

RESINS



BOOK

Nº 1270

PIGMENT, COLOR & CHEMICAL DIVISION

THE SHERWIN-WILLIAMS COMPANY

CHICAGO, CLEVELAND, NEW YORK, OAKLAND

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Foreword

When the Sherwin-Williams Company first started production of alkyd resins—some twenty-five years ago—an alkyd was an expensive novelty which produced a hard tough film provided you were able to apply the finish by spraying. A brushing alkyd was unknown.

During the ensuing years the outstanding characteristics which can be obtained from alkyd resins have been recognized and through constant development work the technologists of the paint industry have adapted alkyds to more and more finishes until a majority of the protective coatings produced in this country contain some form of alkyd. Furthermore, all indications point to an even larger use in the future.

It has been possible for such a major change to take place in a large industry in so short a time, only because the suppliers and consumers have worked together closely and in complete harmony.

The Sherwin-Williams Company is proud of the part that its technologists have played in the utilization of alkyd resins. We recall the contributions which we made to the development of brushing type alkyds with the through drying characteristics required for finishes of this type.

This one development contributed greatly to the advancement of alkyds since it opened up the entire field of architectural enamels and shelf goods. Other contributions, which have not been as spectacular, have—year in and year out—helped make better finishes for more and more different applications.

To our customers who have served so well as friendly critics and collaborators we offer our deep appreciation. It is our aim to serve you in the future to the utmost of our ability.

This resin handbook is being prepared in a transition period—which has followed a period of shortages and restrictions and, we hope, precedes a period of abundant supply. We aim to present this handbook in the spirit of this transition period—the spirit of integrating the technological achievements of the past and looking forward to the outstanding developments which will come in the future.

In presenting the resins, an attempt has been made to list and discuss them in such manner that information can be found easily. The resins have been described in detail, two pages being devoted to each item. In addition they are listed in specification and usage charts where the characteristics can be readily compared and vehicle selection according to use can be made.

While the items listed are the most popular forms in each case, where variations are available, the parallel numbers are indicated by means of references in the individual writeups.

RESIN CLASSIFICATION

The method of numbering our resins has been so designed that the letter prefixes give an indication of either the general formulation class or usage type of the resin. The description of each classification is given on the index page preceeding that class.

Throughout the definitions of these individual classes, the term “alkyd” is taken to mean the oil modified versions of the general class of polymers formed by the reaction of polybasic acids and polyhydric alcohols.

DEFINITION OF SPECIFICATIONS

Non-Volatile

The term “Non-Volatile” refers to the total non-volatile content given as percent by weight based on the total weight of the resin solution.

Volatile

The term “Volatile” refers to the solvent content expressed as percent by weight based on the total weight of the resin solution.

Weight Per Gallon

The “Weight Per Gallon” standards have been established and are accurately controlled by conventional hydrometer measurements made at 77°F.

Viscosity

The "Viscosity" standards were established and are accurately maintained by Gardner-Holdt standard viscosity tubes at 77°F.

Acid Value

The term "Acid Value" may be defined as the number of milligrams of potassium hydroxide required to neutralize one gram of the non-volatile content of the resin solution.

Color

Gardner Color Standards of 1933 are the basis of standard "Color" characteristics.

Oil Content

The "Oil Content" is given as percent by weight of oil based on the total weight of non-volatile.

Phthalic Anhydride Content

The "Phthalic Anhydride Content" is given as percent by weight based on the total weight of non-volatile.

Type of Oil

The "Type of Oil" refers to the major oil component.

DRYING TERMINOLOGY

Drier Recommendations

Recommended percentages of "Driers" are given as percent metal based on non-volatile.

Set

A film is said to be "Set" when gentle pressure of the finger shows a tacky condition but none of the coating adheres to the finger.

Dried Hard

A film is said to be "Dried Hard" when maximum pressure exerted between thumb and finger (without twisting) does not move the film nor leave a mark which remains noticeable after the film is lightly polished.

The information contained in this book is believed to be true and accurate; however, all recommendations are made without guarantee, since the conditions of use are beyond our control. Nothing contained herein shall be construed as a recommendation to violate any patent.

DYAL	POUNDS PER GALLON	% NON-VOLATILE	SOLVENT	VISCOSITY GARDNER-1933 77° F	%NON-VOLATILE AT E-G VISCOSITY	RESIN MODIFICATION
PURE OIL MODIFIED ALKYDS - COLOR RETENTIVE - DRYING						
XAC 1	7.57	50	MINERAL SPIRITS	W-X	40	NONE
XAC 2	7.95	70	MINERAL SPIRITS	V-W	58	NONE
XAC 9	8.29	50	XYLOL	Z-Z ₂	34	NONE
XAC 39	8.22	50	XYLOL	U-W	40	NONE
XAC 42	7.60	50	MINERAL SPIRITS	Z ₂ -Z ₄	36	NONE
XAC 47	7.96	70	MINERAL SPIRITS	Z ₂ -Z ₄	50	NONE
XAC 48	7.25	30	HI-FLASH MIN. SPTS.	U-W	23	NONE
XAC 66	8.40	60	XYLOL	Z ₁ -Z ₃	40	NONE
XAC 76	8.42	65	XYLOL	Y-Z	56	NONE
XAC 83	7.97	70	MINERAL SPIRITS	Z-Z ₂	51	NONE
XAC 93	8.00	70	MINERAL SPIRITS	Y-Z ₁	50	NONE
XAC 97	7.66	50	MINERAL SPIRITS	P-R	42	NONE
XAC 99	7.58	50	MINERAL SPIRITS	Y-Z	40	NONE
PURE OIL MODIFIED ALKYDS - NON-COLOR RETENTIVE - DRYING						
XAD 26	7.65	50	MINERAL SPIRITS	U-W	41	NONE
XAD 37	7.62	50	MINERAL SPIRITS	Z ₂ -Z ₃	36	NONE
RESIN MODIFIED ALKYDS						
XAR 7	7.73	50	32% VM&P 18% XYLOL	T-V	38	PRESENT
XAR 8	8.02	50	35% XYLOL 15% MIN. SPTS.	U-W	45	PHENOLIC
XAR 12	7.62	50	MINERAL SPIRITS	X-Z ₂	38	PRESENT
XAR 13	7.70	50	VM&P NAPHTHA	Z-Z ₂	35	PRESENT
XAR 19	7.76	55	30% XYLOL 15% VM&P	G-I	50	PRESENT
XAR 62	7.83	50	35% XYLOL 15% VM&P	T-V	42.6	PHENOLIC
PURE OIL MODIFIED ALKYDS - NON-DRYING						
XAN 78	8.35	50	XYLOL	U-W	43	NONE
STYRENATED ALKYDS						
XAS 4	8.04	50	XYLOL	O-R	40	NONE
MALEIC AND FUMARIC ACID TREATED RESIN SOLUTIONS						
XMD 6	7.50	50	MINERAL SPIRITS	R-T	44	PRESENT
XMD 18	7.40	50	15% MIN. SPTS. 35% VM&P	Q-S	40	PRESENT
XMD 165	7.45	50	MINERAL SPIRITS	Q-S	42	PRESENT
OLEORESINOUS VARNISH SOLUTIONS						
XOR 31	7.98	50	XYLOL	S-W	40	NONE
XOR 34	7.98	50	XYLOL	T-X	40	NONE
PLASTICIZERS						
XPL 5	8.08	80	XYLOL	T-V	65	PRESENT
XPL 115	8.20	60	25% XYLOL 15% TOLUOL	T-V	43	PRESENT
EMULSION RESINS						
XRE 156	8.93	100	NONE	SEMI-SOLID	58	NONE

ACID VALUE (ON N.V.M.)	COLOR (Gardner- Holtz)	% PHTHALIC ANHYDRIDE	% OIL (ON N.V.M.)	TYPE OF OIL	ALIPHATIC SOLVENT TOLERANCE	DIAL
PURE OIL MODIFIED ALKYDS - COLOR RETENTIVE - DRYING						
12	9	28	58	SOYA-LINSEED	INFINITE	XAC 1
5	9	23	65	SOYA	INFINITE	XAC 2
10	5-7	40	37.1	DEHYDRATED CASTOR	NONE	XAC 9
15	6	38	41	SOYA	400%	XAC 39
10	9	34	50	SOYA	INFINITE	XAC 42
7	7	24	62	SOYA	INFINITE	XAC 47
12-18	7	PRESENT	SHORT	SOYA	INFINITE	XAC 48
25-30	10-11	38	44.7	DEHYDRATED CASTOR	NONE	XAC 66
3-4	11	35	47	SOYA	200%	XAC 76
5	7	23	64	SOYA	INFINITE	XAC 83
3	8	23.8	62	SOYA	INFINITE	XAC 93
12	9	35	52	SOYA	INFINITE	XAC 97
15-20	8-9	30.5	57.5	SOYA	1500%	XAC 99
PURE OIL MODIFIED ALKYDS - NON-COLOR RETENTIVE - DRYING						
10	10	33	52	LINSEED	INFINITE	XAD 26
12	10	34.8	50.6	LINSEED	1500%	XAD 37
RESIN MODIFIED ALKYDS						
25-30	12	PRESENT	42	CHINA-WOOD	50%	XAR 7
20-25	12	28	34	LINSEED	500%	XAR 8
15	14	PRESENT	42	DRYING	INFINITE	XAR 12
24-30	13	29	30	DRYING	INFINITE	XAR 13
40-50	14	PRESENT	51	CHINA-WOOD	150%	XAR 19
10	12	29.6	51.7	SOYA-TUNG	NONE	XAR 62
PURE OIL MODIFIED ALKYDS - NON-DRYING						
5	7	42.2	33	COCONUT	NONE	XAN 78
STYRENATED ALKYDS						
15-20	8	PRESENT	32	DRYING	200%	XAS 4
MALEIC AND FUMARIC TREATED RESIN SOLUTIONS						
20-25	9	NONE	47.5	SOYA	1500%	XMD 6
20-25	11-12	NONE	47.2	SOYA	1500%	XMD 18
10-20	11	NONE	54	DRYING	INFINITE	XMD 165
OLEORESINOUS VARNISH SOLUTIONS						
4	6	NONE	--	--	POOR	XOR 31
3	6	NONE	--	--	POOR	XOR 34
PLASTICIZERS						
7	6	NONE	86	CASTOR	POOR	XPL 5
20-30	12	NONE	48	CASTOR	POOR	XPL 115
EMULSION RESINS						
5	9	PRESENT	LONG	SOYA	INFINITE	XRE 156

U S A G E C H A R T

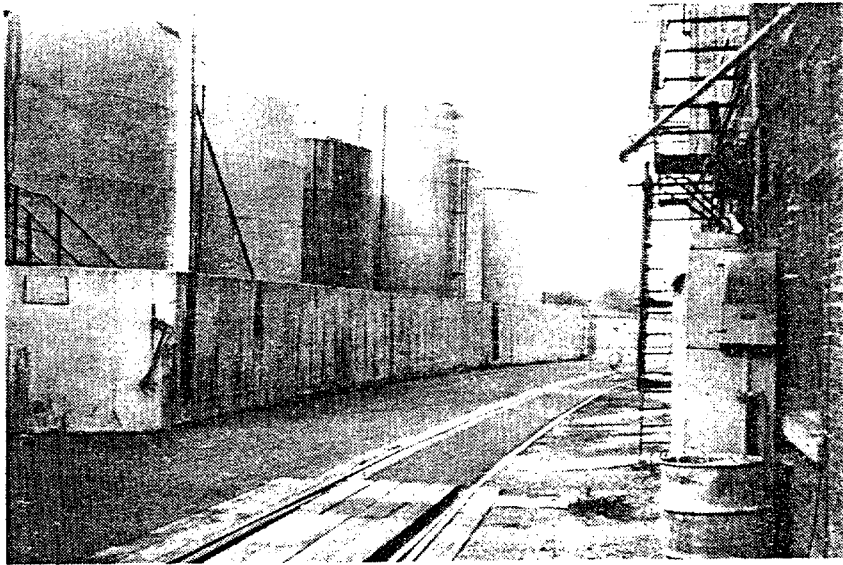
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XAC 1					S	S	S	S		S															
XAC 2						P	P																		
XAC 9	P	S	P								S			S	S	S		P							
XAC 39	S	S	\$									S		P	P	S		P	P	P	P	P			
XAC 42					\$	\$	\$			S	\$			\$	\$	\$	\$	\$	\$					P	
XAC 47					P	P						S													
XAC 48					P			P	P																
XAC 66	S	P	P								S			S								S	S		
XAC 76	S	P	S								P			S	S	S		S				S	S		
XAC 83					P	P					P														
XAC 93					P	P					P														
XAC 97	\$				\$	S	S	S		S		S		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
XAC 99								S	S	S				\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	
XAD 26										S	P												S	\$	
XAD 37		S																					S	\$	
XAN 78	P		P								S													P	
XAR 7	S	S	S							S	S			S	S	S	P	P	P	P	P	P	P	\$	
XAR 8		S	S								P	S											S	\$	
XAR 12											P	\$											\$	\$	
XAR 13										P													\$	\$	
XAR 19																							\$	\$	
XAR 62										S	S													\$	
XAS 4			S																					\$	
XMD 6		\$			\$	\$	\$	\$						\$	\$	\$								\$	
XMD 18																									
XMD 165						\$	\$	\$																	
XOR 31	P	S	S	P																P	P				
XOR 34	P	S	S	P																P	P				
XPL 5											S														
XPL 115											P														
XRE 156																								P	

P-PREFERRED RESIN S-SUITABLE RESIN \$-LOW COST RESIN

DYAL USAGE CHART

FARM MACHINERY	FURNITURE CLEARS	FURNITURE ENAMELS-METAL	FURNITURE ENAMELS-WOOD	GRINDING VEHICLES	HAMMER FINISHES	HOUSEHOLD ENAMELS	LACQUER MODIFIERS	LACQUER PLASTICIZERS	MARINE FINISHES	PAINTS - TRIM & TRELLIS	PUMP ENAMELS	RAILWAY CAR FINISHES	SIGNS - METAL	SIGNS - WOOD	SYNDICATE ENAMELS	TANK CAR FINISHES	TIN DECORATING	TOY ENAMELS	TRUCK FINISHES	VENETIAN BLIND ENAMELS	WASH MACHINE ENAMELS	WRINKLE FINISHES	ZONE MARKING PAINTS	
S	S	S	S			P			S		S	S	S	S			S	S	S					XAC 1
		S	S	S		S			S	S	S											S		XAC 2
	S	S	S				S	S					P				P	S		P	S			XAC 9
	S	P	S	S				S			S	S	P	S			P	S	S	P	S			XAC 39
P	P	P	S			\$			S		P	P	S	S	S	S	S	S	S			P		XAC 42
S		S	S			P			P	P	S	P		S		S						P		XAC 47
																								XAC 48
	S											S						S						XAC 66
S	S	S	S	P		S	P	S			S	S						S	S	S				XAC 76
S		S	S	S		S			P	P	S	P		S								P		XAC 83
S		S				S			P	P	S	S		S								P		XAC 93
S	S	S	S			P			S				S	S			S		S			P		XAC 97
S	S	S	S								S		S	S			S							XAC 99
S			P						S	S	S		S									S		XAD 26
P	P	S	S						S		P	P		S		S	S	P				P		XAD 37
						P	P									P								XAN 78
S	S	S							S		S	S	S		P		P	S			P			XAR 7
S	S	S							S		P				\$		S	S						XAR 8
\$	\$	\$	\$			\$					\$	\$	\$	\$	S	\$		\$	\$			\$		XAR 12
\$	\$	\$	\$								\$	\$					\$	\$	\$					XAR 13
																					P			XAR 19
S											S	S	S	S		S		P						XAR 62
S	S	S	S		P						S	S	S	S			S	S	S					XAS 4
\$	\$	\$	\$		\$									P		\$					\$			XMD 6
\$	\$		\$																					XMD 18
\$	\$													P										XMD 165
																			P	P				XOR 31
	S																		P	P				XOR 34
							P																	XPL 5
						P	P																	XPL 115
																								XRE 156

P-PREFERRED RESIN S-SUITABLE RESIN \$-LOW COST RESIN



*View of 25,000 gallon tanks used for storage of oil going into
Sherwin-Williams Dyal resins.*

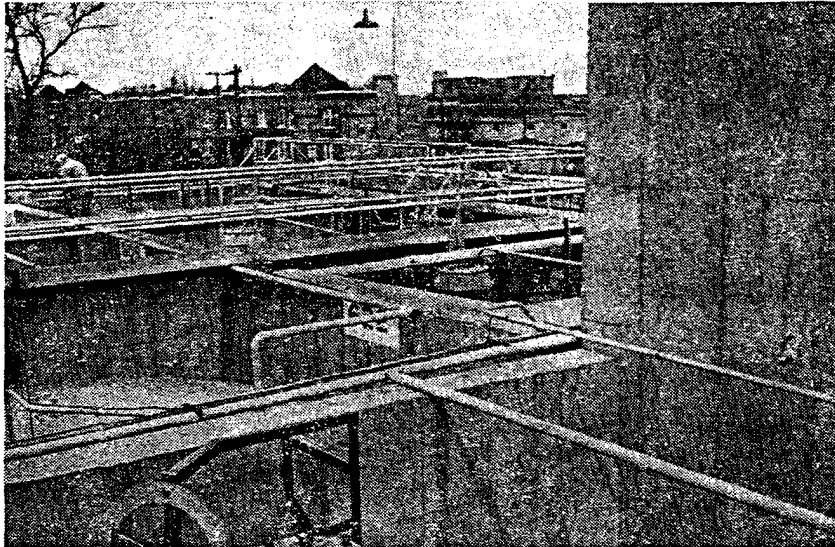
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XAC

DYAL XAC

The DYAL XAC resins are pure oil modified alkyd resins that are of the drying type and are color retentive.

XAC



A view of a modern solvent tank farm at one of the Sherwin-Williams' alkyd producing units. A capacity of 300,000 gallons stored safely and efficiently assures an adequate supply to meet the needs of volume production of alkyd resins.

DYAL XAC-1

TYPE: Medium Length Oil Modified Alkyd

OUTSTANDING FEATURES:

Fast Dry — Versatility

Dyal XAC-1 is outstanding in its versatility. It may be used to obtain maximum performance in a large variety of high quality finishes including both air drying and low temperature baking types. Trade sales finishes made with Dyal XAC-1 apply easily by brushing and set up to give films that dry hard and are print resistant in a matter of only 4 to 6 hours. Industrial finishes made with this resin can be applied by brush, spray or dip.

Dyal XAC-1 will give excellent performance when used as a vehicle for the following usages:

1. Architectural Shelf Goods
Household White and Colored Enamels
Painter Maintenance Finishes
2. Industrial Finishes
Dairy Maintenance Enamels
Implement Finishes
Machine Enamels
Toy Enamels
Furniture Clears

Dyal XAC-1 is suitable for either ball or roller mill grinding. Dispersion of a wide range of pigments may be accomplished without difficulty. It is recommended that pastes ground in Dyal XAC-1 be let down soon after grinding rather than be stored for any considerable length of time. Finishes made with Dyal XAC-1 will have excellent package stability when handled in this manner.

In low pigment concentration it is advisable to use one or two pounds of aluminum stearate per hundred gallons of enamel to control flow and insure pigment suspension.

SPECIFICATIONS

Non Volatile.....	50%	Color (max.).....	9
Volatile.....	50% M.S.	Acid Value.....	12
Lbs. per gal.....	7.57	Phthalic Anhydride.....	28%
Viscosity.....	W-X	Oil.....	58%
Aliphatic Solv. Tol.....	Infinite	Type Oil.....	Soya, Linseed
Solids at E to G Vis.....	40%	Resin Modifiers.....	None

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FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	good	Pigments	good
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	hard, tough, flexible		excellent excellent fair
Resistance to:			
Abrasion	good		
Acids	good	Varnish	{ long medium short
Alkali	good		excellent excellent good
Oil & Gasoline	excellent	Oils	excellent
Water	excellent	Bodied Oils	good
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	45 min.	Lead	Air Dry	Bake
Air Dry—Hard	6 hours	Manganese	.3 to .6%	none
Bake	250°F. for 60 min.	Cobalt	none	none
		Calcium*	.03% to .06%	.02%
		Zinc	.3% to .6%	.3%
			none	.01%
			*to replace lead	

SUGGESTED FORMULATIONS

Four Hour Gloss Red Enamel				Cream Industrial Maintenance Enamel			
Lbs.	Gals.			Lbs.	Gals.		
90	7.7	Toludine Red		190	5.5	Rutile Ti O ₂ **	
90	11.9	Dyal XAC-1		15	0.3	Med. Chrome Yellow	
418	55.0	Dyal XAC-1		154	20.3	Dyal XAC-1	
146	22.3	Mineral Spirits		479	63.2	Dyal XAC-1	
21	3.0	Dipentine		85	11.5	Mineral Spirits	
15	1.5	24% Pb Naphthenate		12	1.5	24% Pb Naphthenate	
8	1.0	6% Co Naphthenate		3	0.4	6% Co Naphthenate	
1	0.1	Anti Skin Agent		1	0.1	Anti Skin Agent	
789	102.5			939	103.0		

Roller Mill Grind for 6 to 7 Hegman
 Lbs. per gal. — 7.68
 Viscosity — 70 to 72 K. U.
 Set — 60 min.
 Hard — 4 hours

**O. A. 17-19
 Viscosity No. 4 Ford Cup — 97 to 107
 Lbs. per gal. — 9.03
 Brushing — Reduce with Kerosene 5%
 Spray — Reduce with VM&P 15 to 25%

TYPE: Long Soya Oil Modified Alkyd

OUTSTANDING FEATURES:

Low Viscosity, High Oil Content, Compatibility

Dyal XAC-2 is a long oil soya modified pentaerythritol alkyd characterized by excellent drying, excellent application properties and having excellent durability.

Fine quality architectural finishes may be formulated using Dyal XAC-2 as the sole vehicle. With its high oil content, Dyal XAC-2 is more suitable for use in high vehicle solids formulations than other resins generally recommended for architectural enamels such as Dyal XAC-47 and Dyal XAC-83. Dyal XAC-2 will reduce faster than the other two alkyds because of its lower initial viscosity.

The initial color of Dyal XAC-2 is slightly darker than the color of either Dyal XAC-47 or Dyal XAC-83. However, because of the inherent exceptional brushing properties of this alkyd along with its extremely good compatibility, Dyal XAC-2 can be combined with shorter alkyds such as Dyal XAC-99 and Dyal XAC-1 to improve the application characteristics of high quality trade sales and industrial finishes of the following types:

1. Trade Sales Shelf Goods
 - Architectural White Enamels
 - Tinting Colors
 - One Coat Gloss and Semi-Gloss Enamels
 - Trim and Trellis Paints
2. Industrial Finishes
 - Mill Whites
 - Metal Furniture Finishes
 - Maintenance Finishes

Dispersion of most pigments in Dyal XAC-2 requires no special procedure or precautions since this vehicle wets pigments well and forms stable pigment bases which can be let down with little difficulty.

SPECIFICATIONS

Non Volatile.....	70%	Color (max.)	9
Volatile	30% M.S.	Acid Value	5
Lbs. per gal.	7.95	Phthalic Anhydride	23%
Viscosity	V - W	Oil	65%
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	58%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

		Compatibility with:	
Color	good	Pigments	excellent
Color Retention	excellent	Nitrocellulose	none
Gloss	good	Alkyds { long medium short	excellent
Gloss Retention	good		excellent
Type of Film	tough, flexible		poor
Resistance to:			
Abrasion	fair	Varnish { long medium short	excellent
Acids	good		excellent
Alkali	good		poor
Oil & Gasoline	excellent	Oils	good
Water	good	Bodied Oils	good
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	2½ hours	Lead	Air Dry
Air Dry—Hard	10 to 12 hours	Manganese	0.3% to 0.6% for colors
Bake	not recommended	Cobalt	none
		Calcium*	0.03% to 0.06%
		Zinc	0.3% to 0.6%
			none
			*to replace lead in whites

SUGGESTED FORMULATIONS

White Architectural Gloss Enamel			White Semi-Gloss Enamel		
Lbs.	Gals.		Lbs.	Gals.	
250	7.2	Rutile N. C. Ti O ₂	175	5.0	Rutile N. C. Ti O ₂
28	0.6	Zinc Oxide	372	13.7	Ti Cal Rutile N. C.
3	0.3	Aluminum Stearate	4		Soya Lecithin
160	20.0	Dyal XAC-2	2		Aluminum Stearate
455	57.0	Dyal XAC-2	192	25.1	Dyal XAC-2
26	4.0	Water White Kerosene	268	35.4	Dyal XAC-99
79	12.0	Mineral Spirits	130	20.0	Hi Flash M. S.
6	0.8	6% Co Naphthenate	16	2.0	4% Calcium Octoate
7	1.0	Anti Skin Agent (20%)	3	0.4	6% Co Naphthenate
1014	102.9		7	1.0	Anti Skin Agent (20%)
Grind — 6 to 7 Hegman — Roll Mill			1170	102.6	
Viscosity — 69 to 72 K. U.			Grind — 6 to 7 Hegman — Roll Mill		
Gloss — 87 to 92 Photocell			Viscosity — 72 to 74 K. U.		
Dry — 8 to 12 hours			Gloss — 68 to 79 Photocell		
			Dry — 4 to 6 hours		

TYPE: Medium Length Color Retentive Baking Alkyd**OUTSTANDING FEATURES: Cost, Color Retention, Fast Baking Schedule, Hardness**

XAC-4 is an inexpensive medium length alkyd designed for formulating baking finishes. One of the outstanding features of XAC-4 is color retention. Protective coatings formulated from XAC-4 will show less yellowing on aging than most color retentive alkyds. XAC-4 may be used with XRU-1 to formulate economy priced baking enamels. These amine resin modified enamels will have fast baking schedules and give hard films.

