

LEAD INDUSTRIES ASSOCIATION

480 LEXINGTON AVENUE

NEW YORK 17, N. Y.

Pigments and Chemicals Division

June 9, 1955

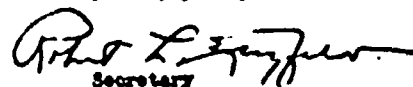
SUBJECT: RED LEAD PAINTS FOR
GALVANIZED SURFACES

To Members of the Pigments and Chemicals Divisions:

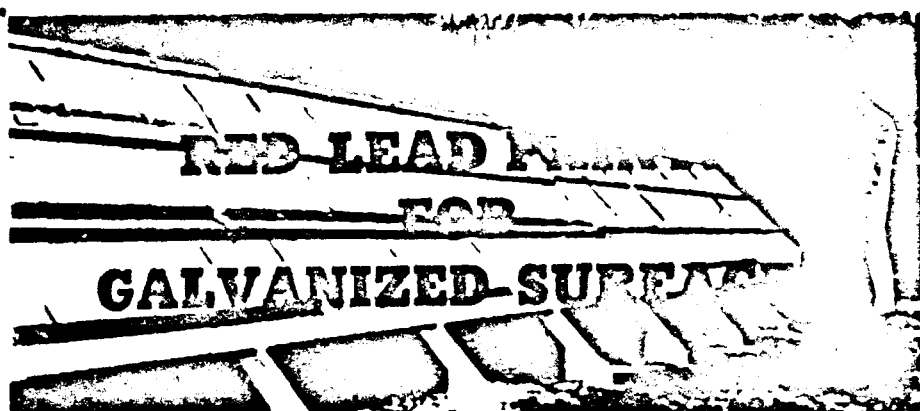
Attached please find a copy of an article entitled "Red Lead Paints for Galvanized Surfaces" reprinted from the May, 1955 issue of "Paint and Varnish Production."

We hope you will find this reprint of interest. If you would like additional copies, we shall be glad to supply them upon request.

Very truly yours,


Secretary

N2746



By
Charles E. Cherry, Jr.

Test road at Sayville, N. Y.

THE problems encountered in the painting of galvanized iron and steel have centered about difficulties with adhesion of the paint film. The sight of paint peeling off galvanized surfaces in large sheets has been a common and, to the paint man, a painful one. The most commonly accepted reason for this irksome phenomenon is that a reaction occurs between the paint film and the galvanizing, forming products that adversely affect adhesion. Good results in improving adhesion have been obtained by weathering the surface before painting, for periods of three to six months and longer. Supposedly, the weathering washes away oils and greases which are a residue of the fluxing materials used in hot dip galvanizing and it produces a roughening effect on the galvanizing. But this practice introduces another factor: rusting has often already commenced when the painting is done. Chemical pretreatment is

Paint systems for various areas of rusted galvanized panel.

AREA	SYSTEM
1	1 Primer Coat
2	2 Primer Coats
3	1 Primer Coat
4	1 Primer Coat
5	1 Primer Coat
6	1 Primer Coat
7	1 Primer Coat
8	1 Primer Coat
9	1 Primer Coat

Paint systems for various areas of rusted galvanized panel.

another method that can be successful. In either case it is evident that paints specifically suited to galvanized surfaces are necessary.

This Cherry is registered with Lead Industries Association, 625 Lexington Ave., New York 17, N. Y.

Red Lead Systems

Although red lead primers have been adapted to a multitudinous variety of services over the years, little work has been done, until recently, on the development of red lead paints particularly suited to service over galvanized surfaces. About three years ago the Red Lead Technical Committee of the Lead Industries Association undertook the investigation of numerous experimental coatings for this purpose. Both rusted and new galvanized surfaces were coated in the tests and, because of aptness to the program, also aluminized steel. From the results of two years exposure, the Committee believes that the five formulations given below are superior for service on galvanized. The paints are versatile in that they serve as active anti-corrosive paints for galvanized surfaces which are already rusted from weathering or they serve as protective coatings for new galvanized

Paint systems for various areas of new galvanized and aluminized steel panel.

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Paint systems for various areas of new galvanized and aluminized steel panel.

lead metal which has been properly treated.

The panels selected for the rusted surface portions of the test were 22 gauge galvanized steel, approximately 50% of whose surfaces was rusted. They were divided into five areas which received systems of one and two primer coats with and without top

FORMULA A

Composition		Percent	Pounds	Gallons
PIGMENT:	Red Lead, 97% Grade	30.0	591.0	8.0
	Silicon Iron Oxide, 85% Fe ₂ O ₃	15.0	295.0	8.0
	Aluminum Stannate	0.5	9.8	1.2
	*Zinc Dust (Fed. Spec. TT-Z-391)	54.5	1070.0	18.2
		100.0		
VEHICLE:	Raw Linseed Oil	40.0	241.0	21.1
	Alkyd Resin Solution (Fed. Spec. TT-R-306, Type I, Class A)	34.2	188.0	21.9
	Mineral Spirits	13.5	76.1	11.7
	Lead Naphthamate (24%)	0.9	4.4	0.5
	Cobalt Octoate (6%)	0.4	2.0	0.2
		100.0	2457.5	308.8

Pigment = 80%
 Vehicle = 20%
 Wt./Gal. = 16.9 lbs. (without zinc dust)
 PV = 43.3

*Zinc dust is to be packaged separately and mixed with paint at time of use.

