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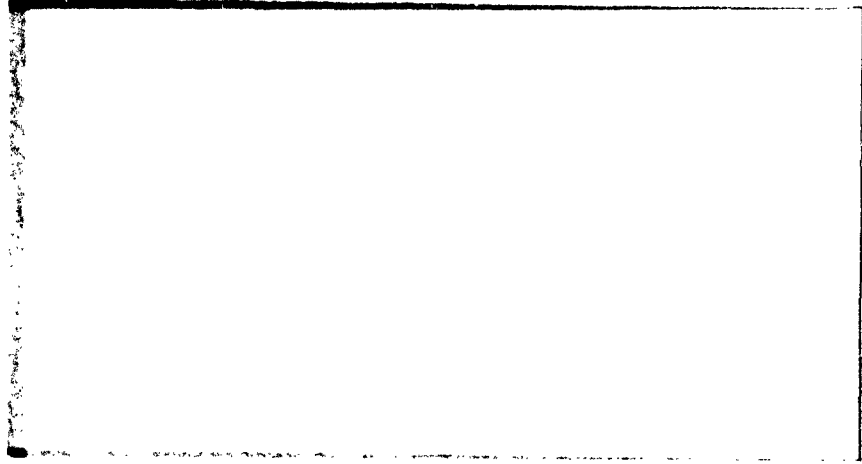
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DATE 10 December 1963

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COMPARISON OF CORROSION

RESISTANCE OF ZINC

CHROMATE PRIMER TO

EPOXY PRIMER

REPORT A264 SERIAL NO. 18

MCDONNELL

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DATE 12 May 1962

ST. LOUIS, MISSOURI

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REVISED (A) 5-23-62

REPORT A264

LABORATORY REPORT

REVISED _____

SYSTEMS LABORATORY

FINAL REPORT

COMPARISON OF CORROSION RESISTANCE OF ZINC CHROMATE PRIMER TO EPOXY PRIMER

ABSTRACT

The need to apply epoxy finishing systems to stock primed with zinc chromate primer has made it necessary to determine if the corrosion resistance of this system is adequate. It is also desired to use only one coat of epoxy primer on stock not already primed with zinc chromate primer provided adequate corrosion resistance can be attained.

Test assemblies were fabricated of 7178-T6 non-clad aluminum panels. Panels covered with one coat of epoxy primer and panels covered with one coat of epoxy primer over one coat of zinc chromate primer were riveted to control panels covered with two coats of zinc chromate primer. The eight assemblies were exposed to salt spray corrosion tests conducted in accordance with Federal Test Method Standard 151a, Method 811.1* Assemblies were removed from the test environment at intervals of 168 hours, until all specimens had been removed.

Examination revealed no corrosion on any of the test specimens after exposure to the salt spray environment for periods up to 672 hours. The single epoxy primer coat and the single epoxy primer coat over one coat of zinc chromate primer are considered equal in salt spray corrosion resistance.

*20 percent salt spray environment

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Chemical Group

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Chief, Systems Laboratory

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Laboratory Project Engineer

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E. Pieper*, E. K. Welhart, R. Goran* (*abstract only)

FINAL REPORT

1. INTRODUCTION

The need to apply epoxy finishing systems to stock primed with zinc chromate primer has made it necessary to determine if the corrosion resistance of such a system is adequate. It is also desired to use only one coat of epoxy primer on stock not already primed with zinc chromate primer, provided that adequate corrosion resistance can be attained. These tests were performed to compare the corrosion resistance of two coats of zinc chromate primer to (a) one coat of epoxy primer, and (b) one coat of epoxy primer over one coat of zinc chromate primer.

