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PARAPLEX® RESINS FOR INDUSTRIAL COATINGS

PARAPLEX® RESINS

- Unique alkyd-type polymeric materials.
- Commonly known as polyester resins.
- Soft, flexible resins widely used as plasticizers for more brittle film-forming materials such as nitrocellulose, ethylcellulose, polyvinyl chloride and polyvinyl butyral.
- Impart unusual flexibility, toughness,
- Retain these physical properties under severe conditions of exposure.
- They should be considered in all applications where toughness, flexibility, durability, resistance to abrasion, resistance to water and permanence are of prime importance.

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SUMMARY OF CHARACTERISTICS

Product	Principle Characteristics and Uses
PARAPLEX RGA-2 **50% and 80% in n-butyl acetate**	Compatible with nitrocellulose, ethyl cellulose, and polyvinyl butyral. Excellent retention of flexibility on aging**.**
PARAPLEX RGA-7 **60% in toluene**	Excellent flexibility, adhesion and color retention. Used with nitrocellulose for tough, durable metal lacquers.
PARAPLEX RGA-8	Compatible with nitrocellulose, ethyl cellulose, polyvinyl butyral; softer than PARAPLEX RGA-2; outstanding non-solvent resin for pigment wetting and grinding characteristics
PARAPLEX GA-20 **80% in MAK or xylene**	Compatible with nitrocellulose; yields tough and rubbery compositions; high viscosity resins; very resistant to gasoline and aliphatics.
PARAPLEX 5-B **80% in toluene**	Very compatible with nitrocellulose and all types of lacquer resins and plasticizers, good solvent release and alcohol tolerance; excellent fullness and gloss.

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PRODUCT INFORMATION

PARAPLEX® RGA-2

DESCRIPTION

PARAPLEX RGA-2 is an oil-modified azelaic acid-type plasticizing resin that imparts excellent toughness and high tensile strength to nitrocellulose films.
PARAPLEX 2 is supplied in either 50% solids or 80% solids in n-butyl acetate.

COMPATIBILITY

Nitrocellulose, ethyl cellulose, polyvinyl butyral, melamine formaldehyde

ATTRIBUTES

- Provides excellent flexibility.
- Outstanding durability on outdoor exposure.
- Shows little color change on aging or exposure to sunlight therefore, can be used in clear or light-colored coatings.
- Imparts adhesion to many nitrocellulose finishes used on rubber and other substrates.
- Helps improve adhesion on aging.

RECOMMENDED USAGE LEVELS

Ratio 75 - 150% RGA-2 (based on solids) on the nitrocellulose dry weight.

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PRODUCT INFORMATION

PARAPLEX® RGA-7 60%

DESCRIPTION

PARAPLEX RGA-7 60% is an oil-modified azelaic acid-type plasticizing resin, cut with toluene to a 60% solids level. PARAPLEX RGA-7 60% provides excellent flexibility, durability and adhesion in nitrocellulose lacquers.

COMPATIBILITY

Lacquers, shellac, dewaxed damar, ester gum, oil, nitrocellulose

ATTRIBUTES

- Excellent for nitrocellulose lacquers.
- Provides excellent flexibility.
- Imparts excellent durability.
- Offers excellent adhesion to metal substrates.
- Exhibits light color for clear and pale or light-colored lacquers.

RECOMMENDED USAGE LEVELS

Ratio 75 - 150% RGA-7 60% (based on solids) on the nitrocellulose dry weight.

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PRODUCT INFORMATION

PARAPLEX® RGA-8

DESCRIPTION

PARAPLEX RGA-8 is a flexible, oil-modified azelaic acid plasticizing resin developed specifically as an all-purpose grinding medium for nitrocellulose lacquers.
PARAPLEX RGA-8 is supplied as 100% solids.

COMPATIBILITY

Nitrocellulose, castor oils, esters, ethyl cellulose, polyvinyl butyral, melamine formaldehyde, chlorinated rubbers

ATTRIBUTES

- Developed specifically as an all-purpose grinding medium for nitrocellulose lacquers
- Low in acid value.
- Excellent pigment wetting and stability characteristics.
- Offers durability, scuff resistence, good flexibility and freedom from spewing in nitrocellulose
- Imparts good toughness, clarity and flexibility in ethyl cellulose.
- Has a pronounced plasticizing action in polyvinyl butyral.

RECOMMENDED USAGE LEVELS

Ratio 100 - 200% RGA-8 (150 typical) (based on solids) on the nitrocellulose dry weight. For other resins 50 - 150%.

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PRODUCT INFORMATION

PARAPLEX® GA-20

DESCRIPTION

PARAPLEX GA-20 is an azelaic acid-type polyester containing no modifying oil and is a true solvent for nitrocellulose.
PARAPLEX GA-20 is supplied as either 80% solids in MAK or 80% solids in xylene.