The compatibility of XAC-4 is another important feature. Mixing varnishes such as XMD-1 may be used with XAC-4 to formulate low cost baking finishes. As an example, the formulation listed on the reverse side of the XMD-1 sheet will bake in from 10 to 20 minutes at from 280° F. to 300° F. The resultant film will be hard and tough and have good flexibility.

We recommend the use of XAC-4 for formulating the following types of protective coatings:

1. Metal Cabinet Enamels
2. Farm Machinery
3. Venetian Blinds
4. Fluorescent Light Fixtures
5. Hardware Enamels
6. Metal Furniture Enamels

PHYSICAL CHARACTERISTICS

Non Volatile	50%	Color	9 Max.
Volatile	50% Mineral Spirits	Acid Value	10 Max.
Pounds per Gallon.....	7.53	Phthalic Anhydride	29%
Viscosity	X-Z	Type of Oil.....	Color Retentive Drying
Aliphatic Solv. Tol.....	Infinite	Resin Modifiers	None
Solids at E. to G. Viscosity.....	39%		

FILM AND PERFORMANCE PROPERTIES

Color	Excellent
Color Retention	Excellent
Gloss	Excellent
Gloss Retention	Excellent
Type of Film.....	Hard, Tough

Resistance to:

Abrasion	Excellent
Acids	Good
Alkali	Good
Oil and Gasoline.....	Good
Water	Excellent
Weather	Good

Pigment Wetting and Dispersing Properties	Excellent
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Compatibility with:

Long Alkyds	Excellent
Medium Alkyds	Excellent
Short Alkyds	Good
Long Varnishes	Fair
Medium Varnishes	Good
Short Varnishes	Good
Oils	Fair
Bodied Oils	Poor

BAKING AND DRIER RECOMMENDATIONS

Baking Schedule:

Twenty minutes at 300° F. using 0.5% lead, 0.05% cobalt and 0.05% manganese metal based on resin solids.

With amine resin modification, the time and temperature of bake will vary with the degree of modification. An example would be 30 minutes at 300° F. for 30% urea resin modification.

Sandstone Brown Baking Enamel

Lbs.	Gals.	Material
165	4.75	TiO ₂ Rutile R-610
57½	1.7	Ferrite Yellow, Lt. Lem.
3½	.08	Red Oxide, R3098
3	.3	Soya Lecithin
250	33.0	Dyal XAC-4
71½	11.0	Mineral Spirits

Ball Mill to 7H

324	43.0	Dyal XAC-4
14½	1.9	Lead Naphthenate 10%
7	1.0	Manganese Naph. 2%
7	1.0	Cobalt Naph. 2%
40	5.4	Solvesso 150
?	—	Dispersed Black

943 103.13

Viscosity	42" #4 Ford Cup
Lbs. per Gal.....	9.10
Grind 7H.....	Ball Mill
NVM	55%
Bake	18' @ 300° F.

Cherry Blossom Pink Baking Enamel

Lbs.	Gals.	Material
227	6.5	TiO ₂ Rutile R-110
31	0.8	Cad. Lithopone, Med. Red
2	0.2	Soya Lecithin
189	25.2	Dyal XAC-4
8	1.1	Pine Oil

283	37.7	Dyal XAC-4
174	20.5	Dyal XRU-1
4½	0.6	0.4% DC 200 Sili. Sol'n.
9½	1.3	Diethylamine Ethanol
60	8.3	Xylol

988.0 102.2

Viscosity	90-100 sec. #4 Ford Cup
Lbs. per Gal.....	9.68
Grind 7H.....	Roller Mill
Reduction..	20-25% with Xylol for Spray
Bake	30' @ 300° F.

0007-PMC-000000749

TYPE: Short Oil Modified Alkyd

OUTSTANDING FEATURES:

Hardness, Gloss, Gloss Retention, Adhesion

Dyal XAC-9 is a short oil dehydrated castor modified alkyd designed for use with urea or melamine in high quality baking finishes. Finishes made with Dyal XAC-9 and modified with normal amounts of amine resin will exhibit excellent gloss, excellent gloss retention, excellent color and color retention, along with exceptional alkali and acid resistance. Such films are hard, mar proof and adhesive.

Dyal XAC-9 may also be used without amine modification and baked or air dried. For most bake applications driers are not required; however, where baking temperatures are below 250° F. it is recommended that small percentages of metallic driers be added. Best results are obtained at higher baking schedules.

Excellent force dry and air dry enamels and clears can be made when Dyal XAC-9 is blended with hard maleic resins. A blend of two or three parts of Dyal XAC-9 with one part of maleic ester cut in xylol can be used to formulate fast and hard air drying enamels and clears at moderate cost.

Suggested applications for Dyal XAC-9 are the following:

1. Refrigerator Enamels
2. Refrigerator Primers
3. Appliance White and Colored Finishes
 - Cabinets
 - Light Reflectors
 - Venetian Blinds
4. Furniture Finishes
 - Air Dry Clear Finishes
 - Low Bake and Force Dry Clear Finishes
 - Metal Furniture Enamels

Aromatic solvents are recommended for reduction of finishes made with Dyal XAC-9. Small amounts of normal butanol or anhydrous ethanol may be used for viscosity control without appreciably decreasing the resin solid content.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	7
Volatile	50% Xylol	Acid Value	10
Lbs. per gal.	8.29	Phthalic Anhydride	40%
Viscosity	Z - Z ₂	Oil	37.1%
Aliphatic Solv. Tol.	None	Type Oil	Dehydrated Castor
Solids at E to G Vis.	34%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	excellent
Gloss	excellent	Nitrocellulose	good
Gloss Retention	excellent	Alkyds	long medium short poor fair fair
Type of Film	tough, hard, flexible		
Resistance to:			
Abrasion	excellent		
Acids	good	Varnish	long medium short poor fair fair
Alkali	good		
Oil & Gasoline	good	Oils	poor
Water	excellent	Bodied Oils	poor
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

		Air Dry	Bake**
Air Dry—Set	30 min.	Lead 0.2% to 0.4%	none
Air Dry—Hard	4 to 5 hours	Manganese none	none
Bake	250°F. to 425°F.	Cobalt 0.02% to 0.04%	0.02% to 0.04%
	45 min. to 45 sec.	Calcium* 0.3% to 0.5%	none
		Zinc none	
		*to replace lead	
		**use metallic driers only when urea or melamine is absent	

SUGGESTED FORMULATIONS

White Baking Appliance Enamel With Urea			Air Dry Industrial White Enamel		
Lbs.	Gals.		Lbs.	Gals.	
300	8.5	Rutile Ti O ₂ ***	275.0	7.9	Rutile Ti O ₂ ****
168	20.0	Dyal XAC-9	3.0	0.3	Soya Lecithin
297	36.0	Dyal XAC-9	2.0	0.2	Aluminum Stearate
252	30.0	Urea Formaldehyde Solu- tion (50%)	199.0	24.0	Dyal XAC-9
65	9.0	Toluol	382.0	46.0	Dyal XAC-9
1082	103.5		129.0	18.0	Xylol
***Oil Absorption — 17 to 18			43.2	6.0	High Solvency Naphtha
Viscosity No. 4 Ford Cup — (Reduced			2.9	0.3	Pb Naphthenate 24%
25% Xylol) — 27" to 32"			1.2	0.15	6% Co Naphthenate
Lbs. per gal. — 10.5			1.4	0.20	Anti Skin Agent
Spray — Reduce with Xylol 25 to 30%			1038.7	103.05	
Hardness (Pencil) — 2H			****Oil Absorption — 17 to 18		
			Viscosity No. 4 Ford Cup — (Reduced		
			25% Xylol) — 90 sec.		
			Lbs. per gal. — 10		
			Spray (Reduce with Xylol) 25%		
			Gloss — Photocell — 93 to 95		
			Dry — Set — 30 min.		
			Hard — 4 to 5 hours		

TYPE: Short Oil Modified Alkyd

OUTSTANDING FEATURES:

Color, Color Retention, Fast Cure

This vehicle is designed for industrial applications where hard, mar-resistant finishes are desired. Dyal XAC-39 is very pale in color, very color retentive and its gloss and gloss retention are outstanding under most exposure conditions.

It may be used for air-drying finishes or for very fast baking finishes with, or without, urea or melamine. Dyal XAC-39 finishes will "set" and air dry very rapidly or bake in short cycles at low temperatures giving hard, flexible, durable films. It may also be employed in the production of nitrocellulose lacquers to which it will impart excellent gloss, color retention, durability and adhesion.

The excellent properties of Dyal XAC-39 have established it as one of the best available resins for the production of white and light-colored industrial finishes. Some of the suggested applications are:

1. Appliance Finishes
 - Venetian Blinds
 - Furniture
 - Cabinets
 - Toys
 - Refrigerators
2. Maintenance Enamels
3. Anti-Rust Primers
4. Nitrocellulose Lacquer Plasticizer

Dyal XAC-39 possesses excellent compatibility with pigments along with such grinding properties as good pigment wetting and mill stability. To insure best gloss and stability it is recommended that *grind bases* made with Dyal XAC-39 be *let-down* shortly after completion of the grind.

SPECIFICATIONS

Non Volatile _____	50%	Color (max.) _____	6
Volatile _____	50% Xylol	Acid Value _____	10 - 20
Lbs. per gal. _____	8.22	Phthalic Anhydride _____	38%
Viscosity _____	U - W	Oil _____	41%
Aliphatic Solv. Tol. _____	400%	Type Oil _____	Soya
Solids at E to G Vis. _____	40%	Resin Modifiers _____	None

FILM AND PERFORMANCE PROPERTIES

		Compatibility with:	
Color	excellent	Pigments	excellent
Color Retention	excellent	Nitrocellulose	excellent
Gloss	excellent		
Gloss Retention	excellent		
Type of Film	hard, flexible	Alkyds	{ long medium short poor fair good
Resistance to:			
Abrasion	excellent		
Acids	good		
Alkali	good	Varnish	{ long medium short poor poor fair
Oil & Gasoline	good		
Water	excellent	Oils	poor
Weather	good	Bodied Oils	poor

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake (without Amine)
Air Dry—Set	15 min.	Lead	none	none
Air Dry—Hard	4 to 5 hours			
Bake	—	Manganese	none	none
No Urea or Melamine				
	25 to 50 min. at 250 to 275°F.	Cobalt	0.03% to 0.07%	0.01% to 0.02%
10% to 30% Melamine		Calcium	0.2% to 0.4%	none
	15 to 45 min. at 250 to 275°F.			
10% to 20% Urea		Zinc	none	0.1%
	5 to 45 min. at 300 to 325°F.			

SUGGESTED FORMULATIONS

White Cabinet Enamel			Blue Toy Enamel		
Lbs.	Gals.		Lbs.	Gals.	
275	8.6	Anatase Ti O ₂	40	3.2	Solfast Sky Blue CP1037
160	20.0	Dyal XAC-39	10	0.3	Ti O ₂ Rutile
15	2.0	Pine Oil	164	20.0	Dyal XAC-39
296	37.0	Dyal XAC-39	7	1.0	Pine Oil
111	13.0	Melamine Sol'n.**	502	61.0	Dyal XAC-39
36	5.0	Xylol	9	1.0	6% Co Naphthenate
134	18.0	Naphtha***	58	8.0	Xylol
7.7	1.0	Ethyl Alcohol	4	0.5	8% Zn Naphthenate
1034.7	104.6		53	8.5	VM&P Naphtha
Viscosity — 20% Reduction Xylol			847	103.5	
— No. 4 Ford Cup 17"			Wt. per gal. — 8.20		
Spray — Reduce with Xylol 15 to 20%			Ball Mill — 8 to 12 hours for 6 Hegman grind		
Bake — 15 min. at 300°F.			Bake — 25 min. at 275°F.		
**50% NVM					
***K. B. — 40 to 54					

TYPE: Medium Oil Modified Alkyd**OUTSTANDING FEATURES:****Hi Viscosity, Color Retention, Gloss, Gloss Retention**

Dyal XAC-42 is a medium length soya oil modified alkyd that was developed for applications where maximum utility at the lowest possible cost is the prime consideration. The high viscosity of Dyal XAC-42 enables the formulator to use only a minimum of vehicle solids and still obtain an enamel with normal package consistency.

Dyal XAC-42 may be used with normal amounts of driers for both air dry and bake application or with urea and melamine for baking to obtain additional hardness. Dyal XAC-42 has exceptionally good color retention; therefore, it can be used in white and colored enamels. This alkyd is of appropriate oil length to give maximum through drying and exhibits exceptional gloss and gloss retention in gloss enamel formulations. Dyal XAC-42 will permit very heavy pigment loadings; therefore, it is possible to formulate semi-gloss or flat finishes of maximum film uniformity which may be applied by spraying or brushing.

A few suggested uses for Dyal XAC-42 are as follows:

1. Industrial Finishes

Farm Implement Enamels (Brush, Spray or Dip)
Freight and Passenger Car Finishes (Spray or Brush)
Hardware Enamels (Spray, Brush or Dip)
Metal Furniture Enamels
Metal Primers

2. Others

Automotive Refinishing Enamels
Specification Finishes (Brush, Spray or Dip)
Traffic Paints
Roller Coat Finishes

Dyal XAC-42 has good pigment compatibility and will disperse the most difficult pigments with ease. With one exception no more care than normal is necessary when Dyal XAC-42 is used with reactive pigments. The one exception is Zinc Oxide; therefore, it is recommended that the amount of Zinc Oxide used does not exceed 25 to 30 pounds per 100 gallons of finished enamel.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	9
Volatile	50% M. S.	Acid Value	10
Lbs. per gal.	7.60	Phthalic Anhydride	34%
Viscosity	Z ₂ - Z ₄	Oil	50%
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Visc.	35%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:		
Color Retention	excellent	Pigments		good
Gloss	excellent	Nitrocellulose		none
Gloss Retention	excellent			
Type of Film	tough, hard, adhesive	Alkyds	{ long medium short	good good fair
Resistance to:				
Abrasion	good			
Acids	good			
Alkali	good	Varnish	{ long medium short	good good fair
Oil & Gasoline	excellent			
Water	excellent	Oils		good
Weather	good	Bodied Oils		fair

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	30 min.	Lead	Air Dry	Bake
Air Dry—Hard	6 to 8 hours	Manganese	.1% to .3%	none
Bake	1 hour at 275 to 300°F.	Cobalt	.01% to .03%	none
			.02% to .03%	.01% to .02%
		Calcium*	.2% to .4%	none
		Zinc	none	.1% to .2%
		*to replace lead		

SUGGESTED FORMULATIONS

Jade Green Maintenance Enamel			Railway Car Zinc Chromate Primer		
Lbs.	Gals.		Lbs.	Gals.	
20	0.6	Micro Fast Chrome Green 11232	266	7.4	Iron Oxide 83% Fe ₂ O ₃
15	0.6	Micro Fast Chrome Green 11235	188	6.4	Zinc Chromate 12054
150	5.5	Titanium Calcium**	77	3.2	Magnesium Silicate
4	0.5	Soya Lecithin	5	0.6	Calcium Stearate
150	20.0	Dyal XAC-42	209	27.5	Dyal XAC-42
428	54.0	Dyal XAC-42	9	0.9	24% Pb Naphthenate
10	1.0	28% Pb Naphthenate	1	0.1	Anti Skin Agent
6	0.6	6% Co Naphthenate	66	9.2	Xylol
130	20.0	Mineral Spirits	289	38.0	Dyal XAC-42
909	102.9		5	0.6	6% Mn Naphthenate
			5	0.6	6% Co Naphthenate
			61	8.5	Xylol
			1181	102.0	
**Oil Absorption 21-22			Ball Mill — 10 to 12 hours		
Wt. per gal. — 8.75			Viscosity — 70 K. U. at 77°F.		
Roller Mill Grind — 6 to 7 Hegman			Recoat — 6 hours		
Viscosity — 72 to 74 K. U.			Hard — 8 hours		
			Wt. per gal. — 11.55		

5-53

0007-PMC-000000755

TYPE: Long Oil Modified Alkyd

OUTSTANDING FEATURES:

Color, Color Retention, Gloss, Gloss Retention

Dyal XAC-47 is a long oil modified pentaerythritol alkyd that was developed for use in the highest quality white and colored architectural finishes. The modifying soya oil is present in Dyal XAC-47 in such length as to complement its good application properties with reasonably fast set and rapid through dry.

Enamels made with Dyal XAC-47 possess good "flow" and "leveling" and brush well to give films that will dry hard in four to five hours, showing good print resistance and mar-proofness. These finishes have excellent initial color, excellent color retention, excellent gloss and excellent gloss retention. Dyal XAC-47 surpasses Dyal XAC-2 and Dyal XAC-83 in gloss retention and is noticeably better than Dyal XAC-2 in initial color and color retention. Dyal XAC-47 will also take a greater solvent reduction than Dyal XAC-2 and Dyal XAC-83.

Dyal XAC-47 will give the utmost in performance for the following applications:

1. Architectural Enamels
 - High-Hiding Whites
 - Painter Type Enamels
 - Trim and Trellis Enamels
 - Top Quality Four Hour Household Enamels
2. Industrial
 - Quality Maintenance Finishes
 - High-Hiding Mill Whites
 - Structural Primers
 - Railway Car Finishes
3. Others
 - Bulletin and Sign Colors
 - Marine Finishes
 - Lawn Furniture Enamels
 - Cabinets (Wood or Metal) Enamels

Zinc oxide may be used with finishes made with Dyal XAC-47. This resin is a very good grinding and pigment dispersion medium and requires no special treatment when used thusly. Small amounts of anti skin agent should be added to finishes made with Dyal XAC-47. Guaiacol is not recommended for use with Dyal XAC-47.

SPECIFICATIONS

Non Volatile	70%	Color (max.)	7
Volatile	30% M. S.	Acid Value	7
Lbs. per gal.	7.96	Phthalic Anhydride	34%
Viscosity	Z ₂ to Z ₄	Oil	63%
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	50%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:		
Color Retention	excellent	Pigments		excellent
Gloss	excellent	Nitrocellulose		none
Gloss Retention	excellent			
Type of Film	hard, tough, flexible	Alkyds	{ long medium short	excellent excellent good
Resistance to:				
Abrasion	good			
Acids	good			
Alkali	good	Varnish	{ long medium short	excellent excellent good
Oil & Gasoline	excellent			excellent
Water	excellent	Oils		excellent
Weather	excellent	Bodied Oils		good

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	60 min.	Lead	Air Dry 0.3% to 0.6% for colors
Air Dry—Hard	4 to 5 hours	Manganese	none
		Cobalt	0.05% to 0.07%
		Calcium*	0.20% to 0.40%
		Zinc	none
		*to replace lead	

SUGGESTED FORMULATIONS

Architectural White Enamel			Toluidine Red Exterior Enamel		
Lbs.	Gals.		Lbs.	Gals.	
252	7.2	Color Retentive Ti-Pure**	100	8.6	Toluidine Red 10451
28	0.6	Zinc Oxide	46	2.0	Micronized Talc
3	0.3	Aluminum Stearate	2	0.2	Soya Lecithin
4	0.3	Soya Lecithin	4	0.4	Calcium Stearate
152	19.0	Dyal XAC-47	240	30.0	Dyal XAC-47
426	53.5	Dyal XAC-47	280	35.0	Dyal XAC-47
37	5.6	Kerosene	78	10.0	"D" Bodied Linseed Oil
92	14.0	Mineral Spirits	93	15.0	Mineral Spirits
6	0.8	6% Co Naphthenate	10	1.0	24% Pb Naphthenate
7	1.0	4% Calcium Naphthenate	5	0.6	6% Co Naphthenate
1007	102.3		2	0.2	Anti Skin Agent
**Oil Absorption 17 — 18			865	103.0	
Viscosity No. 4 Ford Cup — 74"			Viscosity No. 4 Ford Cup — 110" to 130"		
Lbs. per gal. — 9.82			Lbs. per gal. — 8.42		
Gloss — Photocell — 90 to 93			Brushing — Reduce with Kerosene — 5%		
Drying — Hard — 4 to 5 hours			Spraying — Reduce with VM&P — 15 to 25%		
Wet Edge — over 20 min.			Dry — Set to Touch — 2½ to 3 hours		
			Dry Hard — 5 to 6 hours		

DYAL XAC-48

TYPE: Pure Oil Modified Flat Wall Alkyd

OUTSTANDING FEATURES:

Non Penetration, Uniformity, Color Retention

Dyal XAC-48 is a pure oil modified alkyd that was developed specifically for use as a flat wall paint vehicle. This alkyd resin was formulated to combine the desirable properties inherent in alkyds such as washability, durability, and color retention with the non penetrating and thixotropic qualities of the calcicoater type of flat wall vehicles.

The outstanding feature of this vehicle is its non penetration or hold out over porous surfaces. Flat wall topcoats, primers and sealers made with Dyal XAC-48 show exceptional uniformity over surfaces of variable porosity.

Finishes made with Dyal XAC-48 may be applied easily by either brush or roller-coater to give films of smooth and uniform sheen that will flow sufficiently to prevent "lapping." Flat wall finishes made with Dyal XAC-48 will withstand many more washings than the best of the oleoresinous base finishes. Excellent color retention is assured with the use of Dyal XAC-48 because this vehicle is a soya oil modified alkyd that contains no other modifying resins. The excellent pigment wetting qualities of Dyal XAC-48 along with its excellent package stability permit formulation of flat wall topcoats with a wide range of PVC to give any desired sheen.

To obtain maximum performance in the formulation of flat wall finishes it is recommended that Dyal XAC-48 be used as the sole vehicle because of its limited compatibility with bodied oils and long oil alkyds and varnishes.

SPECIFICATIONS

Non Volatile	30%	Color (max.)	8
Volatile	70% M. S. (Hi Flash)	Acid Value	10 - 18
Lbs. per gal.	7.25	Phthalic Anhydride	Present
Viscosity	U - W	Oil	Short
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	23%	Resin Modifiers	None

Dyal XAC-48 may be obtained at a higher non volatile content on a special order under the sales assignment of XAC-C40. The specifications for Dyal XAC-C40 are the following:

Non Volatile	40%	Color (max.)	8
Volatile	60% M. S. (Hi Flash)	Acid Value	10 - 18
Lbs. per gal.	7.5	Phthalic Anhydride	Present
Viscosity	Z ₆ +	Oil	Short
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
		Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	good
Gloss	—	Nitrocellulose	none
Gloss Retention	—		
Type of Film	tough, flexible	Alkyds	long medium short poor fair fair
Resistance to:			
Abrasion	fair		
Acids	good	Varnish	long medium short poor poor poor
Alkali	good		
Oil & Gasoline	good	Oils	poor
Water	excellent	Bodied Oils	poor
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	2½ hours	Lead	Air Dry
Air Dry—Hard	6 to 8 hours	Manganese	0.2% to 0.4%
		Cobalt	none
		Calcium	0.03% to 0.06%
		Zinc	none

SUGGESTED FORMULATIONS

One Coat Flat Wall Paint			Primer and Sealer		
Lbs.	Gals.		Lbs.	Gals.	
50	1.4	Rutile Titanium Dioxide	148	4.0	Rutile Titanium
390	14.1	Rutile Titanium Calcium	10	1.2	Calcium Stearate
55	2.5	Celite	116	16.0	XAC-48
5	0.6	Calcium Stearate	537	74.0	XAC-48
290	40.0	Dyal XAC-48	30	4.0	60% Cold Cut Ester Gum
16	2.0	Anti Skin Agent (20%)	16	2.0	Heavy Bodied Oil
304	42.0	Dyal XAC-48	5	0.5	6% Co Naphthenate
22	3.0	Hi Flash M. S.	862	101.7	
6	0.6	6% Co Naphthenate			
1138	104.2				
Viscosity — 85 to 90 K. U.			Viscosity — 69 K. U.		
Gloss — 10 to 15 Photocell			Gloss — High (Visual)		
(low Eggshell Visual)			Dry to Touch — 8 to 12 hours		
Dry to Touch — 2 to 4 hours			Dry to Recoat — 24 hours		
Wt. per gal. — 10.7 to 11.0			Wt. per gal. — 8.46		
P. V. C. — 49%			P. V. C. — 14.5%		
Ti O ₂ per gal. — 1.54 lbs.					

