



REPORT

EPO-CHEM™ RL 500PF

INNOVATIVE WET AND RUST TOLERANT

PRIMER/FINISH SYSTEM

(IN ONE COAT)

November 2015

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INTRODUCTION

Chemco Epo-chem™ RL 500PF is a **wet & rust tolerant**, two pack, high solids MIO - Zinc epoxy that can be utilized either as a one coat primer/finish with good UV resistance or as a high performance coating which can be over-coated with colour topcoats. Furthermore, tests have shown that it is compatible with many aged paint systems, including epoxies, acrylics and other single pack materials. However, it is always advisable when over-coating existing paints to undertake small trial areas before progressing to full scale application.



Epo-chem™ RL 500PF on a sweating, rusty surface

MATERIAL CHARACTERISTICS

Epo-chem™ RL 500PF exhibits the following properties:

- High solids, two pack epoxy, single coat primer/finish
- **Wet, rust and oil tolerant**
- Applicable to hand prepared, blasted or water blasted steel
- Apply and operate at temperatures up to 150°C
- Extensively used for thermally insulated pipes and tanks; exceptional resistance to CUI
- Manufactured to meet the maintenance needs of:
 - Electricity transmission operators for pylons
 - Rail track maintenance for bridges, gantries, etc. where possession times are minimal
 - Chemical industry, structural coating with very good chemical resistance
 - Petrochemical and Offshore. Especially suited to floating tank roofs and tank externals and structural coatings offshore (not weather dependant)
 - Water and sewerage, pipe and tank externals
- Application by brush/roller or airless spray
- Good edge coverage. Reduces need for stripe coating
- Available in a limited range of colours

CUSTOMER LIST (SPECIFIED)

Epo-Chem™ RL 500PF is specified and used by:

BP	ConocoPhillips	Corus	Manweb	Marathon
MoD	RailTrack	ScottishPower	Shell	Southern Energy
Talisman	Texaco	TOTAL	Chevron	Transco
Manweb	Innovene	Kerr McGee	LOR	Exxon Mobil
HMNB - Faslane (Ministry of Defence Approval)			Oil & Gas Corporation (India)	

CASE STUDIES

CASE STUDY 1: Floating Tank Roof – BP Kinneil

Case Study



Client: BP Kinneil, Finnart and Dalmeny	Industry: Petrochemical
Scope: Floating Tank Roof	Date: 2003 - ongoing
Location: UK	Product: Epo-chem™ RL 500PF

Overview

A number of floating tank roofs at BP Kinneil, Finnart and Dalmeny have been refurbished since 2003 utilising Chemco's unique coating solution. This case study will focus on a 4,000m² floating tank roof at BP Kinneil which required a complete refurbishment. This project was carried out by Hertel.

Challenge

The wintry condition of low temperatures, high humidity and showers made these projects a difficult job for the originally specified 3-coat epoxy paint system. A work package of 24 days had been allowed to complete the project.

Solution

Following many other successful applications by the site contractor, Epo-chem™ RL 500PF was put forward as an alternative and accepted by the BP project team. The tank roof was high pressure washed to remove salt deposits and other contaminants, and the areas of heavy corrosion were spot blasted or mechanically prepared down to metal. Spot blasted areas were coated with 1 coat of Epo-chem™ RL 500PF @ 150µ DFT. Standing water was removed by brush or squeegee and 2 full coats of Epo-chem™ RL 500PF @ 150µ was applied overall by brush roller or spray.

Outcome

During the contract, the freshly coated areas experienced many occasions of heavy rain and many puddles of cold water forming within hours of application. The Epo-chem™ RL 500PF was left untouched to cure underwater without the necessity of ANY remedial work and Chemco guarantee of 16 years was issued, despite the curing condition. This is unique and unheard of in the history of tank roof applications.

(continued overleaf)



Photographs:

- No. 1 BP Kinneil tank top
- No. 2 Typical level of corrosion on floating roof

CASE STUDY 1: Floating Tank Roof – BP Kinneil (cont.)

Outcome (cont.)

The planned 24 day program was completed in 12 days, offering a huge cost savings as compared to the usual delays due to bad weather.

Since the successful completion of this contract, the material has been specified for a number of other tank roofs, tank externals and pipe work in Grangemouth, Dalmeny, Finnart and Kinneil, all with complete success.

Benefits

- Flexibility of surface preparation (any method can be utilised)
- Exceptional **wet & rust tolerant** properties
- Can be applied in any environmental conditions
- Significantly reduced downtime (work programme completed in half the given time frame)
- **Chemco** uniquely guarantee their work.



Photographs:

- No. 3 Completed Application: Two coats of Epo-chem™ RL 500PF
- No. 4 Overview of non-slip walkway.

Solvent-free • Water-based • Wet-tolerant
 • Rust-tolerant • Zero VOC
 • Tank & Pipe Linings • Under-water & Marine • Glassflake
 • Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip
 Flooring
 • Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete
 Primers
 • Concrete Repair Systems • Estomeric System
 • High Temperature Systems • Fire Retardant • Insulation Systems

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 Web Site: www.chemcoinc.com



CASE STUDY 2: Electricity Pylon Refurbishment – Scottish Power

Case Study



Client: <i>Scottish Power</i>	Industry: <i>Power Generation</i>
Scope: <i>Electricity Pylons</i>	Date: <i>March 2003</i>
Location: <i>Scotland, UK</i>	Product: <i>Epo-chem™ RL 500PF</i>

Overview

Scottish Power sought to replace the current two-coat alkyd system with a material that met the following criteria:

- Single coat application
- Applicable over new or rusty galvanised steel
- Minimal surface preparation
- Surface and moisture tolerant
- Easy to apply by brush
- 10 years maintenance free guarantee

Challenge

The project would be completed in open air and potentially in very poor weather conditions. Grit blasting was not permissible.

Solution

Wire brushing was selected as the surface preparation method to be utilised. This was followed by one coat of wet & rust tolerant Epo-chem™ RL 500PF.

Outcome

The project was completed on time, within budget and to the complete satisfaction of all concerned.

Benefits

- Wet & rust tolerant properties of Epo-chem™ RL 500PF
- No grit blasting
- No delays due to extreme weathering
- Reduced H&S and Fire Precautions
- Reduced contract duration

1



2




Photographs

- Nos. 1-2 Before application


Rev: March 2015

CASE STUDY 2: Electricity Pylon Refurbishment – Scottish Power


3



4



5



Photographs

- Nos. 3-5 Before application

- Solvent-free • Water-based • Wet-tolerant
- Rust-tolerant • Zero VOC
- Tank & Pipe Linings • Under-water & Marine • Glassflake
- Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip Flooring
- Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete Primers
- Concrete Repair Systems • Blastomeric System
- High Temperature Systems • Fire Retardant • Insulation Systems

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CASE STUDY 3: Ducting - Longannet Power Station



Client: Longannet Power Station	Industry: Power Generation
Scope: High Temperature Ducting	Date: November 2003
Location: Scotland, UK	Product: Epo-chem™ RL 500PF

Overview

High temperature ducting located at the Longannet Power Station required a new protective coating system capable of being applied and operate at high temperatures.

