PROTECTIVE COATINGS FOR STRUCTURAL STEEL
Second Progress Report

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PROTECTIVE COATINGS FOR STRUCTURAL STEEL

This progress report describes the performance, in accelerated laboratory tests, of a number of specification and proprietary structural steel primers and coatings. These materials were received for evaluation by the Research Laboratory Division from 1956 through early 1960. A previous and initial test series was conducted as part of the same Research Project 49 G-50, and reported in July 1956, in Research Report No. 260.

Primers and coatings received early in this four-year period were evaluated in 30 primer-topcoat systems as Series 2 in 1958, and those received later were tested as 42 additional systems in 1960 in Series 3. In addition to primers and coatings received after the Series 2 tests began, the Series 3 tests included colored, non-aluminum topcoats especially evaluated as possible finish paints then being considered for the Houghton-Hancock bridge, and ten systems being field performance-tested on steel girders of two bridges on M 78 relocation in Shiawassee County. The M 78 field tests are to be reported as Research Project 49 G-50(4).

Laboratory Test Procedure

Tested primers and coatings were applied on steel panels and evaluated in laboratory equipment as two-coat systems of a primer and a topcoat.

The evaluated coatings were applied on duplicate 3- by 5-in. panels, cut from flat, 20-gage, hot-rolled steel sheeting. The hot-rolled grade was selected because bridge structural steel and hand railings are of this particular type. After occasional rust spots were removed with abrasive paper, the test panels were degreased in a trichloroethylene vapor bath prior to application of primers. All paints were applied by brushing, the method of application used in maintenance coating of Department bridges. After a suitable period of at least six days for drying of primers, the panels were topcoated and allowed to dry in the laboratory for a period of about three weeks, before testing.

After drying, the better panel of each set of two was selected for testing, while the other was set aside to serve as a control for comparison purposes at end of weathering tests, and the selected test panel received a vertical scratch through the coating to the metal. A complete test cycle consisted of 200 hours exposure in the Weather-Ometer, followed by 50 hours exposure in a salt-spray and humidity cabinet. The coated panels of each series were exposed to seven such cycles for a total exposure of 1400 hours of Weather-Ometer and 350 hours in the salt-spray and humidity cabinet.

At the conclusion of the laboratory tests, panels for the coating systems listed in Tables 1 and 2 were photographed beside their respective control panels to show the amounts of degradation during the test exposures (Figs. 1 and 2).

Performance Ratings

To assign numerical values to the conditions of coating systems after laboratory exposure, two observers, S. M. Cardone and A. J. Permoda, rated the panels for three factors: 1) topcoat appearance as to fading, chalking, and gloss change; 2) amount of coating breakdown on panel face; and 3) extent of rusting and rust creepage at the vertical scratch. Each factor was rated numerically on basis of 10 to 0 scale, with 10 denoting perfect condition, decreasing to 0, denoting complete failure.

For convenience, these three ratings were added into a single total value indicating the overall merit of the coating system, with the highest total representing the most satisfactory system. These totals are tabulated in Tables 1 and 2, as are the three individual factor ratings, the relative ranks of the paint systems, and sources of proprietary coatings.

Test Results: Series 2

The coatings systems listed in Table 1 and shown in Fig. 1 may be ranked by performance quality in the following order, starting with the best system:

1. MSHD 1A red lead primer and proprietary silicone-alkyd aluminum topcoat (System 8--26 points).

2. MSHD 1C red lead primer and MSHD 5B aluminum topcoat (System 9--25 points).

3. MSHD 1A red lead primer and MSHD 5B aluminum topcoat--the Departmental standard (System 1--24.5 points).

3. MSHD 1A red lead primer and proprietary leaded aluminum gray topcoat (System 29--24.5 points).

4. Proprietary alkyd-linseed oil red-brown primer and proprietary silicone-alkyd gray enamel topcoat (System 13--23 points).

5. MSHD 1A red lead primer and proprietary chlorinated-rubber green topcoat (System 7--21.5 points).

6. Proprietary basic lead silico chromate orange primer and proprietary basic lead silico chromate green topcoat (System 27--21 points).

7. MSHD 1A red lead primer and proprietary basic lead silico chromate green topcoat (System 6--20.5 points).

8. Proprietary epoxy-ester red-brown primer and proprietary epoxy-ester gray topcoat (System 14--20 points).

8. Proprietary urethane brown primer and proprietary urethane green topcoat (System 19--20 points).

8. Proprietary zinc-rich gray primer and proprietary gray topcoat (System 26--20 points).

Nineteen other systems ranked lower, earning less than 20 points. These included neoprene, thiokol, rubber, epoxy-ester, and two-component epoxy primed systems.

The four best-rated systems were red lead-primed with aluminum topcoats. By contrast, five other systems (Systems 2, 3, 4, 5, 10) also red lead-primed but with topcoats based on non-aluminum pigments and oil vehicles obtained poor ratings, largely because of poor appearance and scratch rusting. Four other systems (Systems 6, 7, 19, 27) with proprietary non-aluminum topcoats based on chalk-resisting pigments and improved vehicles, earned good ratings.

