



REPORT

EPO-CHEM™ RA 500 Series

EPOXY SOLVENT-FREE SYSTEM

General Industry

July 2018

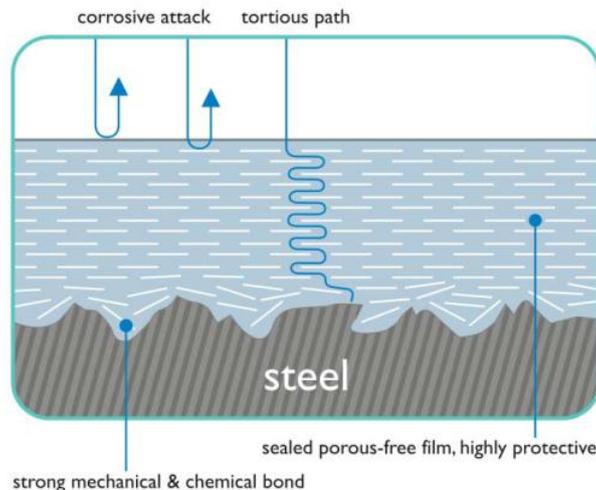
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INTRODUCTION

Epo-chem™ RA 564 is suitable for a wide range of applications, including tanks, vessel linings and deck coatings.

Epo-chem™ RA 564 is a **solvent-free, wet tolerant** and highly chemical resistant epoxy single / topcoat. The glassflake systems have been utilised over the last 30 years as tank lining in the most aggressive environments because they offer total barrier against moisture and corrosive ions. These are typically applied as a 1-coat system or as a topcoat on the primers with DFT of 200-300µ. Minimum surface preparation standard required: Sa 2, WJ-2, St 3.



MATERIAL CHARACTERISTICS

- It has been designed to work in damp, humid and poorly ventilated areas that are typically found in ballast tanks.
- Used as a stripe coat to repair and protect high corrosion areas, i.e. welds and sharp edges. Adhesion test results on wet substrates far exceed industry norms attaining over 1300psi before cohesive failure.
- **Wet tolerant** - Can be applied on wet and soaking surfaces, no requirement for any dehumidification equipment.
- **RA 500M** is 100% solid (**solvent-free**), no requirement for any ventilation equipment.
- Reduces the risk of MIC (Microbiological Induced Corrosion) and SRB (Sulphate Reducing Bacteria) as it does not contain the nutrients contained in solvent-based coatings.
- Excellent chemical resistance.
- Coating compatible with virtually all coal tar epoxy or other traditional ballast tank coatings.
- Compatible with all shop primers.
- Unlimited over-coating intervals.
- Fast turn-around, can be put back into service almost immediately (as soon as touch dry, 6-12 hours) as the system is capable of 'continuing' to cure underwater.
- Glassflake technology ensures superb corrosion resistance and a long service life.
- Ideal for poorly and hand prepared surfaces - reducing the downtime and back-in service time.
- Apply in any environmental condition, no humidity restrictions.
- Zero VOC; no fire hazard or odour.
- Hot-work, e.g. welding, cutting and grinding can be carried out without interruption.
- No storage hazard.
- Preparation and application works can be carried out by ships' crew, riding crew, alongside quayside or in dry-dock.
- User friendly.

CUSTOMERS

Epo-chem™ RA 564 is specified and used by wide range of worldwide industries, including:

Petro-chemical and Oil & Gas Industry

BP

Grangemouth Kinneil Dalmeny Finnart

Talisman Energy

Flotta Oil Terminal Tartan Oil Platform Clyde Oil Platform
Bleo Holms FPSO Piper Oil Platform Orkney Oil Terminal

Chevron Texaco

Chevron Refinery Texaco Pembroke Refinery

Fairfield Energy

Dunlin Oil Platform

Total

North Alwyn Platform

British Gas

Armada Platform

Power Generation

Fiddlers Ferry Power Station Hartlepool Nuclear Power Station
Cottam Power Station Longannet Power Station
Loch Gair Power Station

Food & Beverage

Edrington Brewery Grant Distillery Diageo Distillery
Cheese Manufacturing Plant (N. Ireland) Food Manufacturing Plant (N. Ireland)