Challenge

The ducting would be operating at 150 °C during application. There could be no operational shutdown and no grit blasting was permissible.

Solution

Wire brushing was selected as the surface preparation method to be utilised. This was followed by two coats of wet & rust tolerant Epo-chem™ RL 500PF.

Outcome

The project was completed on time, within budget and to the complete satisfaction of all concerned.

Benefits

- Wet & rust tolerant properties of Epo-chem™ RL 500PF
- No grit blasting
- No operational shutdown
- No disruption to others working in close proximity
- Reduced H&S and Fire Precautions
- Reduced contract duration



Photographs

- Nos. 1-2 External view of large ducting

CASE STUDY 3: Ducting - Longannet Power Station

3



5



4



Photographs

- No. 3 Before application
- Nos. 4-5 Completed application

- Solvent-free • Water-based • Wet-tolerant
- Rust-tolerant • Zero VOC
- Tank & Pipe Linings • Under-water & Marine • Glassflake
- Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip Flooring
- Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete Primers
- Concrete Repair Systems • Elastomeric System
- High Temperature Systems • Fire Retardant • Insulation Systems

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CASE STUDY 4: External Tank Refurbishment – Flotta Oil Platform

Case Study



Client: <i>Talisman Energy (UK)</i>	Industry: <i>Oil & Gas</i>
Scope: <i>Oil Tank Externals</i>	Date: <i>September 2007</i>
Location: <i>UK</i>	Products: <i>Epo-Chem™ RL 500PF & Fast-Guard™ RN 500TC</i>

Overview

The large oil tank required to be blasted and coated externally and have a minimum life expectancy of 16 years.

Challenge

Working without any protection from the elements, no grit blasting feasible (no containment possible) in high humidity and possible rain to a limited timescale.

Solution

Chemco offered a unique solution: Water blasting and utilising a **wet & rust tolerant** system on tank externals with exceptional track records in major petrochemical sites throughout the world.

One coat of **Epo-chem™ RL 500PF** wet & rust tolerant epoxy system @ 150µ by airless spray. Coloured topcoat of **Fast-guard™ RN 500TC** water-based epoxy @ 80µ by airless spray.

Outcome

The technical benefits offered by these systems ensured that the work was carried out on time, within budget and with no major delays.

Benefits

- No delays
- Huge cost savings
- Reduced cost of plant and equipment
- Reduced H&S and Fire Precaution
- Chemco system will protect the steel substrate in excess of 16 years

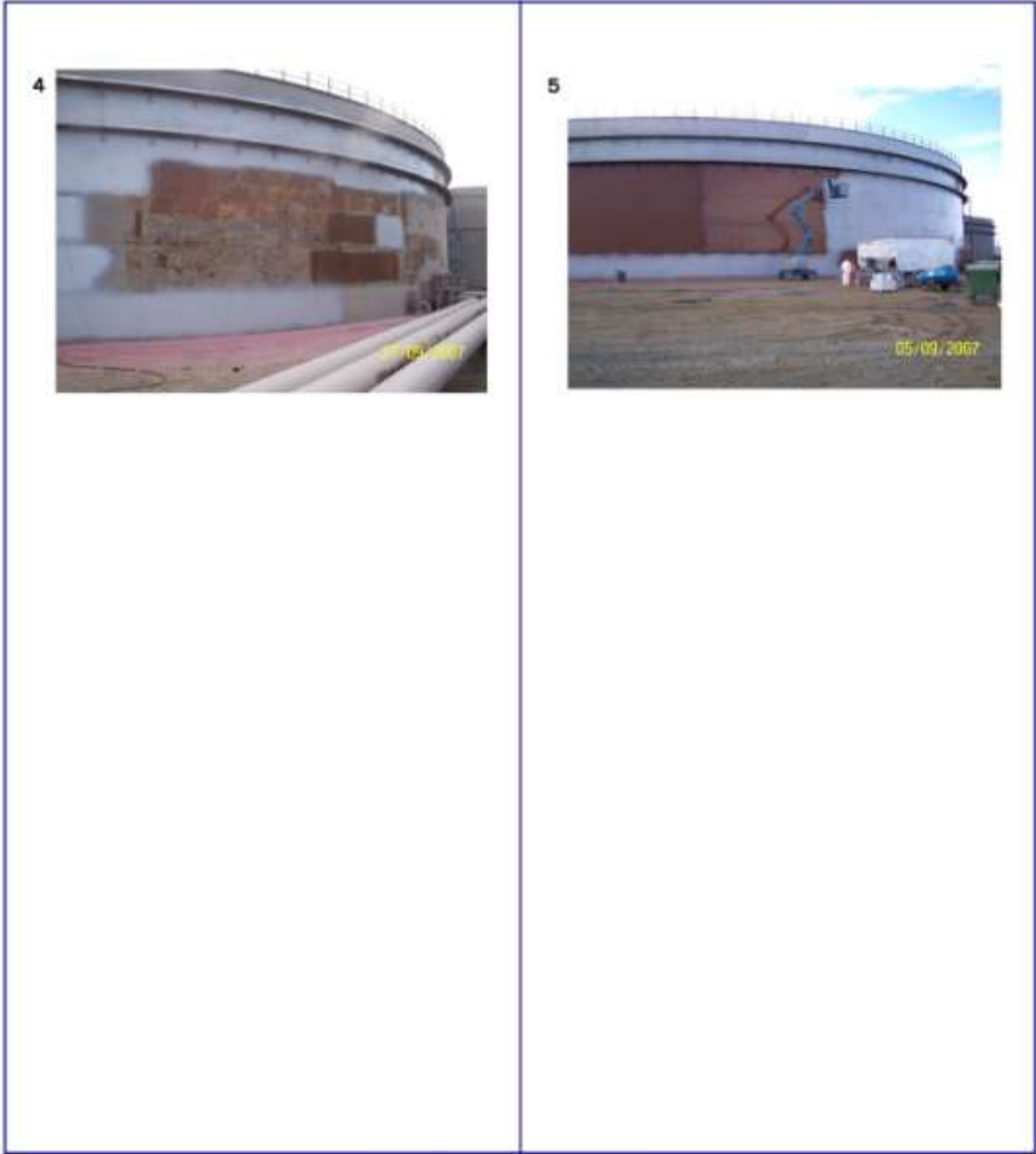


Photographs:

- No. 1 surface preparation by water blasting
- Nos. 2, 3 & 4 application of Epo-chem™ RL 500PF
- No. 5 finished application

Rev: March 2015

CASE STUDY 4: External Tank Refurbishment – Flotta Oil Platform (cont.)