Test Results: Series 3

The coatings systems listed in Table 2 and shown in Fig. 2 may be ranked by performance quality in the following order, starting with the best system:

1. MSHD 1C red lead primer and proprietary silicone-alkyd aluminum topcoat (System 9--26 points).

1. Proprietary zinc-rich gray primer and MSHD 5B aluminum topcoat (System 36--26 points).

2. Proprietary basic lead silico chromate orange and proprietary basic lead silico chromate gray (System 14--25.5 points).

3. MSHD 1A red lead primer and MSHD 5B aluminum topcoat, the Department's standard (System 1--25 points).

3. MSHD 1C red lead primer and MSHD 5B aluminum topcoat (System 6--25 points).

3. Proprietary zinc-rich gray primer and MSHD 5B aluminum topcoat (System 33-25 points).

4. Proprietary epoxy red chromate pigment primer and proprietary epoxy gray topcoat, both two-component (System 31--24.5 points).

4. Proprietary zinc-rich two-component gray primer and proprietary vinyl gray topcoat (System 34--24.5 points).

4. Proprietary zinc-rich gray primer and proprietary gray topcoat (System 35--24.5 points).

Performance ratings for Series 3 were somewhat higher than for Series 2, because these systems were especially selected for quality. Following the nine best systems, the "good" and "fair" systems rated from 24 to 17 points, a higher general level than in the earlier series. Among the "poor" systems were:

1. Proprietary metal black primer with bituminous vehicle and proprietary aluminum topcoat, at normal film thickness (System 15--0 points).

2. Proprietary tar emulsion primer and MSHD 5B aluminum topcoat, at normal film thickness (System 21--11 points).

3. Proprietary brown and black furan topcoat (System 37--0 points).

Five of the six best-rated systems were topcoated with aluminum paint. Some topcoats, also applied over red lead primers, but based on non-aluminum pigments and oil vehicles, performed poorly (Green: System 2; Gray: Systems 3, 11). Others did well, notably proprietary non-aluminum topcoats based on chalk resisting pigments and improved vehicles (Green: Systems 8, 13, 42; Gray: 5, 14, 31, 34, 35, 41).

Series 3 systems undergoing field testing on steel girders of two bridges on M 78 in Shiawassee County tested well in the laboratory, all receiving scores in the range of 26 to 22 points. The MSHD standard system of 1A primer and 5B aluminum topcoat rated 25 points. The ten systems involved are denoted in Table 2 by parenthesized system numbers.

Test ratings for many systems exposed in both Series 2 and 3 were similar, indicating good duplication of test results. The MSHD standard system of 1A primer and 5B aluminum topcoat received 24.5 points as System 1 in Series 2, and 25 points as System 1 in Series 3. MSHD 1C primer plus 5B topcoat had identical ratings of 25 points in both series. Systems with topcoats based on non-aluminum pigments, however, gave less reproducible results.

Conclusions

1. On structural steel, performance of the Department's current system of 1A(1) red lead primer and 5B aluminum topcoat was equalled by very few of the tested paint systems, and surpassed significantly by none. This primer has other advantages in being one-package and easy to prepare, having long pot life, and being easy to apply. This is less consistently true of other systems evaluated in these tests, i.e., epoxies and urethanes.

2. Zinc-rich, cold-galvanizing primers evaluated in the tests earned very good ratings and appear to have potential as superior primers. The tests indicated that specially designed topcoats are required with these primers, which need sandblasting on hot-rolled steel to provide protection cathodically.

3. Few colored topcoats had ratings equivalent to 5B Aluminum. Ratings of the good colored topcoats seemed to depend more on being matched with particularly compatible primers than does 5B aluminum.

Recommendations

1. On the basis of performance in these laboratory tests, the Department should continue its current specification of 1A(1) primer and 5B topcoat on bridge structural steel.

2. Performance evaluation of coatings under field test on two bridges on the M 78-relocation in Shiawassee County should continue, and results subsequently be compared with laboratory performance. The field test results should have greater weight in dictating paint specification revisions.

