



## TECHNICAL INFORMATION

### EPOCAP® 17580A/17570B High Performance Epoxy Encapsulation System

#### PRODUCT DESCRIPTION

EPOCAP 17580A/17570B is a two-component, heat cure epoxy potting and encapsulating compound designed for use in advanced state of the art applications such as high voltage integrated "flyback" transformers used in television sets. This system, at elevated processing temperatures, exhibits low viscosity along with good vacuum stability which results in thorough impregnation of exceptionally tightly wound fine wire coils.

Although there is a recommended stoichiometric mix ratio, this system displays good electrical properties over a wide range of mix ratios; further supporting its overall superiority and uniqueness. The system also displays good thermal shock properties and good adhesion to many thermoplastics such as polyester and Noryl®. It also meets UL flammability test requirements. The system is also available in a natural color as EPOCAP 17570.

#### HOW TO USE

The individual components containing fillers should be stirred or agitated without introducing excessive air before use to ensure that all fillers are properly dispersed. To obtain the best cured properties, accurate proportioning and thorough mixing are essential. To obtain void free castings, the mixed system should be degassed under vacuum at approximately 29 inches of mercury (or better) for a few minutes, both immediately after mixing and then again after castings are poured, if the work life of the system allows.

#### MIXING AND CURING SCHEDULE

Ratio	Part A	Part B
By weight	100	114
By volume	100	109

The cure schedule is dependent upon the temperature. The recommended cure schedule will vary with the desired properties. The recommended schedule to achieve the typical properties is shown below:

2 hours at 105 °C (221 °F)

#### TYPICAL UNCURED PROPERTIES

	Part A	Part B	Mixed
Color	Black	Cream	Black
Viscosity @ 25 °C, cps	130,000	40,000	---
Mixed Viscosity @ 90 °C, cps	---	---	900
Weight per Gallon, lbs.	13.74	14.33	14.05
Specific Gravity @ 25 °C	1.65	1.72	1.68
Gel time, 10g mass			
@ 100 °C, minutes	---	---	39
@ 90 °C, minutes	---	---	80
@ 80 °C, minutes	---	---	159

	@ 70 °C, minutes		
Filler Type	Abrasive	Non-Abrasive	332 Abrasive
Shelf Life (in separate sealed containers), months	12	12	---

#### TYPICAL TIME VS. VISCOSITY DATA

700 gram mass in constant temperature bath @ 90 °C.

Time (mins.)	Viscosity (cps)
5	1,168
10	960
15	860
20	820
25	840
30	880
35	980
40	1,080
45	1,230
50	1,500
55	2,000
60	3,300
65	5,300
67	9,650
69	>50,000

#### TYPICAL CURED PROPERTIES

(Tested at 25 °C unless otherwise indicated)

Test	Result
Hardness, Shore D	93
Tensile Strength, psi	6,591
Elongation, %	> 10
Flexural Strength, psi	9,682
Flexural Modulus, psi	1,240,504
Compressive Strength, psi	20,306
Linear Shrinkage, in./in.	0.0096
Water Absorption, % Weight Gain After:	
200 hours @ 100 °C	1.33
500 hours @ 70 °C	0.58
1,000 hours @ 25 °C	0.27

#### TYPICAL THERMAL PROPERTIES

Test	Result
Heat Distortion Temperature, °C	106
Coefficient of Linear Thermal Expansion, in./in./ °C (+30 to 90 °C)	48 x 10 <sup>-6</sup>
Thermal Conductivity, cal. x cm/sec. x cm <sup>2</sup> x °C	14.1 x 10 <sup>-4</sup>
Thermal Shock, Average Cycle to Failure	7.1
Weight Loss 24 hours @ 130 °C, %	0.04
UL Flame Retardancy Test UL-94-VO @ 0.125"	Passes
Recommended Service Temperature	155 °C

**TYPICAL ELECTRICAL PROPERTIES**

	<u>Dielectric Constant</u>			<u>Dissipation Factor</u>		
	<u>100 Hz</u>	<u>1000 Hz</u>	<u>100 kHz</u>	<u>100 Hz</u>	<u>1000 Hz</u>	<u>100 kHz</u>
Mix Ratio = 100A:104B, parts by weight						
@ 25 °C	3.779	3.762	3.691	0.006	0.005	0.007
@ 100 °C	4.065	3.964	3.851	0.028	0.016	0.008
@ 125 °C	4.85	4.425	4.063	0.085	0.052	0.018
Mix Ratio = 100A:109B, parts by weight						
@ 25 °C	3.771	3.756	3.682	0.006	0.006	0.007
@ 100 °C	4.048	3.953	3.844	0.027	0.015	0.008
@ 125 °C	4.722	4.359	4.044	0.078	0.046	0.016
Mix Ratio = 100A:114B, parts by weight						
@ 25 °C	3.787	3.771	3.693	0.006	0.006	0.008
@ 100 °C	4.096	3.998	3.881	0.028	0.016	0.009
@ 125 °C	4.888	4.48	4.119	0.083	0.05	0.018
Mix Ratio = 100A:119B, parts by weight						
@ 25 °C	3.789	3.771	3.692	0.006	0.006	0.008
@ 100 °C	4.085	3.991	3.877	0.027	0.015	0.009
@ 125 °C	4.822	4.444	4.106	0.079	0.047	0.017
Mix Ratio = 100A:124B, parts by weight						
@ 25 °C	3.804	3.785	3.703	0.007	0.006	0.008
@ 100 °C	4.132	4.03	3.905	0.028	0.016	0.01
@ 125 °C	4.956	4.542	4.162	0.083	0.051	0.019