FORMULA B

Composition		Percent	Pounds	Gallons
PIGMENT:	Red Lead, 97% Grade	30.0	387.0	5.2
	Silicon Iron Oxide, 85% Fe ₂ O ₃	15.0	193.0	5.2
	Aluminum Stannate	0.5	9.8	0.8
	*Zinc Dust (Fed. Spec. TT-Z-391)	54.5	708.0	12.0
		100.0		
VEHICLE:	Alkyd Resin Solution (Fed. Spec. TT-R-306, Type I, Class A)	65.0	367.0	46.5
	Mineral Spirits	34.2	193.0	29.7
	Lead Naphthamate (24%)	0.57	3.3	0.5
	Cobalt Octoate (6%)	0.23	1.5	0.2
		100.0	1264.3	99.9

Pigment = 69.6%
 Vehicle = 30.4%
 Wt./Gal. = 13.1 lbs. (without zinc dust)
 PV = 43.3

*Zinc dust is to be packaged separately and mixed with paint at time of use.

FORMULA C

Composition		Percent	Pounds	Gallons
PIGMENT:	Red Lead, 97% Grade	40.0	712.0	9.0
	Chromium Oxide	19.5	348.0	8.2
	Aluminum Stannate	0.5	9.8	1.1
	*Zinc Dust (Fed. Spec. TT-Z-391)	40.0	712.0	12.1
		100.0		
VEHICLE:	Raw Linseed Oil	47.0	290.0	25.2
	Alkyd Resin Solution (Fed. Spec. TT-R-306, Type I, Class A)	34.2	178.0	22.5
	Mineral Spirits	17.2	89.5	13.8
	Lead Naphthamate (24%)	0.56	3.3	0.5
	Cobalt Octoate (6%)	0.23	1.5	0.2
		100.0	2301.9	308.8

Pigment = 77.4%
 Vehicle = 22.6%
 Wt./Gal. = 16.1 lbs. (without zinc dust)
 PV = 39.8

*Zinc dust is to be packaged separately and mixed with paint at time of use.

FORMULA D

Composition		Percent	Pounds	Gallons
PIGMENT:	Red Lead, 97% Grade.....	50.0	1007.8	13.6
	Aluminum Stearate.....	0.5	9.9	1.3
	*Zinc Dust (Fed. Spec. TT-E-291).....	49.5	997.8	17.0
		100.0		
VEHICLE:	Raw Linseed Oil.....	66.5	236.8	38.7
	Alkyd Resin Solution (Fed. Spec. TT-R-366, Type I, Class A).....	32.75	168.8	71.8
	Mineral Spirits.....	19.50	101.8	13.5
	Lead Naphthenate (20%).....	0.57	4.5	0.5
	Cobalt Octoate (6%).....	0.38	2.0	0.3
		100.0	257.4	30.3

Pigment = 79.7%
 Vehicle = 20.3%
 Wt./Gal. = 18.4 lbs. (without zinc dust)
 PV = 41.4

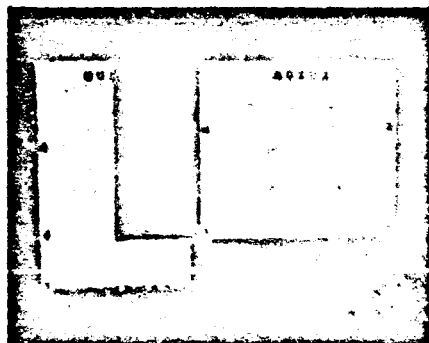
*Zinc dust is to be packaged separately and mixed with paint at time of use.

FORMULA E

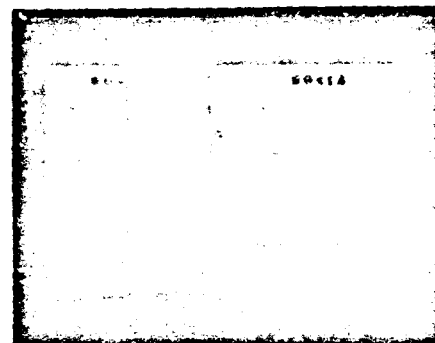
Composition		Percent	Pounds	Gallons
PIGMENT:	Red Lead, 97% Grade.....	50.0	719.9	9.7
	Aluminum Stearate.....	0.5	7.8	0.8
	*Zinc Dust (Fed. Spec. TT-E-291).....	49.5	712.0	12.1
		100.0		
VEHICLE:	Alkyd Resin Solution (Fed. Spec. TT-R-366, Type I, Class A).....	67.7	366.8	66.1
	Mineral Spirits.....	31.42	180.8	27.7
	Lead Naphthenate (20%).....	0.63	3.6	0.4
	Cobalt Octoate (6%).....	0.25	1.4	0.2
		100.0	201.0	30.8

Pigment = 71.3%
 Vehicle = 28.7%
 Wt./Gal. = 14.8 lbs. (without zinc dust)
 PV = 41.5

*Zinc dust is to be packaged separately and mixed with paint at time of use.