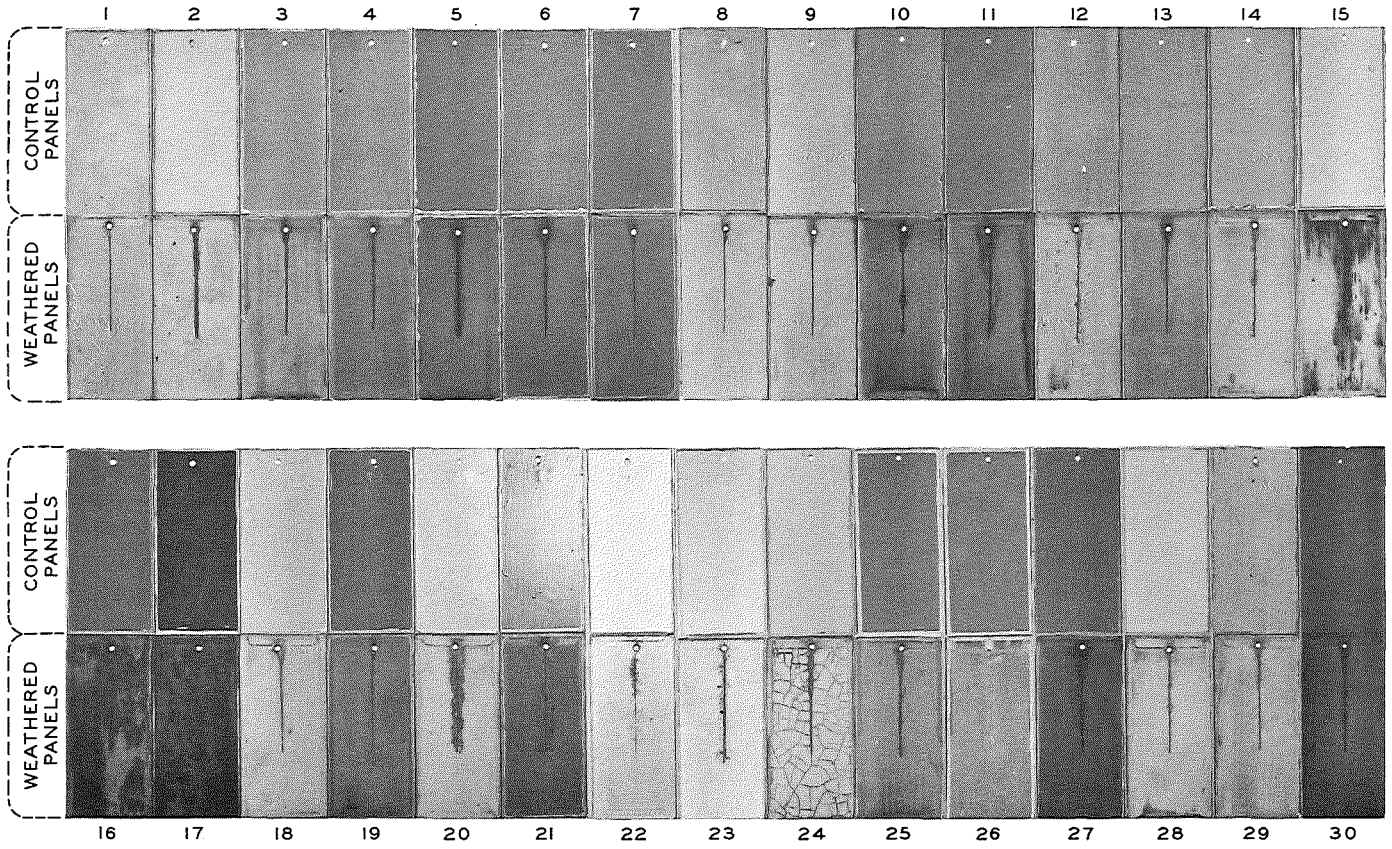

Figure 1. Series 2 panels with unexposed control panel above in each pair, and test-weathered panel with vertical scratch below (identification and performance ratings in Table 1).