COMPATIBILITY

Nitrocellulose, urea formaldehyde, cellulose acetate proprionate, polyvinyl chloride acetate, polyvinyl butyral

ATTRIBUTES

- Exhibits high plasticizing efficiency at average temperatures.
- Very tough resin without much flexibility at low temperatures.
- Non-volatile with excellent heat resistance.
- An excellent compromise between the low temperature flexibility characteristics of an ester-type plasticizer and the high tensile strength obtainable with resin-type plasticizers.
- High resistance to aromatic solvents and gasoline.

RECOMMENDED USAGE LEVELS

Ratio 50 - 150% GA-20 (based on solids) on the nitrocellulose dry weight.

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PRODUCT INFORMATION

PARAPLEX® 5-B 80%

DESCRIPTION

PARAPLEX 5-B 80% is a special maleic alkyd polyester. PARAPLEX 5-B 80% imparts flexibility and high abrasion resistance to nitrocellulose lacquer films.

COMPATIBILITY

Nitrocellulose, ethyl cellulose, chlorinated rubber, urea, melamine, castor oil

ATTRIBUTES

- A pale, tough viscous material.
- Imparts an unusual degree of fullness and build to clear nitrocellulose lacquer films.
- Enhances the fullness and gloss of pigmented lacquer films.
- Can be used in large proportions in a lacquer without detracting from hardness and resistance to water and alcohol
- Contributes flexibility and elongation while minimizing shrinkage of nitrocellulose
- Produces lacquers with good resistance to marring or printing and to solvents

RECOMMENDED USAGE LEVELS

Ratio 50 - 150% 5B 80% (based on solids) on the nitrocellulose dry weight.

TABLE I
FILM PROPERTIES OF PARAPLEX® RGA-2
WITH NITROCELLULOSE

Property	PARAPLEX RGA-2 [1]	100% 1/2" Nitrocellulose (no plasticizer)
Tensile strength (psi)		
Initial	8,420	12,100
After 32 hours ultraviolet exposure	10,100	2,080
Percent change	20.0	-84.4
Ultimate elongation (%)		
Initial	5.8	5.8
After 32 hours ultraviolet exposure	4.2	0.4
Percent change	-28.8	93.0
Gurley stiffness		
25°C.	152.6	273
-12°C.	342.0	365
Percent gain at -12°C.	+124.0	+33.8

[1] Films contain 35% PARAPLEX resin; 65% 1/2" nitrocellulose

TABLE II
SPEW AND COLOR CHARACTERISTICS
OF NITROCELLULOSE FILMS[1]

	Spew Test			Color Test[2] Relative Lack of Color		
	30 min. at 150° F	30 min. at 200° F.	30 min. at 225° F.	30 min. at 250° F.	30 min. at 275° F.	30 min. at 300° F.
Plasticizer						
PARAPLEX® RGA-2	OK	OK	OK	V.Slight Spewing	2	3
Raw Castor Oil	OK	Slight	Spewed	Spewing	1 Discolored	2 Discolored
Heavy Body Castor Oil	OK	OK	Spewed	Spewed	3	4

[1] Films contain 50% plasticizer; 50% 1/2" nitrocellulose.
[2] Small numbers better.

TABLE III
PARAPLEX®PLASTICIZERS IN POLYVINYL BUTYRAL

Stock Composition (Parts by Weight)	**PARAPLEX RGA-2**	**PARAPLEX RGA-8**	**RAW CASTOR OIL**
Polyvinyl butyral	100	100	100
Plasticizer	75	70	50
Characteristics			
Tensile (psi)	2652	3216	3324
Elongation, %	320	320	246
Permanent set, %	3.5	2.0	3.2
Shore Durometer	60	63	65

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TABLE IV
RESIN COMPATIBILITY

	% PARAPLEX RGA-2			% PARAPLEX RGA-7			% PARAPLEX RGA-8			% PARAPLEX GA-20			% PARAPLEX 5-B		
Other Components	**25**	**50**	**75**	**25**	**50**	**75**	**25**	**50**	**75**	**25**	**50**	**75**	**25**	**50**	**75**
Cellulose Nitrate (RS-½")	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Cellulose Acetate	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Cellulose Acetate Propionate	I	I	I	I	I	I	I	I	I	C	C	C	I	I	I
Cellulose Acetate Butyrate	I	I	I	I	I	I	I	I	I	C	I	I	I	I	I
Ethyl Cellulose (10 cps.)	C	C	C	C	C	I	C	C	C	I	I	I	C	C	C
Polyvinyl Acetate	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Polyvinyl Chloride Acetate	I	I	I	I	I	I	I	I	I	C	C	C	I	I	I
Polyvinyl Butyral	C	C	C	I	C	I	C	C	C	C	C	C	I	I	I
Chlorinated Rubber (20 cps.)	I	I	I	I	I	I	C	C	C	I	I	I	I	C	C
Uformite® 27-803	C	C	C	C	C	C	C	C	C	I	I	I	C	C	C
Dewaxed Damar	C	I	I	C	C	C	C	I	I	I	I	I	C	C	C
Refined Shellac	I	I	I	C	C	C	I	I	I	I	I	I	I	I	I
Lacquer Linseed Oil	C	C	-	C	C	C	C	C	-	I	I	-	I	I	-
Heavy Body Castor Oil	C	C	-	C	C	C	C	C	-	I	I	-	C	C	-

