

LEAD INDUSTRIES ASSOCIATION

480 LEXINGTON AVENUE

NEW YORK 17, N. Y.

RED LEAD DIVISION

April 22, 1948

To Members of the Red Lead Technical Committee:

SUBJECT: RED LEAD ATMOSPHERIC PROGRAM.
PROJECT NO. 14

It has been found necessary to postpone the exposure date for the test specimens of Project No. 14 to June 15, 1948, instead of May 15, 1948. This was necessitated by delays in obtaining raw materials and because of the interference of this work with urgent seasonal exposure programs within some of the cooperative laboratories.

Before the paints for this project are applied, it is suggested that each laboratory at which the paints were prepared submit copies of their formulation sheets to the Technical Director of the Red Lead Division as well as to all of the companies cooperating in the application and exposure of the paints. In case minor revisions were necessary in the preparation of the paints this procedure will help to avoid confusion as the tests progress and when the results are eventually published. We would also like to remind the various suppliers of the test paints to submit their Magne Gauge readings taken in accordance with the directions on supplemental page C of the brochure outlining the project.

Very truly yours,

C. J. Vander Valk
C. J. Vander Valk
Technical Director

cc;

Mr. H. P. Carlock
Mr. Wm. Helfrich
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RED LEAD
TECHNICAL LETTER NO. 3

From The Red Lead Technical Committee

RED LEAD PAINTS FOR ATMOSPHERIC EXPOSURE

Lead Industries Association
420 Lexington Avenue
New York 17, N. Y.

May, 1948

RED LEAD PAINTS FOR ATMOSPHERIC EXPOSURE

In accordance with the policy of the Lead Industries Association to encourage the proper and economical use of lead products of all types, the Red Lead Technical Committee, comprised of representatives of the red lead and paint industries, has continued during its five years of existence its endeavor to furnish high performance paint systems containing red lead. In carrying out this objective the Committee has continued to carry out extensive research programs in the laboratories and on the test fences of the various member companies and has also entered into cooperative investigations with many government agencies and private organizations.

While organizing these research projects the Red Lead Technical Committee has continued to consider the latest pertinent developments in pigments, vehicles and techniques of application.

In the protective coatings field as in all fields of scientific endeavor, technology advances gradually with continual steps in refinement, and overnight revolutionary developments must be reserved for the fiction writer and the writer of high pressure advertising copy. Hence these Red Lead Technical Letters are issued periodically by the Lead Industries Association to acquaint the manufacturers, specifiers and users of paints with the latest developments in anti-corrosive paint formulation.

The formulations that follow have been selected from many that have shown outstanding performance for atmospheric exposure on our test fences and in field tests. They are presented here as an illustration of the possibilities of red lead pigmented paints. Information on specific paint problems can be obtained from the Lead Industries Association or from its member companies.

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FORMULAE NO. 11 AND 12

These formulae are intended for use on bridges, similar structural steel and other rusted ferrous metal surfaces. They are suitable for priming and body coats, either in the shop or field, where good resistance to the corrosive effects of usual atmospheric environment is required. Formula 11 may be used wherever painting schedules do not demand recoating in less than 36 hours. The vehicle solids, consisting entirely of linseed oil, offer the best opportunity to wet the metal surface and therefore to obtain an intimate bond of the paint with the surface despite the presence of limited amounts of corrosion products found impractical to remove.

Formula 12 is designed for use where painting schedules require handling and recoating in 16 hours. The presence of the free linseed oil in this paint is desirable for the attainment of intimate bonding with the surface.

FORMULA NO. 11

<u>Composition</u>	<u>Percent</u>	<u>Pounds</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	99.7	77.53	1915.0
Aluminum Stearate	0.3	0.23	6.0
	100.0		
VEHICLE:			
Raw Linseed Oil	19.0	10.90	268.0
Pale Most Bodied Linseed Oil (2-2 Viscosity)	17.0	3.78	89.0
Mineral Spirits	29.0	6.45	158.0
Drier	5.0	1.11	24.0
	100.0	100.0	2460.0

Pigment = 77.76%
 Vehicle = 22.24%
 Wt./Gal. = 24 pounds
 PV = 36%

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FORMULA NO. 12

<u>Composition</u>	<u>Percent</u>	<u>Pounds</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	65.0	43.16	740.0
Iron Oxide (85% grade)	16.0	10.62	182.0
Magnesium Silicate	14.5	9.76	169.0
Mica	4.2	2.66	60.0
Aluminum Stearate	0.3	0.20	1.7
	100.0		
VEHICLE:			
Alkyd Resins	57.0	18.98	355.0
Raw Linseed Oil	28.0	9.44	163.0
Mineral Spirits	14.1	4.84	85.0
Lead Napthenate Drier (21% Pb)	0.6	0.24	5.0
Cobalt Napthenate Drier (6% Co)	0.3	0.10	1.9
	100.0	100.00	1721.7

Pigment = 66.4%

Vehicle = 33.6%

Wt./Gal. = 17 pounds

PV = 30%

Medium oil length linseed modified glyceryl phthalate alkyd (31% phthalic anhydride), 50% solution in mineral spirits.

