

MEMO

To Bronwynne Ferreira, Albert Scholtz, Les Bryson, Lee Rushby
From Karen Voogt, Owen Feldtman
Date 5 February 2014
Subject Oxifree Metal Protection Evaluation

Dear Bronwynne


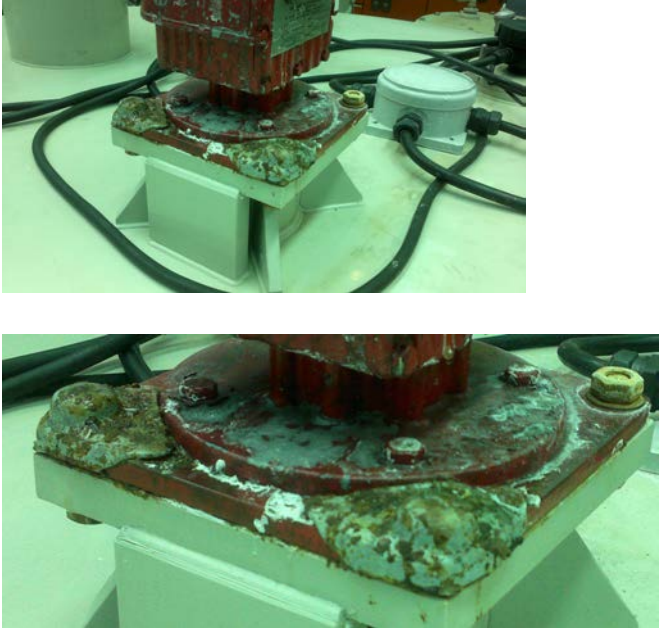

Oxifree coatings are designed to protect metal components. Advantages of these coatings are that they are reportedly reusable, contain active corrosion inhibitors, require minimal surface preparation, are fast to apply, easy to remove, can be applied in hazardous environments and are ecologically safe and non-hazardous. To test these claims Oxifree metal protection coating was applied on the following items in the Hydrometallurgy pilot plant building on 18 February 2013 before an operation using sulphuric acid started:

- Advance electrolyte tank agitator motor bolts
- Electrolyte pump flange bolts
- Effluent tank agitator motor bolts
- Several loose nuts and bolts
- Several coupons of metals (stainless steel, aluminium and mild steel) mounted on the railings of the walkway next to the make-up tank

The coatings were removed on 17 December after ten months of continuous operation. This memorandum serves as feedback on the performance of the Oxifree coating with a visual comparative evaluation in Table 1 below.

Oxifree Metal Protection Evaluation

Table 1: Visual comparative evaluation of Oxifree coating performance.

Before	Coated (17 December 2013)	After removal of the Oxifree coating
<p>Make-up tank</p> 	 <p>Oxifree coating after exposure to operating environment for 10 months.</p>	 <p>Oxifree coating peeled off from the nut on the left side of the agitator. Compare to the corroded nut at the back, right. Nuts made of stainless steel.</p>

Spent electrolyte tank



Oxifree coating after exposure to operating environment for 10 months.



Oxifree coating peeled off from the nut on the right front of the agitator. Compare to the corroded nut at the back, right. Nuts made of stainless steel.



Oxifree coating peeled off from the nuts on the front of the agitator. Stainless steel nuts still shiny compared to corroded nut at the back of the agitator.

Effluent tank

No photographs available before Oxifree coating was applied.



Oxifree coating after exposure to operating environment for 10 months. This tank and agitator is more exposed to the outside environment and is also exposed to lime and neutralisation products.

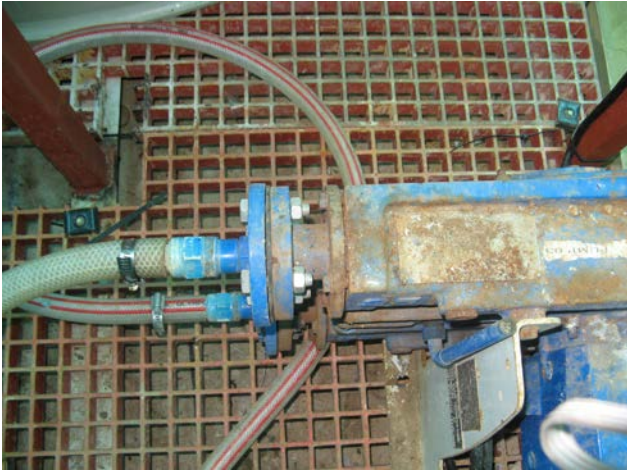


Oxifree coating peeled off from the nuts on the left of the agitator. Stainless steel nuts still shiny compared to corroded nut on the right of the agitator.



Oxifree Metal Protection Evaluation

Transfer pump



This pump was removed from operation during the project. No photographs available.

