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DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

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Ottawa, February 25, 1947.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2183.

Corrosion Resisting Properties of White Enamel  
Paints when Applied to Cold Rolled Sheet Steel.

(Copy No. 4 -)

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Background:

A letter dated November 12, 1946, was received from Mr. S. R. Globe, Secretary of the Metal Craft Company Limited, Grimsby, Ontario, requesting that tests be made to determine the resistance to chemicals of certain baked enamels sprayed on steel.

The letter read in part:

"All paints are on cold rolled steel panels, 3" by 8". Each panel was thoroughly degreased and cleaned and etched in a phosphorous compound solution to form a bond between steel and paint. Each brand was thinned from can as recommended by manufacturer. First each panel was given a mist coat of the paint. In about 5-10 minutes when mist coat was tacky, panels were sprayed with a finish coat as heavy as possible without producing sagging or "orange peel". Each brand was baked at approximately 300° F. for 45 minutes."

Four samples, numbered 1 to 4, were submitted to these Laboratories.

Test Performed:

Each sample was scratched through the paint to the metal before it was put on test. This scratch was in the form of an "X" on the bottom two inches of the surface. Its purpose was to determine how the paint would resist corrosion after abrasion.

The four samples were tested in a salt spray cabinet using a 20 per cent salt (sodium chloride) solution at a temperature of 95°F.  $\pm 2^\circ$ .

The samples were hung by Saran cord in a vertical position facing the flow of the spray.

Results:

After  
1 day - Nos. 1 and 4 had rust only at the "X" scratch.

Nos. 2 and 3 had a few rust spots at the top edge. Also, there was corrosion at the "X" scratch and spreading down slightly over the surface.

After  
3 days - No. 1 had a small amount of rust at the hole and a rust mark down from it. Also, there was very light corrosion at the "X" scratch.

No. 2 had rust on the top edge and under the hole. Considerable rust had formed at the "X" scratch and over the paint surrounding it.

No. 3 had rust at the top edge and spreading down over the surface. The rust at the "X" scratch was very heavy, covering most of the bottom two inches.

No. 4 had rust at the hole and very slight

(Test Performed, cont'd) -

corrosion at the "X" scratch.

After

6 days -

No. 1 had rust at the "X" scratch and was spreading down over the surface.

No. 2 had rust spreading down from the top edge. The bottom two inches was covered with rust.

No. 3 had the complete surface covered with corrosion marks, with considerable rust at the "X" scratch.

No. 4 had rust at the hole and two places on the top edge. Rust at the "X" scratch was spreading down slightly.

After

16 days -

No. 1 had slight rust at the top edge and a few marks over the surface. About 2/3 of the bottom two inches was covered with rust (see Figure 1). Also, slight peeling and a few tiny blisters were observed at various places on the surface.

No. 2 had considerable rusting at the top edge and down over the surface. The bottom two inches was covered with rust (see Figure 2). The surface appeared to be covered with small blisters.

No. 3 had considerable rust at the top edge and it was worse than No. 2. The bottom two inches was three-quarters covered with corrosion (see Figure 3).

The surface was partly covered with tiny blisters.

No. 4 had light corrosion marks over the

(Test Performed, cont'd) -

complete surface. The bottom two inches was one-quarter covered with corrosion (see Figure 4). The surface appeared to have corrosion under the paint.

The samples were all removed from the test after sixteen days. They were rinsed with tap water to remove any salt that remained on the surface after testing. Each sample was then dried.

Appearance After Drying -

No. 1. The paint chipped off in a few places at the "X" scratch.

No. 2. The paint cracked and nearly all peeled off the surface.

No. 3. Very slight cracking was noticed.

No. 4. There was very slight cracking at the edges and at a few spots on the surface.

After the samples had been photographed the adherence of the paint on Nos. 1 and 4 was tested with the point of a knife blade.

No. 1. The paint peeled only at the blisters and the remainder of the surface had good adherence.

No. 4. The paint peeled at most places on the surface.

Conclusions:

On the basis of the above test it is concluded that the order of corrosion resistance of the four enamel-coated samples was as follows:

Sample No. 1 (Best)  
Sample No. 4  
Sample No. 3  
Sample No. 2 (Worst).

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WD:MC.

(Figures 1 to 4 follow,  
( on Page 6. )

Figure 1.

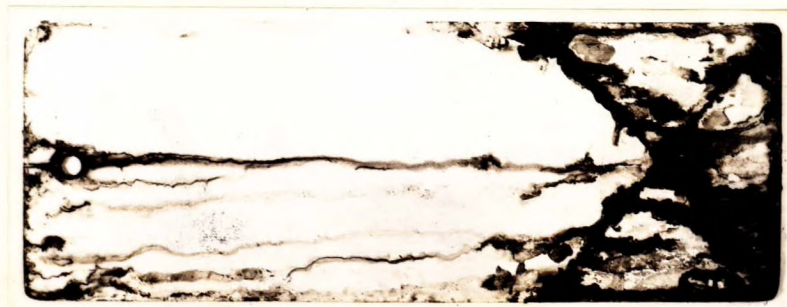


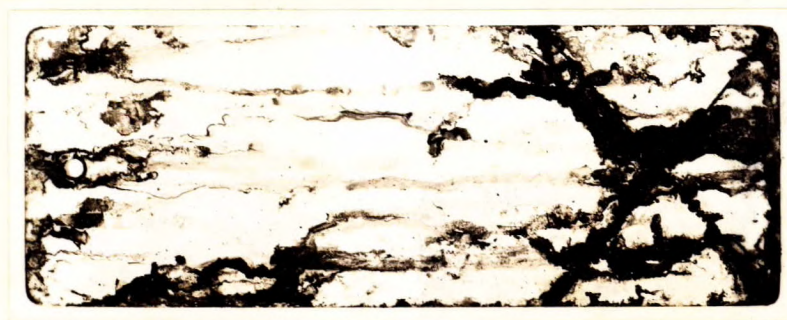
Figure 2.



Figure 3.



Figure 4.



ENAMEL-SPRAYED COLD ROLLED SHEET STEEL SAMPLES,  
AFTER TESTING IN SALT SPRAY FOR SIXTEEN DAYS.

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