DYAL XAC-49 & DYAL XAC-50

TYPE: Alkyd Flat Wall Vehicles in Odorless Mineral Spirits

OUTSTANDING FEATURES:

Dyal XAC-49 — Excellent Uniformity & Non-Penetration, High Viscosity, Retained Flexibility, Low Odor

Dyal XAC-50 — Retained Flexibility, Low Odor, Low Viscosity with Good Non-Penetration

Dyal XAC-49 and Dyal XAC-50 were developed to meet the demands for architectural flat and semi-gloss systems requiring the use of low K. B. odorless solvents. Dyal XAC-49 will permit lower paint solids formulation giving lower material costs while maintaining the highest quality performance. Dyal XAC-50 was designed for use in higher hiding high paint solids flat and semi-gloss formulations.

Dyal XAC-49 will perform with maximum uniformity and non-penetration in flat wall films over surfaces of variable porosity. This performance may be attributed to the resin to solvent relationship that also contributes excellent flow and leveling to brushed films of wall finishes made with Dyal XAC-49. The use of Dyal XAC-49 permits formulation of quality flat and semi-gloss finishes with a wide variety of pigment combinations and concentrations.

Dyal XAC-50 may be formulated into high solids, high hiding, non-penetrating wall finishes that possess excellent application properties.

Both of these vehicles will give excellent color retention and are of sufficient oil length to have maximum retained flexibility to insure against cracking and peeling of aged films.

Good package stability is obtained by the use of recommended amounts of anti-skin agent along with proper initial viscosity adjustment. Initial viscosities of flat wall finishes made with Dyal XAC-49 and Dyal XAC-50 should be 82 to 94 K. U. A six to seven percent maximum increase in viscosity will be noted upon aging.

The good odorless solvent tolerance of these vehicles permits brush cleaning and ordinary clean-up with the low K. B. odorless solvent.

SPECIFICATIONS

DYAL XAC-49

Non-Volatile _____	40%	Color (max.) _____	8
Volatile _____	60%	Acid Value _____	4 max.
Odorless M. S. _____		Odorless M. S. Tol. _____	Infinite
Lbs. per gal. _____	7.18	Viscosity @ 30% NVM _____	U to X
Viscosity @ 40% NVM _____	Z ₈ +		

DYAL XAC-50

Non-Volatile _____	40%	Color (max.) _____	8
Volatile _____	60%	Acid Value _____	20 to 25
Odorless M. S. _____		Odorless M. S. Tol. _____	300%
Lbs. per gal. _____	7.10	Viscosity @ 30% NVM _____	F to H
Viscosity @ 40% NVM _____	X to Z		

FILM AND PERFORMANCE PROPERTIES

		Compatability with:	
Color	good	Pigments	fair
Color Retention	good	Long Oil Alkyds	good
Resistance to:		Long Oil Varnishes	good
Abrasion	good	For maximum performance blending should be in odorless solvent systems	
Acids	good		
Alkali	good		
Water	excellent		
Oil & Grease	good		

DRYING AND DRIER* RECOMMENDATIONS

	Dyal XAC-49	Dyal XAC-50		
Air Dry-Set	30 to 60 min.	30 to 45 min.	Lead	.3 to 5%
Air Dry-Hard	6 to 8 hours	6 to 8 hours	Cobalt	.3 to 5%
(Clear Films)			A.S.A.	.3%

*% Metal on Resin Solids

SUGGESTED FORMULATIONS

	Wall Primer and Sealer		Flat Wall Formula No. 249		Flat Wall Formula No. 649		Flat Wall Formula No. 250	
	Lbs.	Gals.	Lbs.	Gals.	Lbs.	Gals.	Lbs.	Gals.
Ti O ₂ Rutile	—	—	—	—	137.0	3.9	154.0	4.4
Ti Cal	210.0	7.8	572.0	21.2	215.0	7.9	241.0	8.9
Talc	—	—	52.0**	2.2	83.0***	3.7	95.0***	4.2
Ca Stearate	3.0	.3	6.0	.6	8.0	.8	9.0	1.0
Ca Carbonate****	215.0	9.6	—	—	187.0	8.4	202.0	9.0
Lecithin	4.0	.5	2.0	.2	2.0	.2	3.0	.3
Dyal XAC-49	—	—	321.0	44.6	331.0	46.0	—	—
Dyal XAC-50	426.0	60.0	—	—	—	—	355.0	50.1
Odorless M. S.	137.0	21.5	210.0	32.8	197.0	30.8	152.0	23.8
24% Pb Naphth'te	10.0	1.0	2.0	.2	2.0	.2	2.0	.2
6% Mn Naphth'te	2.0	.25	—	—	—	—	—	—
6% Co Naphth'te	2.0	.25	1.0	.1	1.0	.1	1.0	.1
Anti Skin Agent	.5	.05	.5	.05	.5	.05	.5	.05
Total Input	1009.0	101.3	1166.5	101.95	1163.5	101.95	1224.5	101.95
Total Output	1007.0	100.0	1142.0	100.0	1142.0	100.0	1200.0	100.0
% PVC	46		60		60		59.8	
% NVM	61		65		66		69	
Grind	4H		3H to 4H		4H		4H	
Matl. Cost/gal.	\$1.20		\$1.30		\$1.44		\$1.51	
Viscosity	82-84 K.U.		82-84 K.U.		82-84 K.U.		82-84 K.U.	
Wt./gal.	10.07		11.42		11.42		12.00	
Lbs. Ti O ₂ /gal.	.63		1.7		2.01		2.25	
Washability	—		Fair		Good		Good	
Dry vs. Wet Hiding	—		Excellent		Good		Good	
Uniformity	Good		Excellent		Excellent		Excellent	
10 minute Lap	Good		Excellent		Excellent		Excellent	
Sheen	32-38		5-10		10-15		10-15	

** Talc — 8 Micron particle size — O.A. 28 — 3¼ Hegman Grind Limit

*** Talc — 1 Micron particle size — O.A. 44 — 6¾ Hegman Grind Limit

**** Ca Carbonate — 4 Micron particle size — O.A. 17 — 5½ Hegman Grind Limit

THE SHERWIN-WILLIAMS Co.

June 1, 1956

REVISED PRICE LIST — SYNTHETIC RESINS

Effective June 1, 1956—All prices subject to change without notice.

DYALS	% SOLIDS	1-9 DRUMS	10 DRS. TO C/L	C/L DRUMS CWT.
XAC-1	50	\$21.00	\$20.50	\$20.00
XAC-2	70	22.75	22.25	21.75
XAC-9	50	25.50	25.00	24.50
XAC-17	70	23.75	23.25	22.75
XAC-39	50	22.50	22.00	21.50
XAC-42	50	22.00	21.50	21.00
XAC-47	70	22.75	22.25	21.75
XAC-48	30	17.00	16.50	16.00
XAC-49	40	20.50	20.00	19.50
XAC-50	40	20.50	20.00	19.50
XAC-66	60	25.50	25.00	24.50
XAC-76	65	25.00	24.50	24.00
XAC-83	70	22.75	22.25	21.75
XAC-93	70	22.75	22.25	21.75
XAC-99	50	20.50	20.00	19.50
XAC-C17	70	27.75	27.25	26.75
XAD-26	50	21.75	21.25	20.75
XAD-37	50	20.75	20.25	19.75
XAD-116	90	29.00	28.50	28.00
XAD-165	50	18.00	17.50	17.00
XAN-1	60	28.50	28.00	27.50
XAR-7	50	25.50	25.00	24.50
XAR-8	50	23.50	23.00	22.50
XAR-12	50	17.50	17.00	16.50
XAR-13	60	22.50	22.00	21.50
XAR-19	55	30.00	29.50	29.00
XAR-62	50	22.50	22.00	21.50
XAR-C9	50	30.50	30.00	29.50
XAR-C11	90	25.00	24.50	24.00
XAS-4	50	24.25	23.75	23.25
XAS-8	50	22.50	22.00	21.50
XMD-6	50	17.75	17.25	16.75
XMD-165	50	16.25	15.75	15.25
XOR-6	59-61	151.00	150.50	150.00
XOR-13	47	23.75	23.25	22.75
XOR-14	51.5	39.00	38.50	38.00
XOR-15	36	48.00	47.50	47.00
XPL-5	80	30.00	29.50	29.00
XPL-115	60	23.00	22.50	22.00
XRE-1	100	31.00	30.50	30.00

TANKCAR, and in some locations, TANKTRUCKS—\$2.00 under C/L Drums.

0007-PMC-000000762

DYPHENES	1-9 DRUMS	10 DRS. TO C/L	CARLOADS CWT
XRV-5	\$43.00	\$42.50	\$42.00
XRV-80	42.00	41.50	41.00
DYPHENITES			
XRV-133	29.00	28.50	28.00
DYMALS			
XRP-149	22.00	21.50	21.00

Supersedes all previous price lists. All previous prices for resins not listed are withdrawn, but are available upon request.

GENERAL TERMS OF DELIVERY AND SALE

All prices quoted are for shipment F.O.B. factory or warehouse (seller's option), minimum transportation allowed to destination in shipments of one drum or more to all points in the United States except: Arizona, California, Idaho, Montana, New Mexico, Texas, Utah, Washington, Wyoming. Prices in these states are \$1.00 per CWT additional.

Combinations of the various resins may be ordered to qualify for quantity differentials.

PACKAGES

DYALS Shipped in Non-Returnable 55-gallon steel drums.

DYPHENES }
 DYPHENITES } Shipped in fibre containers, 250 lbs. net weight.
 DYMALS }

PACKAGE DIFFERENTIALS

DYALS 5-gallon pails, \$5.00 cwt. additional.

DYPHENES }
 DYPHENITES } Less than barrels, \$5.00 cwt. additional.
 DYMALS }

TERMS Net cash 30 Days.

THE SHERWIN-WILLIAMS CO.

Cleveland 1, Ohio	101 Prospect Avenue, N. W.
Chicago 6, Illinois	300 West Lake Street
New York 17, New York	100 Park Avenue
Oakland 8, California	1450 Sherwin Avenue

0007-PMC-000000763

DYAL XAC 75
DYAL XAC 77

TYPE: Soya Oil Modified Alkyds in Odorless Mineral Spirits

OUTSTANDING FEATURES:

**DYAL XAC 75 — Good Non-Penetration, Low Viscosity,
Low Odor, Retained Flexibility.**

**DYAL XAC 77 — Low Solids, High Viscosity, Low Odor,
Retained Flexibility.**

Dyal XAC 75 and Dyal XAC 77 were developed to meet the demands for architectural gloss and semi-gloss systems requiring the use of low K. B. odorless solvents. Both of these vehicles will give excellent color retention and are of sufficient oil length to have maximum retained flexibility to insure against cracking and peeling of aged films.

Dyal XAC 75 may be formulated into high solids, high hiding, non-penetrating wall enamels that possess excellent flow and leveling properties. Dyal XAC 77 will permit lower paint solids formulation giving lower material costs while maintaining the highest quality performance.

The good odorless solvent tolerance of these vehicles permit brush cleaning and ordinary clean-up with the low K. B. odorless solvent.

SPECIFICATIONS

DYAL XAC 75

Non Volatile	70%	Acid Value.....	5 Maximum
Volatile.....	30% Odorless Min. Spts.	Phthalic Anhydride	24%
Lbs. Per Gal.....	7.78	Oil	67%
Viscosity	V-W	Type Oil	Soya
Color (Max.)	9	Odorless Min. Spts. Tol.....	Infinite

DYAL XAC 77

Non Volatile	45%	Acid Value.....	15 to 25
Volatile.....	55% Odorless Min. Spts.	Phthalic Anhydride	30%
Lbs. Per Gal.....	7.25	Oil	57%
Viscosity	Y-Z ₁	Type Oil	Soya
Color (Max.)	8	Odorless Min. Spts. Tol.....	Infinite

FILM AND PERFORMANCE PROPERTIES

Color _____ Excellent
 Color Retention _____ Excellent
 Gloss _____ Good
 Gloss Retention _____ Good

Resistance to:

Abrasion _____ Good
 Acids _____ Good
 Alkali _____ Good
 Water _____ Excellent
 Oil & Grease _____ Good

Pigment Wetting &
 Dispersing Properties _____ Excellent

Compatability with:

Long Oil Alkyds _____ Good
 Long Oil Varnishes _____ Good

For maximum performance blending
 should be in odorless solvent systems.

DRYING AND DRIER* RECOMMENDATIONS

DYAL XAC 75

Air Dry—Set _____ 30 to 60 Minutes
 Air Dry—Hard _____ 4 to 6 Hours

DYAL XAC 77

Air Dry—Set _____ 30 to 60 Minutes
 Air Dry—Hard _____ 5 to 7 Hours

Lead _____ 0.3 to 0.6%
 Calcium** _____ 0.3 to 0.6%
 Cobalt _____ .05 to .1%
 A.S.A. _____ .1%

(Clear Films) _____ * % Metal on Resin Solids

** to replace lead

SUGGESTED FORMULATIONS

Low Odor Semi-Gloss White Enamel

Lbs.	Gals.	
180	5.1	Rutile N.C. TiO ₂
382	13.9	Ti Cal. Rutile N.C.
3	0.2	Bentone 34
3	0.3	Aluminum Stearate
184	23.7	XAC 75
44	6.1	XAC 77
252	34.8	XAC 77
85	13.5	Odorless Mineral Spirits
17	2.1	4% Calcium Naphthenate
13	1.6	6% Cobalt Naphthenate
6	0.9	Anti-Skin (17% Solution)
1169	102.2	

Low Odor Gloss White Enamel

Lbs.	Gals.	
292	8.35	Rutile N.C. TiO ₂
3	0.3	Aluminum Stearate
2	0.1	Bentone 34
125	16.1	XAC 75
100	12.9	XAC 75
392	54.0	XAC 77
56	8.9	Odorless Mineral Spirits
13	1.6	6% Cobalt Naphthenate
17	2.1	4% Calcium Naphthenate
4	0.6	Anti-Skin (17% Solution)
1004	104.9	

NOTE: The drier and the anti-skin should be of the odorless type.

Lbs./Gal. — 11.43
 Viscosity @ 75°F — 73 to 76 K. U.
 Gloss — 55 to 69 Photocell
 P.V.C. — 36.8%

Lbs./Gal. — 9.56
 Viscosity @ 75°F — 72 to 75 K. U.
 Gloss — 85 to 91 Photocell
 P.V.C. — 16.3%

THE SHERWIN-WILLIAMS CO.

June 1, 1956

SYNTHETIC RESINS NOT IN STANDARD LIST
Effective June 1, 1956

<u>SPECIAL DYALS</u>	<u>C/L DRUMS</u>	<u>SPECIAL DYALS</u>	<u>C/L DRUMS</u>
XAC-97	\$19.00	XAR-86	\$22.50
XAC-189	19.50	XAR-C6	23.00
XAC-C6	20.00	XAR-C23	19.00
XAC-C11	22.75	XAR-C24	21.50
XAC-C29	27.50	XAS-C7	23.25
XAC-C33	19.75	XEN-1	19.25
XAC-C40	18.25	XMD-14	16.75
XAC-C55	21.00	XMD-18	16.75
XAC-C69	24.75	XMD-C1	14.25
XAC-C73	21.75	XMD-C22	17.00
XAC-C76	21.00	XMD-C23	14.00
XAD-1	21.50	XOR-31	44.00
XAD-17	17.50	XOR-34	40.00
XAD-C28	19.25	XPL-C7	29.00
XAN-78	29.00	XRE-C13	20.00
XAN-84	29.50	XRE-C18	27.50

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

All previous prices for other resins not listed are withdrawn, but are available upon request.

0007-PMC-000000766

TYPE: Short Oil Modified Alkyd**OUTSTANDING FEATURES:****Adhesion, Fast Set, Durability**

Dyal XAC-66 represents an outstanding vehicle for use in primers of exterior quality. It has been employed successfully in Naval Aircraft primers where the rapid solvent release and the short recoat time of this vehicle are used to advantage. Dyal XAC-66 may be used in industrial primers for air drying or baking with application by spraying or dipping. Primers composed of Dyal XAC-66 will possess a fast "set to touch" and handling time along with fast through dry giving a film which will have excellent adhesion, good water and hydrocarbon resistance. This vehicle will also give excellent package stability.

Dyal XAC-66 is primarily intended for fast air-dry primers but it may also be adapted to short infra-red baking. For baking the lead and cobalt concentration may be greatly reduced. With the proper solvent balance, either spray or dipping primers may be formulated. For spraying or dipping small objects, xylol or toluol may be employed as a solvent. For dipping large objects, a slower solvent such as "hi-solvency" naphtha may be used.

Because of its high acid value, Dyal XAC-66 cannot be used with reactive pigments such as zinc oxide, but rather it is especially suited for formulations containing less reactive pigments such as zinc chromate, iron oxide, and titanium dioxide. The water content of zinc chromate pigments should be low, preferably below 0.25% to 0.50%, because of the excessive "after-bodying" of primer formed in a medium having more water. If such "after-bodying" should occur, 3 pounds of triethanolamine per 100 gallons of primer will prevent excessive bodying.

SPECIFICATIONS

Non Volatile	60%	Color (max.)	11
Volatile	40% Xylol	Acid Value	30 to 35
Lbs. per gal.	8.40	Phthalic Anhydride	38%
Viscosity	Z ₁ - Z ₃	Oil	44.7%
Aliphatic Solv. Tol.	None	Type Oil	Dehydrated Castor
Solids at E to G Vis.	40%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:		
Color Retention	good	Pigments		excellent
Gloss	good	Nitrocellulose		good
Gloss Retention	good			
Type of Film	hard, tight	Alkyds	{ long medium short	poor fair good
Resistance to:				
Abrasion	good			
Acids	good			
Alkali	fair	Varnish	{ long medium short	poor fair good
Oil & Gasoline	good			
Water	excellent	Oils		poor
Weather	good	Bodied Oils		poor

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	15 min.	Lead	Air Dry	Bake
Air Dry—Hard	6 hours	Manganese	0.5% to 2.0%	none
Bake	250°F. for 10 to 20 min.	Cobalt	0.01% to 0.03%	
		Calcium	0.01% to 0.05%	
		Zinc	none	

SUGGESTED FORMULATIONS

Zinc Chromate Primer			Yellow Primer For Implements		
Lbs.	Gals.		Lbs.	Gals.	
290.0	8.5	Zinc Chromate 12054	100.0	2.9	Rutile N. C. Ti O ₂
50.0	2.2	Micronized Talc	91.0	4.1	Micronized Talc
3.0	0.3	Maleic Anhydride	32.0	1.9	Diatomaceous Silica
3.0	0.3	Aluminum Stearate	19.0	0.4	Medium Chrome Yellow
67.1	8.0	Dyal XAC-66			12152
64.5	9.0	Xylol	4.0	0.4	Aluminum Stearate
2.9	0.3	Pb Naphthenate	4.0	0.4	Soya Lecithin
0.72	0.1	Anti Skin Agent	159.5	19.0	Dyal XAC-66
403.0	48.0	Dyal XAC-66	5.75	0.6	24% Pb Naphthenate
78.0	12.0	Mineral Spirits	2.4	0.3	6% Co Naphthenate
93.0	13.0	Xylol	64.6	9.0	Xylol
4.0	0.5	6% Co Naphthenate	0.72	0.1	Anti Skin Agent
1059.22	102.2		923.27	97.7	

Lbs. per gal. — 10.30

Ball Mill — 5 to 6 Hegman Grind

Recoat — 5 min.

This primer has excellent adhesion to metal and forms a protective coating by itself.

Wt. per gal. — 9.43

Ball Mill — 5 to 6 Hegman Grind

This primer was originally set up for small tractor parts.

DYAL XAC-76

TYPE: Medium Oil Modified Alkyd

OUTSTANDING FEATURES:

Compatibility, Fast Set, Color and Gloss Retention

Dyal XAC-76 is a medium oil modified general purpose vehicle. It is especially well suited for applications where high solids are required.

Dyal XAC-76 has a wide range of compatibility making it useful in applications involving the use of nitrocellulose, chlorinated rubber, urea and melamine, as well as other alkyds and varnishes. Because of its good compatibility, Dyal XAC-76 is used to great advantage as a grinding base vehicle in formulations which require the use of shorter more reactive alkyds. Dyal XAC-76 will not adversely affect the setting and drying time of the shorter alkyds. Dyal XAC-76 can also be used to make color bases for nitrocellulose lacquers where it will serve as a modifying resin for the nitrocellulose. This alkyd may be used alone in air dry or bake schedules for spray or dip applications.

Some suggested uses for Dyal XAC-76 are as follows:

1. Metal Furniture Finishes
2. Metal Tile Enamel
3. Chlorinated Rubber Formulations
4. Nitrocellulose Lacquer Modifier and Plasticizer
5. Urea and Melamine Plasticizer

Dyal XAC-76 possesses excellent pigment compatibility and will disperse most pigments with no special treatment being required. This alkyd is of appropriate oil length to permit roller or ball mill grinding.

SPECIFICATIONS

Non Volatile	65%	Color (max.)	11
Volatile	35% Xylol	Acid Value	5
Lbs. per gal.	8.42	Phthalic Anhydride	35%
Viscosity	Y - Z	Oil	47%
Aliphatic Solv. Tol.	200%	Type Oil	Soya
Solids at E to G Vis.	56 - 57%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	excellent	Pigments	good
Gloss	excellent	Nitrocellulose	excellent
Gloss Retention	excellent		
Type of Film	hard, durable, flexible	Alkyds	long medium short excellent excellent good
Resistance to:			
Abrasion	good		
Acids	good	Varnish	long medium short excellent excellent good
Alkali	good		
Oil & Gasoline	good	Oils	good
Water	good	Bodied Oils	fair
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	15 to 30 min.	Lead	Air Dry	Bake
Air Dry—Hard	4 to 5 hours	Manganese	0.3% to 0.6%	(without Amine)
Bake—		Cobalt	0.03% to 0.06%	0.1%
With Driers	30 to 50 min. at	Calcium*	0.3% to 0.6%	0.01%
	275°F. to 350°F.	Zinc	none	0.01%
Bake—				
With Amine	30 min. at 300°F.			

*to replace lead

SUGGESTED FORMULATIONS

White Metal Tile Enamel			White Baking Primer		
Lbs.	Gals.		Lbs.	Gals.	
274	7.8	Titanium Dioxide, Rutile Color Retentive	140	4.3	Titanium Dioxide, Ana- tase, Full Chalking
109	13.0	Dyal XAC-76	150	3.2	Zinc Oxide
75	9.0	Dyal XAC-9	340	9.5	Blanc Fixe
8	1.0	Pine Oil	3	0.3	Soya Lecithin
282	34.0	Dyal XAC-9	254	30.0	Dyal XAC-76
84	10.0	Plaskon 3353	27	3.5	Pine Oil
83	10.0	Resamine 878	101	12.0	Dyal XAC-76
29	4.0	Toluol	152	20.0	Dyal XAC-99
69	11.0	High Solvency Naphtha	104	14.5	Xylol
13	2.0	Anhydrous Alcohol	34	5.0	Butanol
1026	101.8		7	1.0	17% Guaiacol Sol'n.
Viscosity No. 4 Ford Cup — 60" to 65"			1312	103.3	
Wt. per Gal. — 10.00			Viscosity No. 4 Ford Cup — 50" to 60"		
Grind on Roller Mill — 7 Hegman			Wt. per gal. — 12.66		
Pencil Hardness — F			Grind on Roller Mill — 6 Hegman		
This formula is a good example of the use of Dyal XAC-76 as a plasticizer for both amine resins and a short oil alkyd.			Bake — 30 min. at 350°F.		

5-53

0007-PMC-000000770

TYPE: Long Oil Modified Alkyd**OUTSTANDING FEATURES:****Excellent Gloss, Color Retention, TT-R-266, Type I, Class A**

Dyal XAC-83 is a long soya oil modified pentaerythritol alkyd especially suited for use in quality high solids and heavily pigmented architectural and general purposes enamels. Gloss and semi-gloss enamels made with Dyal XAC-83 have excellent application properties and will produce films that are color retentive, mar proof and durable.

Dyal XAC-83 has been improved to give better gloss retention and increased viscosity. This resin has better initial color and better gloss retention than the longer oil Dyal XAC-2. Dyal XAC-83 will compare rather closely in performance with Dyal XAC-47.

Dyal XAC-83 conforms to the requirements of Specification TT-R-266, Type I, Class A alkyd. Dyal XAC-83 may be obtained at 60% NVM under the assignment of Dyal XAC-C33 to conform to the requirements for the TT-R-266, Type I, Class B vehicle. Dyal XAC-83 is recommended for the following uses:

1. Architectural Finishes
 - High-Hiding Whites
 - Master Painter's Enamels
 - High Quality Wall Finishes
2. Industrial
 - High-Hiding Mill Whites
 - Quality Maintenance Finishes
 - Marine Finishes
 - Awning Paints
 - Silk Screen Finishes
3. Shelf Goods
 - Trim and Trellis Paints
 - Household Enamels (blended with Dyal XAC-1)
 - Lawn Furniture (blended with Dyal XAC-1 or Dyal XAD-26)

Because of its general compatibility and relatively long oil length, Dyal XAC-83 is ideally suited to improve the brushing and leveling of more viscous alkyds and to extend shorter vehicles without increasing the drying time or contributing to the after tack.