General Industry

British Sugar Corus

CERTIFICATES AND APPROVALS

- ABS Certificate – RS 500P/RA 500M on bare steel and blast cleaned steel surfaces (Including on wet & rusty steel)
- ABS Certificate – IMO PSPC-COT Approved Oil Cargo Tank Coating
- Lloyds Approval:
 - Lloyds Approval – Ballast Tank Maintenance Coating – **RA 500M**
 - Lloyds Type Approval – IMO Resolution MSC.215 (82) PSPC for New Build – Bare & Shop Primed Steel
- NSF Certificate – Fresh Drinking Water (when used in conjunction with RS 500P)
- FDA Approval:
 - FDA Approval – Food Contact – **RA 500M**
 - FDA Approval – Potable Water – **RA 500M**

CASE STUDIES

CASE STUDY 1: Crude Oil Tank – BP Kinneil Oil Refinery

Case Study



Client: BP	Industry: Petrochemical
Scope: Crude Oil Tank	Date: November 2008
Location: BP Kinneil (Tank 3701)	Products: Epo-chem™ RA 564 Ceram-chem™ RH 500

Overview

The internal floor area and 2m up the walls of a large diameter tank holding crude oil, required to be completely refurbished in a limited timescale during the plant shutdown. There was also a requirement for a long-term corrosion system that would last until the tank re-opened again in 10 years time. This project was carried out by Hertel.

Challenge

After coming out of a long service, the tank floor was suffering from severe pitting and corrosion. Winter condition, cold weather and high humidity, combined with water ingress, added to the difficulties of this project.

Solution

First coat of Epo-chem™ RA 564 solvent-free glass-flake epoxy system @ 500µ DFT by airless spray. All deep pitting were filled with Ceram-chem™ RH 500 solvent-free, ceramic epoxy putty. Second coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system @ 500µ by airless spray.
Total DFT: 1,000µ

Outcome

The major technical benefits offered by utilizing this system ensured that the work was on time, within budget, with no major delays to the program and no impact on other contractors working in and around the tank. Similar tanks on site will now be refurbished utilizing the Chemco solvent-free epoxy system due to its great success.

Benefits

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

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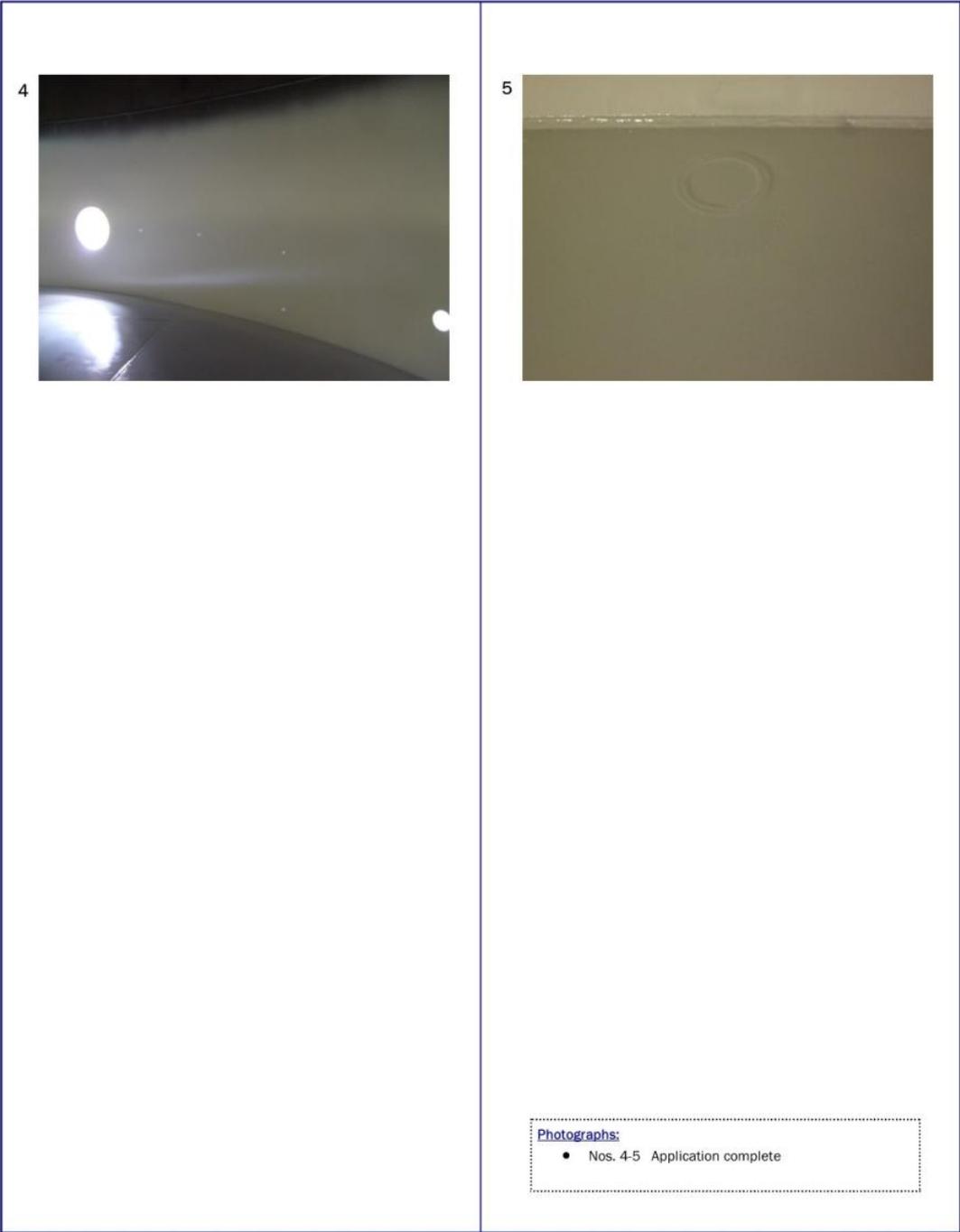
3