2. TEST MATERIALS

The following test panels and primer materials were used:

- (a) Sixteen panels of .040 gauge 7178-T6 non-clad aluminum, 3.0 x 7.0 inches (MIL-A-9180 Cond T6)
- (b) MIL-P-8585 zinc chromate primer
- (c) MMS-405 epoxy primer (yellow)

3. SPECIMEN PREPARATION

The sixteen panels were MIL-C-5541 treated in accordance with PS 13209. Four of the panels were then primed with one coat of zinc chromate primer per PS 13301 and one coat of epoxy primer per PS 13415 (paragraph 5.452); these panels were riveted to four control panels and identified as Type I. Four panels were primed with one coat of epoxy primer per PS 13301 (paragraph 5.452); these panels were riveted to four control panels and identified as Type II. The eight control panel specimens received two coats of zinc chromate primer applied per PS 13301.

4. TEST PROCEDURE

The eight assemblies were exposed to a salt spray corrosion test conducted in accordance with Federal Test Method Standard 151a, Method 811.1. A Type I and a Type II panel were removed at intervals of 168 hours, inspected for corrosion, and photographed. This procedure was followed until all assemblies had been removed from the test environment.

4. TEST RESULTS

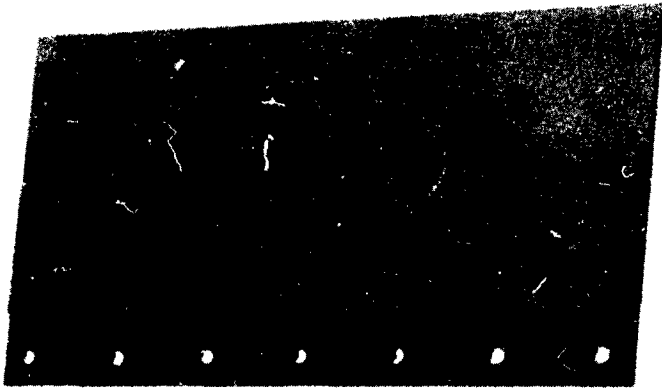
No corrosion was detected in any of the exposed assemblies. Color photographs of each of the assemblies after removal from the test environment are shown on pages 3 through 6.

5. CONCLUSIONS

The tested assemblies exhibited no signs of corrosion and the two primer coating systems are considered equal in salt spray resistance.