This pump was removed from operation during the project. No photographs available.

Metal coupons

No photographs available before Oxifree coating was applied.



From left to right: stainless steel, aluminium and mild steel with the Oxifree coating in place.



From left to right: stainless steel, aluminium and mild steel with the Oxifree coating removed.

Oxifree Metal Protection Evaluation

Some general comments on the product are that it was easy to apply and remove from the surfaces coated. The coated surfaces suffered no corrosion damage that was visible to the eye. The product has a melting point of 120°C (see datasheet attached) making it unsuitable for high-temperature applications. There is potential cost-saving benefit in using Oxifree as a corrosion coating to protect metal surfaces from damage caused by corrosion.

Yours sincerely

Karen Voogt

Senior Metallurgist

T: +27 (0)11 377 4748

E: karen.voogt@angloamerican.com

www.angloamerican.com

Oxifree TM198 Material Datasheet



Introduction:

Oxifree TM198 material was developed for use to combat the worldwide corrosion issues that are faced by all industries and infrastructures.

Specifically Oxifree TM198 offers a solution to protect complex metallic structures for short or extended periods of time.

Description:

Oxifree TM198 is an organic polymeric resin coating applied in a fluid state. It can easily be removed when required and is 100% reusable. It contains anti-corrosion substances that inhibit corrosion and penetrate threaded fastenings to stop seizures.

Recommended Use:

- Anti-corrosion protective coating applied to bolted flanges, valves bearing housings, critical pipeline connections, short and long term storage of strategic machine parts and metal surfaces regardless of size or shape that are exposed to aggressive/corrosive working and storage environments.
- Metal interfaces composed of different materials and metal surfaces affected by corrosion caused by exposure to chemical and maritime environments.
- Protection of mobile machinery and components, in short or long term storage.
- The flexible polymeric resin coating allows for easy removal for inspection and re-application during scheduled maintenance.

HMIS/NFPA Hazard ID System:

Health: 1
Flammability: 1
Reactivity: 0
Personal Protection: B

Hazardous Ingredients/Identity:

Proprietary ingredients
Chemical Family: Cellulose
Contains no known hazardous components as defined in Standard 29 CFR 1910.1200

Approval References:

- Salt Spray – saline mist test – ASTM B-117 – 11,688 hours. No failure.
- Weathering/UV test – ASTM G154 – 400 hours. Unchanged integrity.
- No Volatile Organic Compounds (VOCs).

Appearance:

Standard grey, semi-gloss surface or others on request.

Melting Point:

120°C / 248°F

Recommended application temperature:

165 to 175°C / 329 to 347°F (operating temperature should not exceed this)

Flashpoint:

Greater than 220°C/428°F

Chemical definition:

100% solids

Resistance:

Will resist a wide range of physical metal reactions inclusive of chemical splashing and sea water/spray

Application:

By a choice of 3 portable Polymelt units to heat and apply the Oxifree TM198

1. Polymelt 12 (12lb / 5.5KG capacity) machine which is lightweight and offers ease of transportation for smaller applications
2. Polymelt 50 and Polymelt 50 ATEX2-22 (50lb / 22KG capacity) machines for greater levels of sustained working application and for use in hazardous environments

Surface preparation:

- A general commercial clean to remove loose and flaking fragments of existing coatings and rust.
- Follow with a solvent wash with water to remove any oily surface contaminants.
- Dry the surface before applying the Oxifree material

Recommended thickness:

- 4.0mm for protection on the spot/site
- 2.0mm for protection of parts in stock

Time to dry:

Varies depending on ambient conditions and surface temperature, but no more than:

- Touch dry: 3-5 minutes
- Overlay: 5-10 minutes
- General handling: 15 minutes (to avoid skin burns)

Applying in adverse conditions:

- Exposure to extreme temperatures and UV may induce the appearance of rust inhibiting agents on the surface of the coating resulting in a slight change of appearance; however this does not affect the preventive corrosion characteristics.
- Applications in temperatures below -15°C / 5 °F that are free of ice and moisture will require a continuous application process.
- Maximum temperature of the surface for application: 90°C / 194°F
Environments with temperatures around or below -25°C/-13°F may need special Oxifree additives.

Fire and Explosion Hazard Information:

- Extinguishing Media- Water vapour, Dry chemical, Foam and CO2
- Treat as oil fire
- Vapours possibly flammable beyond 220°C/428°F flash point

Storage and Handling:

- Store in cool dry environment (below 27°C/80°F)
- Waste Disposal as per local legislation same as wax or vegetable oil

Safe Handling:

- Wear protective gloves while handling hot material
- Wear eye protection while handling hot material

For more information please contact



Oxifree Global LLC

Tel: (+1) 281 251 7171 | Email: info@oxifree.com | Web: www.oxifree.com