- Solvent-free • Water-based • Wet-tolerant
- Rust-tolerant • Zero VOC
- Tank & Pipe Linings • Under-water & Marine • Glassfibre
- Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip Flooring
- Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete Primers
- Concrete Repair Systems • Elastomeric Systems
- High Temperature Systems • Fire Retardant • Insulation Systems

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CASE STUDY 5: Safety Barriers Refurbishment – North Lanarkshire Council



Client: North Lanarkshire Council	Industry: Industrial
Scope: Safety Barriers	Date: October 2008, Review June 2011
Location: Cumbernauld, UK	Products: Epo-chem™ RL 500PF

Overview

The Roads Department of North Lanarkshire Council required heavily rusted galvanised safety barriers to be recoated in order to preserve them and improve their appearance in an urban area.

Challenge

Limited access, grit blasting and containment not feasible. Potential wet and damp substrate with no protection from the elements, no disruption or disturbance to public was permissible.

Solution

Hand prepared surfaces by wire brush to ST2 followed by one coat of Epo-chem™ RL 500PF wet & rust tolerant epoxy primer-finish @ 150µ applied by brush and roller.

Outcome

The work was carried out on time, within budget and with minimum inconvenience to the public. Inspected and photographed again in 2011, (page 2) no remedial work was necessary.

Benefits

- Only Epo-chem™ RL 500PF could meet all of the customer's requirements
- The Epo-chem™ RL 500PF system will protect the steel substrate in excess of 10 years
- Any areas that are damaged later can be touched-up with minimum preparation and there is no over-coating time limitation



Photographs:

- Nos. 1 & 2 before application in October 2008
- Nos. 3 & 4 after application in October 2008
- Nos. 5 & 6 inspection after 3 years, June 2011

Rev: January 2015

CASE STUDY 5: Safety Barriers Refurbishment – North Lanarkshire Council (cont.)



- Silver-free • Water-based • Wet-tolerant
- Rust-tolerant • Zero VOC
- Tank & Pipe Linings • Under-water & Marine • Glassfibre
- Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip Flooring
- Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete Primers
- Concrete Repair Systems • Basaltomic System
- High Temperature Systems • Fire Retardant • Insulation Systems

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CASE STUDY 6: Offshore Platform Hull – West Cressida Platform



Client: Seadrill	Industry: Offshore
Scope: West Cressida Platform	Date: December 2012
Location: Thailand	Products: Epo-chem™ RL 500PF & RC 500GTC

Overview

In 2012, Chemco Speciality Coatings in Singapore were asked to provide a solution to refurbish the West Cressida platform as the existing coating system had failed.

Challenge

Due to the nature of offshore platforms, accessibility to the platforms' hull and living quarter areas would be difficult. With the client's schedule being tight and the rig being in operation, water-jetting was the only cost-effective, time-saving alternative surface preparation method to grit blasting which could be used. Due to tropical weather conditions, high humidity would also be a factor.

Solution

A gondola system was used to access the ships hull. For the living quarter areas where the gondola system could not be accessed, rope access was used. With the rig being in operation, high pressure water jetting had to be used to remove the existing failed coating and rust. This process also removed the substantial sea growth and all salt contamination in one operation. One coat of wet & rust tolerant Epo-chem™ RL 500PF was applied, followed by one topcoat of Epo-chem™ RC 500GTC.

Outcome

Utilising water-jetting as the surface preparation method significantly reduced costs and time as Epo-chem™ RL 500PF could be applied in any humidity with no dew point restrictions. The Chemco system allowed work to be safely conducted at height, with high levels of productivity. The client was extremely satisfied with the speed of the contract and the outcome of the Chemco system.

Continued overleaf

Benefits

- No grit blasting
- No disruption to working platform
- No major delays
- Reduced cost of plant and equipment
- Due to Epo-chem™ RL 500PF's wet & rust tolerant properties there was no weather constraints
- No humidity or dew point restrictions

1



2



Photographs

- Nos. 1 & 2 Existing failed coatings

CASE STUDY 6: Offshore Platform Hull – West Cressida Platform (cont.)

<p>3</p> 	<p>4</p> 
<p>5</p> 	<p>6</p> 
<p>7</p> 	<p>8</p> 

Photographs

- No. 3 Priming stage on West Cressida's hull
- Nos. 4 & 5 Contrast between original failed coating and new high gloss topcoat
- Nos. 6 & 8 Completed application of Chemco system

- Solvent-free • Water-based • Wet-tolerant
- Rust-tolerant • Zero VOC
- Tank & Pipe Linings • Under-water & Marine • Glassfibre
- Rust Converters & Primers • Ceramic & Metal Repair • Anti-static, Conductive & Anti-slip Flooring
- Approved for Contact with Food, Drinking Water & Beverages • Damp or Green Concrete Primers
- Concrete Repair Systems • Elastomeric System
- High Temperature Systems • Fire Retardant • Insulation Systems

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CASE STUDY 7: Loch side Crane – Scottish & Southern Energy



Client: <i>Scottish & Southern Energy</i>	Industry: <i>Power Generation</i>
Scope: <i>Loch Side Crane</i>	Date: <i>June 2004</i>
Location: <i>Invergarry, UK</i>	Product: <i>Epo-chem™ RL 500PF</i>

Overview

Loch side crane at Invergarry Hydro Station was to be refurbished in an environmentally friendly and cost-effective way.

Challenge

Total encapsulation, grit blasting and using a conventional 3-coat system, was totally impractical and cost prohibitive.

Solution

Utilising totally wet and rust-tolerant Epo-chem™ RL 500PF, all objectives could be achieved. Surface preparation consisted mechanical/power tool cleaning of the substrate followed by high pressure water wash to remove surface contamination. All areas down to metal was patch repaired using one coat of RL 500PF followed by an overall full coat of Epo-chem™ RL 500PF @ 150µ DFT by brush and roller.

Outcome

The work was carried out with no environmental impact, no delays due to weather in a very simple and cost-effective manner.

Benefits

- No grit blasting, encapsulation
- Huge cost savings
- Reduced H&S and Fire Precaution
- Reduced cost of plant and equipment
- Application can be carried out in adverse climatic condition without protection

1



2



Photographs:

- No. 1 BP mobile dam crane.
- No. 2 Associated crane structural steel.

CASE STUDY 8: External Doors – Alwyn Oil Platform

Case Study



Client: ConocoPhillips	Industry: Offshore
Scope: External Doors	Date: December 2009
Location: Alwyn Oil Platform, UK	Products: Epo-chem™ RC 500GTC & RL 500PF

Overview

The large external doors of the heli-deck administration building required re-coating with minimal surface preparation and no disruption to the heli-deck area.

Challenge

Working in a very busy area of the platform, minimal surface preparation and limited timescales combined with severe weather conditions.

Solution

A primer coat of Epo-chem™ RL 500PF epoxy system @ 150µ and a topcoat of Epo-chem™ RC 500GTC epoxy acrylic system @ 100µ by brush and roller.