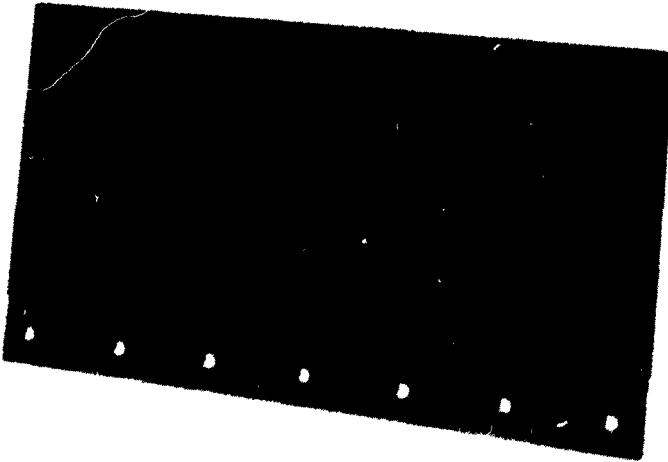
* 20% salt spray environment

TR 052 952
SALT SPRAY EXPOSURE TEST



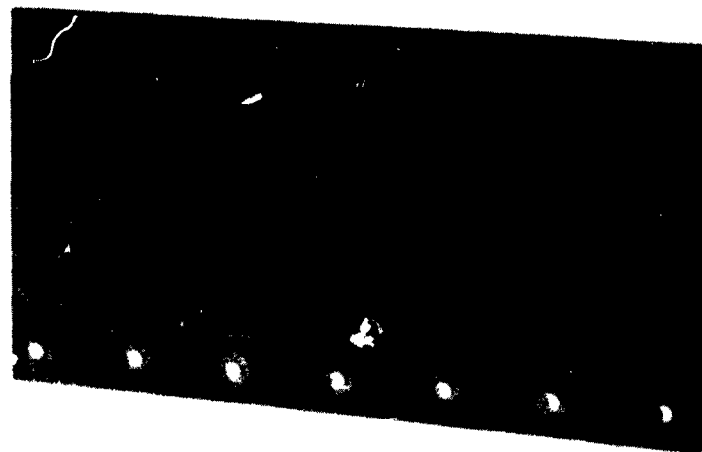
TYPE II SPECIMEN

EXPOSURE TIME 168 HRS
PER FED TEST STD 151
METHOD 811.1

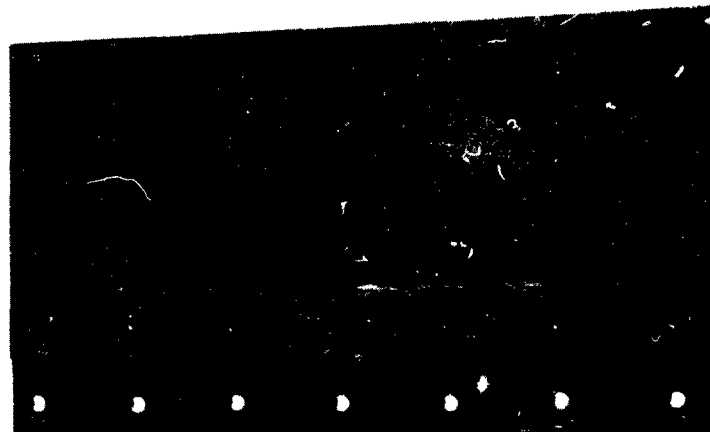


TYPE I SPECIMEN

TR 052 252
SALT SPRAY EXPOSURE TEST



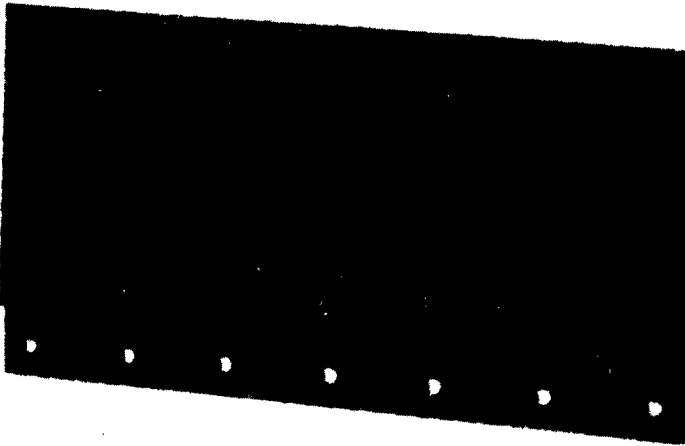
TYPE I SPECIMEN



TYPE II SPECIMEN

EXPOSURE TIME 336 HRS
PER FED TEST STD 151
METHOD 811.1

TR. 032-952
SALT SPRAY EXPOSURE TEST



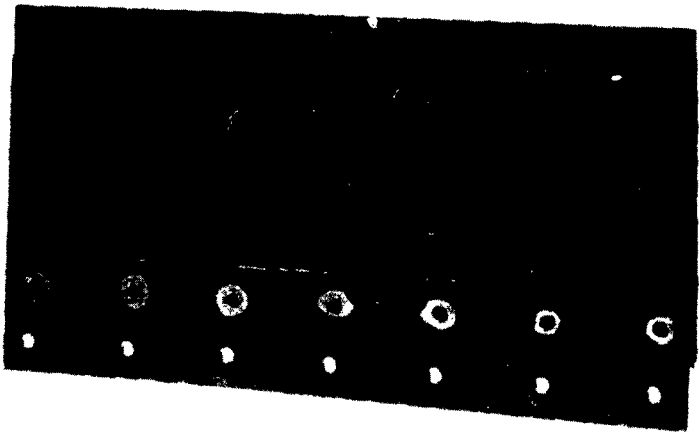
TYPE I SPECIMEN



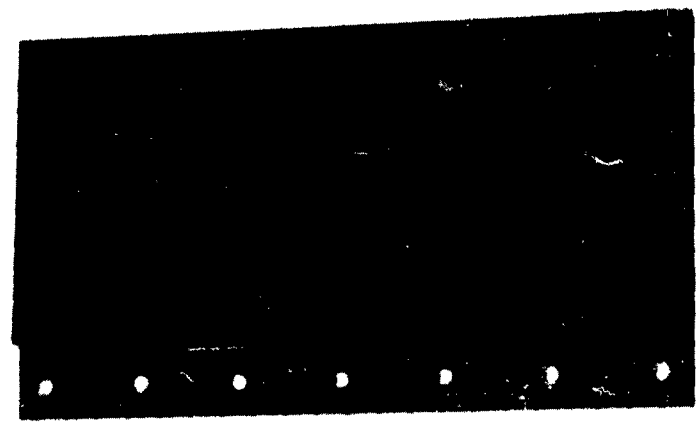
TYPE II SPECIMEN

EXPOSURE TIME 504 HRS.
PER FED. TEST STD 151
METHOD 811.1

TR. 032-952
SALT SPRAY EXPOSURE ILSI



TYPE I SPECIMEN



TYPE II SPECIMEN

EXPOSURE TIME 672 HRS
PER FED TEST STD 151
METHOD 811.1

TEST REQUEST

TITLE COMPARISON OF CORROSION RESISTANCE OF ZINC CHROMATEPRIMER TO EPOXY PRIMER

LABORATORY OR DEPT. RESPONSIBLE FOR TEST

P.252 RRF/EMP 2-12-62

MODEL

FLH

TEST PARTS ON IBM ON TPL NO.

APL/EPI

PRODUCTION PARTS FOR TEST NOT REQUIRED

None

WORK REQUESTED

OBJECTIVE (GIVE PURPOSE OF TEST, WORK AND DATA REQUIRED
INCLUDING SERVICE HISTORY AND BACKGROUND INFORMATION)1.0 OBJECT