Dyal XAC-83 is neutral to reactive pigments including zinc oxide. Its excellent flow and good pigment wetting characteristics make it a good grinding vehicle.

SPECIFICATIONS

Non Volatile	70%	Color (max.)	7
Volatile	30% M. S.	Acid Value	5 - 10
Lbs. per gal.	7.97	Phthalic Anhydride	23%
Viscosity	Z ₁ - Z ₂	Oil	64%
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	50%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	excellent	Pigments	excellent
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	tough, hard, very flexible		excellent excellent good
Resistance to:			
Abrasion	good		
Acids	good	Varnish	{ long medium short
Alkali	good		excellent excellent good
Oil & Gasoline	good	Oils	excellent
Water	excellent	Bodied Oils	excellent
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

			Whites	Colors
Air Dry—Set	1½ to 2½ hours	Cobalt	0.05%	0.05% to 0.08%
Air Dry—Hard	6 to 7 hours	Calcium	0.2% to 0.3%	0.2% to 0.3%

SUGGESTED FORMULATIONS

White Architectural Brushing Enamel

Lbs.	Gals.	
250	7.2	Color Retentive Ti O ₂ *
28	0.6	Zinc Oxide
3	0.3	Aluminum Stearate
4	0.3	Soya Lecithin
153	19.0	Dyal XAC-83
415	52.0	Dyal XAC-83
26	4.0	Kerosene
117	18.0	Mineral Spirits
6	0.8	6% Co Naphthenate
7	1.0	Anti Skin Agent
1009	107.2	

*Oil Absorption 17 — 18

Viscosity — 69 to 72 K. U.

Gloss Photocell — 87 to 92

Dry — 8 to 9 hours

Wet Edge — 20 minutes

White Architectural Semi-Gloss

Lbs.	Gals.	
100	2.8	Color Retentive Ti O ₂ **
500	18.6	Ti Calcium***
75	3.3	Micronized Talc
28	0.6	Zinc Oxide
3	0.3	Aluminum Stearate
272	34.0	Dyal XAC-83
52	8.0	Kerosene
144	18.0	Dyal XAC-83
108	20.5	Mineral Spirits
4	0.5	6% Co Naphthenate
4	0.5	Anti Skin Agent
1290	103.1	

**Oil Absorption 17 - 18

***Oil Absorption 21 - 22

Viscosity — 60 to 74 K. U.

Gloss Photocell — 50 to 60

Dry — 7 to 8 hours

Wet Edge — 15 min.

DYAL XAC-93

TYPE: Long Oil Modified Alkyd

OUTSTANDING FEATURES:

Color Retention, Ease Of Application

Dyal XAC-93 is an all purpose color retentive alkyd having excellent brushing characteristics and possessing excellent retained flexibility. Originally developed for use in high grade architectural brushing enamels, for which it is still unequalled, its versatility has led to its employment in many other related types of finishes such as:

1. Architectural Finishes
Super White Enamels
Fume Proof Whites
2. Trade Sales Finishes
Household Enamels (blended with XAC-1 to increase solids, and control the flow while taking advantage of the faster drying and greater hardness of Dyal XAC-1)
3. Industrial and General Marine Finishes
Topside
Superstructure and Hull Paints
Highway Maintenance Paints

In addition to giving excellent brushing, this alkyd will promote sufficient flow to give good leveling without sagging. The viscosity and solids are such as to give a good build for high gloss. Dyal XAC-93 will furnish excellent exterior durability and meet the Specification TT-R-266, Type I. It is also compatible with all reactive pigments and maintains its gloss well at high pigment concentration by virtue of its excellent grinding properties. Petroleum thinners may be used exclusively and in any proportion with Dyal XAC-93. This vehicle is compatible with large amounts of raw boiled or blown oils making it of great value in hardening long "all oil" type enamels.

SPECIFICATIONS

Non Volatile	70%	Color (max.)	8
Volatile	30% M. S.	Acid Value	10
Lbs. per Gal.	8.00	Phthalic Anhydride	23.8
Viscosity	Y - Z ₁	Oil	62.0
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	50%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:		
Color Retention	excellent	Pigments		excellent
Gloss	good	Nitrocellulose		none
Gloss Retention	good	Alkyds	{ long medium short	excellent
Type of Film	tough, flexible			good
				fair
Resistance to:				
Abrasion	excellent	Varnish	{ long medium short	excellent
Acids	good			good
Alkali	good			fair
Oil & Gasoline	excellent	Oils		excellent
Water	excellent	Bodied Oils		excellent
Weather	excellent			

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	2½ hours	Air Dry	
Air Dry—Hard	7 to 9 hours	Lead	0.3% to 0.6%
		Manganese	none
		Cobalt	0.02% to 0.06%
		Calcium*	0.3% to 0.6%
		Zinc	none
		*to replace lead	

SUGGESTED FORMULATIONS

Hull Paint			Red Exterior Enamel		
Lbs.	Gals.		Lbs.	Gals.	
300	7.6	Iron Oxide (85% Fe ₂ O ₃)	100	8.6	Toluidine Red 10451
171	7.4	Micronized Talc	46	2.0	Micronized Talc
32	0.7	Zinc Oxide	2	0.2	Soya Lecithin
278	35.0	Dyal XAC-93	4	0.4	Calcium Stearate
39	6.0	Mineral Spirits	240	30.0	Dyal XAC-93
215	27.0	Dyal XAC-93	280	35.0	Dyal XAC-93
117	15.0	Mineral Spirits	78	10.0	"D" Bodied Linseed Oil
30.3	4.0	4% Ca Naphthenate	98	15.0	Mineral Spirits
3	0.3	6% Co Naphthenate	10	1.0	24% Pb Naphthenate
1185.3	103.0		5	0.6	6% Co Naphthenate
			2	0.2	Anti Skin Agent
			865	103.0	
Viscosity — Heavy			Viscosity No. 4 Ford Cup — 110" to 130"		
Lbs. per gal. — 11.40			Lbs. per gal. — 8.42		
Brushing (Reduce with M.S.) — 15%			Brushing (Reduce with Kerosene) — 5%		
This particular hull paint has performed well under many deep water conditions.			Spraying (Reduce with VM&P) — 20%		

TYPE: Medium Oil Modified Alkyd**OUTSTANDING FEATURES:****Color Retention, Versatility**

Dyal XAC-97 has been developed for the type of industrial and shelf goods usage that demands the best in quality and performance for either spray, dip or brush application. This general utility vehicle will produce films that exhibit excellent color retention, gloss retention, mar proofness and abrasion resistance. Formulation of a line of enamels for a broad range of application is a relatively simple task with Dyal XAC-97. Some of the suggested uses of Dyal XAC-97 are as follows:

1. Industrial Maintenance Enamels
2. Automotive and Transport White Enamels
3. Furniture Enamels
4. Farm Machinery
5. Cabinets — wood or metal

Dispersion of all types of pigments with the exception of the most reactive types such as zinc oxide, present no problem with the use of this alkyd. Dyal XAC-97 will show good compatibility with most long or medium alkyds as well as with bodied oils and varnishes. It may also be used with naphtha tolerant urea and melamine resins. Dyal XAC-97 complies with the requirements of the government specification TT-E-489.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	9
Volatile	50% M. S.	Acid Value	12
Lbs. per gal.	7.66	Phthalic Anhydride	35%
Viscosity	P - R	Oil	52%
Aliphatic Solv. Tol.	Infinite	Type Oil	Soya
Solids at E to G Vis.	42%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	excellent
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent		
Type of Film	hard, flexible	Alkyds	long medium short excellent excellent good
Resistance to:			
Abrasion	excellent		
Acids	good	Varnish	long medium short excellent good good
Alkali	good		
Oil & Gasoline	excellent	Oils	good
Water	excellent	Bodied Oils	good
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	30 to 60 min.	Air Dry	Low Bake
Air Dry—Hard	4 to 5 hours	Lead	0.3% to 0.5%
Bake	30 to 60 min. at 250°F. to 300°F.		0.2% to 0.4%
		Manganese**	0.01% to 0.03%
			0.01% to 0.03%
		Cobalt	0.03% to 0.05%
			0.01% to 0.03%
		Calcium*	0.3% to 0.5%
		Zinc	none
			0.01%
			*to replace lead
			**only for tints & colors

SUGGESTED FORMULATIONS

White Brush Maintenance Enamel			Transport Semi-Gloss Enamel		
Lbs.	Gals.		Lbs.	Gals.	
260.0	7.4	Ti O ₂ Rutile (Non Chalking)	350.0	11.3	Titanium Calcium-Rutile
2.0	0.2	Calcium Stearate	120.0	3.4	Ti O ₂ Anatase
199.0	26.0	Dyal XAC-97	4.0	0.45	Calcium Stearate
12.0	1.5	4% Ca Naphthenate	96.0	12.5	Dyal XAC-93
11.5	1.15	24% Pb Naphthenate	92.0	11.5	Dyal XAC-97
383.0	50.0	Dyal XAC-97	7.0	1.0	Anti Skin Agent 20%
40.0	5.0	Dyal XAC-2	306.0	40.0	Dyal XAC-97
5.0	0.6	6% Mn Naphthenate	9.0	1.2	24% Pb Naphthenate
3.0	0.5	6% Co Naphthenate	4.67	0.7	6% Mn Naphthenate
2.0	0.4	Anti Skin Agent	2.33	0.33	6% Co Naphthenate
60.0	9.5	Mineral Spirits	123.0	19.0	Mineral Spirits
977.5	102.25		1114.00	101.38	
Lbs. per gal. — 9.54			Lbs. per gal. — 10.95		
Viscosity — 70 to 72 K. U.			Viscosity No. 4 Ford Cup — 75" to 90"		
Air Dry — Set — 45 min.					
Air Dry — Hard — 4 to 6 hours					

TYPE: Medium Oil Modified Alkyd

OUTSTANDING FEATURES:

Rapid Thru Drying, Color Retention

Dyal XAC-99 is an excellent air dry vehicle for use in super white enamels where good mar and abrasion resistance and excellent color retention are desired. It may also be used in formulating baking and dipping enamels completely free from wrinkling on the bead.

Dyal XAC-99 is unique in the unusual combination of color retention and toughness with print resistance, durability and chemical resistance.

Examples of suggested use are the following:

1. Architectural and Household Baking Enamels
2. Low and High Temperature Baking Enamels
3. Good Wood Cabinet Enamels both White and Colors
4. Enamels of Unusually High Water Resistance
5. Dipping Enamels — using Dyal XAC-99 alone or in conjunction with other alkyds to eliminate wrinkling in the bead

Dyal XAC-99 works well with bases ground in Dyal XAD-26 and these two liquids supplement each other in many respects. White enamels may be ground in Dyal XAC-99 to take advantage of its superior color retention. Zinc oxide may be used in very small quantities only. For other colors, Dyal XAD-26 is recommended as the grinding medium.

For applications which require faster solvent release these resin solids may be obtained reduced in VM&P naphtha under the assignment of Dyal XAC-189.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	9
Volatile	50% M. S.	Acid Value	12
Lbs. per gal.	7.58	Phthalic Anhydride	30.5%
Viscosity	Y - Z	Oil	57.5%
Aliphatic Solv. Tol.	1500%	Type Oil	Soya
Solids at E to G Vis.	40%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	good
Gloss	good	Nitrocellulose	none
Gloss Retention	good	Alkyds	{ long good medium good short fair
Type of Film	hard, tough, mar resistant		
Resistance to:			
Abrasion	excellent		
Acids	good	Varnish	{ long good medium good short good
Alkali	good		
Oil & Gasoline	excellent	Bodied Oils	good
Water	excellent	Oils	good
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	45 to 90 min.	Lead	Air Dry 0.2% to 0.4%	Bake 0.2%
Air Dry—Hard	4 to 6 hours	Manganese	0.01% to 0.02%	none
Bake	250°F. to 275° F. for 30 min. to 60 min.	Cobalt	0.02% to 0.04%	0.01%
		Calcium*	0.3% to 0.5%	none
		Zinc	none	0.01%
		*to replace lead		

SUGGESTED FORMULATIONS

R. R. Express White Enamel			White Dipping Enamel		
Lbs.	Gals.		Lbs.	Gals.	
310.0	9.8	N. C. Anatase Ti O ₂ **	309.0	8.75	Rutile Ti O ₂ ***
75.0	1.6	Antimony Stearate	2.05	0.21	Aluminum Stearate
2.0	0.2	Aluminum Stearate	3.09	0.31	Soya Lecithin
152.0	20.0	Dyal XAC-99	218.0	28.80	Dyal XAC-99
13.0	2.0	Mineral Spirits	344.0	45.30	Dyal XAC-99
386.0	51.0	Dyal XAC-99	107.0	16.50	Mineral Spirits
110.0	17.0	Mineral Spirits	14.75	2.10	14% Guaiacol Sol'n.
10.0	1.0	24% Pb Naphthenate	5.92	0.62	24% Pb Naphthenate
6.0	0.7	6% Co Naphthenate	2.50	0.31	6% Co Naphthenate
1064.00	103.3		1006.31	102.90	
Oil Absorption 26 — 27			*Oil Absorption — 17 — 18		
Viscosity No. 4 Ford Cup 80" to 90"			Viscosity No. 4 Ford Cup — 50"		
Lbs. per gal. — 10.32			Lbs. per gal. — 9.70		
Brushing — Reduce with Kerosene			Dip — As is for large objects		
Spraying — Reduce with VM&P 20%			VM&P for short objects to reduce viscosity to 20"		
Dry — Set — 1 hour			Bake: — 250°F. for 30 min.		
Hard — 6 hours					

TYPE: Metal Decorating Baking Alkyd**OUTSTANDING FEATURES: Color, Color Retention, Gloss,
Film Hardness, Flexibility, and Baking Schedule**

XAC C84 is an alkyd that was designed specifically for metal decorating. It may be used to formulate wet ink varnishes or white enamels for ground coat.

Wet ink finishing varnishes formulated from XAC C84 will bake in 12 to 15 minutes at 280° F. to 300° F. One of the outstanding properties of these wet ink varnishes is the good flow and resulting excellent gloss. This good flow is also instrumental in producing a production job that has a minimum of "embossing" which means that the small print will be readily legible.

Still another outstanding property is the lack of bleed. When XAC C84 finishing varnishes are used over the most difficult inks, the amount of bleed is never great enough to detract from the appearance of the finished article. Silking is seldom a problem either when using XAC C84 to formulate wet ink varnishes. This lack of bleed and-silking is due in great part to the fact that the wet ink varnish formula does not contain any aromatic solvent. (See back of this sheet for formulation.) This absence of aromatic solvent will mean that the raw material costs will be lower.

Superior type rollercoating white enamel or ground coat for metal lithography may be formulated from XAC C84. This enamel will have exceptional flexibility, and coated stock may be formed into double tight can covers without any rupture of the film. This same enamel will have exceptional gloss. One quarter pound electrolytic tin plate, when coated with the enamel will give a 90 gloss reading on the 60° Gloss meter.

The white enamel formula listed on the reverse side of this page will bake out in 15 minutes at 280° F. There will be no color degradation even with a 15 minute overbake at 300° F. With the normal baking schedule, XAC C84 enamel will exhibit a film hardness of F as measured by the pencil hardness test.

The excellent flow properties of XAC C84 also manifests itself in the rollercoating white enamel. This means that the white ground coat will be extremely uniform and free from any blemishes due to the roller coating operations.

PHYSICAL CHARACTERISTICS

Non-Volatile	60%	Color (Max.)	8
Volatile	40% Mineral Spirits	Acid Value (Max.)	10
Lbs. Per Gal.	7.83	Phthalic Anhydride	25.5%
Viscosity	Z5-Z6	Type of Oil	Drying
Aliphatic Solv. Tol.	Infinite	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

ColorExcellent
 Color RetentionExcellent
 GlossExcellent
 Gloss RetentionExcellent
 Type of Film.....Tough, Hard, Flexible

Resistance to:

AbrasionExcellent
 AcidsGood
 AlkaliGood
 Oil and Gasoline.....Excellent
 WaterExcellent
 WeatherExcellent

Pigment Wetting and
 Dispersing PropertiesExcellent

Compatibility with:

Long AlkydsExcellent
 Medium AlkydsExcellent
 Short AlkydsGood
 Long VarnishesExcellent
 Medium VarnishesExcellent
 Short AlkydsGood
 OilsGood
 Bodied OilsGood

BAKING AND DRIER RECOMMENDATIONS

Air Dry—Set....not recommended
 Air Dry—Hard...not recommended
 Bake280° to 300° F.
 for 12 to 15 minutes

Bake:

	#1	#2
Lead	None	None
Manganese	None	.002% to .005
Cobalt	None	.002% to .005
Zirconium	None	.04% to .06%
Rare Earth ..0.1 to 0.2%		None
*Accelerator .05% to .075%		None

*6% Activ-8 Solution

SUGGESTED FORMULATIONS

Rollercoat Enamel, White

Lbs.	Gallons	
340		TiO ₂ , Rutile R-510
121	15.4	Dyal XAC C84
419	53.5	Dyal XAC C84
184	25.5	High Solvency Aromatic Naphtha*
7 1/4	1	Rare Earth Naphthenate, 4%
1 3/4	1/4	Activ-8 Solution, 6%
1073	104.4	

*Withhold 3 gallons for Viscosity control
 Wt/Gallon—10.34
 Viscosity—70" - 75" @ 75° F. #4 Ford
 Cup
 Roller Mill Grind—7 Hegman

Wet Ink Vehicle

Lbs.	Gallons	
490	62 1/2	Dyal XAC C84
1 3/4	1/4	Activ-8, Solution 6%
9 3/4	1 3/8	Paraffin Wax Solution
7 1/4	1	Rare Earth Naphthenate, 4%
226 1/4	34 7/8	Mineral Spirits
735	100	

Weight per Gallon—7.35
 Viscosity—40" - 44" @ 75° F. #4 Ford
 Cup
 %NVM—41%

0007-PMC-000000780

DYAL XAD

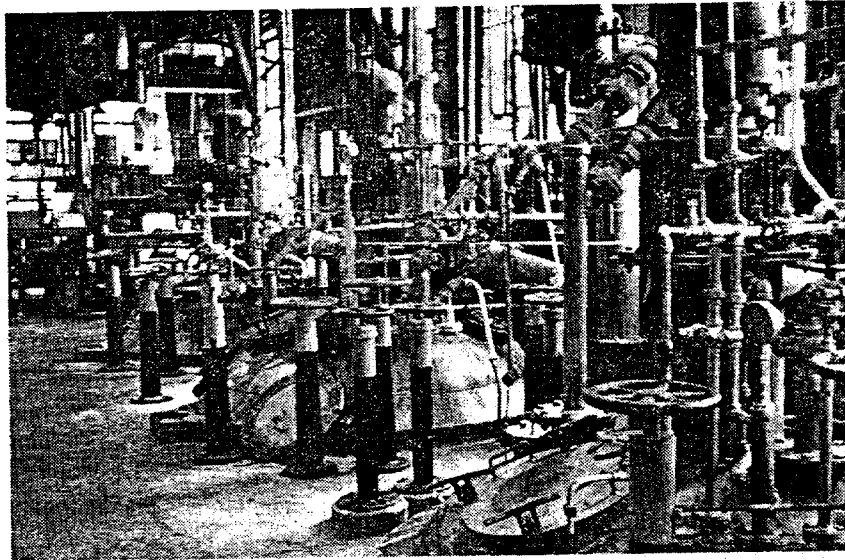
The DYAL XAD resins are pure oil modified alkyd resins that are of the drying type and are non-color retentive.

XAD - XAN

DYAL XAN

The DYAL XAN resins are pure oil modified alkyd resins that are of the non-drying type. They may be color retentive or non-color retentive.

XAD - XAN



A battery of modern Dow-Therm alkyd kettles representing a fraction of the total facilities available for manufacture of Dyal resins.

TYPE: Medium Oil Modified Alkyd

OUTSTANDING FEATURES:

Compatibility, Versatility

Dyal XAD-26 is a medium oil modified alkyd which is used extensively as a grinding and flushing liquid for color bases because of its excellent compatibility with most other alkyds, its non-reactivity with most pigments, and its excellent pigment wetting properties.

Dyal XAD-26 is also used as the basic resin in many general industrial finishes. Its good drying speed, excellent through hardness, excellent durability, and good brushing make it suitable for applications such as the following:

1. Metal Primers
2. Pump Enamels
3. Truck Enamels
4. Brushing Enamels

Pigment and color bases may be flushed or ground in Dyal XAD-26 with all of the usual types of equipment. Such bases have a minimum lengthening effect on short oil alkyds and do not seriously affect drying and hardness characteristics. At the same time they have a minimum shortening effect on long oil alkyds so that in both cases the final film characteristics reflect those of the extending alkyd.

It is advisable to incorporate anti-oxidants when grinding color bases to be stored for long periods in order to insure stability and freedom from skinning. This is especially important with high concentration of reactive colors such as iron blues, etc. Skinning may be controlled by the use of from 0.01% to 0.03% guaiacol based on the vehicle solids. This will improve gloss and package stability.

SPECIFICATIONS

Non Volatile _____	50%	Color (max.) _____	10
Volatile _____	50% M. S.	Acid Value _____	10
Lbs. per gal. _____	7.65	Phthalic Anhydride _____	33.0%
Viscosity _____	U - W	Oil _____	52%
Aliphatic Solv. Tol. _____	Infinite	Type Oil _____	Linseed
Solids at E to G Vis. _____	42%	Resin Modifiers _____	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	fair	Pigments	excellent
Gloss	good	Nitrocellulose	none
Gloss Retention	good	Alkyds	long medium short
Type of Film	hard, tough		excellent
Resistance to:			good
Abrasion	excellent		
Acids	good	Varnish	long medium short
Alkali	good		excellent
Oil & Gasoline	excellent	Oils	excellent
Water	excellent	Bodied Oils	excellent
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake
Air Dry—Set	60 to 90 min.	Lead	0.3% to 0.6%	0.2%
Air Dry—Hard	8 hours	Manganese	0.00% to 0.06%	0.02%
Bake	275°F. for 1 hour	Cobalt	0.03% to 0.06%	0.02%
		Calcium	none	none
		Zinc	none	none

SUGGESTED FORMULATIONS

Light Green Shading Base

Lbs.	Gals.	
780.0	21.5	Micro-Fast Chrome
		Green 12132
500.0	65.0	Dyal XAD-26
102.0	15.6	Mineral Spirits
0.4	0.4	Anti Skin Agent
1382.4	102.5	

Output — 100 gals.
Roller Mill — 6 Hegman Grind
Lbs. per gal. — 13.50

Zinc Chromate Primer

Lbs.	Gals.	
290	10.0	Zinc Chromate 12054
56	1.3	Zinc Oxide
67	2.5	Titanium Calcium
180	7.8	Micronized Talc
243	32.0	Dyal XAD-26
52	8.0	Mineral Spirits
152	20.0	Dyal XAD-26
137	21.0	Mineral Spirits
7	0.7	24% Pb Naphthenate
3	0.3	6% Co Naphthenate
1187	103.6	

Viscosity No. 4 Ford Cup — 65" to 75"
Lbs. per gal. — 11.50
Brushing — as is
Spraying — as is or reduce slightly with VM&P

DYAL XAD-37

TYPE: Medium Oil Modified Alkyd

OUTSTANDING FEATURES:

Durability, Hi Viscosity, Rapid Drying

Dyal XAD-37 is an excellent air drying or baking industrial alkyd that may be utilized for brush, spray or dip application. This medium length linseed vehicle promotes faster drying than the usual vehicle employing the conventional slow-evaporating mineral spirits type of solvent. As is characteristic of most linseed type vehicles Dyal XAD-37 is not strongly recommended for use in white enamels. It is not reactive with most basic pigments.

Some of the suggested uses are as follows:

1. Implement Finishes (clear & pigmented)
2. Furniture Enamels (wood & metal)
3. Pump Enamels
4. Automotive and Transport Enamels
5. Industrial Maintenance Enamels

One of the most attractive assets of Dyal XAD-37 is its extremely heavy viscosity which permits "low-solids" formulations and therefore gives cost savings. Also, excellent dip-tank stability may be expected from this vehicle. It possesses exceptional durability and therefore is very suitable for exterior type paints.