**Volume Resistivity, ohms-cm**

(Mix Ratio = 100A : 114B, parts by weight)

@ 25 °C	$3.0 \times 10^{15}$
@ 100 °C	$9.5 \times 10^{13}$
@ 125 °C	$5.5 \times 10^{12}$

**Dielectric Strength, Volts/Mil @ 1/8" Thickness – 477**

(Mix Ratio = 100A : 114B, parts by weight)

**Long Term Thermal Endurance Data**

After dry heat aging at various temperatures for 1,000 hours, this epoxy system displays excellent retention of physical and electrical properties accompanied by extremely low weight loss.

**Typical Physical Properties After Dry Heat Aging at Various Temperatures**

	<u>Initial Results</u>	<u>After 1,000 Hours at</u>		
		<u>130 °C</u>	<u>155 °C</u>	<u>180 °C</u>
Hardness, Shore D	93-91	92-90	92-91	90-89
Tensile Strength, psi	6,591	6,228	7,449	6,053
Flexural Strength, psi	9,682	9,908	10,523	10,209
Flexural Modulus, psi	1,240,504	1,243,872	1,256,775	1,304,848
% Weight Gain (Loss)	---	No Change	(0.817)	(2.418)

**Typical Electrical Properties After Dry Heat Aging at Various Temperatures**

**DIELECTRIC CONSTANT (K) AND DISSIPATION FACTOR (DF) BEFORE AND AFTER HEAT AGING**

**Initial**

<u>25 °C</u>				<u>105 °C</u>				<u>130 °C</u>				<u>150 °C</u>			
100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz	
K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF
3.84	0.0065	3.75	0.0077	4.17	0.031	3.94	0.0087	5.15	0.0937	4.19	0.021	5.61	0.115	4.27	0.0296

**1000 Hrs. @ 130°C**

<u>25 °C</u>				<u>105 °C</u>				<u>130 °C</u>				<u>150 °C</u>			
100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz	
K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF
3.85	0.0077	3.75	0.0081	4.14	0.0278	3.90	0.0091	4.53	0.0647	4.03	0.0142	5.78	0.1320	4.27	0.0323

**1000 Hrs. @ 155°C**

<u>25 °C</u>				<u>105 °C</u>				<u>130 °C</u>				<u>150 °C</u>			
100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz	
K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF
3.85	0.0090	3.75	0.0084	4.20	0.0238	3.92	0.0101	5.36	0.0844	4.26	0.0257	6.03	0.1168	4.68	0.0576

**1000 Hrs. @ 180°C**

<u>25 °C</u>				<u>105 °C</u>				<u>130 °C</u>				<u>150 °C</u>			
100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz		100 Hz		100 kHz	
K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF	K	DF
3.87	0.0146	3.73	0.0088	5.19	0.0719	4.13	0.0259	5.89	0.688	4.53	0.0568	6.11	0.1814	4.86	0.063

**Volume Resistivity, ohm-cm**

<u>Test Temperature</u>	<u>Initial</u>	<u>After 1,000 Hours at</u>		
		<u>130°C</u>	<u>155°C</u>	<u>180°C</u>
25°C	$2.8 \times 10^{15}$	$4.54 \times 10^{15}$	$1.25 \times 10^{16}$	$2.17 \times 10^{15}$
105°C	$9.4 \times 10^{13}$	$5.81 \times 10^{13}$	$2.00 \times 10^{14}$	$2.72 \times 10^{14}$

## **STORAGE AND HANDLING**

These materials should be stored in a dry environment within a temperature range of 16°C to 27°C (60°F to 80°F). Extremes of temperature beyond this range may result in crystallization or polymerization of the materials. Introduction of a nitrogen blanket into the containers before closing will improve the storage life of the products.

A wide variety of cleaning solutions are available for cured and uncured epoxies and polyurethanes. For more information on proper recommendations and procedures, contact the Technical Department.

## **SAFETY**

These materials are intended for industrial use only and the practices of good housekeeping, safety and cleanliness should be followed before, during and after use.

Although the system contains low volatility materials, care should be taken in handling. Adequate ventilation of work place and ovens is essential.

These materials may cause dermatitis in susceptible individuals. Keep off skin and out of eyes. In case of accidental skin contact, wash thoroughly with soap and water. In case of eye contact, flush eyes thoroughly with water and consult a physician immediately.

Refer to Material Safety Data Sheets for additional information.

## **ADDITIONAL INFORMATION**

Visit our web site at:

[www.royaladhesives.com](http://www.royaladhesives.com)

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