

1.0 Introduction

LycoPro-Finish is an Aluminum anodic flame spray and Urethane over coating. This space age coating withstands the most abrasive and corrosive environments, such as salt spray (fog). Available as an option, this treatment can be applied to meter risers as added protection against severe environmental conditions.

2.0 Method of Application

Applications of LycoPro-Finish starts with a cleaned substrate and a grit blast of the upper casing area of the riser, the blast overlaps onto the epoxy area by approximately 3/8 in.. Once this 3 - 5 mil angular profile is achieved the Aluminum Flame Spray is applied in seconds. This 99% pure aluminum is then flame applied to provide a mechanical anodic bond to the steel substrate overlapping onto the epoxy coating. Aluminum rich Urethane is then automatically brush applied over the flame applied aluminum and epoxy to provide an anodic corrosion resistant barrier.

3.0 Corrosion Resistance

Aluminum sprayed coating 0.003 in. to 0.006 in. thick, both sealed and unsealed, give complete base metal protection from corrosion in seawater and also in service marine and industrial atmospheres. Thin coats of aluminum perform better because they have less tendency to develop pits and blisters and therefore extended life is expected. While aluminum coatings show damage such as chips or scrapes, corrosion did not progress, suggesting the occurrence of galvanic protection.

4.0 Test Results

4.1 American Welding Society 19 Year Report

The following are results obtained from American Welding Society 19 year report published in 1974.

4.1.1 Seawater*

The seawater exposure test sites were Freeport, Texas, Wrightsville Beach, North Carolina. Aluminum sprayed panels at these test sites show a few blisters which originate at the coating-steel interface. The heavier the coating, the larger the blisters (as large as 5/16 in. diameter in some cases). In those cases where a blister had broken open, the exposed steel was relatively free of corrosion. A layer of iron oxide was present, but no measurable loss of steel was evident. While the aluminum surrounding these broken blisters probably contributed to the protection of the steel, there was no significant evidence of aluminum corrosion. In all cases base metal was not attacked.

4.1.2 Marine Atmosphere*

The salt air exposure test sites were Brazes River, Texas, Kure Beach North Carolina and Point Reyes, California. Aluminum sprayed panels at these test sites had a dull, gray-brown, blotchy appearance, with evidence of blistering in thickness' greater than 0.003 in. which originate at the coating-steel interface. The heavier the coating, the larger the blisters (as large as 1/8 in. diameter in some cases). Blisters did not appear to be as prevalent on the groundward surfaces. In all cases base metal was not attacked.



4.1.3 Industrial Atmosphere*

Unsealed 0.003 in. thick aluminum coatings showed, on the skyward surface, many black nodes of corrosion due to retained contamination, The groundward surface was gray to black in color with some indication of nodular corrosion. No rusting of the base metal was evident.

** Further detailed information is contained in the 19-Year Report on corrosion tests of Flame-Sprayed Coated Steel published by the American Welding Society ISBN 0-87171-111-7*

4.2 Urethane Over Coating

The Urethane Over Coating gives a sealing effect to the aluminum flame spray coating. This material is a aluminum rich urethane based primer which is extremely adhesive and chemically inert. This material is applied with automatic brush system, and cures by reacting with atmospheric moisture. Performance of this material alone follows:

Salt Spray (Fog):

ASTM B117, Two application coats applied to SSPC-SP.6 prepared steel. Result: No blistering. cracking, softening or delamination of film. No rust creepage at scribe after 1500 hours.

Humidity:

ASTM D3359, Two application coats applied to SSPCSP-6 prepared steel. Result: No blistering. cracking, softening or delamination of film. No rust creepage at scribe after 1500 hours.

Adhesion:

ASTM D4541, One application coat applied to SSPCSP.6 prepared steel. Result: Greater than 1000 psi pull (3 trials average).

Abrasion:

ASTM D4060, One application coat applied to SSPCSP-6 prepared steel. Result: Less than 75 mg loss after 1000 cycles using a CS-17 wheel with 1000 gram load.

Exterior Exposure:

Industrial Exposure (45 degree south). One application coat applied to SSPC-SP-6 pre. pared steel. Result: No blistering, cracking, softening or delamination of film after 5 years.

4.3 R. W. Lyall & Company Laboratory Tests

ASTM 8117 Salt Spray (fog): Samples were prepared on the production line with a minimum grit blast profile of 3 miis, the upper riser portions were then aluminized and four treated with urethane primer, three without. A salt fog was applied at a temperature of 95 degrees Fahrenheit for a duration of 2800 hours. Results are as follows:

The four samples with aluminum flame spray (aluminizing) and the aluminum rich urethane primer showed no signs of rust or nodular corrosion after 2800 hours of exposure. Staining was not observed either, only slight build up of oxides and salt deposits. The three samples without the urethane were almost identical to the samples with the urethane. The epoxy/aluminizing spray overlap showed no signs of rust or discoloration