SPECIFICATIONS

Non Volatile _____	50%	Color (max.) _____	10
Volatile _____	50% M. S.	Acid Value _____	12
Lbs. per gal. _____	7.62	Phthalic Anhydride _____	34.8
Viscosity _____	Z ₂ -Z ₈	Oil _____	50.6
Aliphatic Solv. Tol. _____	1500%	Type Oil _____	Linseed
Solids at E to G Vis. _____	36%	Resin Modifiers _____	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	fair	Pigments	excellent
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	medium hard, flexible		good good fair
Resistance to:			
Abrasion	good		
Acids	good	Varnish	{ long medium short
Alkali	good		good good fair
Oil & Gasoline	excellent	Oils	good
Water	excellent	Bodied Oils	good
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	30 to 90 min.	Lead	Air Dry	Bake
Air Dry—Hard	6 to 7 hours	Manganese	0.1% to 0.3%	0.10%
Bake	250°F. to 275°F. for 30 min. to 60 min.	Cobalt	none	none
			0.02% to 0.06%	0.02%
		Calcium*	0.3%	0.03%
		Zinc	none	0.1%
				none
		*to replace lead		

SUGGESTED FORMULATIONS

Railroad Green Striping Enamel			Blue Pump Enamel		
Lbs.	Gals.		Lbs.	Gals.	
100.0	4.7	Micro Fast Chrome	25.0	1.7	C P Milori Blue 11086
		Green 11235	42.0	0.9	Zinc Oxide Azo-22**
228.5	30.0	Dyal XAD-37	35.0	1.6	Atomite Ca CO ₃
32.5	5.0	Mineral Spirits	15.0	0.7	Micronized Talc
	0.1	Anti Skin Agent	200.0	25.0	Dyal XAC-93
244.0	32.0	Dyal XAD-37		0.2	Anti Skin Agent
152.0	19.0	Dyal XAC-93	78.0	12.0	Mineral Spirits
9.6	1.0	24% Pb Naphthenate	312.0	41.0	Dyal XAD-37
71.5	11.0	Mineral Spirits	9.6	1.0	24% Pb Naphthenate
838.1	102.8		5.6	0.7	6% Co Naphthenate
			118.0	18.2	Mineral Spirits
			840.2	103.0	
Viscosity No. 4 Ford Cup — 75" to 90"			**(Am. Process-Accicular)		
Lbs. per gal. — 8.10			Viscosity No. 4 Ford Cup — 75" to 90"		
Brushing — Reduce with M. S. — 5 to 10%			Lbs. per gal. — 8.13		
Dry — Slight Tack — 3 to 4 hours			Brushing — Reduce with Kerosene —		
Dry — 6 to 8 hours			5 to 10%		
			Dry — Slight Tack — 3 to 4 hours		
			Dry — 6 to 8 hours		

DYAL XAN-78

TYPE: Short Non Oxidizing Oil Modified Alkyd

OUTSTANDING FEATURES:

Color Retention, Heat Resistance

Dyal XAN-78 is a non oxidizing oil modified alkyd resin designed for use with urea or melamine resins for the production of quality "high bake" enamels. This resin is an outstanding vehicle for finishes which must withstand heat without discoloration. It is superior to Dyal XAC-9 in this respect. However, Dyal XAC-9 finishes will show better adhesion. There are cases where it is advantageous to blend Dyal XAN-78 with Dyal XAC-9 to get improved adhesion.

Dyal XAN-78 may be used as a modifier for a variety of low viscosity, high solids, lacquers and lacquer based materials. The alkyd content imparts improved adhesion, improved cold check resistance, improved print resistance and good rubbing and sanding characteristics. Enamels and lacquers made with Dyal XAN-78 find many applications on such articles as those listed below where high gloss, pale color, moderate heat resistance, and the retention of gloss and color is important:

1. Electrical Appliances
2. Stoves
3. Fluorescent Lighting Units
4. Hospital Equipment
5. Venetian Blinds

Dyal XAN-78 is compatible in all proportions with most ureas, formaldehyde and melamine resins. The use of Dyal XAN-78 with melamine tend to give better color. Urea modified Dyal XAN-78 vehicle combinations tend to have better adhesion.

Dyal XAN-78 is recommended for top coat usage with primer coats based on alkyds such as Dyal XAC-9 and Dyal XAC-76.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	6
Volatile	50% Xylol	Acid Value	7
Lbs. per gal.	8.35	Phthalic Anhydride	42.2%
Viscosity	U - W	Oil	33.0%
Aliphatic Solv. Tol.	None	Type Oil	Coconut
Solids at E to G Vis.	43	Other Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	excellent
Gloss	excellent	Nitrocellulose	excellent
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	hard, tough		none poor good
Resistance to:			
Abrasion	good		
Acids	good		
Alkali	good	Varnish	{ long medium short
Oil & Gasoline	excellent		none none none
Water	excellent	Oils	none
Weather	fair	Bodied Oils	none

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	none	Lead	
Air Dry—Hard	none	Manganese	None required. To be
Bake	300°F. to 400°F. for	Cobalt	fortified with urea
	10 to 60 min.	Calcium	or melamine
		Zinc	

SUGGESTED FORMULATIONS

Melamine White Baking Enamel		
Lbs.	Gals.	
260.0	8.0	Anatase Ti O ₂ L. O.
117.0	14.0	Dyal XAN-78
388.0	46.5	Dyal XAN-78
187.0	22.5	Melamine 50% NVM
90.0	12.5	Xylol
1042.0	103.5	
Roller Mill or W. P. Mixer—6 to 7 Hegman		
Viscosity No. 4 Ford Cup — 18" to 20"		
(25% Red.)		
Lbs. per gal. — 9.92		
Bake — 300°F. for 30 min.		

Urea White Baking Enamel		
Lbs.	Gals.	
250.0	7.8	Anatase Ti O ₂ L. O.
100.0	12.5	Dyal XAN-78
101.0	12.0	Urea Resin 50% NVM
367.0	44.0	Dyal XAN-78
101.0	12.0	Urea Resin 50% NVM
79.0	11.0	Toluol
21.5	3.0	Xylol
13.5	2.0	Anhydrous Alcohol
1033.0	104.3	
Roller Mill or W. P. Mixer—6 to 7 Hegman		
Viscosity — No. 4 Ford Cup — 22" (25%		
Red.)		
Lbs. per gal. — 9.96		
Bake — 300°F. for 30 min.		

TYPE: Short Non Oxidizing Oil Modified Alkyd**OUTSTANDING FEATURES:****Color Retention, Heat Resistance**

Dyal XAN-78 is a non oxidizing oil modified alkyd resin designed for use with urea or melamine resins for the production of quality "high bake" enamels. This resin is an outstanding vehicle for finishes which must withstand heat without discoloration. It is superior to Dyal XAC-9 in this respect. However, Dyal XAC-9 finishes will show better adhesion. There are cases where it is advantageous to blend Dyal XAN-78 with Dyal XAC-9 to get improved adhesion.

Dyal XAN-78 may be used as a modifier for a variety of low viscosity, high solids, lacquers and lacquer based materials. The alkyd content imparts improved adhesion, improved cold check resistance, improved print resistance and good rubbing and sanding characteristics. Enamels and lacquers made with Dyal XAN-78 find many applications on such articles as those listed below where high gloss, pale color, moderate heat resistance, and the retention of gloss and color is important.

1. Electrical Appliances
2. Stoves
3. Fluorescent Lighting Units
4. Hospital Equipment
5. Venetian Blinds

Dyal XAN-78 is compatible in all proportions with most urea formaldehyde and melamine resins. The use of Dyal XAN-78 with melamine tends to give better color. Urea modified Dyal XAN-78 vehicle combinations tend to have better adhesion.

Dyal XAN-78 is recommended for top coat usage with primer coats based on alkyds such as Dyal XAC-9 and Dyal XAC-76.

SPECIFICATIONS

Non Volatile _____	60%	Color (max.) _____	6
Volatile _____	40% Xylol	Acid Value _____	7
Lbs. per gal. _____	8.55	Phthalic Anhydride _____	42.2
Viscosity _____	Z ₂ - Z ₄	Oil _____	33.0
Aliphatic Solv. Tol. _____	none	Type Oil _____	Coconut
Solids at E to G Vis. _____	43	Other Resin Modifiers _____	none

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	excellent
Gloss	excellent	Nitrocellulose	excellent
Gloss Retention	excellent	Alkyds	long medium short none poor good
Type of Film	hard, tough		
Resistance to:			
Abrasion	good	Varnish	long medium short none none none
Acids	good	Oils	none
Alkali	good	Bodied Oils	none
Oil & Gasoline	excellent		
Water	excellent		
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	none	Lead	
Air Dry—Hard	none	Manganese	None required. To
Bake	300°F to 400°F for	Cobalt	be fortified with
	10 to 60 min.	Calcium	urea or melamine.
		Zinc	

SUGGESTED FORMULATIONS

Melamine White Baking Enamel				Urea White Baking Enamel			
Lbs.	Gals.			Lbs.	Gals.		
260.0	8.0	Anatase Ti O ₂ L. O.		250.0	7.8	Anatase Ti O ₂ L. O.	
93.6	10.9	Dyal XAN-78		80.0	9.4	Dyal XAN-78	
23.4	3.25	Xylol		20.0	2.75	Xylol	
310.4	36.3	Dyal XAN-78		101.0	12.0	Urea Resin 50% NVM	
187.0	22.5	Melamine 50% NVM		294.0	34.4	Dyal XAN-78	
167.6	23.3	Xylol		101.0	12.0	Urea Resin 50% NVM	
1042.0	104.25			79.0	11.0	Toluol	
				94.5	13.10	Xylol	
				13.5	2.0	Anhydrous Alcohol	
				1033.0	104.45		
Roller Mill or W. P. Mixer—6 to 7 Hegman				Roller Mill or W. P. Mixer—6 to 7 Hegman			
Viscosity No. 4 Ford Cup—18" to 20"				Viscosity—No. 4 Ford Cup—22"			
(25% Red.)				(25% Red.)			
Lbs. per gal.—10.00				Lbs. per gal.—9.90			
Bake—300°F for 30 min.				Bake—300°F for 30 min.			

DYAL XAR

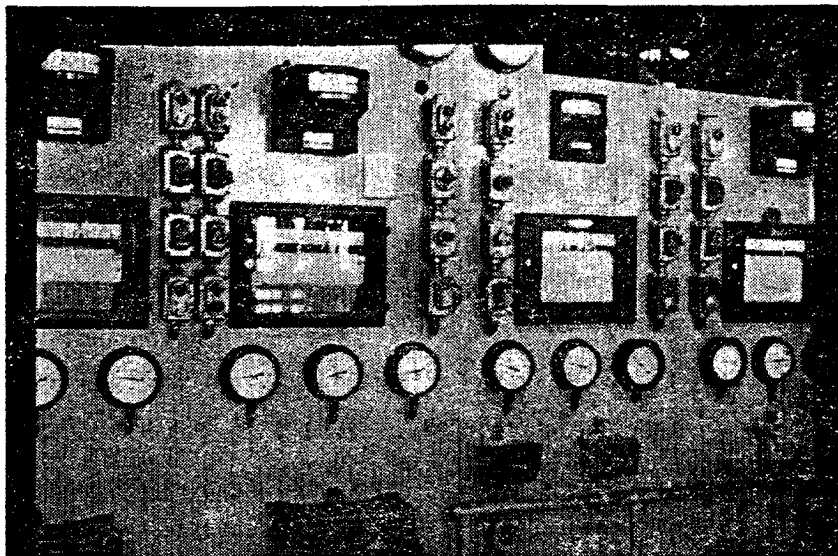
The DYAL XAR resins are alkyds that are resin modified. They may be color retentive or non-color retentive. They may be of the drying or non-drying type.

XAR - XAS

DYAL XAS

The DYAL XAS resins are alkyds that are modified with styrene. These styrenated alkyds may be color retentive or non-color retentive.

XAR - XAS



A view of a typical alkyd processing instrument panel used by the Sherwin-Williams alkyd resin plants. Modern control is combined with years of processing experience to assure the maximum uniformity in quality that is found in Sherwin-Williams Dyal Resins.

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

**Rapid Set, Excellent Adhesion to Metal,
Initial Hardness with Retained Flexibility**

The exceptional stability and very fast initial set of Dyal XAR-8 have proven it to be suitable for use as a vehicle in an established line of small package shop finishes. These finishes set up "out of dust" in a matter of several minutes to give finishes of excellent durability, high gloss, excellent adhesion, good flow and leveling. Finishes made with Dyal XAR-8 can also be expected to have excellent gloss retention, with good initial hardness and retained flexibility.

This excellent stability of Dyal XAR-8 has made this vehicle acceptable for dip tank application for air dry and bake production schedules.

The current version of Dyal XAR-8 has improved color and color retention to give fuller and cleaner colors and tints. This vehicle can be used as a very fast setting furniture clear for air or low temperature force dry schedules on light or dark woods. The suggested uses for Dyal XAR-8 are the following:

1. Metal Primers
2. Automotive Primers
3. Hardware & Machinery Enamels
4. Drum Enamels
5. Tin & Metal Decorating Enamels
6. Furniture Clears

Dyal XAR-8 will be compatible and stable with most pigments. Finishes may be prepared with this vehicle in roller and ball mills.

SPECIFICATIONS

Non Volatile _____	50%	Color (max.) _____	10
Volatile _____	35% Xylol - 15% M. S.	Acid Value _____	5 to 9
Lbs. per gal. _____	7.93	Phthalic Anhydride _____	29%
Viscosity _____	U - W	Oil _____	35%
Aliphatic Solv. Tol. _____	1000%	Type Oil _____	Soya
Solids at E to G Vis. _____	45%	Resin Modifiers _____	Present

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	good
Gloss	excellent	Nitrocellulose	good
Gloss Retention	excellent	Alkyds { long	poor
Type of Film	hard, tough	{ medium	good
		{ short	good
Resistance to:			
Abrasion	excellent	Varnish { long	poor
Acids	good	{ medium	good
Alkali	good	{ short	good
Oil & Gasoline	excellent	Oils	poor
Water	excellent	Bodied Oils	poor
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

		Air Dry	Bake
Air Dry—Set	15 min.	Lead 0.3% to 0.5%	0.2%
Air Dry—Hard	5 to 6 hours	Manganese 0.01% to 0.03%	none
Bake	225°F to 275°F for	Cobalt 0.02% to 0.05%	0.01%
	20 min. to 40 min.	Calcium* 0.3% to 0.5%	0.02%
		*to replace lead	

SUGGESTED FORMULATIONS

Gray Baking Primer			Gray Drum Enamel		
Lbs.	Gals.		Lbs.	Gals.	
285.0	8.9	Anatase Ti O ₂ **	400.0	10.8	Permolith 30M
190.0	5.4	Ti Barium	1.0	0.1	Lamp Black
135.0	6.1	Whiting	198.0	25.0	Dyal XAR-8
4.0	0.4	Aluminum Stearate	13.0	1.3	24% Pb Naphthenate
4.0	0.4	Lamp Black	8.0	1.0	6% Mn Naphthenate
301.0	38.0	Dyal XAR-8	2.5	0.3	6% Co Naphthenate
115.0	16.0	Xylol	65.0	8.0	Xylol
.8	0.1	Anti Skin Agent	2.0	0.15	Anti Skin Agent
143.0	18.0	Dyal XAR-8	254.0	32.0	Dyal XAR-8
5.0	0.6	6% Mn Naphthenate	108.0	15.0	Xylol
2.5	0.3	6% Co Naphthenate	65.0	10.0	Mineral Spirits
63.0	9.0	Xylol	1116.5	103.65	
1248.3	103.2				

**Oil Absorption 26-27

Ball Mill Grind—24 hours

This primer is to be force dried 30 min. at 120°F

Grind—4 to 5 Hegman

Lbs. per gal.—12.10

Grind—6 Hegman

Grind—16 hours on Ball Mill

Lbs. per gal.—10.90

Force Dry—20 min. at 180°F

DYAL XAR-8

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

Rapid Drying, Excellent Durability, Ease Of Application

This short oil resin modified alkyd gives rapid hard through drying and exceptional durability. Dyal XAR-8 may be used in quality air dry and baking finishes for spray and dip applications. Other qualities to be noted are its fast set, high gloss and gloss retention, excellent adhesion, retained flexibility and good flow and leveling. Dyal XAR-8 will air dry "set-to-touch" in 5 to 10 minutes and will be dried hard in 3 to 4 hours. Due to the phenolic modification Dyal XAR-8 is limited to usage in tinted and colored enamel formulations.

Some of the suggested uses of Dyal XAR-8 are:

1. General Air Dry or Bake Finishes
2. Metal Primers
3. Hardware & Machinery Enamels
4. Automotive Refinishing Enamels
5. Hammered Effect Finishes
6. Drum Enamels
7. Tin & Metal Decorating
8. Automotive Chassis

Caution should be exercised in the use of reactive pigments with this vehicle. Bases ground or flushed in Dyal XAD-26 may be used with Dyal XAR-8. However, to retain the fast set and through dry of this alkyd it is recommended that the more difficult pigments be ground in a faster setting alkyd such as Dyal XAC-76.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	12
Volatile	35% Xylol — 15% VM&P	Acid Value	20
Lbs. per gal.	8.02	Phthalic Anhydride	28%
Viscosity	U - W	Oil	34%
Aliphatic Solv. Tol.	500%	Type Oil	Linseed
Solids at E to G Vis.	45%	Resin Modifiers	Phenolic

0007-PMC-000000795

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:	
Color Retention	fair	Pigments	good
Gloss	excellent	Nitrocellulose	good
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	hard, tough		
Resistance to:			
Abrasion	excellent	Varnish	{ long medium short
Acids	good		
Alkali	good		
Oil & Gasoline	excellent	Oils	poor
Water	excellent	Bodied Oils	poor
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	15 min.	Lead	Air Dry	Bake
Air Dry—Hard	3 to 4 hours	Manganese	0.3% to 0.5%	.2%
Bake	225°F. to 275°F. for	Cobalt	0.01% to 0.03%	none
	20 min. to 40 min.	Calcium*	0.02% to 0.05%	0.01%
			0.3% to 0.5%	0.02%

*to replace lead

SUGGESTED FORMULATIONS

Gray Baking Primer			Gray Drum Enamel		
Lbs.	Gals.		Lbs.	Gals.	
285.0	8.9	Anatase Ti O ₂ **	400.0	10.8	Permolith 30M
190.0	5.4	Ti Barium	1.0	0.1	Lampblack
135.0	6.1	Whiting	203.0	25.0	Dyal XAR-8
4.0	0.4	Aluminum Stearate	13.0	1.3	24% Pb Naphthenate
4.0	0.4	Lamp Black	8.0	1.0	6% Mn Naphthenate
308.0	38.0	Dyal XAR-8	2.5	0.3	6% Co Naphthenate
115.0	16.0	Xylol	65.0	8.0	Xylol
.8	0.1	Anti Skin Agent	2.0	0.15	Anti Skin Agent
146.0	18.0	Dyal XAR-8	259.0	32.0	Dyal XAR-8
5.0	0.6	6% Mn Naphthenate	108.0	15.0	Xylol
2.5	0.3	6% Co Naphthenate	65.0	10.0	Mineral Spirits
63.0	9.0	Xylol			
1258.3	103.2		1126.5	103.65	

**Oil Absorption 26 — 27
 Ball Mill Grind — 24 hours
 This primer is to be force dried 30 min.
 at 120°F.
 Grind — 4 to 5 Hegman
 Lbs. per gal. — 12.10

Grind — 6 Hegman
 Grind 16 hours on Ball Mill
 Lbs. per gal. — 10.90
 Force Dry — 20 min. at 180°F.

DYAL XAR-12

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

Low Cost, Durability

Dyal XAR-12 is a low cost resin modified alkyd in the short to medium oil range that is an excellent basic resin for applications where low cost with good durability and quality performance are requirements. Dyal XAR-12 can also be used with other vehicles such as Dyals XAC-42, XAD-26 and XAD-37 to lower cost and to give increased hardness and gloss without the sacrifice of durability, rate of dry or loss of application properties.

Finishes made with Dyal XAR-12 can be applied by spray, brush or dip. The use of VM&P naphtha as let-down solvent will improve the set time of Dyal XAR-12 appreciably. Since Dyal XAR-12 has only fair initial color and color retention it is not recommended for use in white enamel formulations. The resin modification of Dyal XAR-12 contributes to its exceptional gloss and gloss retention and its durability.

High quality finishes can be prepared with the use of Dyal XAR-12 for the following applications:

1. Industrial

Farm Implement Enamels

Freight and Passenger Car Finishes

Drum Enamels

Toy Enamels

Hardware Enamels

Furniture Clears

2. Others

Metal Primers

Automotive Refinishing Enamels

Automotive Chassis Enamels

Dyal XAR-12 will set pigments well and will disperse most pigments with little difficulty. The use of guaiacol as the anti-oxidant is not recommended with Dyal XAR-12 because of its deterrent effect on the drying of this vehicle.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	14
Volatile	50% M. S.	Acid Value	15
Lbs. per gal.	7.62	Phthalic Anhydride	Present
Viscosity	X - Z ₂	Oil	42%
Aliphatic Solv. Tol.	Infinite	Type Oil	Drying
Solids at E to G Vis.	38%	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:	
Color Retention	fair	Pigments	excellent
Gloss	excellent	Nitrocellulose	fair
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	hard, tough		good good fair
Resistance to:		Varnish	{ long medium short
Abrasion	good		good good fair
Acids	good	Oils	good
Alkali	good	Bodied Oils	fair
Oil & Gasoline	good		
Water	excellent		
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	30 to 60 min.	Lead	Air Dry	Bake
Air Dry—Hard	6 to 8 hours	Manganese	0.3% to 0.5%	0.2%
Bake	200°F. to 300°F. for	Cobalt	0.01% to 0.03%	0.02%
	45 min. to 2 hours	Zinc	0.01% to 0.03%	0.02%
			none	0.1%

SUGGESTED FORMULATIONS

Blue Gray Lusterless Enamel			Red Machine Enamel		
Lbs.	Gals.		Lbs.	Gals.	
106.0	3.04	Ti O ₂ Rutile N. C.	90.0	7.3	Para Red 10333
2.0	0.13	Lamp Black	3.0	0.3	Lecithin
270.0	11.50	Soapstone Talc	152.0	20.0	Dyal XAR-12
4.0	0.40	Lecithin	1.0	0.1	Guaiacol
244.0	32.00	Dyal XAR-12	12.0	1.2	24% Pb Naphthenate
15.0	0.54	24% Pb Naphthenate	5.0	0.6	6% Mn Naphthenate
75.0	13.00	VM&P Naphtha	56.0	9.0	VM&P Naphtha
111.0	14.50	Dyal XAR-12	121.0	16.0	Dyal XAR-12
14.0	0.70	6% Mn Naphthenate	282.0	36.0	Dyal XAR-62
155.0	27.00	VM&P Naphtha	5.0	0.6	6% Co Naphthenate
7.0	0.8	6% Co Naphthenate	71.0	11.4	VM&P Naphtha
1.0	0.10	Anti Skin Agent	798.0	102.5	
1004.0	103.54				
Ball Mill — 10 to 12 hours — 4 Hegman			Ball Mill — 12 hours — 6 Hegman Grind		
Lbs. per gal. — 9.70			Lbs. per Gal. — 7.76		
Application — Spray (Reduce 25% with VM&P)			Viscosity No. 4 Ford Cup — 75" (25% Reduction with VM&P)		
			Set to Touch — 30 min.		
			Recoat — 2 to 2¼ hours		

DYAL XAR-13

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

Fast Set, Low Cost, Aliphatic Tolerance

Dyal XAR-13 is a short length phenolated alkyd resin that sets up rapidly to give extremely fast air drying and baking films. This rapid setting and drying makes Dyal XAR-13 applicable to many industrial air dry, force dry and bake schedules where time is the prime consideration. Dyal XAR-13 offers low cost, good aliphatic solvent tolerance and hard gloss retentive films of good durability. Because of its very short oil length, Dyal XAR-13 will give films that are extremely hard and mar-resistant. Finishes made with this resin can be applied by spray or dip.

Dyal XAR-13 has only fair initial color and has poor color retention because of its phenol modification; therefore, this resin is not recommended for use in white enamel formulations. For air dry and bake schedules this resin may be used in light tints.

A few of the recommended applications are the following:

1. Drum Enamels
2. Toy Enamels
3. Hardware Enamels
4. Furniture Clears
5. Metal Primers
6. Automotive Chassis Enamels

Because of the very fast solvent used in Dyal XAR-13, pebble and ball milling are recommended in preference to roller milling for pigment dispersion. Reactive pigments should not be used with this high acid vehicle. The more reactive pigments may be dispersed in Dyal XAC-76 and let down with Dyal XAR-13 without effecting too great a change in drying properties.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	13
Volatile.....15% Xylol — 35% VM&P		Acid Value	24 to 30
Lbs. per gal.....	7.70	Phthalic Anhydride	29%
Aliphatic Solv. Tol.....	Infinite	Oil	30%
Viscosity	Z - Z ₂	Type Oil	Drying
Solids at E to G Vis.	35%	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:	
Color Retention	poor	Pigments	fair
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	long medium short long medium short
Type of Film	hard, mar proof		good
Resistance to:		Varnish	long medium short long medium short
Abrasion	good	Oils	fair
Acids	good	Bodied Oils	fair
Alkali	fair		
Oil & Gasoline	good		
Water	good		
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	5 min.	Lead	Air Dry	Bake
Air Dry—Hard	90 min.	Manganese	0.2% to 0.4%	none
Bake	15 to 60 min. at 140° to 260°F.	Cobalt	0.01% to 0.03%	0.02%
		Calcium*	0.02% to 0.04%	0.02%
			none	0.02%

*to replace lead

SUGGESTED FORMULATIONS

Gray Drum Enamel			Quick Drying Lusterless Blue Enamel		
Lbs.	Gals.		Lbs.	Gals.	
146	4.2	Rutile Ti O ₂ **	96	2.75	Ti O ₂ RNC
120	3.3	Lithopone-Med. Consistency	4	.25	C P Chinese Blue 11023
2	0.2	Lampblack	1	—	Micro-Fast Chrome
1	0.1	Aluminum Stearate			Green 11232
293	38.0	Dyal XAR-13	253	10.8	Soapstone Talc
316	41.0	Dyal XAR-13	4	.4	Yelkin TTS
94	15.0	VM&P Naphtha	266	35.0	Dyal XAR-13
2	0.2	24% Pb Naphthenate	99	13.0	Dyal XAR-13
2	0.2	6% Co Naphthenate	3	0.3	24% Pb Naphthenate
974	102.2		4.5	0.6	6% Co Naphthenate
			249	40.0	VM&P
			2	.25	Guaiacol
			986.5	103.35	

**Oil Absorption 17-18

Roller Mill Grind — 5 to 6 Hegman

Viscosity No. 4 Ford Cup — 25" to 35"
(25% to 35% Red. with VM&P)

Wt. per gal — 9.60

Air Dry to Handle — 60 min.