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TABLE V
TOLERANCE AND NITROCELLULOSE SOLVENCY

Grade	Alcohol Tolerance[1]	Mineral Thinner Tolerance[2]	Solvency for Nitrocellulose[3]
PARAPLEX® RGA-2	52	4	Partial
PARAPLEX RGA-7	46	3	Partial
PARAPLEX RGA-8	52	13	True
PARAPLEX GA-20	50	4	Slight
PARAPLEX 5-B[1]	12	20	Partial

This data indicates the approximate values and are supplied for comparison purposes.

[1] Alcohol Tolerance: Number of cc. of 2-B alcohol required to cause permanent turbidity in 10 grams of a 50% solution of the resin in toluene (PARAPLEX 5-B[1] 80% in toluene).

[2]Mineral Thinner Tolerance: Number of cc. of mineral thinner required to cause permanent turbidity in 10 grams of a 50% solution of the resin in toluene.

[3]Solvency for Nitrocellulose: Determined by making 5% solution of dry nitrocellulose in the resin and allowing to come to equilibrium to determine solubility.

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TABLE VI
SOLVENT STUDY

PARAPLEX® RGA SAMPLES CUT 70% IN BUTYL ACETATE
COMPARED TO CURRENT PRODUCT

	RGA-2 Exp	RGA-2 Current	5B Exp	5B Current	RGA-7 Exp	RGA-7 Current	RGA-8 Exp	RGA-8 Current	GA-20 Exp	GA-20 Current
% NVM	71.4	60.0	68.0	80.0	70.5	60.0	70.2	100	70.7	100
Solvent	Butyl Acetate	Toluene	Butyl Acetate	Toluene	Butyl Acetate	Touene	Butyl Acetate	None	Butyl Acetate	None
Viscosity										
CPS	1820		520		1980		126		4040	
TBR	16		5		16.5		N/A		33.8	
(G-H) Est	Y	U	T	Z1	Y	U	E	ZI-Z3	Z-2	Z10+
Color (Gardner)	4.5	4-7	1.9	3-6	4.0	4-7	2.7	4-7	4.7	6-10
Acid Value	21.7	22-35	39.5	47-60	27.4	35-48	3.7	0-3.5	6.7	10-20
Specific Gravity	0.997		0.965		1.029		0.962		1.045	
Weight-Galllon	8.3	8.0	8.0	8.2	8.6	8.0	8.0	8.3	8.7	9.2

FORMULATIONS

◆ PARAPLEX RGA-2

RUBBER LACQUER	**Parts by Weight (Solids Basis)**
Titanium dioxide	30.0
1/2” RS Nitrocellulose	24.5
PARAPLEX RGA-2	45.5
	100.0

◆ PARAPLEX RGA-8

UPHOLSTERY FABRIC COATING ROLLER MILL GRIND	**Parts by Weight (Solids Basis)**
Pigment	16.7
PARAPLEX RGA-8	8.3
MIX WITH	
15” TO 20” RS Nitrocellulose	33.3
PARAPLEX RGA-8	41.7
	100.0

Ratio of PARAPLEX RGA-8 to nitrocellulose 1.5/1.
Reduce to 50% solids with the following thinner:

Ethyl alcohol-50%; Ethyl acetate-33%; Butyl alcohol-17%

◆ PARAPLEX GA-20

RUBBER LACQUER	**Parts by Weight (Solids Basis)**
Titanium dioxide	23.5
1/2” RS Nitrocellulose	34.5
PARAPLEX GA-20	42.0
	100.0

FORMULATIONS

◆ PARAPLEX 5-B 80%

BOOK CLOTH COATING ROLLER MILL GRIND	**Parts by Weight (Solids Basis)**
Chrome Green	33.3
PARAPLEX 5-B 80%	22.2
MIX WITH	
5” TO 6” RS Nitrocellulose	26.6
PARAPLEX 5-B 80%	17.9
	100.0

Ratio of PARAPLEX 5-B 80% to nitrocellulose 1.5/1.
Reduce with the following thinner:

Ethyl acetate	33%
Ethyl alcohol	33%
Toluene	32%
Acetone	5%

FURNITURE LACQUER	**Parts by Weight (Solids Basis)**
1/2” RS Nitrocellulose	33.4
A-801 Light (Union Camp)	33.3
PARAPLEX 5-B 80%	33.3
	100.0