Formula A—Rusted panel, left; new panel, right, 30 months exposure. This is a linseed oil-alkyd resin vehicle type recommended for use where an additional coating is to be applied. Note excellent performance even over untreated area of new panel.



Formula B—Rusted panel, left; new panel, right, 30 months exposure. Straight alkyd resin vehicle. Recommended for use where an additional coating is to be applied. Note excellent performance even over untreated area of new panel.

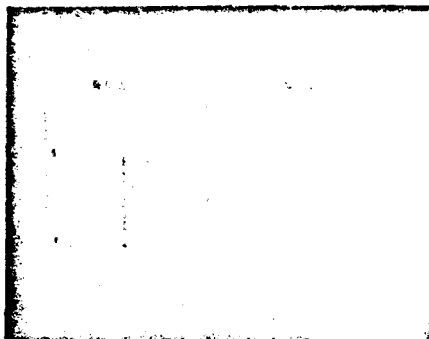
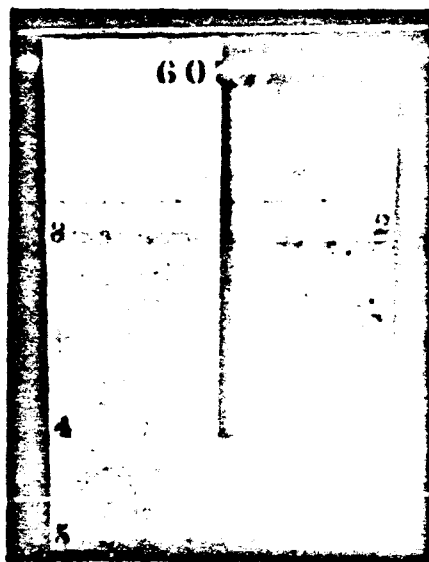


Figure 1—Rusted panel, left; new panel, right; 20 months exposure. Straight alkyl resin vehicle. Recommended for application where a topcoat is to be applied. Note excellent performance even over untreated area of new panel.

coats. Primers were applied to a dry film thickness of 1.5 mil $\pm$ 10 percent per coat. Finish coat (aluminum) was applied to a dry film thickness of 1.0 mil $\pm$ 10 percent. Panels of new galvanized steel were slightly larger and split in half, one side receiving pretreatment, the other not. Each side was divided into three areas for one primer coat, one primer coat and one finish coat, two primer coats and one finish coat. The aluminized panels, of 20 gauge steel, were divided similarly. All panels were washed with mineral spirits and the rusted ones were lightly wire brushed to remove loose rust particles. The panels



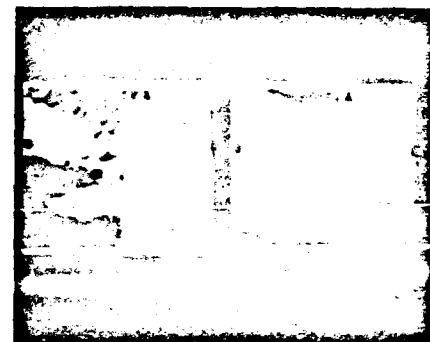
Example of good performing paint on rusted panels. were exposed at the Atmospheric Testing Station, Sayville, N. Y., on the 45° south exposure racks. The station is on Long Island, fifty miles east of New

York City and one mile north of Great South Bay in a rural environment.

Pretreatments

One result of the program, aside from the paints themselves, was the corroboration of the most accepted views on pretreatment. New surfaces that are not treated cannot be painted effectively. Moreover, it was found that a number of commonly known pretreatments, those, for example, with copper sulphate, acetic acid, or hydrochloric acid are ineffective. Very successful, however, was a zinc phosphate treatment. The steps used in pretreating panels in the investigation and highly recommended are as follows:

1. Clean the surface. Remove all grease. Scrub surface lightly with steel wool.
2. Apply coating. Brush or spray undiluted coating uniformly on the cleaned zinc surface. A protective coating will form in one to two minutes.
3. Wash the coating with cold water. A sponge, rag or hose can be used.



Example of peeling on untreated panels.

4. Dry the coating with clean rags or allow sufficient time for the surface to dry before application of the paint.

Formulations

The paints themselves may be divided into three groups. Formulas A and B are for application where no topcoat is to be used. Formula C is for the same application, but where, for matters of taste, a green finish is desired. Where a topcoat is to be applied Formulas D and E are recommended. The reasons for the pairings can be surmised by inspection. The pigments in the pairs are identical, but the vehicles differ. Formulas A and D (and C) are known oil-alkyd vehicle types where the wetting characteristics of linseed oil can be put to advantage where rust has commenced. Formulas B and E are straight alkyd vehicle types for use where faster drying time is desirable. The alkyd types are well suited to new, pre-treated, surfaces.

A final, incidental, result of the test was to demonstrate that aluminized surfaces have intrinsically good reception to adhesion, and a large number of the paints tested on them proved excellent.