Force Dry — 180°F. — 20 min.

Roller Mill Grind — 4 Hegman

Wt. per gal. — 9.50

DYAL XAR-13

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

Fast Set, Low Cost, Aliphatic Tolerance

Dyal XAR-13 is a short length phenolated alkyd resin that sets up rapidly to give extremely fast air drying and baking films. This rapid setting and drying makes Dyal XAR-13 applicable to many industrial air dry, force dry and bake schedules where time is the prime consideration. Dyal XAR-13 offers low cost, good aliphatic solvent tolerance and hard gloss retentive films of good durability. Because of its very short oil length, Dyal XAR-13 will give films that are extremely hard and mar-resistant. Finishes made with this resin can be applied by spray or dip.

Dyal XAR-13 has only fair initial color and color retention because of its phenol modification; therefore, this resin is not recommended for use in white enamel formulations. For air dry and bake schedules this resin may be used in light tints. A few of the recommended applications are the following:

1. Drum Enamels
2. Toy Enamels
3. Hardware Enamels
4. Furniture Clears
5. Metal Primers
6. Automotive Chassis Enamels

Because of the very fast solvent used in Dyal XAR-13, pebble and ball milling are recommended in preference to roller milling for pigment dispersion. Reactive pigments should not be used with this high acid vehicle. The more reactive pigments may be dispersed in Dyal XAC-76 and let down with Dyal XAR-13 without effecting too great a change in drying properties.

SPECIFICATIONS

Non Volatile _____	60%	Color (max.) _____	12
Volatile _____	20% Xylol - 20% VM&P	Acid Value _____	10 to 20
Lbs. per Gal. _____	8.05	Phthalic Anhydride _____	29½%
Aliphatic Solv. Tol. _____	Infinite	Oil _____	30%
Viscosity _____	Z ₃ - Z ₅	Type Oil _____	Drying
Solids at E-G Vis (in VM&P) _____	38%	Resin Modifiers _____	Present

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:	
Color Retention	fair	Pigments	fair
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds { long	none
Type of Film	hard, mar proof	{ medium	fair
		{ short	good
Resistance to:			
Abrasion	good	Varnish { long	none
Acids	good	{ medium	fair
Alkali	fair	{ short	fair
Oil & Gasoline	good	Oils	fair
Water	good	Bodied Oils	fair
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

		Air Dry	Bake
Air Dry—Set	5 min.	Lead 0.2% to 0.4%	none
Air Dry—Hard	90 min.	Manganese 0.01% to 0.03%	0.02%
Bake	15 to 60 min. at	Cobalt 0.02% to 0.04%	0.02%
	140° to 260°F	Calcium* none	0.02%
		*to replace lead	

SUGGESTED FORMULATIONS

Gray Drum Enamel			Quick Drying Lusterless Blue Enamel		
Lbs.	Gals.		Lbs.	Gals.	
146.0	4.2	Rutile Ti O ₂ **	96.0	2.75	Ti O ₂ RNC
120.0	3.3	Lithopone-Med. Consistency	4.0	.25	C P Chinese Blue 11023
2.0	0.2	Lampblack	1.0	—	Micro-Fast Chrome Green 11232
59.0	9.45	VM&P Naphtha	258.0	10.8	Soapstone Talc
234.0	29.0	Dyal XAR-13	53.0	8.5	VM&P Naphtha
251.0	31.1	Dyal XAR-13	213.0	26.5	Dyal XAR-13
159.0	25.55	VM&P Naphtha	80.0	9.95	Dyal XAR-13
2.0	0.2	24% Pb Naphthenate	3.0	0.3	24% Pb Naphthenate
2.0	0.2	6% Co Naphthenate	4.5	0.6	6% Co Naphthenate
976.0	103.3		269.0	43.0	VM&P Naphtha
			2.0	.25	Guaiacol
			987.5	103.30	
**Oil Absorption 17-18			Roller Mill Grind—4 Hegman		
Roller Mill Grind—5 to 6 Hegman			Wt. per gal.—9.55		
Viscosity No. 4 Ford Cup—25" to 35"					
(25% to 35% Red. with VM&P)					
Wt. per gal.—9.45					
Air Dry to Handle—60 min.					
Force Dry—180°F—20 min.					

0007-PMC-000000802

DYAL XAR-7 & DYAL XAR-19

TYPE: Resin Modified Wrinkle Finish Alkyds

OUTSTANDING FEATURES:

Uniformity, Adhesion, Toughness

These resin modified alkyds, Dyal XAR-7 and Dyal XAR-19, were developed for use in wrinkle finishes. Dyal XAR-7 is a wood oil alkyd that is characterized by a uniform pattern and high gloss. Dyal XAR-19 is a longer oil modification of Dyal XAR-7 having considerably more wrinkling power in its film, higher relief and a finer and duller pattern. It is then possible to obtain any desired wrinkle finish by the use of combinations of Dyal XAR-7 and Dyal XAR-19. Experience has shown that these combinations of Dyal XAR-7 and Dyal XAR-19 show no appreciable change in wrinkling characteristics upon aging.

In the formulation of wrinkle finishes with Dyal XAR-7 and Dyal XAR-19 reasonably large quantities of top driers should be used. For good uniformity of wrinkle the drier combination should contain from 0.05% to 1.0% of cobalt metal based on total resin solids. 0.02% to 0.04% of manganese may also be used to aid the through drying of these resins. The amounts of adulterating vehicles introduced in shading bases should be kept at a minimum to insure maximum uniformity. Due to the high acid values of Dyal XAR-7 and Dyal XAR-19, they are not recommended for use with reactive pigments.

Dyal XAR-7 is somewhat more versatile than Dyal XAR-19 because of its shorter oil length. It is possible to formulate exceptionally good, fast setting and drying, high gloss enamels with Dyal XAR-7. The phenol modification of this resin will give topcoats and undercoaters with excellent hardness, adhesion and water resistance. Dyal XAR-7 has good compatibility with most amine resins. Baking finishes may be made with or without amine modifications.

SPECIFICATIONS

Dyal XAR-7

Non Volatile	50%	Color (max.)	12
Volatile	18% Xylol — 32% VM&P	Acid Value	25 - 30
Lbs. per gal.	7.73	Phthalic Anhydride	Present
Viscosity	T - V	Oil	42%
Aliphatic Solv. Tol.	50%	Type Oil	C. W. O.
Solids at E to G Vis.	38%	Resin Modifiers	Present

Dyal XAR-19

Non Volatile	55%	Color (max.)	14
Volatile	30% Xylol — 15% VM&P	Acid Value	40 - 50
Lbs. per gal.	7.76	Phthalic Anhydride	Present
Viscosity	G - I	Oil	51%
Aliphatic Solv. Tol.	150%	Type Oil	C. W. O.
Solids at E to G Vis.	50%	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

	XAR-7	XAR-19		XAR-7	XAR-19
Color	fair	fair	Compatibility with:		
Color Retention	fair	fair	Pigments	fair	fair
Gloss	excellent		Nitrocellulose	fair	fair
Gloss Retention	excellent				
Type of Film	hard, tough	tough	Alkyds	{ long medium short	{ poor fair fair
Resistance to:					
Abrasion	good	good			
Acids	good	good	Varnish	{ long medium short	{ poor poor fair
Alkali	good	good			
Oil & Gasoline	excellent	excellent	Oils	fair	fair
Water	excellent	excellent	Bodied Oils	poor	poor
Weather	good	good			

DRYING AND DRIER RECOMMENDATIONS

	Dyal XAR-7 (Gloss Finish)		GLOSS		WRINKLE
Air Dry—Set	15 min.	Lead	Air Dry 0.3%	Bake 0.2%	Bake 0.1%
Air Dry—Hard	3 to 4 hours	Manganese	0.02%	0.01%	0.03%
Bake	300°F. for 30 min.	Cobalt	0.02%	0.01%	to 1.0%

Dyal XAR-7 & Dyal XAR-19
(Wrinkle Finishes)

Bake 300°F. for 30 min.

SUGGESTED FORMULATIONS

Green Dipping Enamel			Black Wrinkle Finish		
Lbs.	Gals.		Lbs.	Gals.	
33.0	0.9	Micro-Fast Chrome	7.0	0.5	Lampblack
		Green Lt. 12132	5.0	0.3	Carbon Black, Med. Color
33.0	1.5	Micro-Fast Chrome	35.0	1.9	Magnesium Carbonate
		Green Dk. 12135	2.0	0.2	Lecithin
2.0	0.2	Lecithin	166.0	21.0	Dyal XAR-19
191.0	25.0	Dyal XAR-7	34.0	4.7	Xylol
84.0	11.0	Xylol	2.0	0.2	Guaiacol
2.0	0.2	Anti Skin Agent	198.0	25.0	Dyal XAR-19
355.0	46.0	Dyal XAR-7	202.0	26.5	Dyal XAR-7
6.0	0.6	24% Pb Naphthenate	16.0	1.8	6% Co Naphthenate
5.0	0.6	6% Co Naphthenate	101.0	16.3	VM&P Naphtha
115.0	16.0	Xylol	36.0	5.0	Toluol
1.0	0.1	Guaiacol	804.0	103.4	
1.0	0.1	Silicone Solution			
828.0	102.2				

Ball Mill — 20 hours for 6 Hegman Grind
25% Reduction with Xylol or VM&P
Bake — 325°F. for 10 min.
Viscosity — 90" to 102" — No. 4 Ford Cup
Lbs. per gal. — 8.10

Roller Mill Grind — 4 Hegman
Viscosity No. 4 Ford Cup — 65" to 75"
Bake — 225°F. to 250°F. for 30 min.
Bake — I. F. at 250°F. for 10 min.
Spray Application

DYAL XAR-62

TYPE: Medium Oil Phenolic Modified Alkyd

OUTSTANDING FEATURES:

Exterior Durability, Fast Set, Good Dry

Dyal XAR-62 is an excellent fast drying medium length pure phenolic modified alkyd. Finishes made with Dyal XAR-62 exhibit excellent exterior durability, toughness, flexibility, along with mar and scratch resistance. These properties have made this alkyd especially suitable for use as a vehicle for automotive finishes.

Finishes using Dyal XAR-62 may be air dried, force dried, or baked. This alkyd was developed for spray application; however, it may be used in dip and flow-coat applications by adjustment of the solvent combination of the final finish.

Dyal XAR-62 has been found to be extremely useful in the following applications:

1. Automotive Enamels
2. Farm Implement Enamels
3. Truck Finishes
4. Railway Passenger Car Finishes
5. Tractor Finishes

Dyal XAR-62 should not be used with extremely reactive pigments. Ball mill dispersion is recommended when possible. Finishes of excellent quality and performance may be prepared using Dyal XAD-26 or Dyal XAC-76 as the grinding medium along with Dyal XAR-62 as the let-down vehicle.

SPECIFICATIONS

Non Volatile _____	50%	Color (max.) _____	12
Volatile _____	35% Xylol — 15% VM&P	Acid Value _____	10
Lbs. per gal. _____	7.83	Phthalic Anhydride _____	29.6%
Viscosity _____	T - V	Oil _____	51.7%
Aliphatic Solv. Tol. _____	100%	Type Oil _____	Soya, Tung
Solids at E to G Vis. _____	42.6%	Resin Modifiers _____	Phenolic Resins

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	fair
Gloss	excellent	Nitrocellulose	fair
Gloss Retention	excellent	Alkyds	{ long fair medium good short fair
Type of Film	hard, flexible	Varnish	{ long fair medium good short fair
Resistance to:		Oils	fair
Abrasion	excellent	Bodied Oils	fair
Acids	good		
Alkali	good		
Oil & Gasoline	excellent		
Water	excellent		
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

		Air Dry	Bake
Air Dry—Set	15 min.	Lead 0.3% to 0.5%	0.15%
Air Dry—Hard	3 to 4 hours	Manganese 0.07% to 0.13%	0.03%
Bake	220°F. to 280°F. for 30 to 60 min.	Cobalt 0.02% to 0.05%	0.02%
		Calcium 0.1% to 0.3%	none
		Zinc none	0.2%

SUGGESTED FORMULATIONS

Orange Transport Enamel			Prairie Gold Implement Enamel		
Lbs.	Gals.		Lbs.	Gals.	
120.0	2.1	C P Chrome Orange 12082	274.0	5.45	C P Chrome Yellow 12152
118.0	15.0	Dyal XAR-62	18.0	0.44	Lt. Red Iron Oxide (98% Fe ₂ O ₃)
32.0	5.0	Mineral Spirits	3.0	0.34	Soya Lecithin
21.6	3.0	High Solvency Naphtha	157.0	20.0	Dyal XAR-62
9.6	1.0	24% Pb Naphthenate	360.0	46.0	Dyal XAR-62
1.0	0.15	Anti Skin Agent	10.0	1.5	Guaiacol 15% Sol'n.
482.0	61.5	Dyal XAR-62	6.0	0.85	24% Pb Naphthenate
88.0	13.5	Mineral Spirits	5.0	0.65	6% Mn Naphthenate
4.0	0.5	6% Co Naphthenate	5.0	0.65	6% Co Naphthenate
2.4	0.3	6% Mn Naphthenate	112.0	18.0	VM&P
7.8	1.0	4% Ca Naphthenate	71.0	9.85	Xylol
886.4	103.05		1021.0	103.7	
Viscosity No. 4 Ford Cup — 60" to 75"			Viscosity No. 4 Ford Cup — 65" to 75"		
Lbs. per gal. — 8.60			Lbs. per gal. — 9.81		
Spray: Reduce with Xylol or combination of Xylol and High Solvency Naphtha 20% to 30%.			Grind, Roller Mill — 6 to 7 Hegman		
Dry: Slight Tack — ½ hour					
Dry — 4 to 6 hours					
Grind, Roller Mill — 6 to 7 Hegman					

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DYAL XAR-C6

TYPE: Medium Length Resin Modified Alkyd

OUTSTANDING FEATURES:

Drying, Exterior Durability

Dyal XAR-C6 was developed specifically for use as a transportation finish vehicle. At higher cost than Dyal XAR-62, this vehicle will offer better drying especially under conditions of high humidity. Finishes employing this vehicle will exhibit fast set, hard through dry and fast tape time. The phenolic resin modifier assures excellent durability, gloss and gloss retention. Aliphatic tolerance is limited to 100% due to the resin modification. Therefore, a coal-tar solvent is recommended for obtaining full advantage of the outstanding properties of Dyal XAR-C6. With the suggested drier recommendations, enamels made with Dyal XAR-C6 will be "set to touch" within 10 minutes and they will "tape" within 5 to 6 hours. Some of the uses for Dyal XAR-C6 are as follows:

1. Automotive & Truck Refinishing Enamels
2. Railway Finishes
3. Metal Primers
4. Toy Enamels

Finishes made with this vehicle will have good package stability if fortified with small amounts of anti skin agent or guaiacol. With the more reactive pigments it is also advisable to use approximately one-half percent of triethylamine.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	12
Volatile.....	30% Xylol — 20% VM&P	Acid Value	12
Lbs. per gal.....	7.83	Phthalic Anhydride	29%
Viscosity	U - X	Oil	52%
Aliphatic Solv. Tol.....	100%	Type Oil	Linseed
Solids at E to G Vis.....	42%	Resin Modifiers	Phenolic

0007-PMC-000000807

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	good
Gloss	good	Nitrocellulose	good
Gloss Retention	excellent	Alkyds	long medium short fair good poor
Type of Film	tough, hard, flexible	Varnish	long medium short fair good poor
Resistance to:		Oils	fair
Abrasion	excellent	Bodied Oils	fair
Acids	good		
Alkali	good		
Oil & Gasoline	excellent		
Water	excellent		
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	10 min.	Lead	Air Dry	Bake
Air Dry—Hard	5 to 6 hours	Manganese	0.2% to 0.4%	0.1%
Bake	200°F. to 300°F.	Cobalt	none	none
	30 to 60 min.	Zinc	0.03% to 0.05%	0.01%
			none	0.02%

SUGGESTED FORMULATIONS

Blue Freight Car Enamel			Dark Gray Automotive Enamel		
Lbs.	Gals.		Lbs.	Gals.	
27.0	1.8	Milori Blue	42.0	1.2	Ti O ₂ Rutile N. C.
26.0	0.7	Ti O ₂ Rutile	10.5	0.7	Lamp Black
6.0	0.2	Ferrite Yellow Lemon No. 305	50.0	6.6	Dyal XAD-26
3.0	0.4	Calcium Stearate	550.0	70.0	Dyal XAR-C6
130.0	17.0	Dyal XAD-26	13.0	1.4	24% Pb Naphthenate
9.6	1.0	24% Pb Naphthenate	4.0	0.5	6% Co Naphthenate
12.0	1.75	Methyl Ethyl Ketoxime (17% Sol'n.)	10.0	1.1	8% Mn Naphthenate
161.0	21.0	Dyal XAD-26	3.0	0.3	Guaiacol
305.0	39.0	Dyal XAR-C6	3.0	0.3	Anti Skin Agent
3.7	0.5	6% Mn Naphthenate	110.0	17.0	Mineral Spirits
31.0	4.0	Phenolic Resin Sol'n.*	30.0	4.2	Solvent Naphtha
1.7	0.25	6% Co Naphthenate	825.5	103.3	
52.0	8.0	Mineral Spirits			Roller Mill — 6 Hegman Grind
22.0	3.0	High Flash Naphtha			Lbs. per gal. — 8.00
3.0	0.5	Triethylamine			Application — Spray or Brush
793.0	99.10				Reduction 25% for Spray
					Air Dry or Bake

Viscosity No. 4 Ford Cup — 90" to 115"

Lbs. per gal. — 7.95

*45% NVM

DYAL XAR-C9

TYPE: Short Oil Resin Modified Alkyd

OUTSTANDING FEATURES:

Rapid Dry, Outstanding Chemical Resistance

Dyal XAR-C9 is an extremely fast drying short oil straight 100% phenolic resin modified alkyd.

Dyal XAR-C9 with its extremely fast set and drying, may be applied by spray, or dip, to give films that are hard, tough and durable and possess exceptional chemical resistance. This rapid drying and excellent chemical resistance make Dyal XAR-C9 extremely useful as a vehicle for fast setting primers and primer surfacers. The high phenolic resin modification insures excellent gloss retention; however, it limits the use of Dyal XAR-C9 to colored enamels because of its poor color retention.

Dyal XAR-C9 may be formulated into air dry and low bake finishes that will conform to any type of high speed production line schedules which may be required for the following applications:

1. General Industrial Air Dry and Baking Enamels
2. Metal Primers
3. Truck Finishes
4. Metal Cabinets
5. Toy Enamels
6. Drum Enamels

Reactive pigments should be handled with extreme care when used with Dyal XAR-C9. The more reactive pigments should be ground in Dyal XAC-76 and let down with Dyal XAR-C9. Grinding should be done in ball or pebble mills.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	12
Volatile	50% Xylol	Acid Value	20
Lbs. per gal.	8.25	Phthalic Anhydride	30%
Viscosity	U - V	Oil	28%
Aliphatic Solv. Tol.	100% to 200%	Type Oil	Drying
Solids at E to G Vis.	40%	Resin Modifiers	Phenolic

0007-PMC-000000809

FILM AND PERFORMANCE PROPERTIES

Color	fair	Compatibility with:	
Color Retention	poor	Pigments	fair
Gloss	excellent	Nitrocellulose	fair
Gloss Retention	excellent	Alkyds	long medium short poor fair fair
Type of Film	short, hard, tough		
Resistance to:		Varnish	long medium short poor fair fair
Abrasion	good	Oils	poor
Acids	excellent	Bodied Oils	poor
Alkali	good		
Oil & Gasoline	excellent		
Water	excellent		
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake
Air Dry—Set	5 min.	Lead	0.2% to 0.5%	0.02%
Air Dry—Hard	90 to 180 min.	Manganese	0.02% to 0.04%	0.01%
Bake	5 min. at 300°F. to 30 min. at 200°F.	Cobalt	0.03% to 0.05%	0.01%

SUGGESTED FORMULATIONS

Gray Baking Primer			Blue Equipment Enamel		
Lbs.	Gals.		Lbs.	Gals.	
285.0	8.9	Anatase Ti O ₂ **	53.0	3.5	C P Milori Blue 11086
190.0	5.4	Ti Barium	30.0	1.0	Ti Cal, Rutile, N. C.
135.0	6.1	Whiting	4.0	0.3	Soya Lecithin
4.0	0.4	Aluminum Stearate	206.0	25.0	Dyal XAR-C9
4.0	0.4	Lampblack	16.0	1.7	24% Pb Naphthenate
314.0	38.0	Dyal XAR-C9	6.5	1.0	Anti Skin Agent
115.0	16.0	Xylol	57.0	8.0	Xylol
0.8	0.1	Anti Skin Agent	380.0	46.0	Dyal XAR-C9
129.0	18.0	Dyal XAR-C9	100.0	14.0	Xylol
6.0	0.6	6% Mn Naphthenate	7.0	1.0	6% Mn Naphthenate
2.5	0.3	6% Co Naphthenate	7.0	1.0	6% Co Naphthenate
65.0	9.0	Xylol	866.5	103.5	
1148.3	103.2				

**Oil Absorption 26 to 27
This primer to be force dried 30 min. at 120°F.
Grind Ball Mill — 4 Hegman
Viscosity — 60" to 80" No. 4 Ford Cup
Wt. per gal. — 11.10

Viscosity — No. 4 Ford Cup — 90" to 115"
Wt. per gal. — 8.37
Grind Ball Mill — 6 Hegman
Reduction for Spray — 25% VM&P
Bake — 3 to 5 Min. at 300°F.

DYAL XAR-C11

TYPE: Medium Length Soya Resin Modified Alkyd

OUTSTANDING FEATURES:

Compatibility, High Solids, Low Cost

Dyal XAR-C11 is a resin modified alkyd that was developed for use as a flushing or grinding vehicle. Its success in that usage has been due to its wide range of vehicle and pigment compatibility, good drying properties and minimum effect on the drying of medium and short oil alkyds. The high non-volatile content of this vehicle increases its general utility and permits formulation of bases with a broad range of usage. Bases prepared with Dyal XAR-C11 may be used in air dry or bake applications.

Dyal XAR-C11 is resin modified and therefore it is not recommended for use as a base vehicle for white enamels. However, this soya oil alkyd will give satisfactory color retention when used in tinting colors to make pastel finishes from white bases.

The usual precaution of adding the proper anti-oxidants to bases made with this alkyd should be taken in order to insure stability and prevent skinning. The only anti-oxidant that is presently recommended for use with Dyal XAR-C11 is methyl ethyl ketoxime, which should be used in concentration of from 0.02% to 0.04% based on the vehicle solids.

