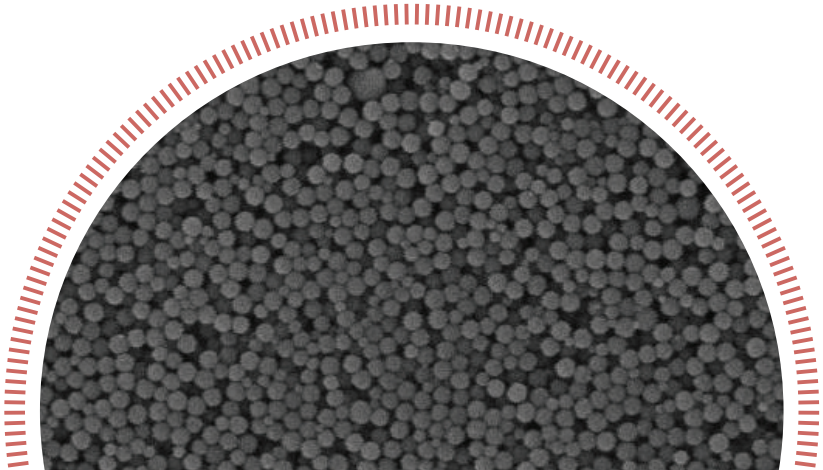
- The ceramic matrix of inhibispheres® is highly compatible with most paints.
- Inhibispheres® survive classical paint formulation processes including grinding, milling, and extrusion. They can be introduced at any time in the formulation.
- The particles have no impact on optical or mechanical performance.
- It is possible to tailor the release profile and particle size to suit your application by adding several inhibispheres® to your paint or combining them with classical pigments.

CONTROLLED RELEASE

- Inhibispheres® are porous silica particles containing encapsulated corrosion inhibitors. Their payload is released by diffusion through the porous silica matrix.
- The spheres can be easily introduced in the paint or coating formulation and are designed to avoid leaching in the pot.
- The inhibispheres® which are homogeneously dispersed inside the coating become activated, either during the rupture of the coating (e.g. cut), or by the presence of water in the paint film during immersion or condensation.
- The released inhibitors then diffuse rapidly to the corrosion site.



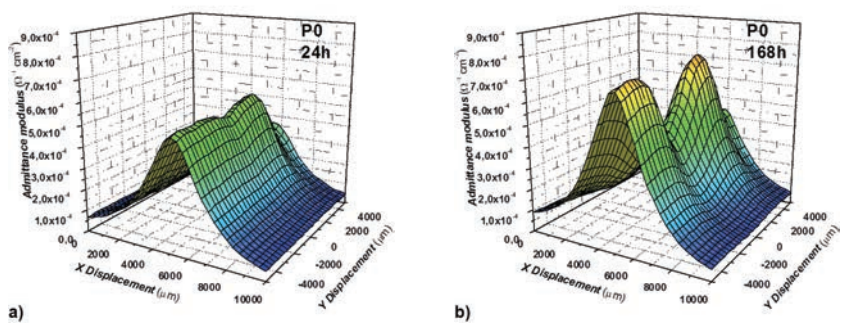




AND SELF-HEALING

- The sustained release of inhibitors from inhibispheres® dispersed throughout the paint film promote self-healing (i.e. corrosion protection in the scribe).
- Local impedance spectroscopy shows that the progression of corrosion in the scribe is dramatically slowed down as the inhibispheres® gradually release their payload.