Photographs:

- Nos. 1-3 Application complete

CASE STUDY 1: Crude Oil Tank – BP Kinneil Oil Refinery (cont.)



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CASE STUDY 2: Tank Refurbishment - BP Grangemouth Oil Refinery

Case Study



Client: <i>INEOS</i>	Industry: <i>Petrochemical</i>
Scope: <i>Drain Tank</i>	Date: <i>April 2010</i>
Location: <i>BP Grangemouth, UK</i>	Products: <i>Epo-chem™ RA 564</i> <i>Ceram-chem™ RH 500</i>

Overview

The main criteria of this project was to reinstate a 20 year old redundant tank back into service. This required the full internal floor area and 1m up the wall to be completely refurbished without the use of any hot-work and in limited timescale.

Challenge

Tank internals suffer from heavy corrosion, pitting and severe metal loss. Combined with the possibility of holes, open-top tank exposed to elements, high humidity, cold and rain adding to the difficulty of this work.

Solution

First coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system was applied on grit blasted Sa 2.5 @ 200µ by airless spray. All welded areas and seams were filled using Ceram-chem™ RH 500 high density ceramic epoxy filler. The complete floor area was then fibre-glassed using Epo-chem™ RA 500L (special laminating grade of RA 500 series) and 450gsm of chopped strand mat in 2 overlapping layers. Second coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system @ 400µ was applied by airless spray. Final coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system @ 400µ was applied by airless spray.

Outcome

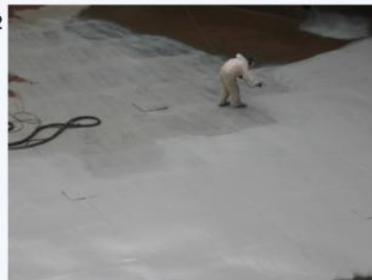
The major technical benefits offered by utilizing this system ensured the client that the work was on time, tank integrity established, within budget and with no delays to the program (many days saved). The use of this tank refurbishment system from Chemco will now be utilized for similar tank refurbishment projects on sites where hot-work is not feasible.

Continued overleaf

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Photographs:

- No. 1 Before application
- Nos. 2-4 Application in Progress

CASE STUDY 2: Tank Refurbishment - BP Grangemouth Oil Refinery (cont.)