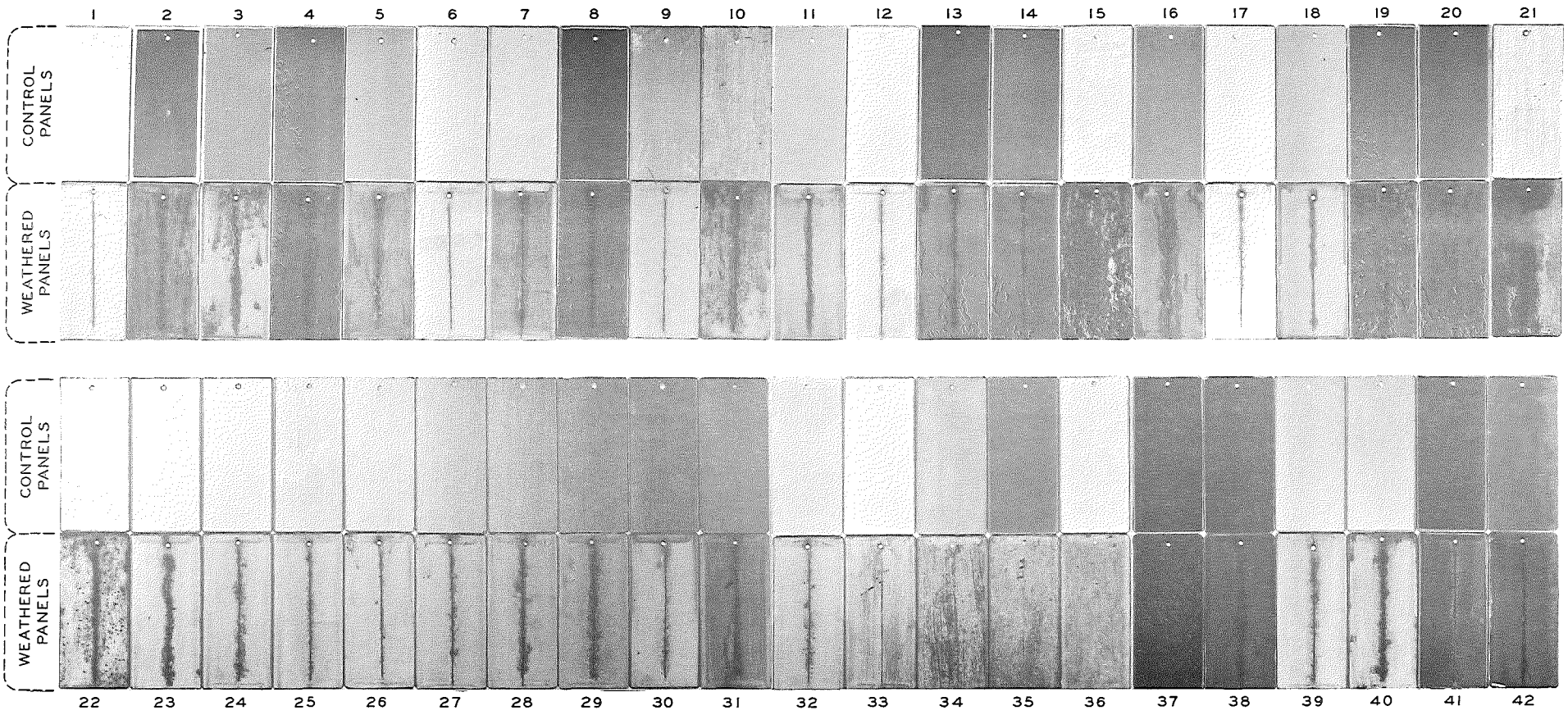

Figure 2. Series 3 panels with unexposed control panel above in each pair, and test-weathered panel with vertical scratch below (identification and performance ratings in Table 2).

TABLE 1
IDENTIFICATION AND PERFORMANCE OF TEST COATING SYSTEMS[1]
Series 2 Coatings (Received 1956–1958)

Test System	Identification	Composition	Drying Time, hr	System Thickness, mils	Ratings**				Rank	Remarks
					Appearance	Face Rusting	Scratch Rusting	Total		
1	Primer: 57 PR-73 Topcoat: 57 PR-151	MSHD No. 1A red lead MSHD No. 5B aluminum with AV-3 vehicle	48 18	2.5	7.5	9.0	8.0	24.5	3	Standard MSHD system
2	Primer: 57 PR-73 Topcoat: 58 PR-110	MSHD No. 1A red lead MSHD No. 3 gray	48 48	3.6	5.5	8.0	4.0	17.5	12	
3	Primer: 57 PR-73 Topcoat: 58 PR-105	MSHD No. 1A red lead Laboratory modified No. 3A gray	48 30	3.6	3.0	9.0	5.0	17.0	13	
4	Primer: 57 PR-73 Topcoat: 58 PR-143	MSHD No. 1A red lead NLL M-50 gray	48 30	2.9	5.0	9.0	5.0	19.0	9	Topcoat from National Lead Laboratories, Brooklyn
5	Primer: 57 PR-73 Topcoat: 57 PR-150	MSHD No. 1A red lead Laboratory modified No. 4A green	48 30	3.0	5.0	8.5	5.0	18.5	10	
6	Primer: 57 PR-73 Topcoat: 56 PR-146	MSHD No. 1A red lead NLL M-50 green	48 30	3.6	6.5	9.0	5.0	20.5	7	Topcoat from National Lead Laboratories, Brooklyn
7	Primer: 57 PR-73 Topcoat: 58 PR-102B	MSHD No. 1A red lead Val-Chem No. 656 green with chlorinated rubber vehicle	48 18	3.5	4.5	9.0	8.0	21.5	5	Topcoat from Valdura Division of American-Marietta Co., Chicago
8	Primer: 57 PR-73 Topcoat: 58 PR-108	MSHD No. 1A red lead XP-7-1042 aluminum with silicone alkyd vehicle (premixed)	48 18	2.7	8.0	9.5	8.5	26.0	1	Topcoat from Dow-Corning Corp., Midland
9	Primer: 58 PR-104 Topcoat: 57 PR-151	MSHD No. 1C red lead MSHD No. 5B aluminum with AV-3 vehicle	48 18	2.7	8.0	9.0	8.0	25.0	2	
10	Primer: 58 PR-104 Topcoat: 58 PR-105	MSHD No. 1C red lead Laboratory modified No. 3A gray	48 30	3.6	2.0	9.0	5.0	16.0	14	
11	Primer: 58 PR-94 Topcoat: 58 PR-95	LIA No. 2614 red lead LIA (Glidden 69649) light gray	48 30	4.0	2.5	8.0	4.0	14.5	16	Both coats from Lead Industries Association, N.Y., N.Y.
12	Primer: 58 PR-94 Topcoat: 58 PR-103	LIA No. 2614 red lead LIA No. 2615 aluminum	48 18	2.2	6.0	4.0	3.5	13.5	17	Both coats from Lead Industries Association, N.Y., N.Y.
13	Primer: 58 PR-76 Topcoat: 58 PR-80	Rust resistant red-brown with alkyd-linseed oil vehicle Gray enamel with silicone alkyd vehicle	30 24*	3.1	5.0	9.0	9.0	23.0	4	Both coats from Robeson Preservo Co., Port Huron
14	Primer: 58 PR-78 Topcoat: 58 PR-79	Rust inhibitive red-brown with epoxy-ester vehicle Gray enamel with epoxy-ester vehicle	24 24	3.5	4.0	9.0	7.0	20.0	6	Both coats from Robeson Preservo Co., Port Huron
15	Primer: 58 PR-101A Topcoat: 58 PR-101C	No. 101 damp-proof red-brown No. 606 silver-gray	24 24	3.2	3.0	1.5	1.0	5.5	20	Both coats from Rust-Sele Co., Cleveland
16	Primer: 58 PR-81A Topcoat: 58 PR-82D	No. CP-1 brown lead with neoprene vehicle No. CN-14 gray with neoprene vehicle	24 24*	2.2	2.0	0.5	1.0	3.5	22	Both coats Chareote from Charleston Rubber Co., Charleston, S.C.