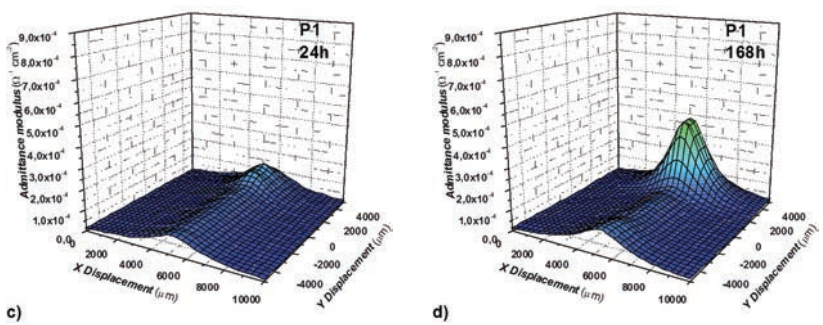
SYSTEM WITHOUT SPHERES



The scratch is clearly visible since the beginning of immersion. The admittance values increase after 168h and corrosion products are visible in the scratch.

(From C. da Silva, C. Barbé, E Campazzi, P-J. Lathière, N Pébère, E. Rumeau, L. Tran, M. Villatte in the Proceeding of the 10th symposium on Electrochemical Methods in Corrosion Research held in Maragogi Brazil 2012)

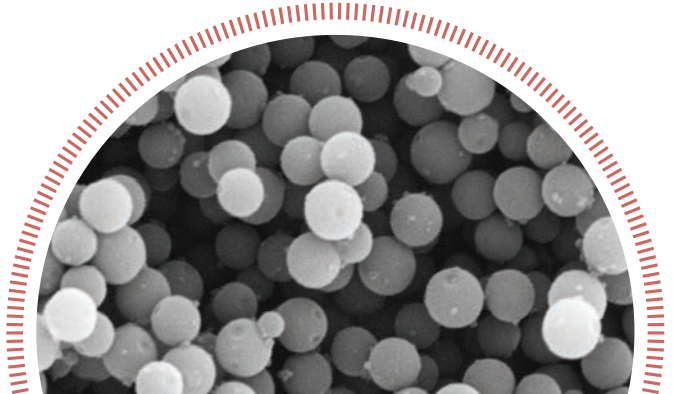
SYSTEM WITH INHIBISPHERES®



The scratch is hardly seen. The admittance values are much smaller than the ones observed in the coating without spheres. No corrosion products are observed in the scratch. This confirms that the encapsulated inhibitors are gradually released into the scratch to limit the corrosion process.

THE INHIBISPHERES® RANGE

Release rate	Aluminium Protection	Steel Protection	Matrix	Size
FAST	inhibispheres®-B	inhibispheres®-ZS	Silica	<20 µm
MEDIUM	ceramisphere®-H	inhibispheres®-ZB	Hybrid Silica	-0.5 µm
SLOW	inhibispheres®-M	inhibispheres®-A & M		



THE INHIBISPHERES® RANGE

	SOLVENT BASED PAINT		WATER BORNE PAINT		SOLVENT-LESS PAINT	
	Epoxy	P.U.	WR Epoxy	WB Epoxy	Epoxy	Powder Coating
IS A	✓	✓	✓	✓	✓	✓
IS B	✓	✓	✓	✓	✓	✓
CS H	✗	✗	✓	✓	✓	✓
IS M	✓	✓	✓	✓	✓	✓
IS ZB	✓	✓	✓	✓	✓	✓
IS ZS	✓	✓	✗	✗	✓	✓

