



PTM&W Industries, Inc.

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PT2848

HIGH TEMPERATURE EPOXY LAMINATING RESIN

DESCRIPTION

PT2848 is an black, lightly filled high temperature epoxy laminating resin designed specifically for demanding high performance composite tooling. PT2848 has good heat resistance, making it capable of providing excellent long term service in today's higher temperature curing cycles. The resin has a medium-low viscosity, and, when combined with the hardeners recommended here, allows very easy handling in tool fabrication. The mixed systems wet out the tooling fabrics very readily. This allows faster tool production than when using more viscous materials. This feature is achieved without the use of hazardous or potentially restricted diluents. PT2848 does not contain vinylcyclohexane diepoxide (VCHD).

HARDENER SELECTION

Three low toxicity hardeners are listed here for use with PT2848. These hardeners provide a broad range of working times for all sizes of tools and lay-up methods. All three hardeners give good high temperature performance with very high physical properties. These hardeners do not contain methylene dianiline (MDA), or other potentially harmful aniline derivatives. They are non-staining materials, and will not crystallize in normal shipping and storage conditions.

Other hardeners with special characteristics are available for use with PT2848. Check with our Technical Services department for details and recommendations.

Hardener	Mix Ratio	Pot Life	Description
PT2848 Part B	100 : 16.5	40-45 min.	Intermediate high temperature service hardener with a shorter pot life for smaller tools. Provides a good hard gel at room temperature. Recommended for tools operating in the 275°F to 350°F range. Also, excellent for back-up structure attachment and quick repairs.
PT2848 Part B1	100 : 20	2.5-3 hours	Intermediate high temperature service hardener with longer working time than PT2848 Part B, for somewhat larger tools and vacuum bagging operations. PT2848 Part B1 gives a good gel at room temperature (77°F), and can allow an unsupported post cure to a properly gelled tool. It provides durable tools with good dimensional stability, for applications in the 300°F to 350°F range. This combination has a lower mixed viscosity for good fabric wetting.
PT2848 Part B2	100 : 8.5	3-4 hours	A unique high temperature service, low toxicity hardener for the most demanding tooling applications. The longer working time allows vacuum bag fabrication of medium sized tools with excellent cured properties. PT2848 Part B2 can be gelled hard at 120°F or higher on a plastic faced plaster pattern for subsequent unsupported post cure and service to over 425°F.

PRODUCT SPECIFICATIONS

	PT2848 A	PT2848 B	PT2848 B1	PT2848 B2	ASTM Method
Color	Amber	Amber	Amber	Amber	Visual
Viscosity, @77°F, centipoise	7000 cps	1700 cps	500 cps	690 cps	D2392
Specific Gravity, gms./cc	1.19	1.09	0.98	1.0	D1475
Mix Ratio		100 : 16.5	100 : 20	100 : 8.5	PTM&W
Pot Life, 4 fl.oz. Mass @ 77°F		40-45 min.	2.5-3 hours	3-4 hours	D2471