* Poor brushability

** Ratings on scale of 10 to 0, with 10 denoting no deterioration and 0 complete failure.

(1) Cycle consisted of 1400 hr cyclical exposure in Weather-Ometer (9 min water spray per 60 min light), and 350 hr exposure in salt spray and humidity cabinet at 95 F.

TABLE 1 (Con't)
IDENTIFICATION AND PERFORMANCE OF TEST COATING SYSTEMS
Series 2 Coatings (Received 1956–1958)

Test System	Identification	Composition	Drying Time, hr	System Thickness, mils	Ratings**				Rank	Remarks
					Appearance	Face Rusting	Scratch Rusting	Total		
17	Primer: 5* PR–11A Topcoat: 5* PR–12C	No. CP–1 brown lead with neoprene vehicle No. CS–15 green with neoprene vehicle	24 24*	2.1	3.0	0.5	1.0	4.5	21	Both coats Charcote from Charleston Rubber Co., Charleston, S.C.
18*	Primer: 5* PR–9*	Val–Chem No. 660 brown with urethane vehicle (two–component)	12	2.0	4.0	6.0	8.0	18.0	11	Both coats from Valdura Division of American–Marietta Co., Chicago
	Topcoat: 5* PR–9*	Val–Chem No. 662 gray with urethane vehicle (two–component)	12							
19	Primer: 5* PR–9*	Val–Chem No. 660 brown with urethane vehicle (two–component)	12	2.7	4.0	8.0	8.0	20.0	8	Both coats from Valdura Division of American–Marietta Co., Chicago
	Topcoat: 5* PR–9*	Val–Chem No. 664 green with urethane vehicle (two–component)	12							
20	Primer: 5* PR–145 Topcoat: 5* PR–102A	Val–Chem No. 690 brown with epoxy–ester vehicle Val–Chem No. 654 gray with chlorinated–rubber vehicle	12 18*	2.6	4.5	7.0	1.5	13.0	18	Both coats from Valdura Division of American–Marietta Co., Chicago
21	Primer: 5* PR–145 Topcoat: 5* PR–102B	Val–Chem No. 690 brown with epoxy–ester vehicle Val–Chem No. 656 green with chlorinated–rubber vehicle	12 18	2.0	4.0	8.5	2.5	15.0	15	Both coats from Valdura Division of American–Marietta Co., Chicago
22	Primer: 5* PR–106 Topcoat: 5* PR–151	Shell No. XA–201 red lead with epoxy–amine vehicle (two–component) MSHD No. 5B aluminum with AV–3 vehicle	12 18	3.4	7.0	8.5	3.0	18.5	10	Primer from Shell Chemical Corp. of N.J.
23	Primer: 5* PR–107 Topcoat: 5* PR–151	Shell No. XA–211 red lead with epoxy–versamid vehicle (two–component) MSHD No. 5B aluminum with AV–3 vehicle	12 18	2.8	7.0	8.5	2.0	17.5	12	Primer from Shell Chemical Corp. of N.J.
24	Primer: 5* PR–112 Topcoat: 5* PR–102A	PRC No. 402 tan with thiokol vehicle Val–Chem No. 654 gray with chlorinated–rubber vehicle	12* 18*	5.5	4.5	2.0	4.5	11.0	19	Primer from Prod. Res. Corp., Det.; Topcoat from Valdura Div. of Amer.–Marietta Co., Chicago
25	Primer: 5* PR–113A Topcoat: 5* PR–113B	Subalux No. 508 gunmetal gray Subox No. 5 light gray	30 30	4.0	3.0	8.0	6.5	17.5	12	Both coats from Subox Inc., Toledo
26	Primer: 5* PR–114 Topcoat: 5* PR–113B	Galvanox zinc–pigment gray with chlorinated–rubber vehicle Subox No. 5 light gray	12 30	5.0	3.0	8.0	9.0	20.0	8	Both coats from Subox Inc., Toledo
27	Primer: 56 PR–144 Topcoat: 56 PR–145	NLL M–50 orange NLL M–50 green	36 30	3.8	6.5	8.0	6.5	21.0	6	Both coats from National Lead Laboratories, Brooklyn
28	Primer: 58 PR–144A Topcoat: 58 PR–145B	PRC No. 408 brown PRC No. 409 gray	12 12	2.4	3.5	7.5	6.5	17.5	12	Both coats from Products Research Corp., Detroit
29	Primer: 57 PR–73 Topcoat: 58 PR–113A	MSHD No. 1A red lead Subalux No. 508 gunmetal gray	48 30	4.2	7.0	9.0	8.5	24.5	3	Topcoat from Subox Inc., Toledo
30	Primer: 57 PR–149 Topcoat: 57 PR–150	Laboratory formulated M–50 zinc chromate olive Laboratory modified No. 4A green	30 30	2.3	5.0	6.5	7.0	18.5	10	