✓ Compatible ✓ Contact Ceramisphere for more information ✗ Not Compatible

GREEN

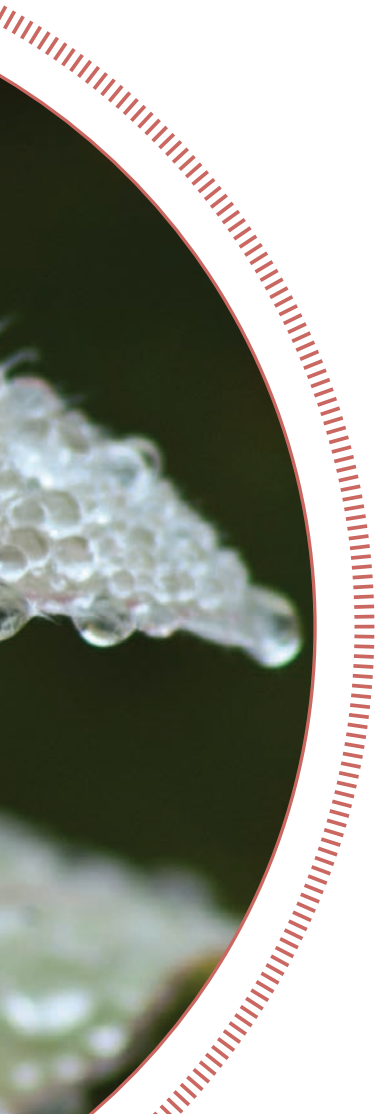
Minimize Safety Labels

- The inhibispheres® silica matrix is biocompatible, non-toxic and environmentally friendly.
- Due to their sustained released capability, the inhibispheres® use significantly less active (10-30 times less) than traditional anti-corrosion pigments for similar performance.
- In contrast to more traditional anti-corrosion pigments ($ZnPO_4$, zinc dust or Cr^{VI} based compounds), the incorporation of inhibispheres® inside a paint will not attract additional safety labels on the final product.

Metal Free Formulations

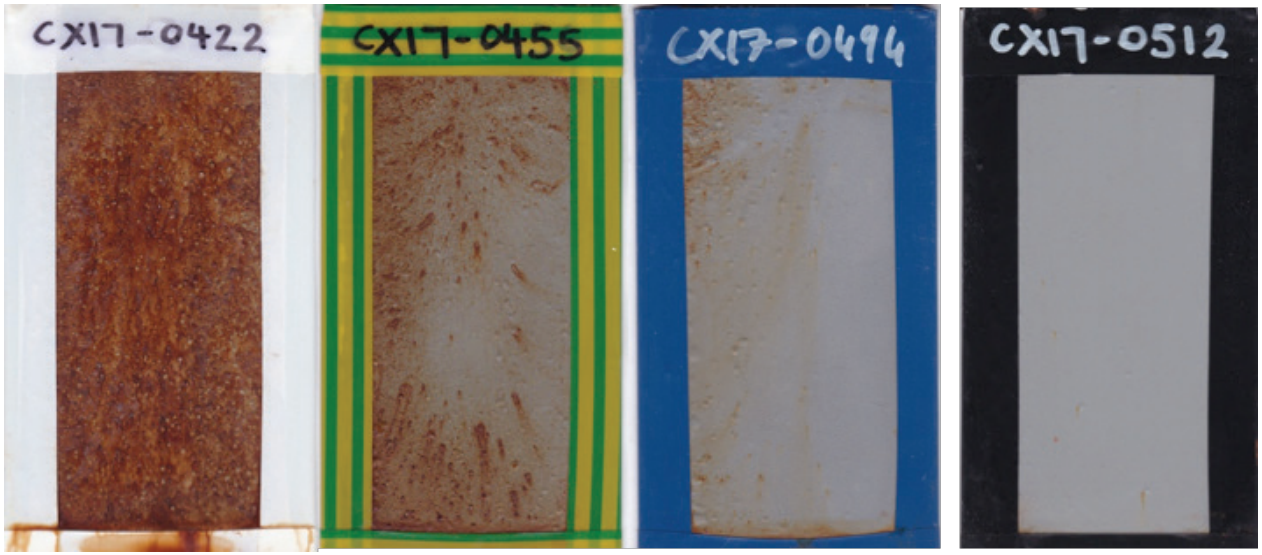
- 4 of the 6 inhibispheres® products are metal free (inhibispheres® A, B, H, and M). They contain powerful 100% organic inhibitors which makes them environmentally friendly in contrast to classical inhibitors like zinc phosphate or zinc dust.
- You can future proof your coating by getting ahead of any future legislation to remove metals.

ADDITIVES



Inhibispheres® can be added to standard anticorrosion primers, containing traditional inhibitors, to extend the corrosion protection over time.