Formulae 11 and 12 are included in the new proposed revision of Federal Specification TT-P-86 as Types I and II respectively.

FORMULA NO. 13

This synthetic vehicle paint was formulated for thoroughly cleaned iron and steel surfaces and for touch-up work where drying within a six hour period is desired. It is recommended for use on smooth steel, particularly as an industrial primer for priming articles fabricated at the factory, such as railroad cars, window sash, air-conditioning conduits, etc. This paint is also well suited as a fast drying general maintenance primer for touch-up work on thoroughly cleaned steel. Because of its fast drying properties and reduced oil content, this paint does not have the surface wetting properties which characterize the preceding free lined oil vehicle paints, exceptionally clean surfaces are essential.

FORMULA NO. 13

<u>Composition</u>	<u>Percent</u>	<u>Percent of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	99.7	67.10	1275.0
Aluminum Stearate	0.3	0.20	3.5
	100.0		
VEHICLE:			
Alkyd Resins	84.0	27.50	52.70
Aromatic Petroleum Spirits	14.5	4.71	90.0
Cobalt Naphthenate (6% Co)	0.3	0.10	1.9
Anti-oxidants and Wetting Agents	1.2	0.39	7.6
	100.0	100.00	1902.0

Pigment = 67.1%
 Vehicle = 32.7%
 Wt./Gal. = 19 pounds
 PV = 30%

*This alkyd is identical to that specified in the vehicle of Formula No. 12.

This fast drying red lead paint is included in the new proposed revision of Federal Specification TT-P-86 as Type III paint.

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FORMULA NO. 14

This paint was designed as a primer for systems exposed to marine atmospheres such as ship superstructures, bridges and dock installations. A system comprised of two coats of this paint and a topcoat meeting the requirements of Maritime Commission Specification 52-MC-6 is exposed at approximately thirty inches above high tide at the marine test basin at Sayville, Long Island. This system is in excellent condition after 42 months in this severe marine atmosphere.

These paints were applied by brushing to 6" x 12" 12 gauge low carbon steel panels. The panels were thoroughly washed with mineral spirits and were free from rust at the time of painting. Mill scale was smooth and intact. As with other synthetic vehicle primers, application on steel free from corrosion products and other foreign matter is essential for the best performance.

FORMULA NO. 14

<u>Composition</u>	<u>Percent</u>	<u>Per cent by Weight of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENTS:			
Red Lead (97% grade)	55.0	37.0	712.0
Zinc Oxide	10.0	6.7	128.0
Zinc Chromate	10.0	6.7	128.0
Iron Oxide (85% grade)	7.0	4.5	86.0
Asbestine	10.0	6.7	128.0
Dicalite or Calite	8.0	5.4	104.0
	<u>100.0</u>		
VEHICLE:			
Dehydrated Castor Alkyd Solution	<u>100.0</u>	<u>33.0</u>	<u>645.0</u>
	<u>100.0</u>	<u>100.0</u>	<u>1929.0</u>

The alkyd vehicle in this paint has the following properties:

N.V. - 50.8% by wt.
 Viscosity - 2 Gardner (77°F)
 Acid Number - Under 5
 % Phthalic Anhydride (Weight of Solids) - 30%

The constants for this paint are:

Pigment = 67% by wt.
 Vehicle = 33% by wt.
 Wt./Gal. = 19 pounds approx.
 PV = 40%

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FORMULA NO. 15

This paint has also shown excellent performance exposed for the same length of time and under the same conditions as Formula No. 14.

FORMULA NO. 15

<u>Composition</u>	<u>Percent</u>	<u>Percent by Weight of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	55.0	36.75	712.0
Zinc Oxide	10.0	7.0	133.0
Zinc Chromate	10.0	7.0	133.0
Mica (325 Mesh)	25.0	17.65	335.0
	<u>100.0</u>		
VEHICLE:			
6 Gallon Linseed Phenolic- Cumarone Varnishes	60.0	17.75	337.0
Medium Linseed Modified Alkyd	40.0	11.85	225.0
	<u>100.0</u>	<u>100.0</u>	<u>562.0</u>

This is a 6 gallon, 100% linseed oil (2-2 Viscosity) varnish containing in the resin portion 50% by weight cumarone-indene resin and 50% tertiary-butyl phenol formaldehyde resin. The thinner consists of a mixed aliphatic-aromatic solvent and the non-volatile content is 60%.

Viscosity = 0-2 Gardner

The alkyd is linseed modified and contains 3% phthalic anhydride. The viscosity is 2 Gardner at 50% solids content.

The constants for this paint are:

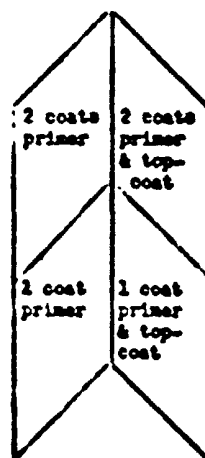
Pigment = 70.15
Vehicle = 29.65
Wt./Gal. = 18.75 pounds
PV = 33%

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PAINTS FOR STRUCTURAL STEEL

The following, mixed pigment red-lead base primers have been selected as outstanding from many on test at the Sayville, Long Island, atmospheric test station. They have been exposed on 4" x 4" x 3/8" structural steel angles in duplicate for five and one-half years. Prior to painting, the angle irons were wire brushed and washed with mineral spirits to remove essentially all of the rust and all of the loose mill scale.