* Poor brushability

** Ratings on scale of 10 to 0, with 10 denoting no deterioration and 0 complete failure.

TABLE 2
IDENTIFICATION AND PERFORMANCE OF TEST COATING SYSTEMS[1]
Series 3 Coatings (Received 1958–1960)

Test System	Identification	Composition	Drying Time, hr	System Thickness, mils	Ratings**				Rank	Remarks
					Appearance	Face Rusting	Scratch Rusting	Total		
(1)	Primer: 60 PR-62 Topcoat: 60 PR-1122	MSHD No. 1A red lead MSHD No. 5B aluminum with AW-3 vehicle	48 18	2.0	8.5	9.0	7.5	25.0	3	Standard MSHD system
2	Primer: 60 PR-62 Topcoat: 58 CH-913	MSHD No. 1A red lead MSHD No. 4A green	48 36	2.5	8.5	4.5	5.0	18.0	15	
3	Primer: 60 PR-62 Topcoat: 58 CH-918	MSHD No. 1A red lead MSHD No. 3A gray	48 48	2.5	6.5	5.0	4.0	15.5	17	
4	Primer: 60 PR-62 Topcoat: 56 PR-1146	MSHD No. 1A red lead NLL M-50 green	48 30	2.3	5.5	8.0	5.5	19.0	13	Topcoat from National Lead Laboratories, Brooklyn
5	Primer: 60 PR-62 Topcoat: 58 PR-1143	MSHD No. 1A red lead NLL M-50 gray	48 30	2.0	7.0	8.5	6.5	22.0	9	Topcoat from National Lead Laboratories, Brooklyn
6	Primer: 59 PR-41 Topcoat: 60 PR-1122	MSHD No. 1C red lead MSHD No. 5B aluminum with AW-3 vehicle	48 18	2.0	8.5	8.5	8.0	25.0	3	
7	Primer: 59 PR-41 Topcoat: 60 PR-69	MSHD No. 1C red lead NLL cream	48 18	2.6	4.5	8.5	6.5	19.5	12	Topcoat from National Lead Laboratories, Brooklyn
8	Primer: 59 PR-41 Topcoat: 60 PR-70	MSHD No. 1C red lead NLL M-50 green	48 122	2.4	8.0	9.0	7.0	24.0	5	Topcoat from National Lead Laboratories, Brooklyn
9	Primer: 59 PR-41 Topcoat: 59 PR-108	MSHD No. 1C red lead XP-7-1042 aluminum with silicone alkyd vehicle (premixed)	48 18	2.2	8.5	9.0	8.5	26.0	1	Topcoat from Dow-Corning Corp., Midland
10	Primer: 59 PR-41 Topcoat: 58 PR-151	MSHD No. 1C red lead No. 301 Alumination with bituminous vehicle	48 40*	2.8	6.5	3.5	8.5	18.5	14	Topcoat from Republic Powdered Metals Inc., Cleveland
11	Primer: 59 PR-41 Topcoat: 58 PR-105	MSHD No. 1C red lead Laboratory modified No. 3A gray	48 30	2.7	6.0	8.5	5.0	19.5	12	
(12)	Primer: 56 PR-1141 Topcoat: 60 PR-1122	NLL M-50 orange MSHD No. 5B aluminum with AW-3 vehicle	36 18	2.0	8.5	8.5	6.5	23.5	6	Primer from National Lead Laboratories, Brooklyn
13	Primer: 58 PR-195A Topcoat: 58 PR-196A	Basic lead silico chromate orange Basic lead silico chromate green	48 24	2.7	7.5	8.5	8.0	24.0	5	Both coats from Eagle-Picher Co., Cincinnati
14	Primer: 58 PR-195A Topcoat: 58 PR-196B	Basic lead silico chromate orange Basic lead silico chromate gray	48 24	2.7	8.0	9.0	8.5	25.5	2	Both coats from Eagle-Picher Co., Cincinnati

[1] Parenthesized test system numbers indicate field evaluation on Mi 7 bridges in Shiawassee County.