500 HOURS IN B117 SALT SPRAY TEST



0% Inhibispheres® in $ZnPO_4$ primer

2% Inhibispheres® in $ZnPO_4$ primer

5% Inhibispheres® in $ZnPO_4$ primer

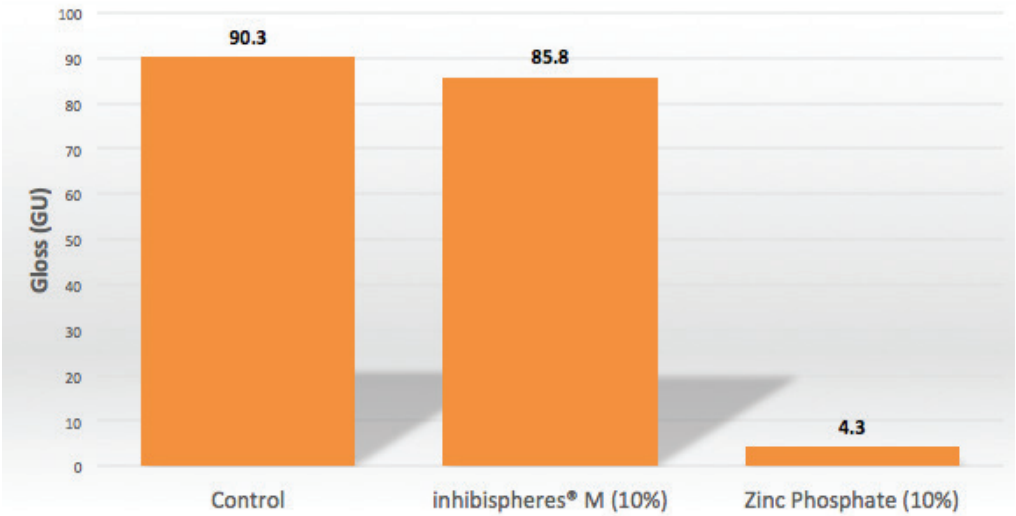
10% Inhibispheres® in $ZnPO_4$ primer

- Inhibispheres® help to fight corrosion creepage and field blisters in coatings.
- They can significantly improve the performance of primer coatings when added in with $ZnPO_4$

PERFORMANCE

No Impact on Mechanical and Optical Properties

- No impact on the mechanical properties of the final coating.
- No impact on dry film adhesion or after immersion in various fluids (water, saline, hydraulic fluid).
- No impact on the chemical resistance of the coatings
- Compared to classical anti-corrosion pigments, there is little to no impact on the optical properties such as gloss.
- **This means that you can introduce anti-corrosive functionalities into glossy coating and thus provide corrosion protection with one single coat without loss of performance.**



Gloss measured at 60 degree angle

SIMPLIFICATION

SANDBLASTED STEEL PANELS AFTER 500 H IN NSST

Commercial Primer (containing 10% $ZnPO_4$) + Top coat

Top Coat only
(containing 10% ISZB)

Direct-to-Metal Coatings

- Adding inhibispheres® inside a glossy coating will introduce corrosion protection functionality without changing the optical properties.
- This allows for the potential replacement of a primer and topcoat system by a single coating (direct-to-metal) without compromising the corrosion protection.
- **This represents a significant cost saving for the end user and the potential to design a premium product for the paint manufacturer.**

COMPATIBILISATION

- Novel inhibitors can be easily encapsulated inside our silica matrices to make them compatible with your paint.
- The inhibispheres® formulation can be adapted to suit your solvent pack. Leaching in the pot can be minimised.
- The inhibispheres® can be produced in different sizes to suit various paint coating thicknesses.

SUSTAINED PERFORMANCE

Rapid Release inhibispheres®

- Rapid release inhibispheres® provide very efficient protection of the scribe in aluminium.

