

## EpoPro® 203A/B or 203A/B/C



### Heat Cured Epoxy Casting & Laminating System for High Temperature Applications

#### Typical Properties (Not for specification purposes. All tests run at 25°C unless otherwise noted)

##### Part A-side Properties:

Appearance	Visual	Amber
Specific Gravity	ASTM-D-1475	1.16 g/cc
Viscosity	ASTM-D-2393	18,000 cP
Flash Point, Closed Cup	ASTM-D-92	>254°C (>489°F)

##### Part B-side Properties:

Appearance	Visual	Amber,
Specific Gravity	ASTM-D-1475	1.03 g/cc
Viscosity	ASTM-D-2393	1,200 cP
Flash Point, Closed Cup	ASTM-D-92	>165°C (>329°F)

##### Part C side Properties

Appearance	Visual	Red-Brown
Specific Gravity	ASTM D-1475	1.03 g/cc
Viscosity	ASTM-D-2393	20 cP
Flash Point, Closed Cup	ASTM-D-92	>91°C (>197°F)

##### Mix Ratio:

Parts by weight	100A : 100B : 0 -1C*
Parts by volume	90A : 100B : 0 -1C*

\* optional Part C level can be adjusted to achieve the desired cure speed and work life.

##### Mixed Properties:

Initial Viscosity @ 25°C	ASTM-D-2393	5,000 cP
@ 66°C (150°F)		200 cP
@ 95°C (200°F)		80 cP

##### Cured Properties (with 1 pbw 203C, cured 3 hrs at 150°C)

Appearance	Visual	Amber clear
Specific Gravity	ASTM-D-792	1.12 g/cc
Shore Hardness at:	ASTM-D-2240	
25°C / 95°C / 150°C		89D / 84D / 34D
Flexural strength at:	ASTM-D-790	
25°C (75°F)		16,000 psi
95°C (200°F)		12,600 psi
150°C (300°F)		1,200 psi
Flexural Modulus @ 25°C		430,000 psi
Heat deflection temp. @264 psi	ASTM D-648	111°C (232°F)
Compressive strength	ASTM D-695	18,000 psi
Tensile strength	ASTM D-638	11,300
Tensile Elongation	ASTM-D-638	2.2%
Izod impact, ft-lb/in of notch	ASTM D-2566	0.13 %
Linear shrinkage	ASTM-D-2566	1.8%
Coefficient of Thermal Expansion(CTE) (per °C) at 5°-50°C (40°-120°F)	Perkin Elmer TM1	30 ppm
50°-66°C (120°-150°F)		45 ppm
66°-95°C (150°-200°F)		70 ppm
Thermal Conductivity	ASTM D-2214	0.18 W/mK
Flame resistance	UL94HB	0.9 in/min
Moisture absorption	ASTM D-570	

24 hrs. @ 25°C		0.08%
2 hrs. @ 100°C		0.30%
24 hrs. @ 66°C		0.42%
Dielectric strength, 1/8"	ASTM D-149	350 V/mil
Arc resistance	ASTM D-495	103 sec
Volume resistivity @ 25°C	ASTM D-527	>10 <sup>15</sup> Ω-cm
@ 95°C		1.4 x 10 <sup>14</sup> Ω-cm

EPOPRO® 203-A/B/C is a low viscosity heat-curing epoxy system which exhibits excellent electrical insulation properties when fully cured. The cured polymer is a rigid, amber solid with excellent heat resistance and mechanical properties. The cured polymer has a thermal rating of at least class F (155°C). Meets Mil-I-16923 Specification requirements.

The EpoPro 203A/B has a long work life and the cure speed can be adjusted by using an optional accelerator known as EpoPro 203C at levels up to 1 part by weight per 100 parts of the 203B. Adding the 203C will however also reduce the work life of the system as detailed in the processing section of this datasheet.

203A/B/C is an excellent system for many potting, encapsulation & impregnation applications. It has been used to produce thousands of transformers, motors, & other wire wound devices and has also been used for high temperature laminating of glass cloth, carbon fibers, and Kevlar. It wets out most fabrics very easily and when cured yields a strong heat resistant composite.

#### Benefits:

- Low viscosity
- Easily wets and impregnates many materials
- Long work life that is adjustable with the use of an optional catalyst (EpoPro 203C)

#### Applications

- Laminating Composites
- Impregnating Motors, Stators, Armatures, & other wire wound devices

#### Dielectrical Properties @ 25C

Frequency (Hz)	Dielectric Constant		Power Factor	
10 <sup>2</sup>	3.53*	3.39**	.0023*	.0051**
10 <sup>3</sup> (Kilo)	3.51	3.35	.0043	.0104
10 <sup>4</sup>	3.48	3.29	.0077	.0139
10 <sup>5</sup>	3.468	3.22	.0098	.0124
10 <sup>6</sup> (Mega)	3.44	3.24	.0094	.0118
10 <sup>7</sup>	3.41	3.19	.0145	.0149
10 <sup>8</sup>	3.33	3.11	.0181	.0181
10 <sup>9</sup> (Giga)	3.22	2.98	.0246	0.0190

\*the result for cured EpoPro 203A/B \*\*the result for cured EpoPro 203A/B/C with the 203C at 1 pbw

## Thermal Aging Results

Weight loss as a % of initial mass:

Sample Size	Aged @ 150°C (300°F) for:		
	1 day	7 days	30 days
.5"x1"x3"	.03%	.05%	.08%
.25"x1"x3"	.18%	.25%	.32%
.125"x1"x3"	.25%	.37%	.43%

Sample Size	Aged @ 205C (400°F) for:		
	1 day	1 day	1 day
.5"x1"x3"	0.52%	0.91%	1.64%
.25"x1"x3"	1.30%	1.84%	2.72%
.125"x1"x3"	1.72%	2.72%	4.22%

### Storage Guidelines:

Store this material in a clean, dry environment in its tightly closed original container. These products are not considered especially temperature or moisture sensitive, but should ideally be stored at temperatures between 18-35°C (64-95°F) and kept from moisture contamination. Storage at lower temperatures could lead to crystallization and may require the application of heat to reverse. If the product appears crystalline or is thicker than normal when opened, heat for 4-6 hours at 65C to re-liquefy prior to use. If the recommended storage conditions are observed the products will have a minimum shelf-life of 12 months from the date of shipment.

### Processing Guidelines:

This system can be mixed manually or by using either dynamic or static mixing systems. Whatever method is chosen, be sure to accurately weigh both the resin and the hardener prior to mixing them and ensure the correct mix ratio is used.

If mixing manually, stir for at least 2 minutes and be sure to scrap the walls and bottom of the mixing vessel to be sure that all of the material is thoroughly mixed. To ensure a void free casting, vacuum de-air the mixture after thorough mixing. A vacuum of 28 inches of mercury is generally sufficient to remove the vast majority of entrapped air from 1 quart volume within 5-10 minutes. Large volumes of the mixed system may require longer times under vacuum.

For impregnation applications, heat the component to be impregnated at up to 150C and then dip into the fully mixed EpoPro 203A/B or A/BC system. For rapid wetting the EpoPro 203AB or A/B/C may be heated and will show a dramatic viscosity reduction with heating. Heating the 203A/B or A/B/C system will cause the material to react more quickly leading to a reduced work-life and a faster gelation or set time.

See below for an estimate of the work life and gel time at various level of the 203C:

### Working Life: (200 grams)

System Temperature:	203 A/B	203 A/B +0.5 pbw C	203 A/B +1 pbw C
25°C (75°F)	>30 days	10 hours	4 hours
65°C (150°F)	>10 days	2- 4 hours	1- 2 hours
95°C (200°F)	48 hours	1 hour	0.5 hours
122°C (250°F)	18 hours	N/D	
150°C (300°F)	6 hours	N/D	

## Recommended Cure Schedules:

Please note: any cure schedule selected for use should be confirmed through testing as being appropriate for your particular processing methods and for your intended application.

System	Curing time @ 125C	Curing time @150C
203A/B	36 - 48 hours	24 - 36 hours
203A/B/C (0.5 pbw C)	9 -12 hours	4 - 6 hours
203A/B/C (1 pbw C)	6 - 8 hours	2 - 4 hours

**Note:** Alternate cure schedules can be developed to meet your needs. Please contact us for technical assistance if you would like to evaluate cure schedules other than those listed or determine the optimum or minimum cure schedule for your application.

### Handling Precautions:

Mandatory and recommended industrial hygiene procedures should be followed whenever these products are being handled and processed. For additional information please consult the corresponding material safety data sheets.

### Personal Hygiene:

#### EpoPro 203A

**CAUTION!** May cause eye irritation. Prolonged or repeated skin contact may cause irritation, may cause allergic skin reaction. Harmful if inhaled. Harmful if swallowed. Avoid contact with eyes, skin, or clothing. Wear eye protection and impervious gloves when handling. Wash thoroughly after handling. Avoid breathing vapor or mist. Keep containers closed when not in use. Use only with adequate ventilation. Do not take internally.

#### EpoPro 203B

**WARNING!** Causes severe eye irritation and possible eye damage. Causes severe skin irritation and possible allergic skin reaction. Harmful if inhaled. Harmful if swallowed. DO NOT get in eyes, on skin, or clothing. Wear chemical splash goggles and impervious gloves when handling. Wash skin and clothing thoroughly after handling. Avoid breathing vapor or mist. Use only with adequate ventilation. Keep containers closed when not in use. DO NOT take internally.

#### EpoPro 203C

**COMBUSTIBLE!** Corrosive to eyes, respiratory system & skin. May cause skin sensitization.. Protect from heat, sparks, and open flame. Harmful if swallowed. Avoid contact with eyes, skin, or clothing. Wear eye protection and impervious gloves when handling. Wash thoroughly after handling. Avoid breathing vapor or mist. Keep containers closed when not in use. Use only with adequate ventilation. Do not take internally.

### First Aid

In case of contact:

**Skin** - Wash skin thoroughly with mild soap and water. Remove contaminated clothing and wash before reuse. Discard contaminated shoes and other articles made of leather

**Eyes** - Flush eyes with plenty of water for 15 minutes and get prompt medical attention.

**Inhalation** - Remove person to fresh air

**Ingestion** - Do not induce vomiting. Dilute with plenty of water and contact physician immediately. Never give anything by mouth to an unconscious person

### Disclaimer:

**IMPORTANT:** The following supercedes Buyer's documents. **SELLER / MANUFACTURER MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Seller / Manufacturer be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer's sole remedy and Seller's sole liability for any claims shall be Buyer's purchase price. Data and results presented are based

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on controlled or laboratory work and must be confirmed by Buyer by testing for its intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended

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