Compare the corrosion resistance of two coats of zinc chromate primer to:

- A. One coat of epoxy primer
- B. One coat of epoxy primer over one coat of zinc chromate primer.

2.0 JUSTIFICATION

It is necessary to apply the epoxy finishing system to stock already primed with zinc chromate. Since stripping is a costly operation, it is desired to apply epoxy primer over the zinc chromate provided the corrosion resistance of this system is adequate. It is also desired to use only one coat of epoxy primer on stock not already primed with zinc chromate provided adequate corrosion resistance can thus be obtained.

3.0 MATERIAL

- 3.1 Sixteen (16) panels of .040 gauge 7178 T6 nonclad aluminum measuring 3.0" x 7.0" (Mil-A-9180 Cond. T6).
- 3.2 Mil-P-8585 Zinc chromate primer
- 3.3 MMS-405 Epoxy primer

4.0 SPECIMEN PREPARATION

- 4.1 Mil-C-5541 treat all 16 panels per MAC P.S. 13209.
- 4.2 Prime eight (8) panels with two coats of zinc chromate primer per MAC P.S. 13301 for control panels.
- 4.3 Prime four (4) panels with one coat of epoxy primer per MAC P.S. 13415 Para. 5.452.
- 4.4 Prime four (4) panels with one coat of zinc chromate primer per MAC P.S. 13301 and one coat