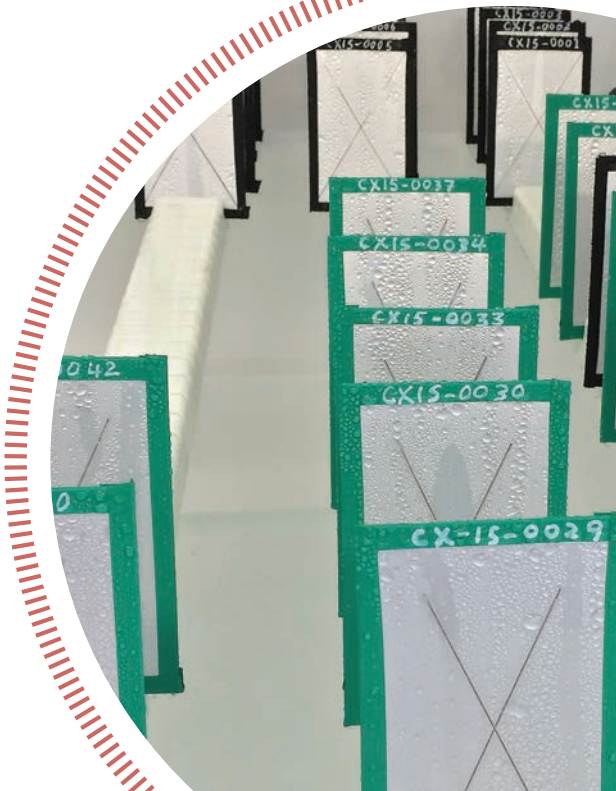
The water soluble inhibitor is released rapidly, protecting the scribe instantaneously and producing a ‘shiny scribe’ effect similar to chromates (up to 1000 h).

CONTROL

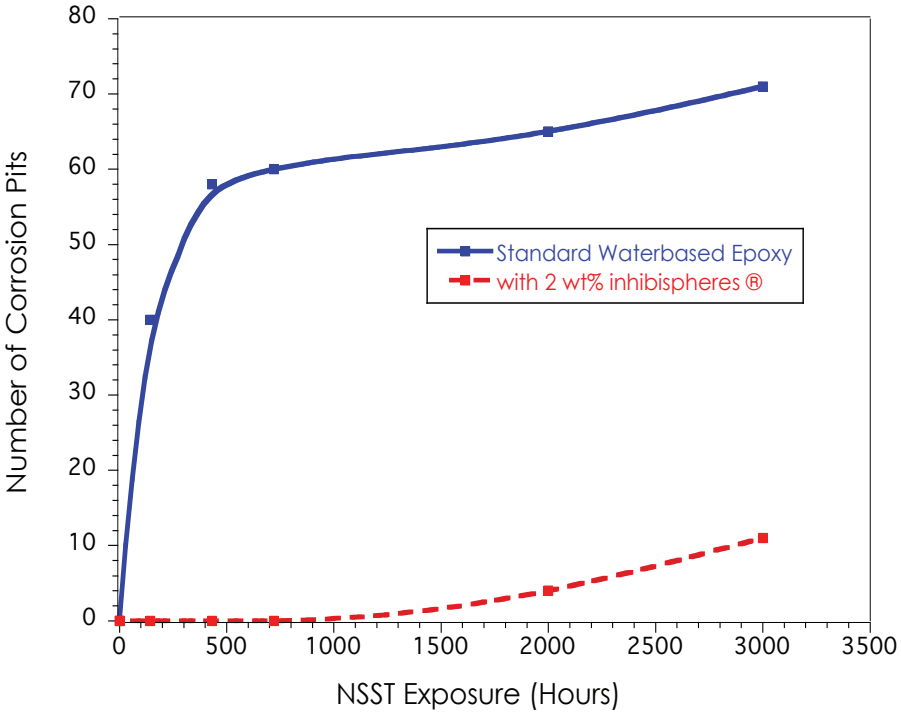
WITH 10 WT % STATE OF THE ART CHROME FREE PIGMENTS

WITH 10 WT % INHIBISPHERES® B

NB: Droplets on films are caused by water condensation not blistering.