* Poor brushability

** Ratings on scale of 10 to 0, with 10 denoting no deterioration and 0 complete failure.

(1) Cycle consisted of 1400 hr cyclical exposure in Weather-Ometer (9 min water spray per 60 min light), and 350 hr exposure in salt spray and humidity cabinet at 95° F.

TABLE 2 (Con't)
IDENTIFICATION AND PERFORMANCE OF TEST COATING SYSTEMS
Series 3 Coatings (Received 1958-1960)

Test System	Identification	Composition	Drying Time, hr	System Thickness, mils	Ratings**				Rank	Remarks
					Appearance	Face Rusting	Scratch Rusting	Total		
15	Primer: 58 PR-187A Topcoat: 58 PR-187B	Zoco metal black with bituminous vehicle Zone aluminum	18* 18	1.5	0.0	0.0	0.0	0.0	19	Both coats from Zone Co., Ft. Worth, Texas
16	Primer: 58 PR-190 Topcoat: 58 PR-190	Galvinoleum No. 1226 aluminum-gray with zinc dust (two-component) Galvinoleum No. 1226 aluminum-gray with zinc dust (two-component)	18 18	2.2	6.5	8.0	6.5	21.0	11	Both coats from Rust-O-Leum Corp., Evanston, Ill.
17	Primer: 58 PR-195A Topcoat: 58 PR-195B	Dixon No. 101 red lead-graphite brown Dixon No. 109 bright aluminum with graphite	48 18	3.5	8.5	8.5	6.5	23.5	6	Both coats from J. Dixon Co., Jersey City, N.J.
18	Primer: 58 PR-195A Topcoat: 58 PR-195C	Dixon No. 101 red lead-graphite brown Dixon No. 102 extra light gray	48 30	3.2	6.5	8.5	6.0	21.0	11	Both coats from J. Dixon Co., Jersey City, N.J.
19	Primer: 58 PR-195A Topcoat: 58 PR-195D	Dixon No. 101 red lead-graphite brown Dixon No. 119 sage green	48 48	2.0	6.0	6.0	5.5	17.5	16	Both coats from J. Dixon Co., Jersey City, N.J.
20	Primer: 59 PR-5 Topcoat: 58 PR-201	Horn Galvinide metal gray Horn Rusthaar rust-inhibitive gray	18 30	2.3	6.0	5.0	7.5	18.5	14	Both coats from A. C. Horn Co., Long Island City, N. Y.
21	Primer: 59 PR-7 Topcoat: 60 PR-112	Jennite No. J-16 tar-emulsion black MSHD No. 5B aluminum with AV-3 vehicle	12 18	2.4	8.0	1.0	2.0	11.0	18	Primer from Jennite Products Inc., Detroit
22	Primer: 59 PR-8 Topcoat: 60 PR-112	Everwear No. J-45-B pitch-base black MSHD No. 5B aluminum with AV-3 vehicle	18 18	1.5	8.0	3.5	6.5	18.0	15	Primer from Jennite Products Inc., Detroit
23	Primer: 60 PR-2 Topcoat: 60 PR-112	No. E-3-776 maintenance brown MSHD No. 5B aluminum with AV-3 vehicle	24 18	1.9	8.5	8.0	4.5	21.0	11	Primer from Eagle-Picher Co., Cincinnati
24	Primer: 60 PR-64 Topcoat: 60 PR-112	NLL maintenance orange MSHD No. 5B aluminum with AV-3 vehicle	24 18	2.0	8.5	9.0	4.5	22.0	9	Primer from National Lead Laboratories, Brooklyn
(25)	Primer: 60 PR-59 Topcoat: 60 PR-112	PPG XLO-FLO brown lead MSHD No. 5B aluminum with AV-3 vehicle	48 18	2.4	8.5	9.0	6.0	23.5	6	Primer from Pittsburgh Plate Glass Co., Pittsburgh
(26)	Primer: 60 PR-65 Topcoat: 60 PR-112	Glidden No. 2614 special-wetting red lead MSHD No. 5B aluminum with AV-3	48 18	2.0	8.5	8.5	7.0	24.0	5	Primer from Glidden Co., Cleveland
(27)	Primer: 60 PR-67 Topcoat: 60 PR-112	SSPC paint 3-55T No. 3 brown MSHD No. 5B aluminum with AV-3 vehicle	48 18	2.0	8.5	8.5	6.0	23.0	7	Primer from Steel Structures Painting Council, Pittsburgh
(28)	Primer: 60 PR-68 Topcoat: 60 PR-112	Calif. No. 52G51 zinc chromate yellow-green MSHD No. 5B aluminum with AV-3 vehicle	18 18	2.0	8.5	8.5	5.5	22.5	8	Primer based on Calif. specifications