Benefits

- No hot work
- Structural/tank integrity restored
- Huge cost savings compared to tank floor replacement
- No delays
- Reduced H&S and Fire Precaution
- Reduced cost of plant and equipment
- Chemco system will protect the steel substrate for minimum of 25 years



Photographs:

- No. 4 Application in Progress
- Nos. 5-6 Completed Application

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CASE STUDY 3: Pipe Spool – Peterhead Power Station

Case Study



Client: Peterhead Power Station	Industry: Power Generation
Scope: Pipe Spools	Date: April 2009
Location: Peterhead, UK	Product: Epo-chem™ RA 564

Overview

The fabricator, Eurofab, required a very quick turnaround time with 25 years life expectancy for the internal/external protection of a number of large 48" pipe spools for Peterhead Power Station.

Challenge

The client required a coating system that would last at least 25 years and could be applied very quickly to the internal/external of large 48" spools.

Solution

Two coats of Epo-chem™ RA 564 solvent-free epoxy system @ 500µ per coat by airless spray was applied to both internal and externals of the spools.
 Total DFT Internal: 1,000µ
 Total DFT External: 1,000µ

Outcome

Epo-chem™ RA 564, when applied at such high thickness, would offer a complete corrosion protection for minimum of 25 years. The system has excellent impact and abrasion resistance as well as very high gloss. The contract was completed on time and within budget to the total satisfaction of the client.

Benefits

- Solvent-free
- No major delays to program
- Reduced cost of plant and equipment
- Reduced H&S and Fire Precaution
- Chemco system will protect the steel substrate in excess of 25 years

Continued overleaf

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Photographs:

- Nos. 1-2 Pipe Spools Before Application

CASE STUDY 3: Pipe Spool – Peterhead Power Station

<p>3</p> 	<p>4</p>  <p>Photographs:</p> <ul style="list-style-type: none">Nos. 3-4 Pipe Spools After Application
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CASE STUDY 4: Surface Walls – Cheese Manufacturing Plant

Case Study



Client: Cheese Manufacturing Plant	Industry: Food & Beverage
Scope: Surface Walls	Date: December 2009
Location: Northern Ireland	Product: Epo-chem™ RA 500M

Overview

The existing masonry production area walls (500m²) required a complete re-coat without any disruption to other areas of the plant. It also had to be carried out in a very tight timescale and have no odours. The surface finish had to be easy to wash and decontaminate seamless with food contact approval.

Challenge

Working in a very restrictive area, limited timescale, minimal surface preparation, FDA approval, odourless product, combined with temperature variations added to the difficulty of the project.

Solution

Two coats of Chemco Epo-chem™ RA 500M solvent-free, wet tolerant glassflake epoxy system @ 200µ per coat applied by brush and roller.

Outcome

The work was carried out on time, with no delays to the program and no impact on other contractors working in close proximity. Since this project was completed, the client has specified the same system for similar plants in Northern Ireland.

Benefits

- Solvent-free
- No major delays to program
- Reduced H&S and Fire Precaution
- No blasting or ventilation required
- Reduced cost of plant and equipment

Continued overleaf



Photographs

- Nos. 1 & 2 Before Application

CASE STUDY 4: Surface Walls – Cheese Manufacturing Plant (cont.)

<p>3</p> 	<p>4</p> 
<p><u>Photographs</u></p> <ul style="list-style-type: none">Nos. 3 & 4 After Application	

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CASE STUDY 5: Flooring Refurbishment – Food Factory

Case Study



Client: Food Manufacturing Plant	Industry: Food & Beverage
Scope: Production Floor	Date: December 2009
Location: Northern Ireland	Product: Epo-chem™ RA 500M

Overview

The main food production floor area of 400m² required complete removal of the existing paint system and recoated without any disruption to other areas of the plant. It also had to be carried out in a very tight timescale with no odours present during or after the application of coating system.

Challenge

FDA food contact approval with ease of decontamination with excellent resistance to daily wash. Working in a restrictive area with very short timescale and at varying temperatures, no ventilation feasible and limited surface preparation added to the difficulties of the project.

Solution

Two coats of Epo-chem™ RA 500M solvent-free, wet-tolerant epoxy system @ 200µ per coat by roller.

