PR2032
Laminating Resin
For Composite Parts

DESCRIPTION

PR2032 is a medium viscosity, unfilled, light amber laminating resin that is designed for structural production applications. When used with the three hardeners listed here, the combinations provide excellent wet-out of fiberglass, carbon and aramid fibers. Special additives have been incorporated into these products to promote chemical adhesion to fabrics made with these fibers. Typical applications include aircraft and sail plane skins and structural components, auto bodies, radomes and prototype parts.

Hardeners PH3660 and PH3665 are the standard production hardeners for fabricating composite parts. PH3660 has a one hour working time, and PH3665 has been developed to provide a longer working time for larger and/or more complicated laminates when needed. PH3630 is a faster setting hardener that can be used for patching and repairs, and smaller laminates. PH3630 has a similar viscosity to PH3660 and PH3665, so handling will be similar, except for the faster cure.

These products can be considered low toxicity materials that have minimum hazard potential when used properly and in a clean and responsible manner. PR2032 does not contain any hazardous diluents or extenders. Hardeners PH3660, PH3665 and PH3630 do not contain methylene dianiline (MDA), or other potentially harmful aniline derivatives. Neither the resin nor the hardeners will crystallize in normal shipping and storage conditions, including refrigerated storage. Both components have excellent moisture resistance, for minimal problems in high humidity environments.

PRODUCT SPECIFICATIONS

	PR2032	PH3630	PH3660	PH3665	ASTM Method
Color	Lt. Amber	Amber	Amber	Amber	Visual
Viscosity, @77°F, centipoise	1,650 cps	150-175 cps	190-200 cps	200-250 cps	D2392
Specific Gravity, gms./cc	1.15	0.96	0.96	0.95	D1475
Mix Ratio, By Wt.		30 minutes	1 hour	2 hours	PTM&W
Pot Life, 4 fl. Oz. Mass @ 77°F		100 : 27 By Weight, or 3 to 1 By Volume			D2471

HANDLING and CURING

PH3660 and PH3665 are the hardeners typically used to fabricate high performance composite parts. PH3660 has a one hour working time, and can be used for all sizes of parts using the contact layup method of fabrication. If the vacuum bagging technique is being used, PH3660 should only be used for smaller parts. Hardener PH3665 has a longer working time that is useful for vacuum bagging larger parts before the resin has gelled. In sufficient mass, both of these hardeners will cure completely at room temperature (77°F or above). However, when constructing 2-3 ply, thin laminates and when overnight demolding and sandability is required, some heat should be applied to the PH3660 system, and must be utilized when using PH3665 hardener. PH3660 will require only moderate heat to gel hard. The application of as low as 90°F is usually sufficient. This temperature can be easily achieved by either tenting the laminate or putting it in a box and using incandescent light bulbs to generate this temperature. PH3665 hardener should be given a cure of 12 to 14 hours at 120°F to 130°F to insure a hard gel sufficient for demolding and sandability.

In thicker laminates and larger masses with these hardeners, plan to allow the laminate to cure at least 24 hours, at a minimum of 75°F, before moving the structure. This can be accelerated by applying heat after the resin has gelled as described above. Be careful using heat guns and lamps, as they tend to concentrate heat, producing localized hot spots which can damage the epoxy. The higher the curing temperature, the higher the resulting service temperature. With a higher temperature cure, a safe service temperature over 200°F can be obtained.

Hardener PH3630 will cure completely at room temperature, and does not require a heat cure. It is intended for fast repairs or additions to a primary structure, and for parts that will be exposed to lower service temperatures. All primary structures should be fabricated with PH3660 or PH3665 to take advantage of their longer work life and better service temperature capabilities.

TYPICAL MECHANICAL PROPERTIES

	PR2032 PH3630	PR2032 with PH3660				PR2032 PH3665	ASTM Method
		Neat Resin (Unreinforced)	With Fiberglass	With Graphite	With Kevlar		
Mix Ratio	100 : 27 By Weight, or 3 to 1 By Volume						PTM&W
Pot Life, @ 77°F	30 minutes	1 hour				2 hours	D2471
Color	Lt. Amber	Light Amber				Lt. Amber	Visual
Mixed Viscosity, @77°F, cps	800-875 cps	900 - 950 cps				925-975 cps	D2393
Cured Hardness, Shore D	88 Shore D	88 Shore D				87 Shore D	D2240
Specific Gravity, grams, cc	1.16	1.11				1.12	D1475
Density, lb./cu. Inch	.0420	.0401				.0410	D792
Specific Volume, cu. in./lb.	23.8	25.0				24.4	D792
Tensile Strength, psi (1)	45,350 psi	9828 psi	45,170 psi	75,640 psi	45,400 psi	45,870 psi	D638
Elongation at Break, % (1)	1.91 %	1.90 %	1.96 %	0.91 %	1.31 %	1.98 %	D638
Tensile modulus, psi (1)	2,800,000 psi	418,525 psi	2,620,000 psi	8,170,000 psi	3,770,000 psi	2,520,000 psi	D638
Flexural Strength, psi (1)	68,167 psi	16,827 psi	62,285 psi	96,541 psi	34,524 psi	66,667 psi	D790
Flexural Modulus, psi (1)	2,770,000 psi	462,910 psi	2,560,000 psi	6,480,000 psi	2,500,000 psi	3,050,000 psi	D790
Glass Transition Temp., Tg	194°F	196°F				194°F	TMA
Thermal Coef. of Expansion Range:	3.7 x 10^{-5} in./in./°F	4.3 x 10^{-5} in./in./°F				4.15 x 10^{-5} in./in./°F	D696

(1) Fiberglass Properties Derived with A 10 Ply Laminate, Hand Lay-up, Style 181 Glass Fabric, 55% Glass Content; Graphite Properties with a 10 Ply Laminate of 5.6 oz. 3K Fabric; and Kevlar Properties with A 10 Ply Laminate of 5 oz. Kevlar

PACKAGING WEIGHTS

	Quart Kit	Gallon Kit	Pail Kit	Drum Kit
PR2032	2.25 lb.	7.5 lb.	48 lb.	500 lb.
PH3630, PH3660 or PH3665	.66 lb.	2 lb.	13 lb.	135 lb.
Kit	2.9 lb.	9.5 lb.	61 lb.	635 lb.

SAFETY and HANDLING

PTM&W AEROPOXY epoxy products are made from raw materials carefully chosen to minimize or even eliminate toxic chemicals, and therefore offer the user high performance products with minimum hazard potential when properly used. Generally, the PTM&W AEROPOXY epoxy resins and hardeners will present no handling problems if users exercise care to protect the skin and eyes, and if good ventilation is provided in the work areas. However, all epoxy resins and hardeners can be irritating to the skin, and prolonged contact may result in sensitization; and breathing of mist or vapors may cause allergenic respiratory reaction, especially in highly sensitive individuals. As such, avoid contact with eyes and skin, and avoid breathing vapors. Wear protective rubber apron, clothing, gloves, face shield or other items as required to prevent contact with the skin. In case of skin contact, immediately wash with soap and water, followed by a rinse of the area with vinegar, and then a further wash with soap and water. The vinegar will neutralize the hardener and lessen the chances of long term effects. Use goggles, a face shield, safety glasses or other items as required to prevent contact with the eyes. If material gets into the eyes, immediately flush with water for at least 15 minutes and call a physician. Generally, keep the work area as uncluttered and clean as possible, and clean up any minor spills immediately to prevent accidental skin contact at a later time. Keep tools clean and properly stored. Dispose of trash and empty containers properly. Do not use any of these types of products until Material Safety Data Sheets have been read and understood.

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