Outcome

The major technical benefits offered by utilizing this system assured the client that the work was carried out safely, on time and with no major delays to the program.

Benefits

- No blasting required
- No major delays to program
- Reduced H&S and Fire Precaution
- Reduced cost of plant and equipment
- Chemco system will protect the steel substrate in excess of 10 years

1



2



Photographs

- Nos. 1 & 2: The large external door after application

CASE STUDY 9: Steel Pipes and Flanges – East Brae Platform

Case Study



Client: <i>Marathon Oil</i>	Industry: <i>Offshore</i>
Scope: <i>Steel Pipes & Flanges</i>	Date: <i>March 2009</i>
Location: <i>East Brae Platform, UK</i>	Product: <i>Epo-chem™ RL 500PF</i>

Overview

Heavily corroded steel pipes and flanges required a corrosion protection system with minimal surface preparation and no disruption to a busy production area.

Challenge

Working in a very restrictive area, minimal surface preparation, extreme weather conditions and limited timescale, combined with live hot pipe work.

Solution

Two coats of Epo-chem™ RL 500PF wet & rust tolerant epoxy system was applied @ 150µ per coat by brush and roller.

Outcome

The major technical benefits offered by utilizing this system ensured that the work was carried out safely, on time and with no delays to the program.

Benefits

- No blasting
- No delays
- Application carried out on hot pipe work without shutdown
- Reduced H&S and Fire Precaution
- Reduced cost of plant and equipment
- Chemco system will protect the steel substrate in excess of 10 years

1



2



Photographs:

- No.1 Steel pipes before application
- No.2 Steel pipes after application

CASE STUDY 10: Pipework – Flotta Oil Terminal

Case Study



Client: <i>Talisman Energy (UK)</i>	Industry: <i>Petrochemical</i>
Scope: <i>Pipework</i>	Date: <i>August 2008</i>
Location: <i>UK</i>	Product: <i>Epo-chem™ RL 500PF</i>

Overview

Large number of pipe work with external coating damage to be refurbished without shut down, grit blasting or weather protection.

Challenge

The harsh weather condition, no grit blasting, live pipe work in a very damp and wet condition added to the difficulties of the job.

Solution

A single coat of Epo-chem™ RL 500PF wet & rust tolerant epoxy primer finish system @ 200µ was applied by brush, roller and spray. Minimal or no surface preparation was carried out.

Outcome

The technical benefits offered by this system ensured that the work was carried out on time, within budget and with no delays. Since this project has been completed, other similar areas within the terminal have been specified using Epo-chem™ RL 500PF.

Benefits

- No blasting required
- Single coat application
- Application carried out in high humidity
- No delays to program
- Reduced cost of plant and equipment
- Reduced H&S and Fire Precaution
- Chemco single coat system will protect the substrate in excess of 10 years

1



2



3



Photographs:

- Nos. 1, 2 and 3 pipes after application.

CASE STUDY 11: Railings Refurbishment – Fermanagh District Council



Client: Fermanagh District Council	Industry: Industrial
Scope: Railings Refurbishment	Date: March 2009
Location: Northern Ireland	Products: Epo-chem™ RC 500GTC & RL 500PF

Overview
Public park railings required to be coated without disruption to the public.

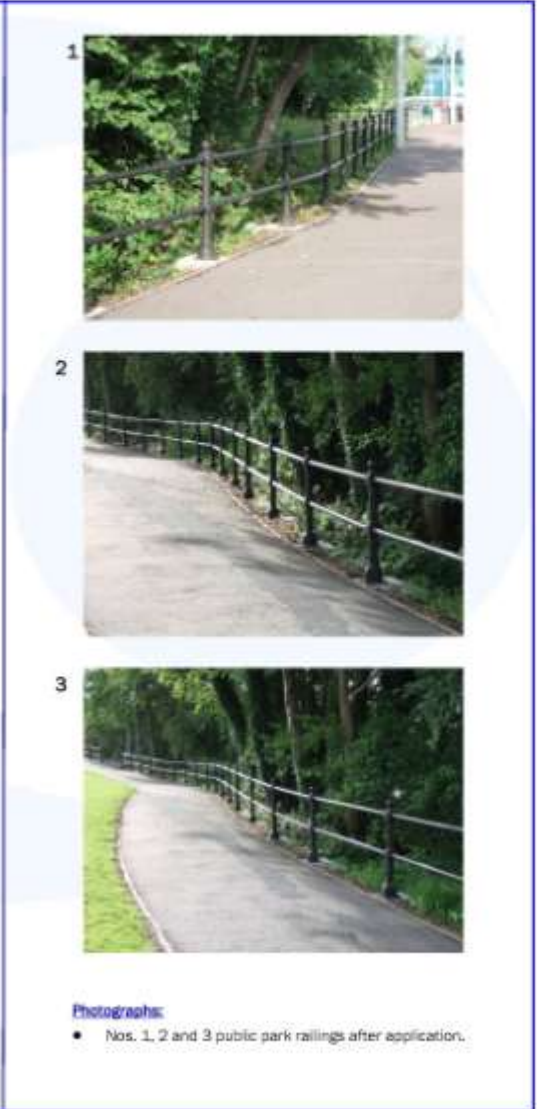
Challenge
Working in a very damp environment, to a limited timescale, with no disruption to the public and no grit blasting permitted.

Solution
One coat of Epo-chem™ RL 500PF wet & rust tolerant epoxy system @ 150µ by brush and roller.
Second coat of Epo-chem™ RC 500GTC epoxy acrylic topcoat @ 80µ by brush and roller.

Outcome
The technical benefits offered by this system assured the client that the work was carried out on time, in budget, with no H&S issues and no major delays. More importantly, there was no disruption to the public.

Benefits

- Not weather dependant
- No major delays to program
- Reduced cost of plant and equipment
- Long-term, maintenance-free protection



Rev: January 2015

APPENDIX 1

TEST REPORTS

1.1 USING EPO-CHEM™ RL 500PF FOR AGEAD ALKYD COATINGS



This is to certify that

Protective Treatment XM92
For Maintenance Painting of Steelwork with Sound Existing
Aged Alkyd Coatings Not Requiring a Decorative Finish

Supplied by

CHEMCO

Chemco International Ltd.
East Shawhead Industrial Estate
Coatbridge
Scotland
ML5 4LY

has been independently tested by

Scientifics Ltd
500 London Road, Derby

and found to satisfy the appropriate requirements of

Network Rail Line Specification RT98

Spot blast-clean to surface standard Sa $\frac{1}{2}$, BS7079, Part A1
Epochem RL500PF (Spot prime, 150 μ m dft)
Epochem RL500PF (150 μ m dft)

Minimum Expected Service Life : 10 Years
(dependent on the standard of surface preparation achieved)
Certificate Expiry Date : 06/06/2008

Certificate No:

XM92/038

Authorised by:

Malcolm Astle
Team Leader, Coatings

Date: 06/06/2003

Registered Office: 500 London Road, Derby D124 8SQ
Telephone: 01332 264619 Fax: 01332 263186
<http://www.scientifics.com> email: info@scientifics.com

894A

1.2 USING EPO-CHEM™ RL 500PF FOR NEW OR WEATHERED GALVINISED STEEL



This is to certify that

Protective Treatment XO99
For New or Weathered Galvanized Steelwork
Not Requiring a Decorative Finish

Supplied by

CHEMCO

Chemco International Ltd.
East Shawhead Industrial Estate
Coatbridge
Scotland
ML5 4LY

has been independently tested by

Scientifics Ltd
500 London Road, Derby

and found to satisfy the appropriate requirements of

Network Rail Line Specification RT98

Epochem RL500PF (Stripe coat 150µm dft)
Epochem RL500PF (150 µm dft)

Minimum Expected Service Life : 10 Years
(dependent on the standard of surface preparation achieved)
Certificate Expiry Date : 06/06/2008

Certificate No:

XO99/010

Authorised by:

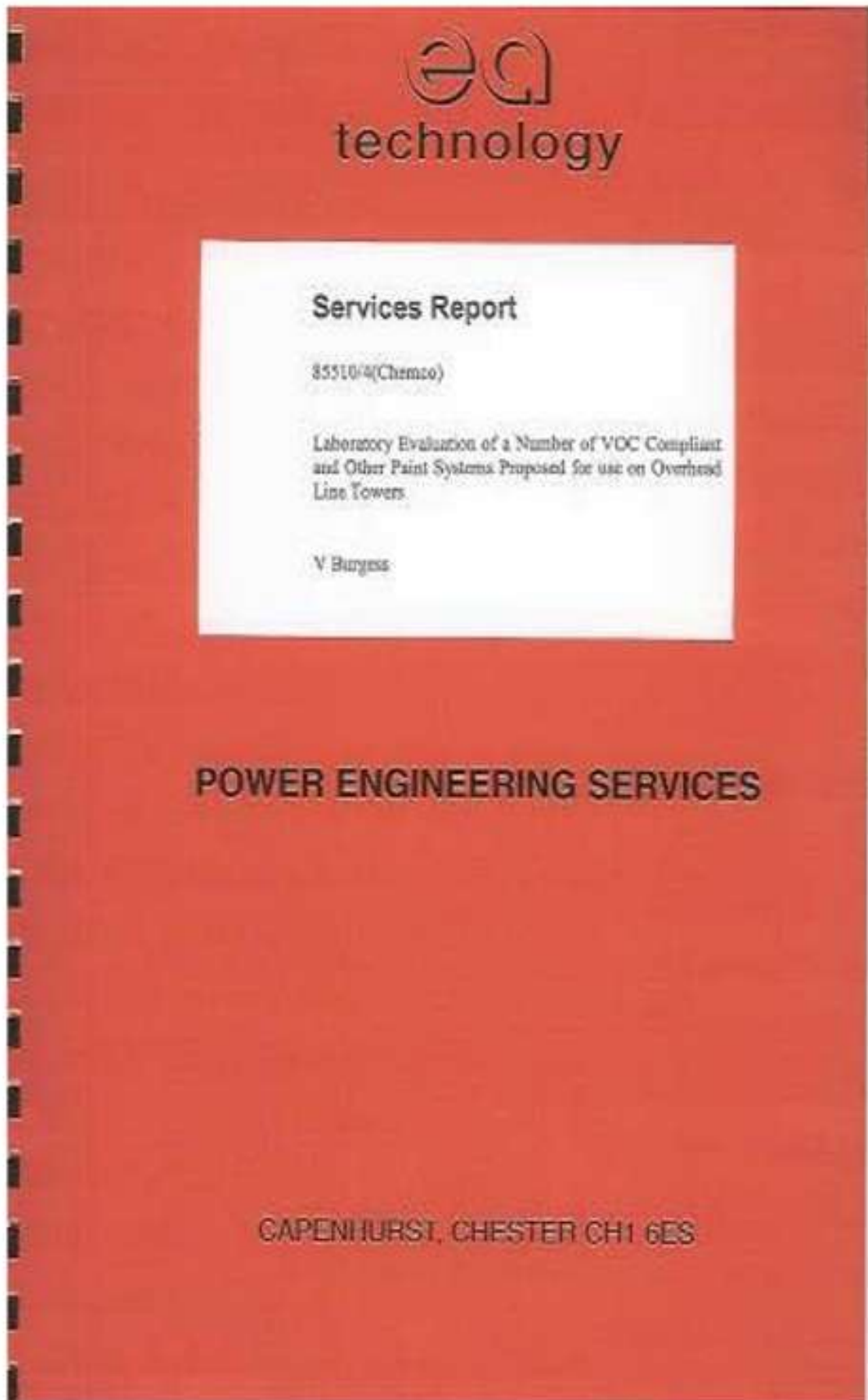
Malcolm Astle
Team Leader, Coatings

Date: 06/06/2003

Registered Office: 500 London Road, Derby DE14 8BQ
Telephone: 01332 264579 Fax: 01332 263380
<http://www.scientifics.com> email: info@scientifics.com

0404

1.3 EA TECHNOLOGY ASSESSMENT REPORT



Services Report

Job no: 85510/4(Chemoo)

Title: Laboratory Evaluation of a Number of VOC Compliant and Other Paint Systems Proposed for use on Overhead Line Towers

Author: V Burgess

Contacts:

Companies:

Summary:

An accelerated weathering test has been carried out in the laboratory to assess the relative protective performance of a number of VOC compliant and other paint systems. The paints were supplied by various manufacturers and proposed for use on overhead line towers.

Details of the paint systems and the test results are presented in this report.

Approved by: _____
M Wilding
Manager, Cables Consultancy and Services

Date: 16 January 2003.

1 Introduction

An accelerated weathering test has been carried out in the laboratory to assess the relative protective performance of various paint systems. This report describes the work carried out.

The protective performance was assessed using the Prohesion Test, which simulates natural weathering by cyclic wetting and drying using an aggressive salt fog containing ammonium sulphate and sodium chloride. The cycle consists of one hour exposure to the wet fog followed by one hour drying at a temperature of 35°C. Manufacturers literature suggests that a period of between 1500 and 2000 hours in the Prohesion cabinet equates to a typical outdoor exposure of approximately ten years. Although this relationship cannot be proven, and in any case the effects of outdoor exposure vary according to location, it is considered that 2000 hours in the Prohesion cabinet is a suitable period for a comparative test.

2 Paint Types

The paint systems used on the test samples are numbered below. Some of the samples were coated with a two coat system whilst others were coated with either a single coat system or the top coat of a two-coat system.

- 4 Chemco Epo-chem single coat 2-pack epoxy system
Reference RL 500P, Batch No 25 A 21.