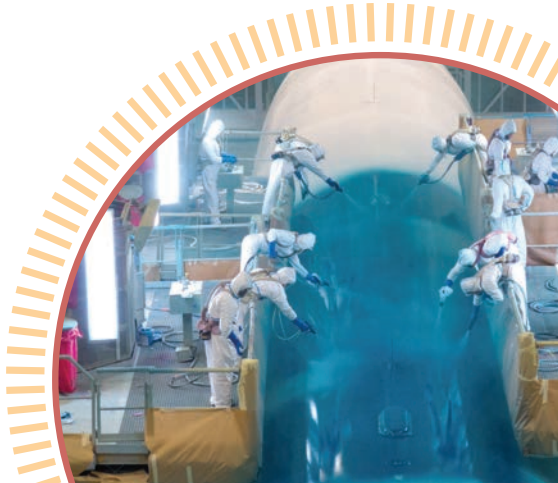


SUSTAINED PERFORMANCE



Medium Release

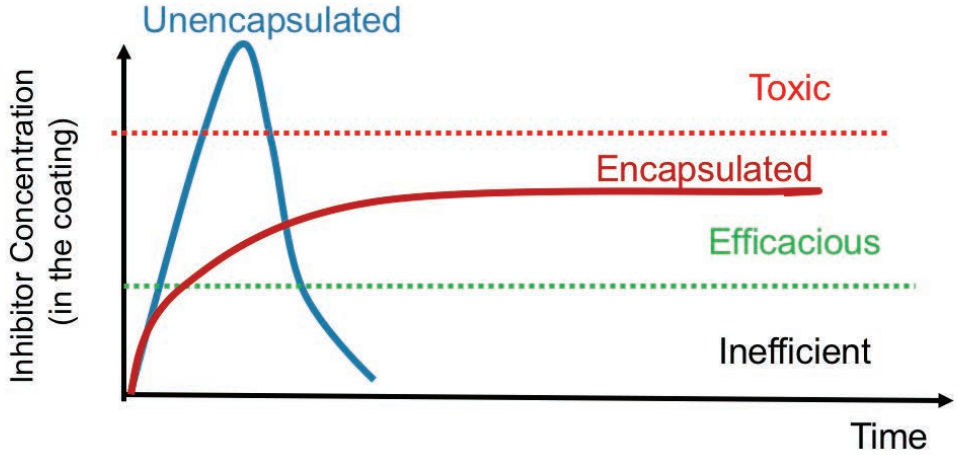
- The sustained release offered by the inhibispheres® extends the availability of inhibitors over time and thus delays the onset of corrosion. For example, pit corrosion on aluminium can be delayed by 1000h by the addition of only 2 wt% of inhibispheres®.



SUSTAINED PERFORMANCE

Slow Release

- Inhibispheres® can be used to prolong the corrosion protection of coatings already containing standard corrosion inhibitors or by replacing them altogether.
- Similar performance to traditional corrosion inhibitors can be achieved using less inhibispheres® material and significantly less active inhibitor.
- Inhibispheres® with a slow release profile can give superior corrosion protection to a coating.



INHIBISPHERES®:
A NEW WAY TO LOOK AT CORROSION PROTECTION

Green:

Inhibispheres® use significantly less active (10-30 times less) for similar performance. No additional safety labels on the final product.
Potential metal-free formulations.

Improved performance :

Inhibispheres® can be added to existing anti-corrosion paint formulations to extend the duration of the corrosion protection without significant reformulation.

Easy to use :

Very easy to incorporate at any stage during the paint manufacturing process.

Simplification of the paint system:

By adding some anti-corrosive functionalities to the top coat. Efficient direct-to-metal coatings.

Compatibilisation:

Encapsulation inside the inhibispheres® enables the use of inhibitors which react with or destabilize the paint chemistry.

Contact Us

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