SPECIFICATIONS

Non Volatile _____	90%	Color (max.) _____	12
Volatile _____	10% M. S.	Acid Value _____	10
Lbs. per gal. _____	8.37	Phthalic Anhydride _____	Present
Viscosity _____	Z to Z ₂	Oil _____	54%
Aliphatic Solv. Tol. _____	Infinite	Type Oil _____	Soya
Solids at E to G Vis. _____	70%	Resin Modifiers _____	Present

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	excellent
Gloss	good	Nitrocellulose	limited
Gloss Retention	excellent	Alkyds { long	excellent
Type of Film	tough, hard, flexible	{ medium	excellent
		{ short	good
Resistance to:		Varnish { long	excellent
Abrasion	good	{ medium	excellent
Acids	good	{ short	good
Alkali	good	Oils	excellent
Oil & Gasoline	good	Bodied Oils	good
Water	excellent		
Weather	excellent		

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake
Air Dry—Set	1½ hours	Lead	0.3% to 0.6%	0.2%
Air Dry—Hard	6 to 8 hours	Manganese	0.0% to 0.06%	0.2%
Bake	240°F. to 260°F.	Cobalt	0.03% to 0.06%	0.2%
	60 min. to 90 min.	Calcium*	0.3% to 0.6%	none
		*to replace lead		

SUGGESTED FORMULATIONS

Toluidine Red Enamel		
Lbs.	Gals.	
63.8	5.5	Toluidine Red 10451
47.9	5.7	Dyal XAR-C11
28.0	4.3	Mineral Spirits**
500.0	66.0	Dyal XAC-I***
110.0	17.0	Mineral Spirits
21.3	3.0	Dipentene
14.5	1.5	24% Pb Naphthenate
8.0	1.0	6% Co Naphthenate
1.0	0.1	Anti Skin Agent
794.5	104.1	

**Base Formulation

***Base Let Down

Viscosity — Stormer K. U. — 68

Lbs. per gal. — 7.80

Chrome Yellow Enamel		
Lbs.	Gals.	
239.4	5.5	C P Chrome Yellow 12147
54.2	6.5	Dyal XAR-C11
22.2	3.4	Mineral Spirits**
495.0	66.0	Dyal XMD-6***
104.0	16.0	Mineral Spirits
21.3	3.0	Dipentene
9.6	1.0	24% Pb Naphthenate
4.0	0.5	6% Co Naphthenate
1.0	0.1	Anti Skin Agent
950.7	102.0	

**Base Formulations

***Base Let Down

Viscosity — Stormer K. U. — 69

Lbs. per gal. — 9.30

TYPE: Styrenated Alkyd**OUTSTANDING FEATURES:****Fast Set, Rapid Thru Dry, Color Retention,
Excellent Durability, Excellent Stability**

Dyal XAS-4 is a styrene modified alkyd that is fast setting and dries rapidly to give films that possess excellent durability, hardness, gloss, color, and color retention. Finishes made with Dyal XAS-4 have good stability and may be used for spray or dip applications which may be air dried, force dried or baked. Air dried and baked films of Dyal XAS-4 finishes are tough and show good adhesion over metal, paper and wood.

Styrenated alkyds inherently show poor solvent resistance and present a problem in recoatability. Air dried finishes made with Dyal XAS-4 may be recoated in 30 to 120 minutes but not after that until 48 hours have elapsed. After 48 hours films of Dyal XAS-4 show reasonably good gasoline resistance.

Dyal XAS-4 has proven to be very useful in the preparation of enamels to meet the requirements of Specification MIL-E-10689. Dyal XAS-4 is recommended for use as a grinding and let down vehicle in enamels covered by this specification. This greatly simplifies formulation, vehicle handling and vehicle inventories. Dyal XAS-4 is also recommended for the following usage:

1. Metal and Wood Cabinet Enamels
2. One Coat Hammer Finishes
3. Implement Enamels
4. Toy Enamels
5. Furniture Clears

Highly reactive pigments, especially Zinc Oxide, should not be used in enamels made with Dyal XAS-4. Pigments may be ground in Dyal XAS-4 by any of the usual methods. Small amounts of pine oil and soya lecithin will improve the pigment wetting characteristics of this vehicle.

The recommended drier combination will give good mill and package stability. Dip tank and package stability may be improved by the addition of a small percentage of the usual anti-oxidants.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	8
Volatile	50% Xylol	Acid Value	10 - 20
Lbs. per gal.	7.99 — 8.09	Phthalic Anhydride	Present
Viscosity	O - R	Oil	32%
Aliphatic Solv. Tol.	200%	Type Oil	Drying
Solids at E to G Vis.	40%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	excellent	Pigments	good
Gloss	excellent	Nitrocellulose	poor
Gloss Retention	excellent	Alkyds	long medium short none none fair
Type of Film	hard, tough		
Resistance to:			
Abrasion	good		
Acids	good	Varnish	long medium short none none fair
Alkali	good		
Oil & Gasoline	good	Oils	fair
Water	excellent	Bodied Oils	none
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	5 to 15 min.	Lead	Air Dry	Bake
Air Dry—Hard	90 min.	Manganese*	0.2% to 0.4%	none
Bake	15 to 30 min. at 300°F.	Cobalt	0.02% to 0.04%	0.03%
			0.02% to 0.04%	none

*Manganese is not absolutely necessary however, it will enhance drying.

SUGGESTED FORMULATIONS

White Cabinet Enamel			Green Hammered Effect Enamel		
Lbs.	Gals.		Lbs.	Gals.	
165	4.7	Titanium Calcium	20	1.70	Non Leafing Aluminum
115	3.8	Ti O ₂	9	0.80	Flushed Solfast Green
1	0.1	Soya Lecithin			FL-346
161	20.1	Dyal XAS-4	32	4.00	Dyal XAS-4
8	1.0	Pine Oil	607	75.50	Dyal XAS-4
58	8.0	Xylol**	7	1.00	Heavy Mineral Oil
372	46.0	Dyal XAS-4	2	0.25	Silicone Solution
65	9.0	Xylol	58	8.00	Xylol
56	9.0	C-8 Naphtha	50	8.00	C-8 Naphtha
1	0.1	Guaiacol	5	0.65	6% Co Naphthenate
4	0.4	24% Pb Naphthenate	1	0.10	Guaiacol
3	0.4	6% Co Naphthenate	791	100.00	
1019	103.5				

**For Roller Mill grinds add this solution in let down
 Viscosity No. 4 Ford — 49 seconds
 Air Dry — Hard — 30 to 35 min.
 Gloss Photocell — 89
 Wt. per gal — 9.87

Mix all materials above line until smooth paste is obtained. Then let down with the remainder of the materials. Strain.
 Wt. per gal. — 7.90
 Air Dry, Force Dry, or Bake
 Spray Full Body

TYPE: Styrenated Alkyd

OUTSTANDING FEATURES:

Low Cost, Recoatability, Gasoline Resistance, Fast Set, Rapid Thru-Dry

Dyal XAS-8 is a lower cost version of Dyal XAS-4 which possesses most of the desirable characteristics of the latter. In addition, Dyal XAS-8 offers greatly improved gasoline resistance.

Gasoline resistance, which is of major importance in specifications, was investigated thru a series of tests that conformed to specification TT-P-141A. These tests revealed Dyal XAS-8 to have gasoline resistance equivalent to, or better than, other more expensive styrenated alkyds. It also compared very favorably against a vinyl-toluene type vehicle. Clear and pigmented films of Dyal XAS-8 have shown excellent gasoline resistance after only 7 hours of air-dry time.

Enamels made with Dyal XAS-8 were recoated after 1, 2, 4, 8 and 16 hours air-dry time without effect on gloss or lifting of the film. This vehicle is manufactured in a way which gives a product essentially free of monomeric or dimeric styrene, which accounts for the excellent recoating properties.

Dyal XAS-8, like Dyal XAS-4, possesses excellent stability with or without driers. Therefore, it can be used in spray, dip or flow-coat applications. Maintenance of dip tanks when using fast-setting Dyal XAS-8 requires only normal amounts of anti-oxidants along with the regular replacement of lost solvent.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	9
Volatile	20% VM&P, 30% Xylol	Acid Value	10-20
Lbs. per gal.	7.80	Phthalic Anhydride	Present
Viscosity	T - W	Oil	32%
Aliphatic Solv. Tol.	50%	Type Oil	Drying
Solids at E to G Vis.	38%	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	good	Pigments	good
Gloss	good	Nitrocellulose	poor
Gloss Retention	good	Alkyds	long medium short poor poor. fair
Type of Film (air dry)	hard, short		
Type of Film (bake)	hard, tough		
Resistance to:			
Abrasion	good		
Acids	excellent	Varnish	long medium short poor poor poor
Alkali	good	Oils	fair
Oil & Gasoline	excellent	Bodied Oils	none
Water	excellent		
Weather	good		

DRYING AND DRIER RECOMMENDATIONS

		Air Dry	Bake
Air Dry—Set	5 to 10 min.	Lead 0.2% to 0.4%	none
Air Dry—Hard	1½ to 1¾ hours	Manganese* 0.02% to 0.04%	0.03%
Bake	15 to 30 min. at 250-275°F	Cobalt 0.02% to 0.04%	none

*Manganese is optional, however it will enhance drying somewhat.

SUGGESTED FORMULATIONS

Green Implement Enamel			White Enamel		
Lbs.	Gals.		Lbs.	Gals.	
58.0	1.38	Chrome Green Light	165.0	4.7	Titanium Calcium
58.0	1.38	Chrome Green, Extra Lt.	115.0	3.8	TiO ₂
3.0	0.30	Soya Lecithin	1.0	0.1	Soya Lecithin
5.0	0.65	6% Mn Naphthenate	156.0	20.0	Dyal XAS-8
42.0	6.00	Xylol	8.0	1.0	Pine Oil
Grind 6 hours or to 6H			58.0	8.0	Xylol**
Add and Grind 15 minutes			360.0	46.0	Dyal XAS-8
65.0	8.00	Dyal XAS-8	65.0	9.0	Xylol
520.0	65.00	Dyal XAS-8	56.0	9.0	C-8 Naphtha
10.0	1.50	17% Sol'n. A.S.A.	1.0	0.1	A.S.A.
5.0	0.60	6% Co Naphthenate	4.0	0.4	24% Pb Naphthenate
137.0	19.25	Xylol	3.0	0.4	6% Co Naphthenate
903.0	104.06		1002.0	103.5	
Wt./gal. — 8.68			Wt./gal. — 9.70		
Viscosity — 50" on #4 Ford			Viscosity — 45" on #4 Ford		
Ball Mill — 7 hours			Grind — 6H		
Grind — 6H			**For roller mill grinds add this solvent in let-down.		
Reduce 30% in Xylol for spraying					

DYAL XMD

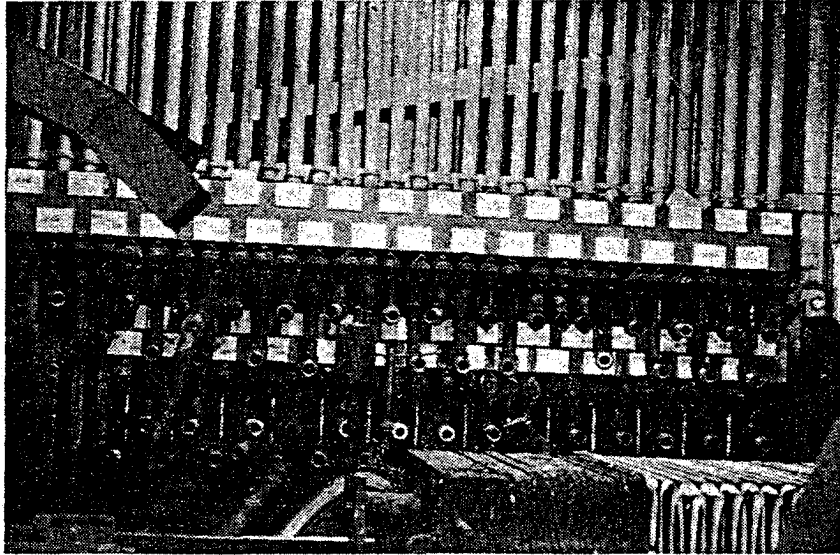
The DYAL XMD classification includes varnishes or solutions based on maleic or fumaric treated resins.

XMD - XOR

DYAL XOR

The DYAL XOR classification is a miscellaneous group of drying and non-drying types of oleo-resinous combinations.

XMD - XOR



This view shows pipelines leading from the filter presses to the alkyd storage tanks. The filtering of Sherwin-Williams Dyal Resins through plate and frame presses assures maximum clarity and freedom from minute suspended particles.

TYPE: Short Oil Mixing Varnish**OUTSTANDING FEATURES: Low Cost, Stability, Gloss, Adhesion**

Dyal XMD-1 has wide application as a mixing varnish in formulating low cost finishes of many types. Although air dried or baked films of XMD-1 tend to be brittle, similar films, when modified with medium and long oil alkyds, oleoresinous varnishes and blown or heat bodied oils, display good hardness, high gloss, good toughness and good adhesion. The overall material cost of these finishes would be difficult to duplicate with any other vehicle system.

The formulator of low cost finishes will find the use of XMD-1 a convenient way to meet exacting competition, keeping in mind the following points:

1. The degree of modification of XMD-1 should be governed by the performance desired.
2. XMD-1 is reactive with basic pigments.
3. Superior pigment dispersions are usually obtained when the fortifying alkyd or oil is used as the grinding vehicle or as a portion of the grinding vehicle.
4. Lead driers produce excellent film hardness with XMD-1, but excessive quantities promote viscosity. Because of this fact, only nominal amounts of lead should be used. Any tendency towards after bodying can then be satisfactorily controlled by the fortifying oil or alkyd, guaiacol and National Aniline's ASA.
5. Improved gloss may often be obtained when 2 per cent to 4 per cent zinc resinate is incorporated.

Examples of low cost finishes formulated from XMD-1 are as follows:

1. Drum Enamels
2. Chassis Enamels
3. Freight Car Paints
4. Syndicate Enamels (Colors)
5. Toy Enamels

PHYSICAL CHARACTERISTICS

Non-Volatile	50%	Color	13 Maximum
Volatile	Mineral Spirits	Acid Value	15-25
Pounds Per Gallon.....	7.50	Phthalic Anhydride	None
Viscosity	Q-R	Oil Length	48%
Solids at E to G Viscosity.....	43%	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

Color	Fair
Color Retention	Good
Gloss	Excellent
Gloss Retention	Excellent
Type of Film.....	Hard, Brittle, except when modified

Resistance to:

Abrasion	Good
Acids	Fair
Alkali	Fair
Oil and Gasoline.....	Good
Water	Excellent
Weather	Fair

Pigment Wetting and Dispersing Properties	Excellent
Compatibility with:	
Long Alkyds	Excellent
Medium Alkyds	Good
Short Alkyds	Poor
Long Varnishes	Fair
Medium Varnishes	Excellent
Oils	Good
Bodied Oils	Fair

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set.....	3 Hours	Driers	Air Dry	Bake
Air Dry—Hard	Overnight	Lead	0.3 to 0.6%	Same
Bake.....	250° F. to 275° F. for 1 hour depending on type of modification	Manganese	0.02 to 0.05%	Same
		Cobalt	0.04 to 0.07%	0.01 to 0.06%

Note: The quantity and type of driers to be used with Dyal XMD-1 is greatly influenced by the quantity and type of modifying resin. However, in general, the above ranges, expressed as per cent metal on the resin solids basis, are representative of common usage.

SUGGESTED FORMULATIONS

Red-Brown Freight Car Paint			
Lbs.	Gals.		
80	2.1	Red Oxide NR4284	
80	2.0	Syn. Red Oxide, C1548	
8	0.1	Litharge	
62	8.0	Blown Fish Oil	
4	0.5	Soya Lecithin	
143	19	Dyal XMD-1	
23	3	Lead Naphthenate, 10%	
Ball Mill Grind to 5-H			
119	14	Dyal XMD-1	
96	12.5	Blown Fish Oil	
37	5	Ht. Bodied Linseed Oil (Reduced—65% NVM)	
14	2	Mang. Naphthenate, 2%	
14	2	Cobalt Naphthenate, 2%	
72	11	Mineral Spirits	
88	14	VM&P Naphtha	
Lbs. Per Gallon.....8.61			
Grind.....5H Ball Mill			
Viscosity60-72" on # 4 Ford Cup			
Drying.....1 to 2 hours—touch			
3 to 5 hours—handle			
1 to 4 hours—recoat			

Black Baking Enamel			
Lbs.	Gals.		
20	1.4	Channel Black L.C. Beads	
2	0.2	Aluminum Stearate	
2	0.25	Soya Lecithin	
10	1	Lead Naphthenate, 24%	
7	1	Guaiacol Solution	
74	10	Dyal XAC-4	
37	6	VM&P Naphtha	
39	6	Mineral Spirits	
450 60 Dyal XMD-1			
14	2	Mang. Naphthenate, 2%	
74	12	VM&P Naphtha	
14	2	Toluene	
Lbs. Per Gallon.....7.31			
Grind.....7H Ball Mill			
Viscosity30"-40" on #4 Ford Cup			
Baking Schedule.....10' @ 300° F.			

TYPE: Short Length Resin Modified Mixing Vehicle**OUTSTANDING FEATURES:****Gloss, Gloss Retention, Low Cost**

This vehicle can find a wide variety of uses in the Trade Sales or Industrial Finishes line giving a very low vehicle cost. These finishes, when properly formulated, may be air dried or baked, brushed, sprayed, or dipped. Dyal XMD-6 will give exceptional exterior durability in comparison to oleoresinous varnishes in the same cost range. It is reactive with zinc oxide and to some extent with carbon blacks.

In many applications Dyal XMD-6 may be used to give quality performance at low cost and may also be used in conjunction with other vehicles, like Dyal XAC-93 and Dyal XAC-1, to lower cost without affecting the quality. Anti-oxidants such as guaiacol and anti skin agent are suggested when especially good stability in partly-filled containers and dip tanks is required. The stability is a matter of proper balance between driers, anti-oxidants and pigments.

For Industrial Finishes applied by spray or dip where faster setting and increased build are requirements Dyal XMD-18 is recommended. Dyal XMD-18 contains the same resin solids as Dyal XMD-6 reduced in VM&P naphtha. The viscosity of Dyal XMD-18 is slightly less than that of XMD-6. In all other respects it is equal to Dyal XMD-6.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	11
Volatile	50% M. S.	Acid Value	20 - 26
Lbs. per gal.	7.50	Phthalic Anhydride	None
Viscosity	R - T	Oil	47.5
Aliphatic Solv. Tol.	1500%	Type Oil	Soya
Solids at E to G Vis.	44%	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

		Compatibility with:		
Color	good	Pigments	fair	
Color Retention	good	Nitrocellulose	fair	
Gloss	excellent	Alkyds {	excellent	
Gloss Retention	excellent		medium	excellent
Type of Film	hard, short		short	fair
Resistance to:				
Abrasion	good	Varnish {	excellent	
Acids	fair		medium	excellent
Alkali	fair		short	fair
Oil & Gasoline	good	Oils	excellent	
Water	excellent	Bodied Oils	fair	
Weather	fair			

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake
Air Dry—Set	2½ to 3 hours	Lead	0.3% to 0.8%	0.5%
Air Dry—Hard	4½ to 5½ hours	Manganese	0.01% to 0.08%	0.03%
Bake	250°F. to 275°F. for 1 hour	Cobalt	0.06% to 0.08%	0.03%

SUGGESTED FORMULATIONS

Industrial White Enamel			Red and Brown Freight Car Paint (Quick Dry)		
Lbs.	Gals.		Lbs.	Gals.	
240	7.5	Anatase Ti O ₂ *	165	4.6	Iron Oxide (85% Fe ₂ O ₃)
2	0.2	Aluminum Stearate	10	0.1	Litharge
113	15.0	Dyal XMD-6	6	0.6	Aluminum Stearate
19	3.0	Mineral Spirits	96	12.0	Heavy Blown Fish Oil
262	35.0	Dyal XMD-6	46	7.0	Mineral Spirits
198	26.0	Dyal XAC-99	240	32.0	Dyal XMD-6
39	5.0	60% Ester Gum Sol'n.	60	7.5	Bodied Linseed Oil
65	10.0	Mineral Spirits	149	23.0	Mineral Spirits
7	0.7	24% Pb Naphthenate	88	14.0	VM&P Naphtha
4	0.5	6% Co Naphthenate	10	1.0	24% Pb Naphthenate
2	0.2	Anti Skin Agent	6	0.8	6% Co Naphthenate
941	103.1		6	0.8	6% Mn Naphthenate
			882	103.4	

*Oil Absorption 24 to 25
 Viscosity No. 4 Ford Cup — 85" to 95"
 Lbs. per gal. — 9.23
 Brushing — Reduce with Kerosene — 5%
 Dipping or Spraying — Reduce with
 VM&P — 15% to 25%

Viscosity No. 4 Ford Cup — 95" to 105"
 Lbs. per gal. — 8.53
 Brushing — Reduce with M.S. — 3% to 7%
 Spraying — Reduce slightly with VM&P

TYPE: Short Length Resin Modified Mixing Vehicle**OUTSTANDING FEATURES:****Low Cost**

Dyal XMD-165 is a low cost vehicle developed for use in syndicate type enamels. It possesses good color and dry for this particular type of vehicle. Films produced by XMD-165 are high in gloss, gloss retentive and maintain a fair degree of flexibility. This vehicle is compatible with long oil alkyds and may be extended in this way to improve flexibility and durability.

This type vehicle has been proving itself highly satisfactory in the following type of finishes:

1. Implement Enamels
2. Drum Enamels
3. Freight Car Paints
4. Toy Enamels

It is suggested that reactive type pigments should be avoided when using Dyal XMD-165. Also, it is recommended that with the given drier combinations 0.2% of Anti-Skin Agent based on the resin solids should be employed.

SPECIFICATIONS

Non Volatile	50%	Color (max.)	11
Volatile	50% M. S.	Acid Value	10 to 20
Lbs. per gal.	7.45	Phthalic Anhydride	None
Viscosity	Q - S	Oil	54%
Aliphatic Solv. Tol.	Infinite	Type Oil	Drying
Solids at E to G Vis.	42.5	Resin Modifiers	Present

FILM AND PERFORMANCE PROPERTIES

Color	good	Compatibility with:	
Color Retention	fair	Pigments	good
Gloss	fair	Nitrocellulose	none
Gloss Retention	good	Alkyds	{ long good medium fair short poor
Type of Film	hard, slightly brittle		
Resistance to:			
Abrasion	good	Varnish	{ long good medium fair short poor
Acids	fair	Oils	good
Alkali	fair	Bodied Oils	- good
Oil & Gasoline	good		
Water	good		
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

			Air Dry	Bake
Air Dry—Set	4 to 5 hours	Lead	0.5% to 0.7%	0.3%
Air Dry—Hard	12 to 16 hours	Manganese	0.02% to 0.04%	0.01%
Bake	250°F. to 275°F. for 60 min.	Cobalt	0.05% to 0.08%	0.03%
		Zinc	none	0.01%

SUGGESTED FORMULATIONS

Black Drum Enamel			Interior Ivory Ceiling Paint		
Lbs.	Gals.		Lbs.	Gals.	
27.0	1.85	Carbon Black	500.0	18.4	Titanium Calcium
592.5	79.0	Dyal XMD-165	3.0	.35	Calcium Stearate
52.0	8.0	Mineral Spirits	150.0	20.0	Mixing Varnish — Med. Length (Soya Rosin Ester)
9.4	1.25	24% Pb Naphthenate			
3.5	0.5	6% Mn Naphthenate	44.0	6.0	Dyal XMD-165
50.0	8.0	VM&P Naphtha	246.0	33.0	Dyal XMD-165
3.0	0.42	6% Co Naphthenate	79.0	10.0	Non-Break Linseed Oil
737.4	99.0		40.0	5.0	Heat-Bodied Linseed Oil
			9.6	1.0	24% Pb Naphthenate
			4.7	0.7	6% Co Naphthenate
			2.3	0.33	6% Mn Naphthenate
			26.0	4.0	Mineral Spirits
			1104.6	98.7	
					Viscosity No. 4 Ford Cup — 80" to 120"
					Wt. per gal. — 11.10

TYPE: Modified Silicone Resin Solution**OUTSTANDING FEATURES:****Heat Resistance, Flexibility, Adhesion**

Dyal XOR-6 is a modified silicone resin solution developed specifically for use in "heat resisting finishes." The use of Dyal XOR-6 permits formulation of this type of finish at lower cost than is obtained with the use of unmodified silicone resins.

Dyal XOR-6 enamels approach the performance of ceramic finishes to the same degree as the much more expensive straight silicone finishes. Results of evaluations of finishes made with Dyal XOR-6 indicate that Dyal XOR-6 will replace the higher cost, straight silicone resins and ceramic finishes for many applications.—

SPECIFICATIONS

Non Volatile	59 to 61%	Color	4 max.
Volatile	H. S. Naptha & MIBK	Acid Value on NVM.....	14 to 20
Wt./gal.	8.95	Viscosity.....	O to Q

Specific advantages of enamels made with Dyal XOR-6 modified silicone resin solution are as follows:

(1) Appearance

- A. High gloss—87 to 90 on 60° photovoltmeter.
- B. Porcelain-like appearance.
- C. Excellent mar resistance (slick silicone feel).

(2) Color Retention

- A. Exposed to 400°F temperature for 16 hrs. without change.
- B. Extended tests at 400°F for 400 hrs. show only slight color change.

(3) Gloss Retention

- A. Exposure at 400°F temperature for 16 hrs. without a drop in gloss.
- B. Extended heat tests show maximum of a 20% drop in gloss reading after 160 hrs. at 400°F with no further drop after 160 hrs. up to 400 hrs. at this temperature.

(4) Flexibility and Adhesion

- A. 120 inch pounds on phosphatized metal or double this on solvent cleaned metal.
- B. No cracking over 1/8 in. conical mandrel.
- C. No loss in flexibility or adhesion after exposures up to 400 hrs. at 400°F.

(5) Grease Resistance

- A. 10 cycle immersion at one minute intervals in and out of grease at 500°F—almost equal to straight silicone finish.
- B. Immersion in grease at 500°F for 5 minutes—equal to straight silicone finish.

(6) Weathering

- A. Excellent weathering properties—which indicate permissible use as replacement for ceramics for outdoor signs and dispensers.

