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LEAD INDUSTRIES ASSOCIATION PROJECT NO. 14RED LEAD ATMOSPHERIC EXPOSURE PROGRAMPURPOSE:

To evaluate by atmospheric field exposures red lead pigmented type structural metal paint primers versus other pigmented types taking both cost and quality into consideration.

LOCATION OF TESTS:

<u>Place</u>	<u>Specimens</u>	<u>Test Supervised By</u>
Savville, L. I.	Panels and Angles	National Lead Co.
Cleveland, Ohio	Panels	Glidden Co.
Joplin, Mo.	Panels and Angles	Eagle-Fisher Co.
San Francisco, Calif.	Panels	W. P. Fuller and Co.
New Orleans, La.	Panels	Glidden Co.

TEST SPECIMENSMATERIALS:

Panels - cold rolled steel (ASTM 609 46T Carnegie, Illinois #5 brush) 12"x18".

Angles - hot rolled 4"x1"x3/8", 12" long with normal mill scale. Corrosion products are not to exceed 10%.

Treatment - Paints shall be applied to panels and angles without sandblast treatment. Panels shall be cleaned with three mineral spirit washes and angles shall be solvent cleaned and wire brushed just prior to painting.

NUMBER:

Each test sample on cold rolled steel shall consist of one panel painted as hereinafter described.

Each test sample on structural steel shall consist of two angles painted as hereinafter described.

Four angles shall be used for each primer. Two of these will be topcoated with the adjusted S2-MC-6 paint and the other two with the aluminum topcoat.

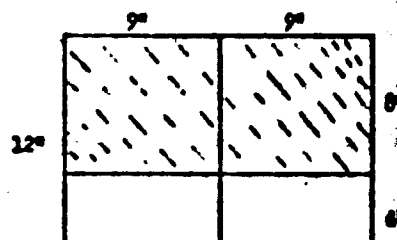
All panels are to be primed in duplicate. Set No. 1 shall carry a topcoat of Navy S2-MC-6 adjusted for accelerated chalking. Set No. 2 shall carry a topcoat of aluminum paint TT-A-468, Type II, Class A. (See formulations, page 3).

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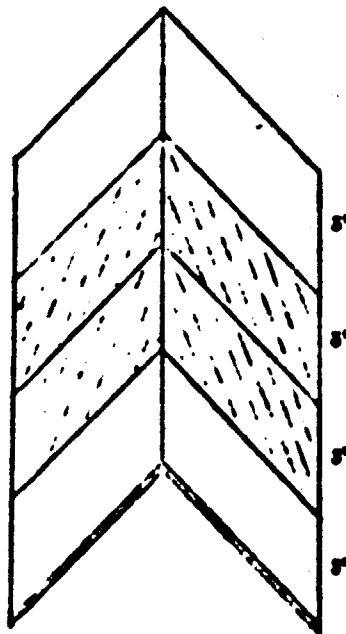
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PANEL LAYOUT:



Left 9 inches and back of panel, 1 coat primer.
Right 9 inches, 2 coats primer.
Upper 8 inches, 1 topcoat
Lower 4 inches, primer exposed.

ANGLE LAYOUT:



Lower 6 inches and back, 1 coat primer.
Upper 6 inches, 2 coats primer.
Middle 6 inches (shaded area), 1 topcoat.

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IDENTIFICATION OF SPECIMENS:

Each test specimen shall be labeled to include exposure site, designated by letters as listed below, L.I.A. paint number as listed on pages 849 of this outline and type of topcoat, designated by A for aluminum and B for gray.

Test site designations are:

A - Sayville
B - "
C - Cleveland
D - New Orleans
E - Joplin
F - San Francisco

Example:

A specimen labeled A-203-B indicates that it is exposed at Sayville, that it is primed with L.I.A. Paint No. 203 and that the topcoat is gray.

Panels and angles will not be distinguished by numbers or letters and it will be necessary to record the exposure data in separate tables for the two types of specimens at Joplin and Sayville.