Note: The paint samples were supplied directly by the manufacturers for testing, with the exception of the two-pack epoxy system manufactured by Chemco (paint system 4), which was taken from the trial carried out in Scottish Power.

3 Test Samples

Test samples were prepared using the paint systems described in Section 2, on four different types of substrate, using both cold-rolled steel Q-panels, which are uniform steel panels specially manufactured for testing coatings, and galvanised steel panels.

For each paint system samples were prepared on clean steel panels (Substrate A), previously rusted and wire brushed steel panels (Substrate B), and on two types of galvanised steel panels with different thicknesses of zinc (Substrates C and D). The test samples were therefore numbered according to the paint and substrate types, 1 1B, 1C etc.....up to 9C, 9D. Diagonal scratches were cut on all these samples through the coating, down to the steel.

1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)

For the single coat systems, additional samples were prepared on the same substrates, although no scratches were cut in these samples. These were numbered and labelled E, F, G and H, corresponding to the substrates A, B, C and D.

The coatings were applied by brush, as closely as possible to the recommended film build. Measurements of the paint film thickness on each of the test samples were made using an Elcometer 256F Coating Thickness Gauge. This measures the total thickness of the coating down to the steel substrate. Calibration measurements were therefore also made on the rusted steel and galvanised panels to allow the actual film build to be determined. The results of all the film thickness measurements are presented in Table 1. The samples were then photographed, placed in the environmental chamber and subjected to the Prohesion test.

Table 1. Film Thickness Measurements

Sample Number	Elcometer 256F Thickness Measurement, microns				
	No. of Readings	Lowest	Highest	Mean	Standard Deviation
Substrate B/F	20	2.5	21.6	12.0	4.6
Substrate C/G	20	11.1	17.7	13.7	1.7
Substrate D/H	20	25.0	36.5	31.7	3.5
4A	10	73.4	152	125	25.1
4B	10	157	232	203	20.6
4C	10	98.0	168	135	24.4
4D	10	158	209	187	14.6
4E	10	79.5	145	110	19.5
4F	10	170	204	182	10.1
4G	10	141	178	167	10.6
4H	10	147	210	165	18.0

4 Results

The samples were removed from the environmental chamber, washed in clean water and examined in detail after 200, 500, 1000, 1500, and 2000 hours of the Prohesion test. At each inspection they were evaluated according to the ASTM Standard D610: Standard Method of Evaluating Degree of Rusting in Painted Steel Surfaces. The degree of rusting is determined by visual inspection and comparison with photographic standards on a scale of 0 to 10, where 0 refers to 100% of the surface rusted and 10 refers to no rusting or less than 0.015% of the surface rusted.

On the samples with scratches cut through to the substrate, the area away from the scratch was evaluated according to this method. In the case of the samples on galvanised panels, the breakthrough of zinc salts was treated as if it were rust breakthrough. The extent of the apparent spread of rust underneath the paint film or loss of adhesion from the scratch was also measured. These values, together with additional comments on the condition of the samples are given in Table 2.

Photographs showing the final conditions of all the samples after 2000 hours of the Prohesion test are presented in Figures 1 to 30.

Table 2 Prohesion test results

Sample No	Time hours	Spread under paint film from scratch, mm	ASTM D610 Rust grade	Comments
4A	200	1	10	Slight blistering near scratch Blistering spreading
	500	3	9	
	1000	4	9	
	1500	8	9	
	2000	12	8	
4B	200	1	10	Odd spots
	500	1	10	
	1000	1	9	
	1500	2	9	
	2000	3	8	
4C	200	0	10	Slight lifting of coating near scratch Spreading
	500	0	10	
	1000	2	10	
	1500	7	9	
	2000	12	9	
4D	200	0	10	Reasonably good condition
	500	0	10	
	1000	1	9	
	1500	1	9	
	2000	1	9	

1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)

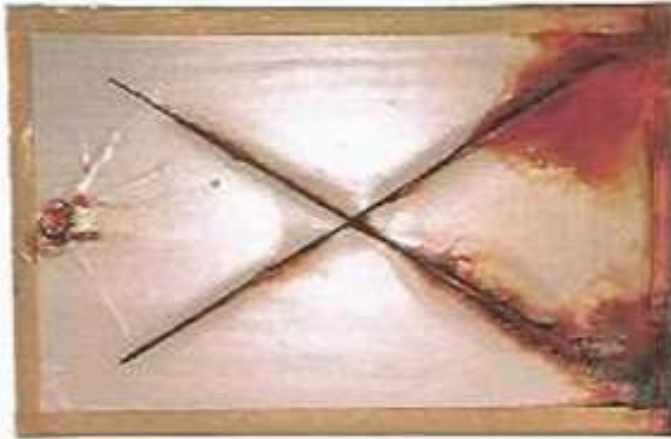
Table 2 (continued) Prohesion test results

Sample No	Time hours	Spread under paint film from scratch, mm	ASTM D610 Rust grade	Comments
4E	200	-	10	Slight blennish on surface, no breakthrough
	500	-	10	
	1000	-	9	
	1500	-	9	
	2000	-	9	
4F	200	-	10	Slight blennish on surface, no breakthrough
	500	-	10	
	1000	-	9	
	1500	-	9	
	2000	-	9	
4G	200	-	10	No deterioration
	500	-	10	
	1000	-	10	
	1500	-	10	
	2000	-	10	
4H	200	-	10	No deterioration
	500	-	10	
	1000	-	10	
	1500	-	10	
	2000	-	10	

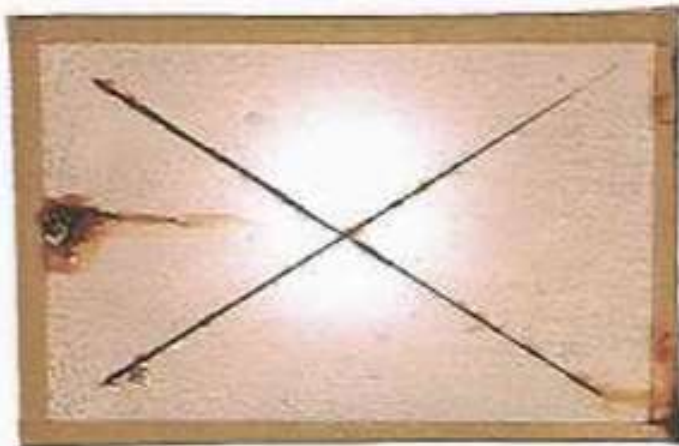
1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)

EA Technology

Services Report



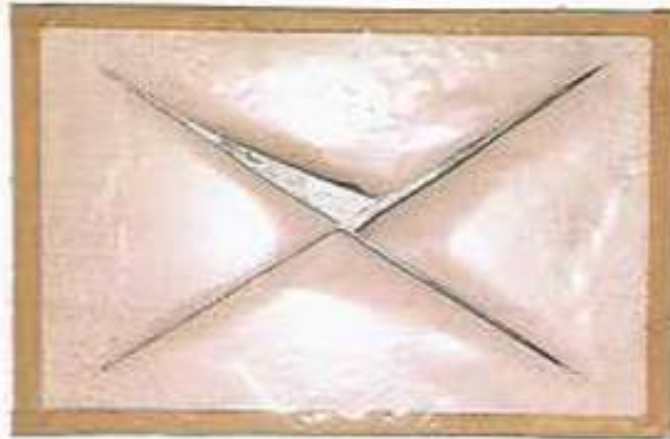
Sample 4A 2000 hours Prohesion



Sample 4B 2000 hours Prohesion

Figure 13.

