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PROTECTIVE COATINGS (PAINT) CONSULTANTS: Testing • Instruments • Inspection • Analytical Laboratory

February 3, 1999

Mr. H.L. Ha, President
SamKumSa, Ltd.
59-23, 3-KA, Chungmu-Ro
Chung-Ku, Seoul, Korea 137-130

SUBJECT: Results of IICL Paint Testing of System 3 – SamKumSa, Ltd.; 980669

Dear Mr. Ha:

In accordance with your transmittal of September 23, 1998, KTA-Tator, Inc. (KTA) has completed the application and testing of one (1) coating system in accordance with the general and detailed procedures of the Institute of International Container Lessors (IICL). The system was tested as an exterior system. This report contains the application and testing procedures as well as the results of the corrosive, mechanical and cosmetic evaluations conducted on the test specimens.

SUMMARY

One (1) three-coat exterior system (SamKumSa, Ltd. Zinky #200Z/Fostite #5000/Uni-Rubber HB) was tested in accordance with IICL procedures. The final rating of the system was (95), which is between the minimum and maximum rating of 70/100. Supporting data for the rating is provided in Tables IV - IX, appended.

LABORATORY INVESTIGATION

The laboratory investigation consisted of specimen preparation, testing and evaluation.

Specimen Preparation

Palmer Newark provided the corten steel test panels for this project. The panels consisted of 3" x 6" x 1.6 mm (16 gauge) steel conforming to JIS G3101, SS41. Prior to coating application, all test panels were abrasive blast cleaned to Swedish Standard SA 2 ½ (near-white metal) with a nominal surface roughness (R_a) of 20 to 40 microns.

Once blast cleaned, a three coat system consisting of Zinky #200Z (an epoxy zinc-rich primer), Fostite #5000 (an epoxy zinc phosphate intermediate) and Unirubber HB(a chlorinated

rubber topcoat) manufactured by SamKum Sa, Ltd. was applied by KTA in accordance with the manufacturers instructions, using conventional (pressure pot) spray application. Mr. H.M. Byun, Director, was present during the application of the coating system.

Table I in the appendix contains a summary of the system tested during this program. The product data and MSDS sheets for each coating material tested are appended.

Table II in the appendix is a summary of the curing conditions for the coating system. The products requiring an ambient (room temperature) cure were actually cured longer than the manufacturers suggested minimum. The final coating system was force-cured at 70°C for 20 minutes. The completed coating system was permitted to cure a minimum of seven (7) days at room temperature prior to testing.

Table III in the appendix is a summary of the target and actual dry coating thickness data obtained on the test specimens for each of the coatings.

Testing and Evaluation

The testing of the cured coating system entailed color and gloss before and after cyclic weathering (exterior systems only), and evaluations for blistering, degree of rusting, undercutting, adhesion, and impact resistance after cyclic weathering.

The coating system was subjected to cyclic testing (exterior cycle). The cycle consisted of 72 hours in an ASTM G-53 UV/condensation apparatus (QUV) programmed for eight hours of UV at 60°C (using UVA-340 lamps) and four hours of condensation at 50°C. Following the 72 hours in the QUV chamber, the panels were placed in a Q-Fog (Prohesion) cabinet and subjected to 96 hours of a cycle consisting of four hours wet at 30°C followed by two hours dry at 40°C. Accordingly, each cycle consisted of 72 hours in the QUV cabinet followed by 96 hours in the Prohesion cabinet, for a total of eight (8) cycles (56 days).

At the end of the 56 days of cyclic weathering, the coated specimens were evaluated for blistering (ASTM D714), rusting (ASTM D610), undercutting (ASTM D1654, modified), adhesion (ASTM D3359), and reverse/direct impact resistance (ASTM D2794). In addition, the system was evaluated for pre- and post-exposure color (ASTM D2244) and gloss (ASTM D523) retention.

The blistering and rusting results are shown in Table IV, appended, along with the IICL unit value and points scores. The undercutting results are contained in Table V, also appended, along with the IICL unit value and points scores. The adhesion and impact resistance results are contained in Table VI, along with their respective scores, and the color and gloss results are contained in Tables VII and VIII, respectively. All evaluations and scoring methods were performed in accordance with the instructions in the IICL method.

The final tabulation of test scores is contained in Table IX in the appendix.

DISCUSSION

One (1) exterior three-coat system (Zinky #200Z epoxy zinc-rich primer, Fostite #5000 epoxy zinc phosphate intermediate coat and Unirubber HB chlorinated rubber topcoat) manufactured by SamKumSa, Ltd. was applied, tested and evaluated in accordance with the IICL procedures. Table IX in the appendix summarizes the performance of the system. Briefly, scores are obtained for three categories for exterior systems (corrosive, mechanical, and cosmetic). The IICL procedures list a suggested minimum score for each category, and also for the final point total. In terms of the total score, the system scored a (95), which exceeded the IICL recommended minimum (70). Detailed scores for the coating system for each category are included in Table IX.

If you have questions or comments regarding the information contained herein, please do not hesitate to contact this office.

Very truly yours,

KTA-TATOR, INC.



William D. Corbett
Corporate Products Manager

WDC/RNR:wc

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