

1929 - 2009
80 Years of
Pipeline & Steelwork
Protection



Densoclad Tape protecting pipes in a corrosive brine field environment - see story page 4.

Volume 28 - Number 3

QUALITY & INNOVATION FROM 1883 INTO THE 21ST CENTURY



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LEADERS IN CORROSION PREVENTION & SEALING TECHNOLOGY

Denso Protection for Historic Welsh Crane

A key feature of the Llechwedd Exchange Sidings industrial archeological site on the A470 Improvement Scheme near Blaenau Ffestiniog in Wales, is a crane that first saw service in the late 1800s loading slate from the nearby quarries on to railway trucks. The site which has been designated as 'An Area of Special Archeological Importance' has been the subject of a design and build scheme, with Giffords being the designer for the original contractors, Alfred McAlpine, who are now part of Carillion plc.

For quick identification of the relevant product type used in each story we have used the following colour codes:

Protective coatings for.....

- BURIED PIPELINES & LPG VESSELS
- EXPOSED STEEL & PIPEWORK
- SUB SEA PIPELINES & JETTY PILES

Protective linings for.....

- STORAGE TANKS, PUMPS ETC

Sealing & waterproofing.....

- SEALING MASTICS
- MEMBRANES & FLASHINGS
- INDUSTRIAL TAPES



The original crane pillar is coated with Denso Paste before being wrapped with Denso Tape.



The protected crane in its final position.

Giffords designed a foundation for the original pillar of the Llechwedd crane to go in its new location. The pillar is the original 500mm diameter casting, which has been protected from corrosion by an application of Denso Paste followed by Denso Tape before being sunk 2.5 metres into the ground. Denso Tape is a non-woven synthetic fibre fabric impregnated and coated with an adhesive compound based on petrolatum.

In its former days the crane would load the slate that came down from the quarries on

narrow gauge quarry wagons to standard gauge rail wagons. Those going north to Llandudno would go through a 1½ mile long

tunnel, which was then the longest in Britain, whilst another rail line would take the slate down to Portmadog.

Project Summary

Product type: Buried Steelwork Coatings

Country:	United Kingdom
Location:	Llechwedd Exchange Sidings, Wales
Object:	Crane pillar
Problem:	Corrosion prevention
Product solution:	Denso Paste and Denso Tape



LEADERS IN CORROSION PREVENTION & SEALING TECHNOLOGY

Densoclad 70S Tape Chosen for Major 23km Pipe Wrapping Contract

Densoclad 70 and 70S Tapes were chosen for the complete protection of some 23km of pipeline lengths in a major wrapping contract recently completed by Barrier Ltd at Wallsend, Tyne and Wear. The pipeline lengths ranging in diameter from 50mm to 500mm, have been wrapped for a project in the Cheshire brine fields.

The large diameter pipes were wrapped on a motorised rolling rig specifically designed for fast throughput with Densoclad 70S Tape using rolls of 225mm wide x 60m long. Densoclad 70S was used here because it had a stiffer pvc backing to enable it to withstand the greater tension exerted by the motorised rolling rig.

The 50mm diameter pipes were also wrapped on a motorised rolling rig but Densoclad 70, 100mm x 60m was used here. Barrier reported that their customer delivery targets were not only matched but exceeded for each pipe size.

Densoclad 70S heavy duty tape is designed for corrosion prevention of large diameter pipes, welded joints, bends and fittings. The extremely tough pvc backing combined with polymer bitumen adhesive ensure complete protection and exceptional resistance to impact by poor backfill or aggressive ground conditions.

Photos:

Top: Rolling rig application of Densoclad 70S Tape to pipeline lengths at Barrier's premises in Wallsend.

Middle & bottom: Wrapped pipeline lengths in the Cheshire brine fields.



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Project Summary

Product type: Buried Pipeline Coatings

Country:	United Kingdom
Location:	The Cheshire brine fields
Object:	Pipe lengths
Problem:	Corrosion prevention
Product solution:	Densoclad 70S and 70 Tape



LEADERS IN CORROSION PREVENTION & SEALING TECHNOLOGY

Archco-Rigidon Protects Oil Production Water Filter System

Forsythe Ltd of Rothes, Moray, N.E. Scotland, recently completed the fabrication of five vessels which make up a water disposal media filter system destined for oil production in Azerbaijan.



In order to give maximum internal corrosion protection the vessels were first shot blasted and then given a spray application of Archco-Rigidon 403D vinyl ester glass filled coating. The two largest of the five vessels

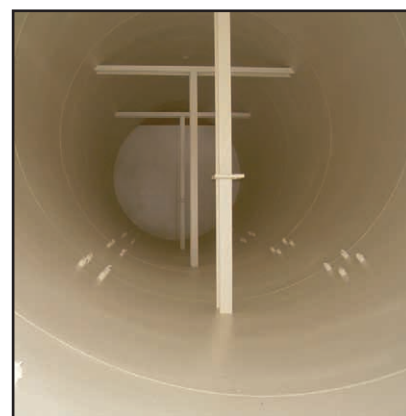
internally coated have a capacity of 268 cubic metres.

