

DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

Ottawa, February 7, 1947.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2178.

Corrosion Resistance of Painted Steel
Under Salt Spray Conditions.

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(Copy No. 6.)

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Background:

A letter dated September 21, 1946, was received from Mr. E. Viens, Director of the Testing Laboratories, Department of Public Works, Ottawa, Canada, requesting that eight samples of painted steel be tested in the Salt Spray Cabinet until breakdown.

The steel samples had been painted as follows:

<u>Number of Panels</u>	<u>Serial</u>	<u>Marked</u>
2	674 (grey)	1 primer, 2 top coats.
2	674 (grey)	1 primer, 3 top coats.
2	740 (black)	2 coats.
2	740 (black)	3 coats.

Salt Spray Test:

The samples were placed in the Salt Spray Cabinet in which a spray from 20 per cent salt (sodium chloride) solution and a temperature of 95° F. were used.

The samples were hung in a vertical position, painted sides facing the flow of the salt spray.

Results:

After

1 day - (a) Sample 740 with three coats had rust at the edge and at places one-quarter to one-half inch in from the edge.

(b) Sample 740 with two coats had rust only at the edges.

After

2 days - (a) Sample 740 with three coats had rust one-half inch in from the edge and as far as one inch in some places.

(b) Sample 740 with two coats had rust one-quarter inch in from the edge with rust marks extending down from the top edge.

After

3 days - (a) Sample 740 with three top coats had rust extending across the surface in many places.

(b) Sample 740 with two coats had rust extending in from the sides and down from the top edge.

Samples of both (a) and (b) were about equally corroded.

(Continued on next page)

(Salt Spray Test, cont'd) -

- (c) Sample 674 with two top coats had a few tiny rust marks at the edge.

After

5 days - (a) Sample 740 with three coats had rust over one-third of surface.

- (b) Sample 740 with two coats had rust over almost one-third of surface.

- (c) Sample 674 with two top coats had rust extending in about one-quarter of an inch. There was, also, slight corrosion on the surface.

- (d) Sample 674 with three top coats had rust at the edges and a few spots on the surface.

After

36 days - (a) Sample 740 with three coats was slightly more corroded, having about three-quarters of the surface covered with rust.

- (b) Sample 740 with two coats had almost one-half of surface completely covered with corrosion and the remaining part had rust marks over it.

- (c) Samples of 674 paint had changed very little in thirty-one days since the last observation.

After

44 days - (a) Sample 740 with three coats was about one-half corroded.

- (b) Sample 740 with two coats was completely

(Salt Spray Test, cont'd) -

corroded over the surface.

- (c) Sample 674 with two top coats was corroded in from the edges slightly more and rust lines were extending down over the surface from the top.
- (d) Sample 674 with three top coats was corroded in from the edges but not as severely as 674 with two top coats.

After

90 days - Samples were all removed from the

Salt Spray and photographed. Their condition was as follows:

- (a) Sample 740 with three coats was almost covered with rust except for small patches (see Figure 1). The paint on these patches was cracked and ready to peel.
- (b) Sample 740 with two coats had a thick covering of rust over the complete surface (see Figure 2).
- (c) Sample 674 with two top coats had rust one half inch in from sides with a few rust lines extending down from the top edge. A few small blisters were noticed in the centre of the sample (see Figure 3).
- (d) Sample 674 with three top coats had rust one-half inch in from the sides with one or two rust lines

(Salt Spray Test, cont'd) -

on the surface. There were also very slight signs of blistering (see Figure 4).

The paint surfaces of the 674 samples seemed to have very little adherence to the steel. The painted surface was cut and a knife blade inserted under the paint. On all samples coated with this paint, the paint surface easily lifted away from the steel. Corrosion was observed under these surfaces.

Conclusions:

The painted samples may be arranged according to their resistance to salt spray corrosion, as follows:

Grey 674 with one primer and three top coats. Best.

Grey 674 with one primer and two top coats.

Black 740 with three coats.

Black 740 with two coats. Worst.

Suggestions:

It is suggested, due to the fact that the grey 674 coatings were easily removed from the surface after the test, that an examination be made of freshly coated samples to see if the adherence of the paint is good before testing. If not, this factor will no doubt considerably limit the uses of this paint.

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(Figures 1 to 4 follow,
(on Pages 6 and 7.)

Figure 1.



SAMPLE 740 WITH THREE COATS OF PAINT, AFTER 90
DAYS IN THE SALT SPRAY CABINET.

Figure 2.



SAMPLE 740 WITH TWO COATS OF PAINT, AFTER 90
DAYS IN THE SALT SPRAY CABINET.

Figure 3.



SAMPLES 674 WITH ONE PRIMER AND TWO TOP COATS OF
PAINT, AFTER 90 DAYS IN SALT SPRAY CABINET.

Figure 4.



SAMPLE 674 WITH ONE PRIMER AND THREE TOP COATS
OF PAINT, AFTER 90 DAYS IN SALT SPRAY CABINET.

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