* The letter B has not been assigned and is reserved for possible future designation of marine exposures.

APPLICATION:

Each set of exposure specimens is to be prepared at the site of exposure by one man who will endeavor to maintain a uniform dry film thickness of 1.5 mils $\pm$ 10% per coat throughout the entire set. Application shall be by spray. (See page 5 for consistency requirements.)

FORMULATIONS

TOP COATS:

Set No. 1 of the panels and angles shall carry a top coat consisting of a revision of U. S. Maritime Commission Specification 52-MC-. The purpose of this revision of pigmentation is to accelerate chalking. The paint formulation (L.I.A. 116) follows:

Pigmentation: (P-159)

TiO ₂ (Anatase Type)	125 lb.
Zinc Oxide	160 lb.
Magnesium Silicate (52-MC-52) (10/9/45)	200 lb.
Type II, High Oil Absorption	165 lb.

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Vehicles (V-206)

Alkyd Solution (52-MC-501 (9/15/45) Type 17)	608 lb.
Glyptol Solution 2466 meets the requirements of this specification	
Petroleum Spirits (73 TT-7-291a)	192 lb.
Dipentene	72 lb.
	622 lb.
Lead Drier	0.90 lb.
Manganese Drier	0.08 lb.
Cobalt Drier	0.08 lb.

FF = 60
Fineness of grind = 7
Pounds per gallon = 11.1

Set No. 2 of the panels and angles shall carry top coat of aluminum paint (L.I.A. No. 308); 2 lb. of standard grade aluminum paste, meeting Federal Specification TT-A-468, Type II, Class A, 2 lb. per gal. in a long oil alkyd resin vehicle similar to one meeting Army-Navy Specification AN-TT-7116a.

Top coat paints, both the modified 52-MC-6 and the aluminum paint, are assigned to the Glidden Company who will make them and ship two gallons of each paint to each testing station. The aluminum paint shall be shipped in one quart compartment cans.

VEHICLES:

Vehicles to be used for the paints formulated for tests shall be as follows:

- Linseed Replacement Oil type of vehicle similar to that called for in Federal Specification TT-P-36 Amendment L.
- Combination raw linseed oil-glyceryl phthalate alkyd vehicle described below:

<u>Vehicle 33.7%</u>	
G.E. Alkyd 2458	56.3%
Raw Linseed Oil	28.1%
Mineral Spirits Driers	15.6%
	100.0%

- 60% by volume G.E. Alkyd 2529 and 40% by volume phenolic varnish called for in U. S. Eng. (Pittsburgh) 512, Vehicle #2. This is a 33 gallon BP254 phenolic varnish. The oil phase consists of 60% tang and 40% linseed. WT#60%, Viscosity#2 (O-M).

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D. G.E. Alkyd 2529.

E. Freight car vehicle:

V705 Cl Varnish	56.0%
Heavy Bodied Linseed Oil	29.0%
(Spencer Kellogg's #1215)	
Mineral Spirits	15.0%
	100.0%

Wt. per gallon = 7.36 lb.

All pigmentations are to be tested in all vehicles, except controls which shall have vehicles as described.

PV:

A PV of 35 is to be used for all paints except specification paints which shall be specified.

GRINDING:

The top coat paints shall be ground to a fineness of 7. All of the primers shall be ground to a fineness of 4. All paints are to be ground in a ball mill.

CONSISTENCY:

Each laboratory preparing assigned paints shall prepare them for shipment at a consistency of 75 Krebs Units. The applicator shall be informed as to the weight of reduced paint necessary to obtain the desired 1.5 mil dry film thickness on each prescribed area on the face of the panels and angles.

DRYERS:

Driers for the vehicles A, B, C, D and E shall be 0.5% lead, 0.02% manganese, 0.02% cobalt, based on the oil content. Specification paints shall carry the driers specified.