The work was carried out by Forblast who are Forsythe's specialist coating subsidiary company.

The contract was placed with



Forsythe and Forblast by Petreco Ltd of Rugby, who were working directly for the Azerbaijan International Operating Companies (AOIC). Member companies of AOIC include BP, Statoil and ExxonMobil, among others. Once installed in Azerbaijan the 'Produced Water Disposal Media Filter System' will allow significant increase in the production of oil.



Project Summary

Product type: Industrial Tank Linings

Country:	United Kingdom
Location:	Moray, N.E. Scotland / destination Azerbaijan
Object:	Steel vessels
Problem:	Internal corrosion prevention
Product solution:	Archco-Rigidon 403D

ARCHCO RIGIDON
Resistant  Materials

Photos:

Top: Spray application of Archco-Rigidon 403D.

Left: One of the five vessels.

Above: Internal shot of the vessel showing the completed lining.



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Denso Canada Coatings Application Certification Process

One of the biggest challenges facing the coating industry today is ensuring that the proper application techniques are being performed to the correct specifications and manufacturers' guidelines during the entire coating application period.

If a coating is not applied properly by the applicator, it is in some instances better not to apply a coating at all. Unfortunately when a coating fails the first to take blame is the coating itself, although most of the time the problem is actually caused by the improper method of application or incorrect surface preparation. This is a global problem without a simple solution.

In Canada, Denso works closely with industry to try and ensure people are educated on the proper installation practices for all of our coating lines; this includes working with personnel from engineering firms, owner companies, contractors and coating specification writers and inspectors.

Although we are very attentive to all the Denso products, our liquid coatings require the highest level of diligence from an applicator/contractor standpoint due to the necessity for more detailed procedures for surface preparation and application.

One of the controls we have put into place to try to ensure that our products are being applied properly is by conducting certification/training programs and issuing certificates to the approved contractor for both field/ hand applied and spray applied coatings.

Field Certification (Hand application)

One area requiring certification for application of Denso liquid coatings is in the hand applied (brushes, rollers, trowels) application to girth welds or welded joints of pipe in a new pipeline installation. This task takes place in the pipeline right of way and will see a wide range of variables that challenge the task of proper installation - from inexperienced coating crews to extreme weather conditions.

These conditions require conscientious attention if the coating is to be applied properly.

One must remember that some of these projects have tens of thousands of joints and contractor negligence can contribute to catastrophic failures even if only a few joints are poorly completed.

The certification process is completed by a recognized Denso representative observing the actual application process in the field and taking the necessary measurements for

Above and below: Denso certification cards are issued for hand applied applications that are considered of an acceptable standard.



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surface profile, dew point, pipe temperature, wet film thickness (WFT), dry film thickness (DFT), hardness, etc.

This observation may include some destructive testing also. Once the process has been completed satisfactorily and the contractor has shown proper diligence, certification cards are issued to the crew. This is a process that usually takes place at the start of a project and may need to be repeated depending on the duration of the project. These certification cards are made out to the individuals and are valid for one year.

Spray Application Certification

The spray certification process is different in the sense that when granted it gives certification to a company, usually a shop coating facility which may also provide field applied spray services. The market is such in Canada that spray application represents opportunities for coating of underground or submerged piping and the internal linings of tanks with Denso liquids.

The certification process is a more involved procedure from a Denso standpoint, where all measurements taken in the field applied/hand certification are repeated in the coatings application shop and, an actual spray out with the Denso spray-grade coating is observed on a pipe sample. This sample is then sent to a coatings evaluation lab for testing. These independent, third party tests include adhesion, cathodic disbondment and more thorough DFT set of measurements.

A systematic facility

inspection is also done, including observations of equipment maintenance, a review of the shop QA/QC policy, pipe capacity and handling capabilities, shop cleanliness, etc. The certification granted in this instance is reviewed regularly and re-approval takes place when there is a change of ownership or there is a time period greater than two years between the applications of Denso products.

Conclusion

Denso Canada has offered this no charge service to our clients for many years now. It goes without saying that the application process is much better served in all cases with a competent, full time NACE Certified Coatings Inspector on-site who is involved for the length of the project.

For Denso, as a coatings manufacturer, these certifications are a constant work in progress due to labour turnover and changes in the market place and it is a topic that we take very seriously in Canada. Owner companies are very receptive to this QC mechanism and view it as good customer service and value added to the product.



An example of a Denso spray application certificate.



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Kinder Morgan Rockies Express Pipeline (REX) uses Denso Protal 7125

New pipeline coating applications in the Midwest and Northeast USA can be very challenging during the cold weather months with temperatures below freezing. Protal 7125 was chosen as the girth weld coating for the winter months on the Kinder Morgan Rockies Express Pipeline (REX) Project. Once completed the REX Pipeline will be 1,679 miles of 42" diameter pipeline. It will be the largest continuous gas pipeline ever built in the United States and will extend from Colorado to New Jersey.

