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REPORT

Fuel and water resistance testing of HUMIDUR FP

Introduction

Upon request, FORCE Technology has tested HUMIDUR FP from the company Acotec NV. The company has informed that the product is a solvent-free, polyamine-cured epoxy lining.

The test carried out was a fuel and water resistance test with Jet Fuel type A-1 in accordance with MIL-PRF-4556F¹, sections 4.3.17 and 4.3.18.

In compliance with the mentioned test, coated panels were immersed in a heated mixture (1:1 v/v) of distilled water and Jet Fuel Type A-1. The temperature was 51-53 °C and the duration of the immersion was 21 days, Figure 1.



Figure 1: The test bath with the two panels immersed in the water/fuel mixture in the glasses.

At the end of the test period, the panels were removed and examined immediately and after 24 hours.

¹ Performance specification. Coating kit, epoxy, for interior of steel fuel tanks. MIL-PRF-4556F, 15 December 1998.

The test panels

The front side of two test panels (sized 155 x 80 x 7 mm) had been painted by Acotec NV with a single coat of HUMIDUR FP. Upon arrival to FORCE Technology, we painted the reverse sides of the coated panels with the same product, and then the panels were left to cure for one week at ambient indoor temperature. Then the dry film thicknesses of the front side coating were measured and the panels immersed as described in [1]'s section 4.3.17, removed after 21 days and examined.

Test results

Dry film thickness

Mean value: 1660 μm . 19 readings on the two panels.

Surface hardness

When examined according to [1]'s section 3.6.8., the surfaces exposed to the water phase and the solvent phase did not show any softening from the test.

Blistering

When examined according to [1]'s section 3.6.8., none of the surfaces showed any sign of blistering.

Adhesion test

According to [1]'s section 4.3.18., the adhesion of the coating shall be evaluated 24 hours after the immersion test period, and the testing regime is ASTM D3359, method B (cross cut method). However, as the dry film thickness (DFT) of the coating was above 5 mils ($\approx 125 \mu\text{m}$), method B cannot be used, according to the ASTM D3359 standard. For coatings with a DFT above 5 mils, the ASTM D3359 standard states that the X-cut method, method A, is to be employed instead.

Following the X-cut method, two straight cuts - approximately 40 mm long - through the coating to the substrate are made in the film. The cuts intersect near the middle with a small angle between 30° and 45° . 6 X-cuts were made on each panel (3 in the water area and 3 in the fuel area) and the X-cut areas were inspected for removal of the coating from the substrate.

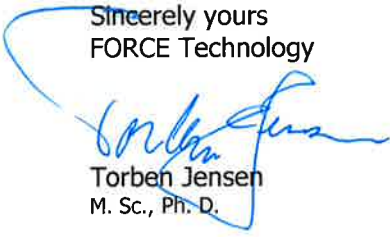
The result was no peeling or removal, or trace peeling or removal in the X-cut area. Ratings are 4A-5A, ASTM D3359, Method A.

MIL-PRF-4556F's section 3.6.9 states that the adhesion on both areas shall have a rating of minimum 3B.

Conclusion

HUMIDUR FP applied in one coat complies with the fuel and water resistance test in accordance with MIL-PRF-4556F, section 4.3.17 and 4.3.18. ASTM D3359, Method A, was used in the test.

Sincerely yours
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