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TEST PIGMENTATIONS:

The following pigmentations are to be tested in each of the five vehicles listed above:

	<u>114</u>	<u>115</u>	<u>116</u>	<u>117</u>	<u>118</u>	<u>119</u>	<u>120</u>
Red Lead 97% grade	99.5%	75%	-	-	-	-	25%
Zinc Chromate	-	-	25%	35%	50%	25%	20%
Zinc Oxide	-	-	-	15%	-	10%	15%
Magnesium Silicate	-	-	20%	13%	10%	25%	19.5%
Iron Oxide, 85%	-	24.5%	55%	37%	40%	30%	20%
Mica 325 Mesh	-	-	-	-	-	10%	-
Aluminum Stearate	0.5%	0.5%	-	-	-	-	0.5%
	<u>121</u>	<u>122</u>	<u>123</u>	<u>124</u>	<u>147</u>	<u>148</u>	<u>158</u>
Red Lead 97% grade	55%	65%	40%	-	52%	30%	-
Zinc Chromate	10%	-	7%	15%	-	-	-
Zinc Oxide	-	-	-	10%	-	-	10%
Magnesium Silicate	23.5%	14.5%	24.5%	25%	23.5%	27.5%	15%
Iron Oxide, 85%	2%	16%	28%	50%	24%	34%	40%
Mica 325 Mesh	9%	4%	-	-	-	-	-
Aluminum Stearate	0.5%	0.5%	0.5%	-	0.5%	0.5%	-
Basic Lead Chromate	-	-	-	-	-	-	3%

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PAINTS

NOTE: LETTERS PRECEDING PAINT NO. INDICATE MEMBER ASSIGNED TO MAKE PAINT

E - Eagle-Picher Co.

G - Glidden Co.

N - National Lead Co.

Each primer including controls shall be made in quantity of 6 pints and one pint sent to each exposure station. The sixth pint shall be forwarded to National Lead Co. Laboratories in Brooklyn, N.Y. for storage.

<u>L.I.A.</u> <u>Paint</u> <u>No.</u>	<u>Pigeon-</u> <u>station</u> <u>No.</u>	<u>Letter</u>	<u>Vehicle</u> <u>No.</u>
E 203	114	A	103
N 204	114	B	104
N 205	114	C	105
G 206	114	D	106
G 207	114	E	107
E 208	115	A	108
N 209	115	B	109
N 210	115	C	110
G 211	115	D	111
G 212	115	E	112
E 213	116	A	113
N 214	116	B	114
N 215	116	C	115
G 216	116	D	116
G 217	116	E	117
E 218	117	A	118
N 219	117	B	119
N 220	117	C	120
G 221	117	D	121
G 222	117	E	122
E 223	118	A	123
N 224	118	B	124
N 225	118	C	125
G 226	118	D	126
G 227	118	E	127
E 228	119	A	128
N 229	119	B	129
N 230	119	C	130
G 231	119	D	131
G 232	119	E	132

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<u>L.I.A. Paint No.</u>	<u>Pigmen- tation No.</u>	<u>Letter</u>	<u>Vehicle No.</u>
E 233	120	A	133
N 234	120	B	134
N 235	120	C	135
O 236	120	D	136
O 237	120	E	137
E 238	121	A	138
N 239	121	B	139
N 240	121	C	140
O 241	121	D	141
O 242	121	E	142
E 243	122	A	143
N 244	122	B	144
N 245	122	C	145
O 246	122	D	146
O 247	122	E	147
E 248	123	A	148
N 249	123	B	149
N 250	123	C	150
O 251	123	D	151
O 252	123	E	152
E 253	124	A	153
N 254	124	B	154
N 255	124	C	155
O 256	124	D	156
O 257	124	E	157
E 286	147	A	180
N 287	147	B	181
N 288	147	C	182
O 289	147	D	183
O 290	147	E	184
E 291	148	A	185
N 292	148	B	186
N 293	148	C	187
O 294	148	D	188
O 295	148	E	189
N 311	158	A	201
N 312	158	B	202
N 313	158	C	203
N 314	158	D	204
N 315	158	E	205

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CONTROLS:

The following formulations are to be included as controls:

PIGMENTATIONS (CONTROLS):

	<u>92</u>	<u>114</u>	<u>125</u>	<u>126</u>	<u>127</u>	<u>128</u>	<u>129</u>	<u>130</u>
Red Lead 97% grade	-	99.5%	-	-	-	-	-	-
Basic Lead Chromate	-	-	-	-	-	-	-	25%
Blue Lead	-	-	-	-	-	-	-	-
Zinc Chromate	-	-	55%	47%	59%	65%	29%	-
Zinc Oxide	20%	-	-	11%	-	-	-	-
Zinc Dust	80%	-	-	-	-	-	-	-
Magnesium Silicate	-	-	25%	27%	10%	20%	15%	15%
Iron Oxide 85%	-	-	-	-	-	7%	50%	50%
Iron Oxide 76%	-	-	-	-	25%	-	-	-
325 Mesh Mica	-	-	-	-	10%	-	-	-
Silica	-	-	-	-	-	-	10%	10%
Aluminum Stearate	-	0.5%	-	-	-	-	-	-
TiO ₂ Rutile	-	-	15%	12%	-	-	-	-
Raw Sienna	-	-	5%	-	-	-	-	-

	<u>131</u>	<u>132</u>	<u>133</u>	<u>149</u>	<u>150</u>	<u>151</u>	<u>152</u>	<u>153(1)</u>	<u>154(2)</u>
Red Lead	-	-	-	-	-	-	-	-	-
Blue Lead	-	-	-	-	-	-	-	-	-
35/65 Co. Fumed Leaded Zinc	Army	-	-	-	-	-	F.S. Bakelite	Bakelite	Bakelite
Basic Lead Carbonate	Ordi-	-	-	72%	-	-	TT-P- WP-1	P-10	P-10
Basic Lead Sulphate	nance	-	-	-	72%	-	20 Primer	Anti-	Anti-
Soapstone	Spec.	-	-	-	-	72%	Blue Pignen-	Corro-	Corro-
Talc	3-181	-	-	15%	15%	15%	Lead tation	sive	sive
Water Ground Mica(325 Mesh)	Type	-	-	8%	8%	8%	Paint	Pignen-	Pignen-
Aluminum Stearate (High Gel)	II	-	-	4.5%	4.5%	4.5%	-	tation	tation
				0.5%	0.5%	0.5%	-		

(1) Formulated according to the directions in the Bakelite Corporation Bulletin on Wash Primer WP-1 of January 2, 1947.

(2) Formulated according to Bakelite Corporation instructions for P-10.

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PAINTS (CONTROLS)

<u>L. Y. A.</u> <u>Paint</u> <u>No.</u>	<u>Pigmen-</u> <u>tation</u> <u>No.</u>	<u>Vehicle</u>
E 258 (52-MC-29)	126	V-158
E 259 (Reichold Formula No. I)	127	V-159 (Reichold Resin P381)
E 260	128	V-160 (VF 636)
E 261 (BMS-102 #29)	129	V-161
E 262 (P.S. TT-P-641)	92	V-162 ^a
E 263	92	V-163 ^b
E 264	130	V-164 (Vehicle D)
E 265 (Army Ordinance 3-181 Type II)	131	V-165
E 266	132	V-166
E 267	133	V-167
E 268	114	V-85 (TT-P-86 Linseed Oil)
E 297	149	D-191
E 299	150	D-193
E 301	151	D-195
E 302	125	V-2
G 306 (WP-1)	153	V-196
G 307 (P-10)	154	V-197
H 309 ^c	156	V-199
E 310	152	V-200

^aVehicle Raw Linseed Oil 90% mineral spirits of type 5X liquid oil drier. (New Jersey Zinc Technical Service Bulletin, dated July 2, 1942.

^bDesigned to meet Federal Specification TT-P-641, Type I^a.)

^cMade with 2458 Glyptal.

^dRed Lead Primer consisting of replacement of zinc chromate in WP-1 with 95% red lead on equal pigment volume basis.