Outcome

The major technical benefits offered by utilizing this system ensured that the work was carried out on time, with no delays to the program and no impact on other contractors. Since the completion of this project, the client has specified the same system for similar plants in Northern Ireland.

Benefits

- Solvent-free
- No major delays to program
- Reduced H&S and Fire Precaution
- Reduced cost of plant and equipment
- Very fast and efficient

Continued overleaf



Photographs

- Nos. 1 & 2 Production Floor Before Application

CASE STUDY 5: Flooring Refurbishment – Food Factory (cont.)

<p>3</p> 	<p>4</p> 
<p><u>Photographs</u></p> <ul style="list-style-type: none">• Nos. 3 & 4 Production Floor After Application	

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CASE STUDY 6: Secondary Containment – Edrington Distillery

Case Study



Client: <i>Edrington Distillery</i>	Industry: <i>Food & Beverage</i>
Scope: <i>Flooring</i>	Date: <i>August 2008</i>
Location: <i>UK</i>	Products: <i>Epo-chem™ RA 564 & Easi-prime™ RX 500P</i>

Overview

Distillers and blenders of famous malt and blended whisky, the Edrington Group required a seamless coating system to comply with current legislation. The existing ceramic tile floor had to be retained due to cost and time limitation. Seamless, FDA food contact approval to comply with the legislation.

Challenge

Working in a live production area, minimal surface preparation, limited timescale, combined with application of coating on ceramic tiles and with no disruption to the operation. A solvent-free solution was required.

Solution

Easi-prime™ RX 500P, a water-based epoxy with excellent adhesion to ceramic tiles was applied @ 100µ followed by one coat of solvent-free, wet tolerant glassflake topcoat Epo-chem™ RA 564 @ 200µ by brush and roller.

Outcome

The work was carried out on time, within budget and with no delays to the complete satisfaction of the client.

Benefits

- Solvent-free
- No need to remove existing tiles
- No odour, no impact on personnel
- No disruption to production
- Reduced cost of contract
- Reduced H&S and Fire Precaution

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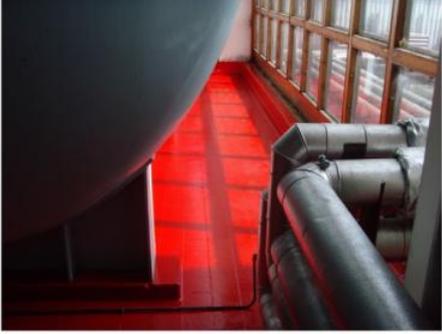
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Photographs:

- Nos. 1 & 2 Production Floor Before Application
- No. 3 Production Floor After Application

CASE STUDY 6: Secondary Containment – Edrington Distillery (cont.)

<p>4</p> 	<p>5</p> 
<p>6</p> 	<p>7</p> 
<p>8</p> 	<p><u>Photographs:</u></p> <ul style="list-style-type: none">Nos. 4 - 8 Production Floor After Application

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CASE STUDY 7: Potable Water Tank – Basingstoke Hotel



Client: <i>Basingstoke Hotel</i>	Industry: <i>Industrial</i>
Scope: <i>Potable Water Tank Repair</i>	Date: <i>October 2012</i>
Location: <i>UK</i>	Product: <i>Epo-chem™ RS 500P & RA 500M</i>

Overview

The potable water tanks were approximately 90 years old and were showing signs of corrosion damage. The client required these tanks to be restored to “as good as new” condition.

Challenge

The tanks had holes through their shell, floors and lower walls. The tanks were also located in a confined space on the roof of the building. Working within a strict time frame also added to the difficulty of this project.

Solution

Manual preparation was selected as the surface preparation method. One primer coat of solvent-free, wet & rust tolerant Epo-chem™ RS 500P was applied first. This was followed by two topcoats of solvent-free, wet tolerant Epo-chem™ RA 500M.

Outcome

The work was completed in three working days with no delays. The tanks were restored to “as good as new” condition resulting in huge cost savings for the client as they did not need to purchase new tanks.

This system is NSF Certified for fresh drinking water applications.