(7) Stain Resistance

A. Not affected by common household foodstuffs and reagents.

(8) Chemical Resistance

A. Not affected by 1% NaOH solution or 5% HCl after 24 hrs. at room temperatures. Salt Spray—20% NaCl at 95°F for 200 hrs. with no rust creepage.

(9) Humidity Resistance

A. Over phosphatized steel with a 30 min. at 400°F curing cycle—up to 1000 hrs.

B. Over phosphatized steel with a 30 min. at 500°F curing cycle—over 1500 hrs.

To attain the maximum performance from finishes prepared with Dyal XOR-6, a few precautions must be observed:

1. *The metal surface to be finished must be clean, that is, properly solvent cleaned, or must be clean and phosphate treated.*
2. *Manufacturing and application equipment must be clean.*
3. *Most important of all—a proper baking cycle for the applied film is required. The baking cycle should be at least 30 min. at 400°F, wherein the metal is maintained at 400°F metal temperature throughout the schedule.*

Pigmentation of this vehicle is limited to those pigments able to withstand the high curing cycle. Pigments should also be alkali and lead free to insure maximum storage stability. Dispersion on roller mill is recommended, however, pebble milling is permissible. In either case, the mill should be clean and free from alkali or lead contamination.

Enamels prepared on a production scale with titanium dioxide pigmentation have shown excellent storage stability requiring no stabilizing agents. Dyal XOR-6 enamels do not require the use of a curing catalyst or driers.

The compatability of Dyal XOR-6 with common film forming materials is very limited. Contamination with other film forming materials will detract from the inherent exceptional performance of this vehicle in heat resisting type finishes.

SUGGESTED FORMULATIONS

Heat Resisting White Enamel

Lbs.	Gals.	
300.0	8.6	TiO ₂ Rutile
144.0	16.0	Dyal XOR-6
549.0	61.0	Dyal XOR-6
97.0	13.5	Toluol
25.0	4.0	C-8 Naphtha

1115.0 103.1

Roller Mill Grind—7 Hegman
Reduced viscosity—18 to 20 sec. #4 Ford
NVM—60%
Reduce—20% with Toluol for spraying
Wt./gal.—10.82
Output—100 gals.
Bake at 400°F—30 min.

Heat Resisting Aluminum Paint

Lbs.	Gals.	
175.0	14.25	Al. Lining Paste E.F.
225.0	25.25	Dyal XOR-6
448.0	62.50	Xylol

848.0 102.00

Blend in Clean Agitator Tank
Wt./gal.—8.30
Viscosity—10 to 12 sec. #4 Ford
NVM—29%
No reduction for spray application
Bake at 400°F—30 min.

TYPE:**Modified Ether Resin Solution****OUTSTANDING FEATURES:****Chemical Resistance, Stain Resistance, Color Retention, Adhesion**

Dyal XOR-31 is a modified ether resin solution which was developed for use in highest quality baking finishes. Baking finishes made with Dyal XOR-31 will exhibit exceptional stain resistance and outstanding chemical resistance. This modified ether resin will also give films that possess excellent adhesion, excellent color retention, excellent gloss and build. The outstanding stain and chemical resistance of Dyal XOR-31 greatly surpasses that of the very best alkyd resins. Dyal XOR-31 may be formulated to utilize these properties to full advantages for use in the following:

1. Appliance Finishes
2. Metal Decorating
3. Specification Finishes
4. Metal Primers
5. Toy Enamels
6. Electrical Wire Enamels

Dyal XOR-31 may be used for air drying finishes with conventional driers; however, air drying does not properly cure this resin. Therefore, the full benefits of the vehicle will not be realized unless it is used in a baking finish.

Baking finishes made from Dyal XOR-31 may be formulated with or without amine resins. Amine modification results in completely cured films that offer the utmost in performance. It is recommended that 15% to 30% of the total resin solids be amine resin. Finishes made with Dyal XOR-31 may be sprayed or dipped. The baking schedule should fall within the following limits: 20 to 40 minutes at 275° F. to 325° F.

SPECIFICATIONS

Non Volatile	50%	Solids at E to G Vis.....	40%
Volatile	50% Xylol	Color (max.)	6
Lbs. per gal.....	7.98	Acid Value	4
Viscosity	S - W	Phthalic Anhydride	None
Aliphatic Solv. Tol.....	Poor	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	good
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	{ long medium short
Type of Film	tough, hard, flexible		none
Resistance to:			
Abrasion	excellent		
Acids	excellent +	Varnish	{ long medium short
Alkali	excellent +		none
Oil & Gasoline	excellent		none
Water	excellent	Oils	none
Weather	fair	Bodied Oils	none

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	not recommended	Bake*	
Air Dry—Hard	not recommended	Lead	none
Bake	275°F. to 325°F. for 20 to 40 min.	Manganese	0.02% to 0.04%
		Cobalt	none
		Calcium	none
		Zinc	none
		*when amines are not used	

SUGGESTED FORMULATIONS

Appliance White Baking Enamel			Aluminum Baking Enamel		
Lbs.	Gals.		Lbs.	Gals.	
285.0	8.15	Titanium Dioxide-Rutile	113.0	10.12	400 Mesh Aluminum
15.0	0.32	Zinc Oxide (Lead Free)**			Paste
489.0	61.00	Dyal XOR-31	444.0	55.62	Dyal XOR-31
167.0	19.50	Urea Formaldehyde Sol.	252.0	35.25	Xylol
70.0	10.00	Xylol	809.0	100.99	
27.0	4.00	Ethyl Alcohol**			
1053.0	102.97				
**For Package Stability			Cold Blend in order shown		
Grind — 6 to 7 Hegman — Roller Mill			Viscosity No. 4 Ford Cup — 26"		
Lbs. per gal. — 10.22			Lbs. per gal. — 8.09		
Bake — 300°F. for 30 min.			Bake — 300°F. for 30 min.		
			NVM — 35.9%		

TYPE: Modified Ether Resin Solution

OUTSTANDING FEATURES:

Stain Resistance, Chemical Resistance, Color Retention, Adhesion, Flexibility

Dyal XOR-34 is a modified ether resin solution which is similar to Dyal XOR-31 in such important properties as flexibility, adhesion and stain resistance. Dyal XOR-34 differs from Dyal XOR-31 in that the former has been modified to lower the cost. In lowering the cost it was necessary to sacrifice a slight degree of chemical and stain resistance; however, Dyal XOR-34 still retains a major share of the excellent chemical and stain resistance inherent in an ether resin, and it is to be recommended as far superior to the average alkyd in chemical and stain resistance.

Dyal XOR-34 has a further advantage over Dyal XOR-31 in that the full benefits of Dyal XOR-34 may be obtained by means of an air dry finish; thus it is a vehicle with a broad range of applications.

To summarize: Dyal XOR-31 is suggested for the ultimate in chemical and stain resistance where the finish can be baked, and Dyal XOR-34 is suggested where a lower cost finish or an air dry finish is desired.

Among the finishes for which Dyal XOR-34 may be used are:

1. Appliance Finishes
2. Metal Decorating Finishes
3. Specification Finishes
4. Metal Primers
5. Toy Enamels
6. Machine Enamels
7. Baked Aluminum Enamels
8. Furniture Clears

SPECIFICATIONS

Non Volatile	50%	Solids at E to G Vis.....	40%
Volatile	50% Xylol	Color (max.)	6
Lbs. per gal.....	7.98	Acid Value	3
Viscosity	T - X	Phthalic Anhydride	None
Aliphatic Solv. Tol.....	Poor	Resin Modifiers	None

FILM AND PERFORMANCE PROPERTIES

Color	excellent	Compatibility with:	
Color Retention	excellent	Pigments	good
Gloss	excellent	Nitrocellulose	none
Gloss Retention	excellent	Alkyds	long
Type of Film	tough, hard, flexible		medium
			short
Resistance to:			
Abrasion	excellent	Varnish	long
Acids	excellent		medium
Alkali	excellent		short
Oil & Gasoline	excellent	Oils	none
Water	excellent	Bodied Oils	none
Weather	fair		

DRYING AND DRIER RECOMMENDATIONS

Air Dry—Set	2 hours	Lead	Air Dry	Bake*
Air Dry—Hard	6 hours	Manganese	0.5%	none
Bake	275°F. to 325°F. for	Cobalt	0.05%	0.03%
	20 min. to 40 min.	Calcium	0.05%	none
		Zinc	none	none
			0.02%	none
		*When used without Amine		

SUGGESTED FORMULATIONS

See suggested formulations for Dyal XOR-31. These same formulations may be used with Dyal XOR-34 with only minor adjustments.

DYAL XPL

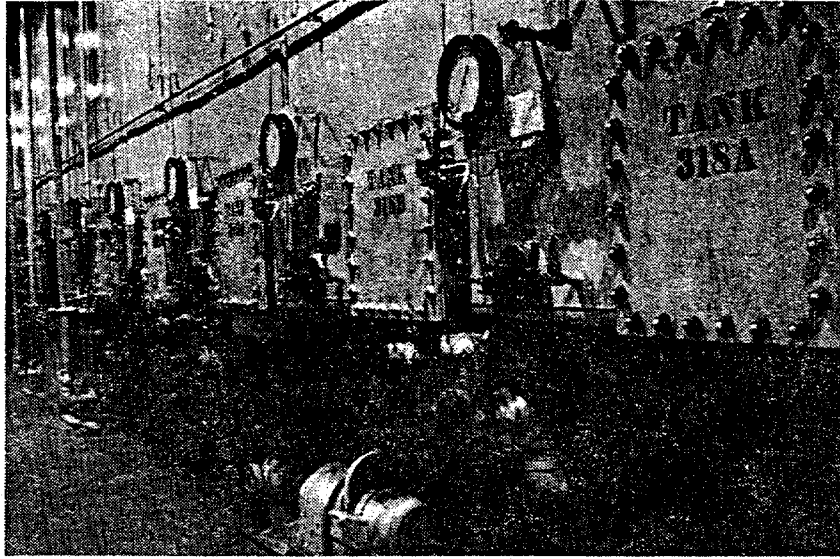
The DYAL XPL resins are used as plasticizers.

DYAL XRE

The DYAL XRE resins are for use in emulsion type coatings.

XPL - XRE

XPL - XRE



A partial view of modern alkyd resin storage tanks with capacity large enough to assure uniformity and adequate supply for consumer demand.

0007-PMC-000000832

TYPE: Alkyd Lacquer Plasticizer

OUTSTANDING FEATURES:

Retained Flexibility, Alcohol Solubility, Low Cost

Dyal XPL-5 is a castor oil modified alkyd that has been found to be extremely useful as a lacquer plasticizer.

Dyal XPL-5 exhibits good alcohol solubility, excellent flexibility, good durability, good adhesion, excellent color and color retention when used in lacquer for applications on paper, fabric, wood, or metal. The most outstanding characteristic of this plasticizer is its excellent flexibility which remains unchanged after aging because Dyal XPL-5 will not volatilize, oxidize, or separate from the film. This extended flexibility accounts for the good durability of lacquers plasticized with Dyal XPL-5. The initial color of Dyal XPL-5 is very good and ultraviolet light exposures show this plasticizer to have excellent color retention. The low viscosity and high solids of Dyal XPL-5 are also very desirable in high solids lacquer formulation.

A very important fact concerning Dyal XPL-5, that should not be overlooked, is that all of the desirable performance properties mentioned above usually require plasticizers that cost much more. Dyal XPL-5 actually costs considerably less than many lacquer plasticizers recommended for the same type usage.

Dyal XPL-5 is compatible with nitrocellulose, ethylcellulose, and many short and medium length alkyd and maleic resins. The heat resistance of Dyal XPL-5 is only fair and its hydrocarbon resistance is only fair. Dyal XPL-5 may be used in clear as well as pigmented lacquer formulations.

SPECIFICATIONS

Non Volatile	80%	Color (max.)	6
Volatile	20% Xylol	Acid Value	7
Lbs. per gal.	8.08	Phthalic Anhydride	None
Viscosity	T - V	Oil	86%
Aliphatic Solv. Tol.	Poor	Type Oil	Castor
		Resin Modifiers	Present

TYPE: Lacquer Modifying Resin

OUTSTANDING FEATURES:

Adhesion on Metal, Retained Flexibility

Dyal XPL-115 is a non drying castor oil modified inter-ester type resin solution that has been proven exceptionally useful as a lacquer plasticizing and modifying resin. As a lacquer modifying resin the low viscosity and high solids of Dyal XPL-115 produces lacquer films of increased solids and increased build. As a lacquer plasticizing resin Dyal XPL-115 shows outstanding adhesion and excellent retained flexibility. This inherent adhesion and flexibility has made Dyal XPL-115 extremely useful in the formulation of automotive and industrial primers and primer surfacers.

Lacquer primers and primer surfacers made with this plasticizing and modifying resin will be exceptionally tough and durable and will possess good sanding properties. In only a few minutes after application these primers and primer surfacers may be recoated with no danger of lifting under lacquer topcoats.

Heavy pigment loadings may be dispersed in Dyal XPL-115 and let down with nitro-cellulose cuts. Dyal XPL-115 wets and disperses most pigments well; however, extremely reactive pigments should not be used with it.

This resin is not recommended for white and pastel topcoats because of its color. It may be used for medium and dark shade topcoats.

SPECIFICATIONS

Non Volatile	60%	Acid Value	35
Volatile	15% Toluol	Phthalic Anhydride	None
Volatile.....	15% Toluol — 35% Xylol	Oil	48%
Lbs. per gal.....	8.20	Type Oil	Raw Castor
Viscosity	T - V	Resin Modifiers	Present
Color (max.)	12		

TYPE: Oil Modified Latex Emulsion Modifying Alkyd

OUTSTANDING FEATURES:

Compatibility, Ease of Emulsification, Good Drying, Color Retention

Latex emulsion paints are becoming an ever increasing factor in Trade and Maintenance Paint Sales Markets. In general, two basic types of latex emulsion paint formulations have been involved and used with marked success. One type formulation is one which uses latices exclusively as the pigment binder and film former. The other uses a combination of latices with oleoresinous or alkyd modifiers. Experience has shown the alkyd modified latex emulsion paints to have several distinct advantages over the straight latex formulations.

The most important advantages of the alkyd modified latex emulsion formulations are:

1. Alkyd modification contributes to the final paint a thixotropic consistency which is desirable to obtain proper flow and leveling in application. This thixotropic consistency contributes the necessary "slip" under the brush and "leveling" for improved uniformity of coat.
2. Alkyd modification serves to hasten the conversion to an insoluble film to permit washing in a shorter period of time.
3. Alkyd modification gives the necessary post conversion plasticization which is desirable to maintain tough and durable films. This plasticization is also necessary to permit satisfactory recoatability of aged films.
4. Alkyd modification gives equal washability to that obtained with the straight latex formulations.
5. Alkyd modification helps emulsion stability under extreme temperature changes.
6. In most instances the above advantages may be obtained with alkyd modification at costs equal to or below that of the straight latex formulation.

SPECIFICATIONS

Non Volatile _____	100%	Color (max.) _____	9
Volatile _____	None	Acid Value _____	5
Lbs. per gal. _____	8.93	Phthalic Anhydride _____	Present
Viscosity _____	Semi-Solid	Oil _____	Long
Aliphatic Solv. Tol. _____	Infinite	Type Oil _____	Soya
Solids at E to G Vis. _____	58%	Resin Modifiers _____	None

Proper alkyd modification of latex emulsion paints entails only the choice of proper modifying agent along with the appropriate procedure for introduction of the alkyd into the emulsion system. Dyal XRE-156 is a tried and proven latex emulsion modifying alkyd. Experience has shown Dyal XRE-156 to contribute all of the desirable properties mentioned above.

The correct procedure for handling Dyal XRE-156 is as follows:

1. Dependent on the type of latices used the recommended amount of oil modification is 25% to 55% of the total vehicle solids. (This amounts to approximately one-half pound to one pound of alkyd modifier per gallon of Latex Emulsion Paint.)
2. Addition of concentrated driers to give the following amounts of metal based on resin solids.

.5 to .7 % Lead

.05 to .07% Cobalt

3. Several methods of introduction of the alkyd into the Latex Emulsion Paint system may be employed. However, the most convenient method, one that requires no special equipment, is one in which emulsification of the resin is performed in a paste mixer. A processing schedule which has given consistently stable emulsions is as follows:

A portion of the protective colloid solution and all of the pigments, colors and inerts are mixed in the paste mixer so that a smooth, heavy paste is obtained. The resin and driers are added at this time and the batch is allowed to mix 10 to 20 minutes. The mix is then reduced in body to grinding consistency with additional protective colloid solution and passed through a colloid type mill or other suitable grinding equipment. The latex, remaining protective colloid solution, shading bases, and water are then added to the ground paste in a thin down or shading tank.

It is extremely important to have the alkyd properly emulsified prior to its addition into the Latex Emulsion Paint system. Most non-ionic and anionic types of emulsifiers will give good oil and water emulsions for this usage.

XR V

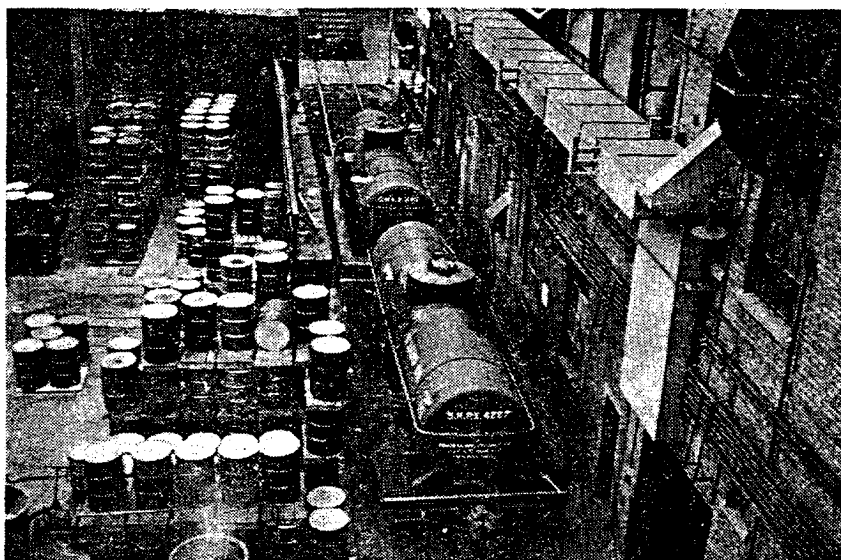
XR V resins are for use in further processing in varnishes. They may be:

DYPHENES (Pure Phenolic Resins)

DYPHENITES (Modified Phenolic Resins)

DYMALS (Maleic Modified Hard Resins)

XR V



Ample facilities are available for rapid filling and shipment of Dyal resins in drums, tank wagons, and tank cars.

XRV

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DYAL XRU-1

TYPE: Urea Formaldehyde Resin Solution

OUTSTANDING FEATURES: Mineral Spirits Tolerance, Versatility, Low Viscosity

XRU-1 is a low viscosity urea formaldehyde resin solution which may be used to formulate baking enamels for a multitude of purposes. These finishes will have upgraded properties when compared with unmodified alkyd baking finishes.

A desirable feature of XRU-1 is its mineral spirits tolerance. As an example, XRU-1 may be used in conjunction with XAC-4. (See handbook sheet on XAC-4), to formulate low cost, high solids baking enamels. The high solids content of these enamels makes them especially desirable for one coat applications where good gloss and film hardness are required. In addition, the use of XRU-1 imparts light color, chemical resistance and marproofness.

The use of XRU-1 is not confined to the formulation of only high solids baking enamels. All unmodified alkyd baking enamels will usually be improved by the addition of XRU-1. Here the improvement is manifested in the harder films and faster baking schedules, even when relatively small amounts of modifications are used.

XRU-1 may be used for formulating the highest quality chemical-resistant furniture finishes. Here in conjunction with XOR-15 and XAN-1, flat varnishes may be formulated having any desired degree of sheen. Please refer to the back of the XOR-15 Resin Handbook Insert Sheet for specific formulation information.

DYAL XRU-2

TYPE: Urea Formaldehyde Resin Solution

OUTSTANDING FEATURES: High Viscosity, Fast Cure

XRU-2 is a companion piece to the above mentioned XRU-1. Its main distinguishing feature is its more rapid curing rate. This means that harder films are obtained at similar baking schedules than in the case of XRU-1. XRU-2 modified protective coatings will require a shorter baking schedule to give equal film hardnesses when compared to XRU-1 modified protective coatings.

Because XRU-2 has a high viscosity, it can be used to formulate low solids baking enamels such as in a two coat system.

PHYSICAL CHARACTERISTICS

	XRU-1	XRU-2
Non-Volatile	50%	50%
Volatile	30% Butyl Alcohol 20% Xylene	30% Butyl Alcohol 20% Xylene
Pounds/Gallon	8.48	8.50
Viscosity	N-P	Y-Z1
Acid Value	4-9	4-9
Color (APHA)	Water White	Water White
Xylene Compatibility	2000%	2000%
Mineral Spirit Compatibility	100%	100%

DYPHENE XRV-5

TYPE: Pure Oil Reactive Phenolic Resin

OUTSTANDING FEATURES:

Light Stability, Improved Drying, Excellent Alkali Resistance

Dyphene XRV-5 is an oil-reactive pure phenolic resin characterized by good color retention, fast dry and excellent alkali resistance. Because of the high reactivity of Dyphene XRV-5, it is an ideal resin for kettle modification with ester gum. Varnishes of this type using 15% to 20% of Dyphene XRV-5 based on the resin produce films of superior performance with respect to speed and hardness of dry, color retention and soap and alkali resistance. The greater reactivity of Dyphene XRV-5 is an important factor in the resultant superior performance.

Dyphene XRV-5 kettle modified resins have excellent petroleum solubility. Melting points of such resins may rise as high as 300° F. These resins show optimum performance with tung oil in the varnishes of the four-hour type.

Clear varnishes of exceptional hardness, color retention and alkali resistance may be formulated with Dyphene XRV-5; however, varnishes of this type, when using tung oil, should not be cooked in less than 30 gallon lengths. Dyphene XRV-5 is especially suitable for kettle modification of alkyd resins in the manufacture of high grade industrial finishes. This 100% phenolic resin is soluble in all varnish oils at temperatures of 360° F. to 380° F. Varnishes made with Dyphene XRV-5 and reduced with mineral spirits have infinite petroleum solvent tolerance.

SPECIFICATIONS

Melting Point _____ 175°F. to 195°F. (Modified Ring and Ball Method)

Acid Number _____ 15 to 25 (Salt Layer Method)

Color _____ 9 max. (50% Solution in Toluol)

Specific Gravity _____ 1.10

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DYPHENE XRV-80

TYPE: Pure Non Reactive Phenolic Resin

OUTSTANDING FEATURES:

Exterior Durability, Chemical Resistance, Good Gas Proofing

As ordinarily classified, Dyphene XRV-80 would be termed, "non reactive" because no foaming takes place when cooking with oils; however, Dyphene XRV-80 is reactive to the extent that when processed with tung oil it increases the bodying rate and will improve the alkali and water resistance of softer oils more than can be accounted for by dilution effect only.

Dyphene XRV-80 varnishes show exceptional durability and chemical resistance, easily equaling or surpassing varnishes made from the so called reactive type resins. Varnishes made with this resin have good color and color stability, but are inferior in this respect to varnishes made with Dyphene XRV-5. Dyphene XRV-80 has very strong gas proofing qualities with tung oil. Generally speaking, this resin is better adapted to use with oils drying by polymerization than by oxygen absorption.

Dyphene XRV-80 may be processed at any oil length desired. Spar varnishes of exceptional durability may be prepared with Dyphene XRV-80. This resin is also excellent for kettle modification of alkyd resins.

Dyphene XRV-80 is insoluble in mineral spirits and has limited solubility in toluol. Oil varnishes containing this resin may be reduced with mineral spirits in the longer lengths (30 gallons and above). The shorter varnishes should contain some stronger solvents. Dyphene XRV-80 conforms to the requirements of Navy Specification 52-R-11 and this resin can be used to prepare varnishes conforming to Specification MIL-E-15218, Type II and Type VI.

SPECIFICATIONS

Melting Point.....250°F. to 275°F. (Modified Ring and Ball Method)
Acid Number.....10 to 15 (Salt Layer Method)
Color.....9 max. (50% Solution in Toluol)
Specific Gravity.....1.07

This section is intended for future use. Comparative Resin Data, Drying Charts, Hardness Charts and Compatability Charts are to be issued as part of this book and are to be filed in this section.

MISC. DATA

0007-PMC-000000842

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ALB. RES. DEPT.

0007-PMC-000000843

PIGMENT, COLOR & CHEMICAL DIVISION
THE SHERWIN-WILLIAMS COMPANY

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100 PARK AVENUE, NEW YORK 17, N. Y.
1450 SHERWIN AVENUE, OAKLAND 8, CALIF.



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616 MAIN STREET, CINCINNATI 2, OHIO
2036 WOODWARD AVENUE, DETROIT 26, MICH.
4110 SO. MAIN STREET, HOUSTON, TEXAS
363 SO. MISSION ROAD, LOS ANGELES 33, CALIF.
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