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Relative Corrosion Performance of Primers in Accordance with ASTM G85 : A5 - 2009

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Providing Indicators of Future Performance

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1 Introduction

The Accelerated Weathering Laboratory (AWL) Ltd was approached by Simon Kinnersley of Oxidos De la Malaga with a requirement for relative performance testing of 2 red oxide primers. The samples were identified by Oxidos as follows:

Sample 1 BCP (N)

Sample 2 BCP (S)

Samples were received at AWL Ltd in the premixed condition, and each sample applied to 4 mild steel test panels (150 x 75mm) by roller in a consistent manner to achieve maximum thickness in one single coat to full coverage of the panel. All test panels were prepared using new rollers and trays for each sample to avoid cross contamination.

After ageing for 48 hours at 23^{o}C and 50% RH, all samples were cross cut to substrate in order to provide relative performance after 500 hours exposure in accordance with ASTM G85 : A5 – 2009 based on the following criteria:

- Ability to provide an effective barrier coating to withstand perforation (resistance to isolated blistering and rust spotting)
- Ability to provide minimal undercut corrosion from the cross cut (assessed as the mean width of blistering and/or peeling from each side of the cross cut or scribe)

Samples were further prepared by encapsulating the edges of each test panel with PP adhesive tape to avoid panel edge corrosion and it was agreed that intermediate inspections with photographs were to be taken at 100 hour intervals to establish 'first signs' of any perforation / undercut corrosion that may occur during exposure.

2 Overview and History - ASTM G85 : A5 – 2009

This test was recommended by AWL Ltd as it is particularly relevant to paints on steel. It has provided good correlation with real time exposure tests, particularly from industrial areas were airborne contaminants such as nitrates and sulphides are present, and it was considered the preferred option to neutral salt spray testing (ASTM B117 – 2007).

It began its development in the 1960's when J.B Harrison and T.C.K Tickle began experiments using a diluted mixture of sodium chloride to replace the 5% sodium chloride solution used in standard neutral salt spray tests (ASTM B117) which has shown poor correlation with real time exposures.

Then in the 1970's F.D. Timmins along with Mebon Paint, a UK manufacturer of surface coatings decided to dilute the solution to its presently used concentration (0.05% sodium chloride – 0.35% ammonium sulphate). They also reduced the chamber temperature during fogging to ambient from 35°C to more closely simulate natural weathering.

F.D. Timmons coined the term "Prohesion" from **Pro**tection is Ad**hesion,** and it is still referred to as the PROHESION Test.

3 Test Cycle and Profile

All sample panels were tested using a Q-Fog CCT600 cyclic corrosion chamber and exposed in accordance with ASTM G85:A5-2009 which comprises of the following 2 part repeating cycles:

- 1.0 hour exposure to a continuous indirect spray of dilute salt and ammonium sulphate solution which falls-out on to the samples at a rate of 1.0 to 2.0ml/80cm²/hour at an ambient temperature 23°C followed by:

- 1.0 hour exposure to an air drying (purge) climate at 35°C. The number of cycle repeats or test duration is variable depending on the type of coating tested, and with these paints systems 500 hours duration was chosen by AWL Ltd to provide the necessary corrosive conditions and duration to establish relative performance for each sample as a barrier coating on mild steel.

3.1 Test Results and Photographs

The following photographs show performance before and after testing. The photographs shown within this report are typical of the group of 4 tested.