REFERENCES OR ENCLOSURES

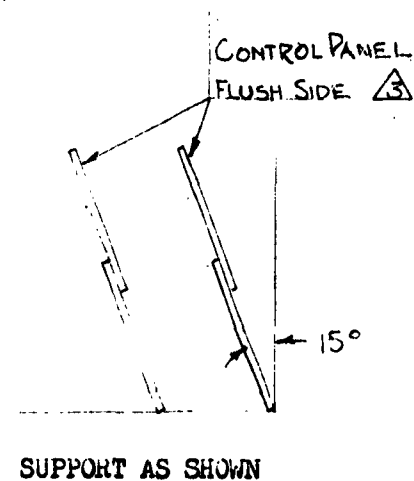
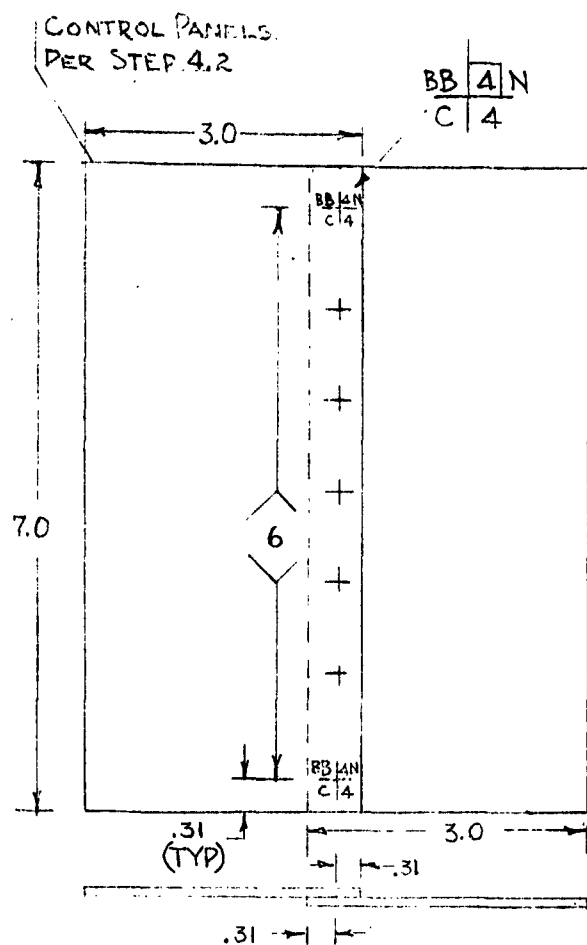
- 4.4 (Continued)
of epoxy primer per P.S. 13415, Para. 5.452.
- 4.5 Rivet the four panels in 4.3 to four of the eight panels in 4.2 per Figure 1. Identify these four assemblies as Type I.
- 4.6 Rivet the four panels in 4.4 to the remaining four panel in 4.2 per Figure 1. Identify these four assemblies as Type II.

5.0 TESTING

- 5.1 Subject the eight (8) assemblies to a salt spray corrosion test per Test Method 811.1 of Federal Test Method Standard 151a using a 20% NaCl solution.
- 5.2 Remove one Type I assembly and one Type II assembly after one week. Drill out the rivets and inspect the specimens.
- 5.3 Repeat step 5.2 for the next three weeks.

6.0 DATA REQUIRED

- 6.1 Compare the relative corrosion of the Type I to the Type II assemblies on the exposed surfaces and faying surfaces to determine the following:
 - 6.1.1 If the corrosion resistance of the one coat of epoxy primer is not as good as, equal to or better than the two coats of zinc chromate primer of the mating panel.
 - 6.1.2 If the corrosion resistance of the one coat of epoxy primer over the one coat of zinc chromate primer is not as good as, equal to or better than the two coats of zinc chromate primer of the mating panel.
- 6.2 Submit colored photographs of the specimens which would tend to substantiate the conclusions reached in step 6.1. Submit additional photographs, as required, of any unusual conditions observed during the inspection of the specimens.



SPECIMEN CONFIGURATION

NOTE:

1. Drill, countersink and drive MS20426AD4-4 rivets after application of primers.
2. Install rivets per P.S. 19110. Do not shave heads after driving.
3. Flush the rivets in the eight panels (Ref. step 4.2) having the two coats of zinc chromate primer.
4. Support specimens as shown in sketch.

FIGURE I