The Protal 7125 is a fast cure, low temperature liquid coating that can be applied in temperatures down to -4°F (-20°C). This allowed the coating crews to proceed without delays of preheating and

no down-time due to cold weather. The girth welds were prepared to SSPC-SP 10/NACE No. 2. The coating was spread out by brush taking approximately 5-8 minutes to complete each joint.



Mixing of Protal 7125.

Completed section of the Kinder Morgan REX Pipeline





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Applying Protal 7125 by brush.



Above: Applying Protal 7125 at 50 mils for directional drill on 42" diameter pipe.
Below: Coated girth weld with Protal 7125

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On directional drill joints the coating was applied at 50 mils in one coat and on the main line girth welds the coating was applied at 25-30 mils in one coat. Protal 7125 is also being used for tie-ins and patching of the damaged FBE main line coating.

The project will continue through the summer of 2009 in which our Protal 7200 will be used on many of the remaining girth welds during the warmer months. The versatility of our line of Protal Liquid Coatings has provided Kinder Morgan and the contractors the advantage of dealing with severe temperature ranges with no project delays.

Denso manufactures a full line of Protal Liquid Coatings that are considered the choice by owners, oil and gas engineers and contractors across North America.



Project Summary	
Product type: Buried Pipeline Coatings	
Country:	United States of America
Location:	Midwest USA
Object:	Coating of buried 42" natural gas pipeline girth welds
Problem:	Corrosion prevention
Product solution:	Denso Protal 7125



LEADERS IN CORROSION PREVENTION & SEALING TECHNOLOGY

DENSO S43/R23 PROTECTS SASOL GAS LINE

Denso South Africa supplied Sasol Gas with the Denso Butyl S43/R23 System for the protection of 2km of 6" pipeline.

RPN Pipelines installed the pipeline and Isotec were the contractors who applied the tape with our Densoman wrapping machines.

In total 2500 sq.m. of the inner and outer wrap were supplied. The job was completed in time to the satisfaction of the client.

The 6" gas pipeline protected by the Denso Butyl S43/R23 System.

Project Summary

Product type:
Buried Pipeline Coatings

Country:	South Africa
Location:	Gauteng Province
Object:	Gas pipeline
Problem:	Corrosion prevention
Product solution:	Denso Butyl S43/R23 System



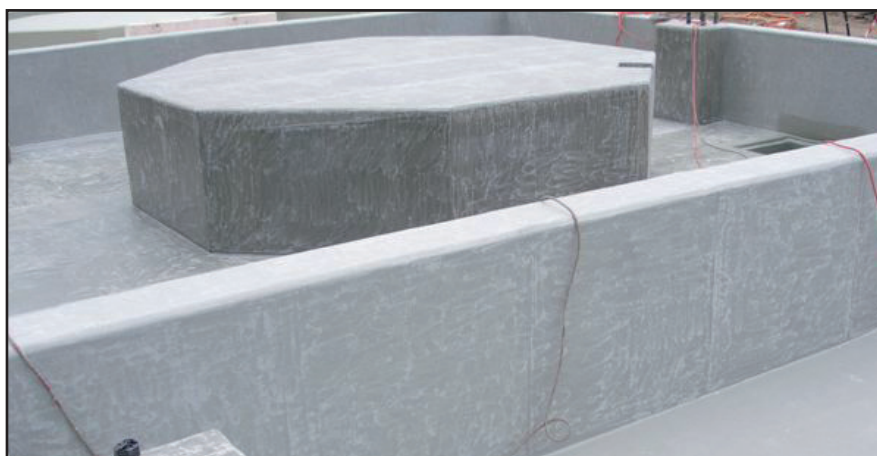
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Archco-Rigidon Protects Concrete Acid Bund Area

A concrete bund on the new desalination plant in Sydney, New South Wales has had Archco-Rigidon 701ESR specified and applied to protect it from spillages of various aggressive chemicals such as solutions of Ferric sulphate (up to 40%), sodium hypochlorite, sodium bisulphate and fluorosilicic acid amongst others. The Ph ranged from 2 to 4 during operations. The ground underneath the bund is reclaimed compacted clay as the plant was built on swamp land south of Sydney.



substrate moisture content was never below 9% due to the swamp area. The substrate was prepared by wet abrasive blasting before application of 2 coats of epoxy primer in attempt to rectify concrete porosity. The 701ESR was trowel and roller applied to an overall nominal dry thickness of 3mm.

Left: The bund during the application of the Archco-Rigidon 701ESR lining.

Above: The complete 3mm thick application.

Archco Rigidon 701ESR, and epoxy novolac resin glass fibre matt laminate was selected for the work due to its excellent performance in trials when immersed in 98% sulphuric acid and previous successful case histories.

A local contractor, Eptec carried out the work with ambient temperatures of 15°C to 28°C during application. The concrete

Project Summary

Product type: Industrial Bund Linings

Country:	Australia
Location:	Sydney, New South Wales
Object:	Concrete bund in desalination plant
Problem:	Resistance to chemicals and acids
Product solution:	Archco-Rigidon 701ESR