The primers and a high quality topcoat were applied by brushing as indicated on the diagram below. This scheme permitted the incorporation of the test primer into four paint systems on the same angle.



After five and one-half years, the primers described below are showing excellent performance in the topcoated areas and are still offering good protection to the steel in the areas protected by primer coats alone.

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FORMULA NO. 16

<u>Composition</u>	<u>Percent</u>	<u>Percent by Weight of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	70.0	47.5	860.0
Zinc Oxide	10.0	6.8	123.0
Iron Oxide	10.0	6.8	123.0
Asbestos	7.0	4.8	87.0
Cellite	3.0	2.1	38.0
	<u>100.0</u>		
VEHICLE:			
60 Gal. Dehydrated Castor - Fish			
Oil Modified Phenolic Varnish	100.0	32.0	580.0
	<u>100.0</u>	<u>100.0</u>	<u>1811.0</u>

VEHICLE COMPOSITION:

Bakelite Resin BR2963	10.0%
Dehydrated Castor Oil	31.3%
Fish Oil (Varnish Grade)	15.5%
Mineral Spirits	35.5%
Hi-Flash Naptha	4.5%
Dipentene	2.2%
	<u>100.0%</u>

DRIERS (BY WEIGHT OF SOLIDS):

Lead Napthenate (2%)	3.5%
Cobalt Napthenate (6%)	0.69%
Manganese Napthenate (6%)	1.4%

VEHICLE PROPERTIES

Non-Volatile - 50%
 Viscosity - B-C Gardner
 Wt./Gal. - 7.50 pounds

PAINT PROPERTIES

Pigment = 60%
 Vehicle = 32%
 Wt./Gal. = 18.1 pounds
 PV = 30%

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FORMULA NO. 17

<u>Composition</u>	<u>Percent</u>	<u>Percent by Weight of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	45.0	26.0	370.0
Zinc Oxide	10.0	5.8	81.0
Iron Oxide	30.0	17.3	247.0
Asbestine	10.0	5.8	81.0
Cellite	5.0	2.8	40.0
	<u>100.0</u>		
VEHICLE:			
60 Gal. Linseed Oil Turpene			
Phenolic Varnish	100.0	42.3	610.0
	<u>100.0</u>	<u>100.0</u>	<u>1429.0</u>
VEHICLE COMPOSITION:			
Phenolic Resin Durv 420		9.5%	
Linseed Oil (Z-2 Gardner)		48.0%	
Mineral Spirits		35.0%	
Hi-Flash Naptha		4.2%	
Dipentene		<u>3.3%</u>	
		<u>100.0%</u>	
DRIERS (BY WEIGHT OF SOLIDS):			
Lead Napthenate (24%)		3.9%	
Cobalt Napthenate (6%)		1.0%	
Manganese Napthenate (6%)		1.7%	

VEHICLE PROPERTIES

Non-Volatile - 55%
 Viscosity - B-C Gardner
 Wt./Gal. - 7.54 pounds

PAINT PROPERTIES

Pigment = 57.7%
 Vehicle = 42.3%
 Wt./Gal. = 14.3 pounds
 PV = 24%

The topcoat used with formulas 16 and 17 was Maritime Commission
 Specification Paint 52-MC-6.

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FORMULA NO. 18

This paint was exposed on test specimens identical to those used for numbers 16 and 17. The time of exposure to date is five years. Instead of the low visibility gray paint a white lead-chromium oxide green paint was used as the finish coat on the specified sections of the angles. The formulation for this paint is given below.

As with the previously described primers, the topcoated areas are in excellent condition and the areas containing only the primer are still furnishing excellent protection to the steel.

FORMULA NO. 18

<u>Composition</u>	<u>Percent</u>	<u>Percent by Weight of Paint</u>	<u>Pounds for 100 Gallons</u>
PIGMENT:			
Red Lead (97% grade)	55.0	31.0	482.0
Monobasic Lead Chromate	20.0	11.4	178.0
Zinc Oxide	10.0	5.7	88.0
Asbestine	10.0	5.7	88.0
Cellite	5.0	2.8	44.0
	100.0		
VEHICLE:			
Dehydrated Castor Oil 170-1	100.0	43.4	680.0
	100.0	100.0	1560.0

This vehicle is identical to that specified in Formula No. 14 and consists of a dehydrated castor oil modified glyceryl phthalate alkyl containing 30% phthalic anhydride. Non-volatile content = 50.8%

PAINT PROPERTIES

Pigment = 56.6%
 Vehicle = 43.4%
 Wt./Gal. = 15.6 pounds
 PV = 30%

WHITE LEAD - CHROMIUM OXIDE GREEN FINISH COAT

Basic Carbonate White Lead Paste	58.0%
Chromium Oxide Green	24.0%
Raw Linseed Oil	17.4%
Driers	0.6%