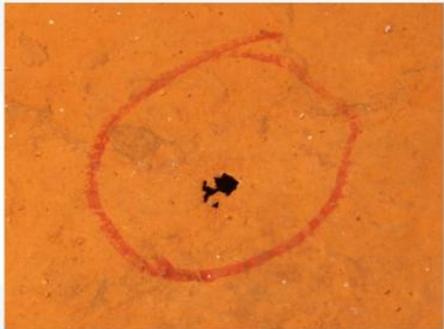
Benefits

- Solvent-free
- Restored to “as good as new” condition
- Reduced H&S and Fire Precaution
- No grit blasting
- Substantial time and cost savings

Continued overleaf



1



2

Photographs

- Nos. 1 & 2 Before application

*This project was completed by our approved contractor Specialist Coatings Ltd, UK

CASE STUDY 7: Potable Water Tank – Basingstoke Hotel (cont.)

<p>3</p> 	<p>4</p> 
<p>5</p> 	<p>Photographs</p> <ul style="list-style-type: none">• Nos. 3 & 4 After priming• No. 5 Completed application

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CASE STUDY 8: Swimming Pool Refurbishment – Cruise Ship

Case Study



Client: Royal Caribbean Cruise Lines	Industry: Marine
Vessel: Cruise Ship	Date: February 2014
Location: Bermuda	Products: Epo-chem™ RS 500P & RA 500M

Overview

The swimming pools on-board Royal Caribbean's cruise vessel had to be refurbished as the existing tile system required regular maintenance and this was causing major problems.

Challenge

Removing the existing tiles and concrete backing to expose the steel. Utilising an alternative surface preparation method to grit blasting, which could not be considered due to problems of excessive dust contamination to the surrounding areas. The client was looking for a system offering a long-term solution which did not require regular maintenance. Working within a strict time-frame also added to the difficulty of this project.

Solution

Both mechanical preparation and water jetting were utilised as the surface preparation methods to St2 and WJ-3 standards respectively. Chemco's solvent-free, wet & rust tolerant primer Epo-chem™ RS 500P was applied followed by two coats of solvent-free, wet tolerant Epo-chem™ RA 500M.

Outcome

The project was completed in 20 days, much quicker than the given time-frame. The quality of the smooth, high gloss finish and the speed of the contract were to the satisfaction of all concerned. The surface preparation method utilised and the unique solvent-free properties of the Chemco system also allowed other work to continue nearby without disruption.

Benefits

- Solvent-free
- No grit blasting
- Reduced down-time and equipment cost
- Wet & rust tolerant properties of the Chemco system
- H&S compliant
- No disruption to other work
- Chemco system offers a long-term and easily repairable solution

Continued overleaf

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2



3



Photographs

- Nos. 1-2 After Surface Preparation
- No. 3 Topcoat Being Applied on Top of Primer

CASE STUDY 8: Swimming Pool Refurbishment – Cruise Ship (cont.)

<p>4</p>  <p>16.01.2014 07:44</p>	<p>5</p>  <p>16.01.2014 09:33</p>
<p>6</p>  <p>23.01.2014 08:55</p>	<p>7</p>  <p>30.01.2014 15:54</p>
<p>8</p>  <p>30.01.2014 15:56</p>	<p>9</p>  <p>01.02.2014 06:50</p>

Photographs

- Nos. 4 and 5 First Topcoat Being Applied
- No. 6 First Topcoat Complete
- Nos. 7 - 9 Completed Application



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CASE STUDY 9: Crude Oil Tank – BP Dalmeny

Case Study



Client: BP Dalmeny	Industry: Petrochemical
Scope: Crude Oil Tank	Date: June 2007
Location: Scotland, UK	Product: Epo-chem™ RA 564

Overview

Crude oil tank (75m diameter) internal lining required to be refurbished with a minimum 17 (12 + 5) years guarantee.

Challenge

To carry out the work in as short as possible time scale. Reduce cost and duration, as any tank "out of service" costs a huge amount due to the size and volume of these tanks. The work should also be carried out in a safe manner in a working tank farm.

Solution

Two coats of Epo-chem™ RA 564 solvent-free, wet tolerant glassflake epoxy @ 500µ per coat by airless spray with no requirement for ventilation or dehumidification.