4 Test Results – Sample 1 BCP (N)

4.1 Photographs at 0 and 500 hours Exposure

Fig 1

Sample 1 – BCP (N) @ 0 Hours

Fig 2

Sample 1 – BCP (N) @ 500 hours

5 Test Results – Sample 2 BCP (S)

5.1 Photographs @ 0 and 500 hours

Fig 3

Sample 2 – BCP (S) @ 0 Hours

Fig 4

Sample 2 – BCP (S) @ 500 hours Exposure

6 Undercut corrosion @ 500 hours

6.1 Sample 1 BCP (N) vs. Sample 2 BCP (S)

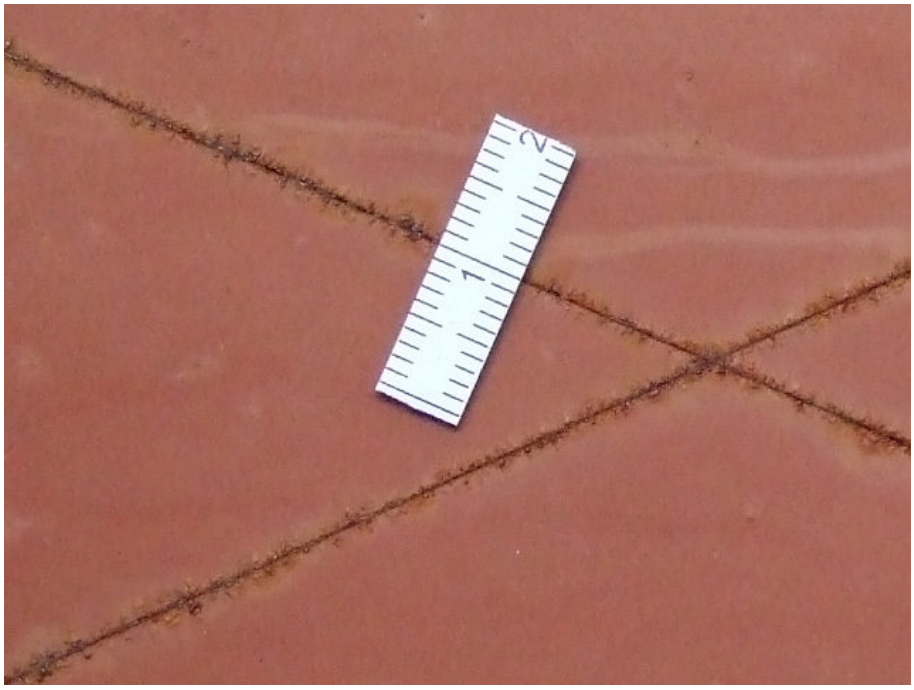

Fig 5

Sample 1 – BCP (N) undercut corrosion estimated at 1.0 to 1.5mm

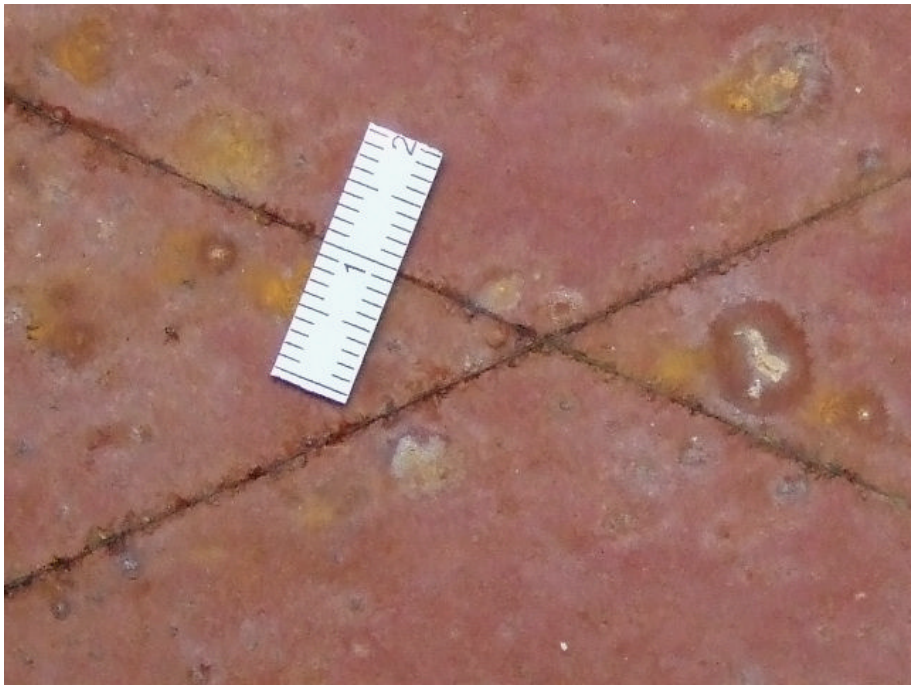

Fig 6

Sample 2 – BCP (S) undercut corrosion estimated at 1.0 to 1.5 mm with significant perforation

7 Results and Conclusion

- Sample 1 – BCP (N) showed superior performance as a barrier coating due to resistance to perforation compared with Sample 2 – BCP (S)

- Undercut corrosion from the cross cut was similar for both samples

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