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CURING SCHEDULES

PT2848 Part B and Part B1	PT2848 Part B2
SPECIAL INFORMATION	
<p>Hardeners PT2848 Part B and Part B1 have been designed to gel hard at room temperature, to allow removal of the laminate from the pattern after an overnight (18 to 24 hours) cure at room temperature, and then be given an unsupported post cure. PT2848 Part B1 has a longer pot life than PT2848 Part B, to allow vacuum bagging applications on smaller tools.</p>	<p>A unique feature of PT2848 Part B2 is that the heat resistance of the material "leads" the curing temperature. For example, castings of PT2848 Part B2 and PT2848 cured for 16 hours at 120°F have a heat deflection temperature of over 175°F. With the addition of four hours at 200°F, the heat deflection temperature of the casting is increased to over 250°F. Values for a laminate would be much higher due to the reinforcement of the fabric. This feature allows the fabrication of a high temperature laminate on a plastic faced pattern, and removal after an initial low temperature cure. It can then be post cured unsupported with full confidence that the finished tool will have excellent stability.</p>
TYPICAL CURE SCHEDULE	
<ol style="list-style-type: none"> 1. Allow to gel on the pattern at room temperature for a minimum of 18 hours. 2. Remove tool from the pattern and place in a cold oven. Slowly raise to 150°F and hold 3 - 4 hours. 3. Slowly raise the temp. to 250°F, hold 3 - 4 hours. 4. Slowly raise the temperature to 350°F and hold for 4 hrs. 5. After completion of the cure cycle, turn off the oven and allow the tool to cool to room temperature before removing for clean-up and service. 	<p>UNSUPPORTED POST CURE: Cure on the pattern for 36 - 48 hours at Rm. Temp., then remove from the pattern and cure for 3 - 4 hours at 150°F, 200°F, 250°F, 350°F, and 4 hours at 25°F over the expected service temperature.</p>
	<p>PARTIALLY UNSUPPORTED POST CURE: Cure on the pattern for 18 to 24 hours at room temperature followed by 16 hours at 120°F; then remove from the pattern and post cure for 3 - 4 hours at each of the following temperatures: 150°F, 250°F, 350°F, and 425°F.</p>
	<p>SUPPORTED POST CURE - FOR MAXIMUM TOOL STABILITY: Cure on the pattern 18 - 24 hours at room temp. plus 3 - 4 hours at each of the following temperatures: 150°F, 250°F, 350°F, and 425°F.</p>

TYPICAL MECHANICAL PROPERTIES

	PT2848 A/B	PT2848 A/B1	PT2848 A/B2	ASTM Method
Mix Ratio, By Weight	100 : 16.5	100 : 20	100 : 8.5	PTM&W
Mixed Viscosity, @77°F, centipoise	4000-4500 cps	3200-3500 cps	5000-5500 cps	D2393
Pot Life, 4 fl. Oz. Mass, @77°F	40 - 45 min.	2.5 - 3 hours	3.5 - 4 hours	D2471
Cured Hardness, Shore D, @ 77°F @ 300°F	93 D 89 D	92 D 87 D	91 D 80 D (@ 350°F)	D2240
Specific Gravity, grams, cc	1.24	1.19	1.24	D1475
Density, lb./cu. Inch	.0448	.0432	.0449	D792
Specific Volume, cu. in./lb.	22.33	23.1	22.29	
Tensile Strength, psi, Laminate*	29,920 psi	30,260 psi	27,780 psi	D638
Elongation at Break, %, Laminate*	1.52 %	1.68 %	1.49 %	
Tensile modulus, psi, Laminate*	50,830 psi	62,766 psi	44,800 psi	
Flexural Strength, psi, Laminate*	41,028 psi	44,891 psi	40,554 psi	D790
Flexural Modulus, psi, Laminate*	490,345 psi	827,751 psi	592,157 psi	
Compressive Strength, psi, Cast Bar	16,270 psi	17,480 psi	16,800 psi	D695
Glass Transition Temperature, Tg	286°F	319°F	336°F	(TMA) D3386
Coefficient of Thermal Expansion,	3.47 x 10 ⁻⁵ in./in./ °F	3.16 x 10 ⁻⁵ in./in./ °F	3.59 x 10 ⁻⁵ in./in./ °F	D696

*Tensile & Flexural Properties Determined with a 1/8" Laminate, Style 7500 Tooling Cloth, Resin Content of 50%-55%.

PACKAGING WEIGHTS

	Gallon Kit	Pail Kit	Drum Kit
PT2848 Part A	9 lb.	40 lb.	450 lb.
PT2848 Part B	1.5 lb.	6.6 lb.	74 lb.
PT2848 Part B1	1.81 lb.	8 lb.	90 lb.
PT2848 Part B2	.77 lb.	3.4 lb.	38.5 lb.