* Poor brushability

** Ratings on scale of 10 to 0, with 10 denoting no deterioration and 0 complete failure.

TABLE 2 (Con't)
IDENTIFICATION AND PERFORMANCE OF TEST COATING SYSTEMS
Series 3 Coatings (Received 1958-1960)

Test System	Identification	Composition	Drying Time, hr	System Thickness, mils	Ratings**				Rank	Remarks
					Appearance	Face Rusting	Scratch Rusting	Total		
(29)	Primer: 60 PR-66 Topcoat: 60 PR-112	Calif. No. T53G42 Epon red lead (two-component) MSHD No. 5B aluminum with AV-3 vehicle	12 18	1.6	8.5	8.5	5.0	22.0	9	Primer based on Calif. specifications
30	Primer: 60 PR-77 Topcoat: 60 PR-78	Baker No. 13-R-48 red lead Baker No. 11-A-6 aluminum (premixed)	12* 12	2.3	8.0	9.0	7.0	24.0	5	Both coats from H. E. Baker Painting Co., Northville, Mich.
31	Primer: 58 PR-188 Topcoat: 58 PR-189	Nu Pon Cote Type 3 epoxy red chromate (two-component) Nu Pon Cote Type 3 epoxy gray (two-component)	12* 12*	4.5	7.5	9.0	8.0	24.5	4	Both coats from Glidden Co., Cleveland
(32)	Primer: 60 PR-9 Topcoat: 60 PR-112	Speedrex No. RB 1107 epoxy-ester orange MSHD No. 5B aluminum with AV-3 vehicle	12 18	2.3	9.0	8.5	5.5	23.0	7	Primer from Truscon Laboratories, Detroit
33	Primer: 60 PR-61 Topcoat: 60 PR-112	Chem-Zinc No. RB 1119 zinc gray MSHD No. 5B aluminum with AV-3 vehicle	4 18	2.2	7.5	8.5	9.0	25.0	3	Primer from Truscon Laboratories, Detroit
(34)	Primer: 59 PR-192 Topcoat: 60 PR-11A	Carbo-Zinc No. 11 zinc-gray (two-component) Carbo No. 1230 vinyl gray	48 12*	5.3	6.5	9.0	9.0	24.5	4	Both coats from Carboline Co., St. Louis, Mo.
(35)	Primer: 60 PR-74 Topcoat: 58 PR-113B	Galvanox zinc-pigment gray Subox No. 5 light gray	18 30	4.2	6.5	9.0	9.0	24.5	4	Both coats from Subox, Inc., Hackensack, N.J.
36	Primer: 60 PR-76 Topcoat: 60 PR-112	Zincote zinc-pigment aqueous binder gray (two-component) MSHD No. 5B aluminum with AV-3 vehicle	48 18	5.8	7.0	9.0	10.0	26.0	1	Primer from Amercoat Co., Evanston, Ill.
37	Primer: 60 PR-5 Topcoat: 60 PR-6	Permaspray BB brown Permaspray furan black (two-component)	8* 18	2.2	0.0	0.0	0.0	0.0	19	Both coats from Leonetti Enterprises, Houston, Texas
38	Primer: 57 PR-77A Topcoat: 57 PR-77C	NLL M-50 baking orange NLL M-50 baking green	Oven-dry* Oven-dry*	2.7	8.0	8.0	7.0	23.0	7	Both coats from National Lead Laboratories, Brooklyn
39	Primer: 60 PR-72 Topcoat: 60 PR-112	Fed. Spec. TT-P-86a, Type 2 brown MSHD No. 5B aluminum with AV-3 vehicle	30 18	2.5	8.5	9.0	6.5	24.0	5	Primer from Acme Quality Paints, Detroit
40	Primer: 60 PR-73 Topcoat: 60 PR-112	Fast Dry zinc-chromate red lead-brown MSHD No. 5B aluminum with AV-3 vehicle	18 18	1.6	8.5	7.0	6.0	21.5	10	Primer from Acme Quality Paints, Detroit
41	Primer: 57 PR-76 Topcoat: 59 PR-185	Subox L-47 epoxy brown (two-component) Kil-Rust epoxy gray (two-component)	12 18	3.3	7.5	8.0	7.0	22.5	8	Primer from Subox Inc., Hackensack, N.J. Topcoat from Kish Industries, Lansing, Mich.
42	Primer: 60 PR-77 Topcoat: 57 PR-150	Baker No. 13-R-48 red lead Laboratory modified No. 4A green	12 30	2.3	7.0	8.5	7.0	22.5	8	Primer from H. E. Baker Painting Co., Northville, Mich.

* Poor brushability

** Ratings on scale of 10 to 0, with 10 denoting no deterioration and 0 complete failure.