1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)



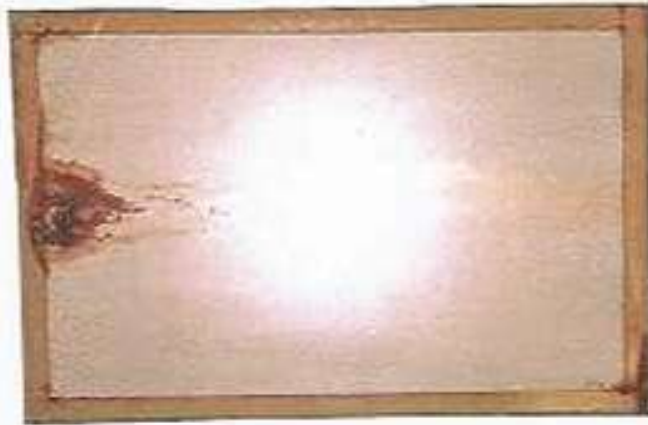
Sample 4C 2000 hours Prohesion



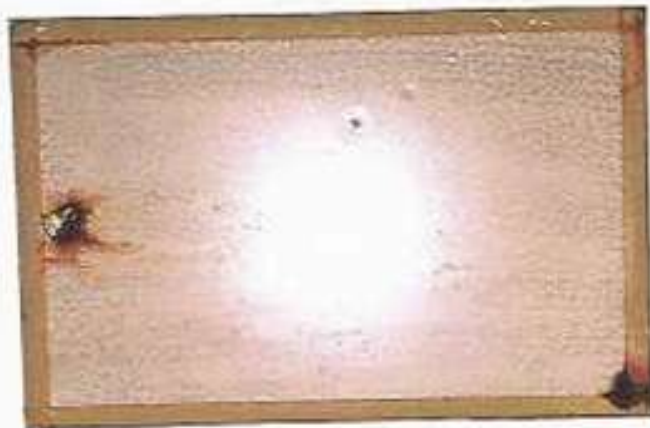
Sample 4D 2000 hours Prohesion

Figure 14.

1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)



Sample 4E 2000 hours Prohesion



Sample 4F 2000 hours Prohesion

Figure 15.

1.3 EA TECHNOLOGY ASSESSMENT REPORT (cont.)

EA Technology

Services Report



Sample 4G 2000 hours Prohesion



Sample 4H 2000 hours Prohesion

Figure 16.

1.4 JE TEST REPORT

JE		PAINTING REPORT	
JOB NO.:	Cmp/1547	REPORT NO.:	000
UNIT:	G3	INSPECTION DATE:	13/09/02
JOB TITLE:	PAINT TESTING ON LEAD COATED AND WET PIPE.		
<p>DESCRIPTION OF ITEM (State Drawing Nos. where applicable):</p> <p>Test Carried Out On 8" Pipe with 4off different paints Supplied by chemco international paint.</p> <p>(1) RA 500 _____ EPOXY SOLVENT-FREE SYSTEM .</p> <p>(2) R I 500 _____ EPOXY SOLVENT-FREE SYSTEM .</p> <p>(3) RL 500 _____ EPOXY SYSTEM WITH ADDED SOLVENT.</p> <p>(4) RS 500 _____ EPOXY SOLVENT-FREE SYSTEM .</p>			
<p>SUMMARY</p> <p>RA-500 _____ RI _____ RS _____, Are all 100% volume solids.</p> <p>RL-500 _____ 90% volume solids.</p> <p>RA 500 looks to be the better coat when applying, and can be seen to be flashing off within 30 min. (very good).</p> <p>RI 500 A Bit Harder to apply but as seen good overall coat. (good).</p> <p>RL 500 This application found to sag during application using brush,(more care when applying). (good).</p> <p>RS 500 This coat same as RI 500 When applying found to be a bit hard to apply. (good).</p>			
<p>OBSERVATIONS</p> <p>Four parts off an 8" lead coated pipe were prepared for coating. this pipe was also seen to be wet Prior To paint application.</p> <p>Remove all loose material .</p> <p>To final wire brush.</p> <p>To clean down.</p> <p>To apply to all four areas coating with different material (all areas coated on 13-09-02) .</p> <p>Today 16-09-02 dollys were attach to these areas for adhesion testing which will Be carried out on 20-09-02.</p>			
<p>REPORT DATE: <u>13-09-02</u></p> <p>INSPECTOR: <u>A COOK</u></p>		<p>DISTRIBUTION:</p>	

1.4 JE TEST REPORT (cont.)

JE			
PAINTING REPORT			
JOB NO.:	Cmp/1547	REPORT NO.:	001
UNIT:	G3	INSPECTION DATE:	18/09/02
JOB TITLE:	PAINT TESTING ON LEAD COATED AND WET PIPE.		
DESCRIPTION OF ITEM (State Drawing Nos. where applicable): Test Carried Out On 8" Pipe with 4off different paints Supplied by chemco international paint. (1) RA 500 _____ EPOXY SOLVENT-FREE SYSTEM . (2) RI 500 _____ EPOXY SOLVENT-FREE SYSTEM . (3) RL 500 _____ EPOXY SYSTEM WITH ADDED SOLVENT. (4) RS 500 _____ EPOXY SOLVENT-FREE SYSTEM .			
SUMMARY			
ADHESION PULL OFF RESULT			
Adhesion test carried out by A cook J E Coating Inspector.			
Item Tested ; 8" Pipe 4 off 12" areas marked up for testing with above materials			
Test instrument ; elcometer adhesion tester.			
Results ;			
RI 500		RA 500	
Dolly 1. (1150 psi) 100 % Cohesion		Dolly 3 1 (1150 psi) 100 % Cohesion	
RS 500		RL 500	
Dolly 2. (1250 psi) 100 % Cohesion		Dolly 4. (1350 psi) 100% Cohesion	
Test pipe wire brushed and cleaned, accepted, and painted with 4 different materials Over a wet surface (4 off) 12" areas dollys pulled on 18-09-02 at 9Am. Leaving a Further 4 off pull off tests to do on 20-09-02.			
OBSERVATIONS			
Note : A total off 8 dollys fitted at different angels Date fitted 16-09-02. 4 Off In number pulled on 18-09-02. See above for test results.			
REPORT DATE: 18-09-02			DISTRIBUTION:
INSPECTOR: A COOK			

1.4 JE TEST REPORT (cont.)



PAINTING REPORT

JOB NO.:	Cmp/1547	REPORT NO.:	002
UNIT:	G3	INSPECTION DATE:	20/09/02
JOB TITLE:	PAINT TESTING ON LEAD COATED AND WET PIPE.		