Outcome

The technical benefits offered by this system ensured that the work was carried out on time, within budget and with no H&S issues.

Benefits

- No major delays
- Minimum 9 days reduction in contract duration
- Reduced H&S and Fire Precaution
- Reduced cost of equipment
- Chemco system will protect the steel substrate in excess of 17years



Photographs:

- Nos. 1 - 3 Crude oil tank after application

CASE STUDY 10: Process Vessel – Flotta Oil Terminal

Case Study



Client: <i>Talisman Energy (UK)</i>	Industry: <i>Petrochemical</i>
Scope: <i>Process Vessel</i>	Date: <i>May 2007</i>
Location: <i>UK</i>	Products: <i>Epo-chem™ RA 564 Ceram-chem™ RH 500</i>

Overview

A large process vessel, operational temperature at around 55°C, required to be completely refurbished without any disruption to other contractors working adjacent to this area. It also had to be carried out in a very tight timescale in cold and very damp conditions during the plant shutdown.

Challenge

Working within a very tight timescale, severe pitting and corrosion, high humidity, confined space and other contractors working adjacent to the vessel refurbishment added to the difficulty of the project.

Solution

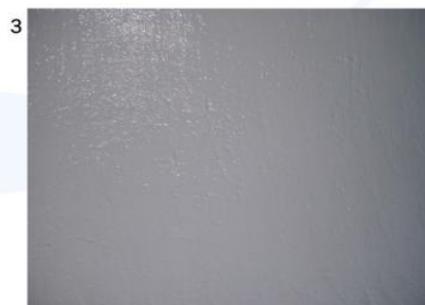
First coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system @ 500µ DFT by airless spray. All deep pitting were filled with Ceram-chem™ RH 500 solvent-free, ceramic epoxy putty. Second coat of Epo-chem™ RA 564 solvent-free glassflake epoxy system @ 500µ by airless spray. Total DFT: 1,000µ

Outcome

The major technical benefits offered by utilizing this complete system ensured that the work was carried out on time, within budget, with no major delays to the program and no impact on other contractors working in close proximity.

Benefits

- Solvent-free
- No delays
- Reduced cost of plant and equipment
- Reduced H&S and Fire Precaution
- Chemco system will protect the steel substrate



Photographs:

- Nos. 1 - 3 The process vessel after application

CASE STUDY 11: Pipework Leak Repair – Alcan Primary Metals

Case Study



Client: Alcan Primary Metals	Industry: Industrial
Scope: Leaking Pipe Work	Date: January 2003
Location: England, UK	Product: Epo-chem™ RA 500 Series

Overview

Chemco were requested by the senior mechanical engineer at Alcan Primary Metals to provide a repair system, that would not require a process shut down, to a leaking section of 60" (1,500mm) diameter of their main cooling water pipe work. The pipe work carries seawater which is used for cooling on the main condensers. The problem was perforation, close to both the VJ coupling and the pipe flange adjacent to a butterfly valve. Photograph 1 shows the extent of the leakage and the pressure involved.

Challenge

Carrying out this repair whilst on load. Isolation of this section of pipe work would result in the station having to shut down one of the generation units with considerable loss of revenue. Chemco carried out an inspection to assess the safety implications, feasibility and techniques to be employed in this critical contract. The decision was taken that by utilising Chemco special wet-tolerant polymer technology and mechanical engineering, the problem can be sorted in a very quick and cost-effective manner.

Solution

The decision was taken to manufacture a split clamping ring, designed to fit between the VJ coupling and the flange. Utilising the amazing ability of Epo-chem™ RA 500 to cure and seal underwater, the area of damage was reduced by the clamp ring being secured, leakage was reduced to a few drops per minute. Further applications of specially reinforced Epo-chem™ RA 500 laminating resin, developed for application in wet conditions, stopped the leak completely. The patch repair was completely successful until the next scheduled shut-down. Photograph 2 shows the successful sealing of the leak.

Outcome

A very costly shut-down was avoided at an extremely low cost. The contract was carried out in a safe, efficient manner and within budget.



Photographs:

- No. 1 The leakage of the pipe
- No. 2 The sealed pipe