DESCRIPTION OF ITEM (State Drawing Nos. where applicable):
 Test Carried Out On 8" Pipe with 4off different paints Supplied by chemco international paint.
 (1) RA 500 _____ EPOXY SOLVENT-FREE SYSTEM .
 (2) RI 500 _____ EPOXY SOLVENT-FREE SYSTEM .
 (3) RL 500 _____ EPOXY SYSTEM WITH ADDED SOLVENT.
 (4) RS 500 _____ EPOXY SOLVENT-FREE SYSTEM .

SUMMARY

ADHESION PULL OFF RESULT

Adhesion test carried out by A cook J E Coating Inspector.

Item Tested ; 8" Pipe 4 off 12" areas marked up for testing with above materials

Test instrument ; elcometer adhesion tester.

Results ;

RI 500	RA 500
Dolly 1. (1150 psi) 100 %Cohesion	Dolly 3 (1150 psi) 100 % Cohesion
RS 500	RL 500
Dolly 2. (1300 psi) 100 % Cohesion	Dolly 4. (1450 psi) 100% Cohesion

Further test carried out to same painted areas (different locations) .
 Test carried out to 09.00 hrs on 20-09-02

OBSERVATIONS

Note : After 7 Days Further 4 Dollys Pulled , see results above.

REPORT DATE: 23-09-02

INSPECTOR: A COOK

DISTRIBUTION:


1.5 TEST RESULTS FOR WET SUBSTRATES



Report No: COA/01515

Issue Date: 28th April 2003

**Test Report:
Evaluation of
Epochem
RS500 and
RL500 Coating
Systems
Applied in Wet
Conditions**

Authorised by: 
A Gascoyne
Coatings & Corrosion Technologist

Prepared by:

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COA01515/MSU5629 -1

Page 1 of 3

1.5 TEST RESULTS FOR WET SUBSTRATES (cont.)



Epo-chem RL500PF: Applied to Wet Aged Alkyd (Test Panels: 021729A).
Dfts ranging from: 108 – 141 µm

Test	Result									
Application & Appearance	<p>Application: Intermittent 'skidding' of the brush over the wet surface. Presence of water adversely affected the paint substance finish (see appearance).</p> <p>Appearance: Generally satisfactory, but with elongated areas of water-affected paintwork (locally thin film).</p>									
Cross-cut adhesion test, BS3900: Part E6: 1992	Classification 0 result, triplicate determination with 3mm spacing.									
Pull-off adhesion, ASTM D4541	All three tests gave pull-off adhesion values greater than 1000 psi.									
Resistance to impact, BS3900: Part E7	No defects evident in the coating system, including cracking, flaking or detachment from the substrate.									
Resistance to humidity, BS3900: Part F2: 1973	Panels inspected after 2000 hours exposure. No signs of softening, swelling, blistering or underfilm corrosion were evident.									
Resistance to Salt Spray, BS3900: Part F12: 1997	After 2000 hours exposure, rusting and rust staining was recorded at the parallel scratches, but no undercutting present. No breakdown was noted on the remainder of the panel.									
Resistance to UV/Condensation, BS3900: Part F16: 1997	<p>No signs of cracking, flaking, blistering or loss of substrate adhesion were evident after 1000 or 2000 hours, however, slight chalking was evident after 1000 and 2000 hours exposure. Changes in colour (CMC(2:1) colour difference equation) and gloss are detailed below:</p> <table border="1"> <thead> <tr> <th>Exposure Period</th> <th>Colour Change ΔE</th> <th>Change in gloss 60° Head</th> </tr> </thead> <tbody> <tr> <td>1000 hours</td> <td>2.04</td> <td>-2 G.U. (3 to 1)</td> </tr> <tr> <td>2000 hours</td> <td>3.15</td> <td>-2 G.U. (3 to 1)</td> </tr> </tbody> </table>	Exposure Period	Colour Change ΔE	Change in gloss 60° Head	1000 hours	2.04	-2 G.U. (3 to 1)	2000 hours	3.15	-2 G.U. (3 to 1)
Exposure Period	Colour Change ΔE	Change in gloss 60° Head								
1000 hours	2.04	-2 G.U. (3 to 1)								
2000 hours	3.15	-2 G.U. (3 to 1)								

1.5 TEST RESULTS FOR WET SUBSTRATES (cont.)



Epo-chem RS500PF: Applied to Wet Aged Alkyd (Test Panels: 021733A).
Dfts ranging from: 130 - 152µm

Test	Result									
Application & Appearance	<p>Application: Intermittent 'skidding' of the brush over the wet surface.</p> <p>Appearance: Generally satisfactory, but with elongated areas of water-affected paintwork (locally thin film).</p>									
Cross-cut adhesion test, BS3900: Part E6: 1992	Classification 0 result, triplicate determination with 3mm spacing.									
Pull-off adhesion, ASTM D4541	All three tests gave pull-off adhesion values greater than 1000 psi.									
Resistance to impact, BS3900: Part E7	No defects evident in the coating system, including cracking, flaking or detachment from the substrate.									
Resistance to humidity, BS3900: Part F2: 1973	Panels inspected after 2000 hours exposure. No signs of softening, swelling, blistering or underfilm corrosion were evident.									
Resistance to Salt Spray, BS3900: Part F12: 1997	After 2000 hours exposure, rusting and rust staining was recorded at the parallel scratches, also undercutting was present due to failure of the original alkyd.									
Resistance to UV/Condensation, BS3900: Part F16: 1997	<p>No signs of cracking, flaking, blistering or loss of substrate adhesion were evident after 1000 or 2000 hours, however, significant chalking was evident after 1000 hours exposure. Changes in colour (CMC(2:1) colour difference equation) and gloss are detailed below:</p> <table border="1"> <thead> <tr> <th>Exposure Period</th> <th>Colour Change ΔE</th> <th>Change in gloss 60° Head</th> </tr> </thead> <tbody> <tr> <td>1000 hours</td> <td>9.36</td> <td>-63 G.U. (65 to 2)</td> </tr> <tr> <td>2000 hours</td> <td>7.42</td> <td>-64 G.U. (65 to 1)</td> </tr> </tbody> </table>	Exposure Period	Colour Change ΔE	Change in gloss 60° Head	1000 hours	9.36	-63 G.U. (65 to 2)	2000 hours	7.42	-64 G.U. (65 to 1)
Exposure Period	Colour Change ΔE	Change in gloss 60° Head								
1000 hours	9.36	-63 G.U. (65 to 2)								
2000 hours	7.42	-64 G.U. (65 to 1)								