Tough, High-Strength Casting System Using PT8902 Urethane and Selected Reinforcing Filler

DESCRIPTION

PT8902 is a unique two-component urethane casting system that has very high cured properties - particularly impact strength. PT8902 has a notched Izod Impact Strength greater than 2.0. By itself, PT8902 produces very tough, impact resistant parts.

In situations where greater part stiffness is required, by the addition of certain reinforcing fillers PT8902 can produce castings that have a very high Flexural Modulus. When these fillers are incorporated into PT8902 castings, the resulting parts have much improved stiffness and excellent impact resistance. This allows the user to produce parts with the strengths to perform in the most demanding prototype and production applications.

FILLER TYPE AND SOURCES

Fiberglass milled fibers are E-glass filaments hammer-milled to various densities. Unlike chopped strands, which are chopped to a precise strand length, milled fibers are milled to an average bulk density, which is determined by the input glass and process conditions.

Milled fibers are available in sizes of $^1/_8$", $^1/_{16}$" and $^1/_{32}$". The $^1/_{32}$" size has proven to be the better for adding to PT8902, as the $^1/_8$" and $^1/_{16}$" fibers cause an unacceptably high viscosity. When using the $^1/_{32}$" fibers, a good pourable viscosity is maintained, and the mold can be filled with a minimum of air entrapment. Milled fibers are available with sizing that is compatible with thermosetting resins. The sizing improves the resin wet-out and adhesion to the fibers. The proper selection of sizing can make significant improvements in the final properties of the finished part.

The properties listed in this bulletin were derived by using PT8902 casting system with two commercially available milled fiber products. These milled fibers are treated with a sizing that gives excellent performance with thermosetting resins such as PT8902. These fibers are:

Product Number	7216M	731 ED $^1/_{32}$"
Supplier	Fibertec, Inc.	Fiberglass Services
Address	35 Scotland Blvd. Bridgewater, MA 02324 PH: 508-697-5100 FAX: 508-697-7140 www.fibertecins.com	Fiberglass Services, Inc. 15331 S. Avalon Blvd. Gardena, CA 90248 310-327-0080 FAX: 310-327-0060 Contact: Tammy Wiswell

HANDLING and CURING

Considering the effects on handling and cured properties, the optimum filler loading of PT8902 appears to be 25% on system. This translates to 100 Parts Resin to 50 Parts Filler to 50 Parts Hardener BY WEIGHT. The milled fiber should be added to the resin, to have a better, more liquid viscosity, than if it were added to the hardener component.

The technique is to add the 50 Parts Milled Fibers to the 100 Parts PT8902 Resin, stir thoroughly, and deair the mixture. At the time of pouring, the proper amount of PT8902 hardener is added to the premixed resin and fiber, mixed thoroughly, and cast into the mold. The casting is then cured according to the schedule outlined on the PT8902 Product Bulletin.

It is recommended that only the amount of material needed to cast at the moment be mixed and used at the same time. If a "Master Batch" of fiber filled resin is going to be made up in advance of casting, additional precautions must be undertaken. First, the milled fibers have a huge surface area per volume, and can attract moisture to the surface. This moisture attached to the fibers can cause problems as the resin/fiber mixture sits around before curing. Reaction with the resin in storage and/or foaming during cure are possible when excess moisture is present. Second, when mixed into the resin in advance, the milled fibers can settle out to a relative hard pack in storage. This hard settled layer of fibers must be thoroughly stirred back into the resin before mixing the material to pour.

HANDLING and CURING, Continued

Since the milled fibers can entrap atmospheric moisture in storage, it is advisable to dry the milled fiber before use. It is mandatory to dry the fibers if a "Master Batch" is to be produced, as the moisture will have a longer time to react with the resin in storage in this instance. The milled fibers used to develop the properties in this bulletin were dried overnight in a 180°F oven before use. Several hours and preferably overnight in a 170°F - 180°F oven before use are recommended.

The mix ratio for a system to be used at the time would be 100 Parts PT8902 Part A to 50 Parts Milled Fibers to 50 Parts PT8902 Part B, BY WEIGHT.

If a "Master Batch" is to be used, the mix ratio would be 100 Parts Resin/Milled Fibers Mixture to 33 Parts PT8902 Part B, BY WEIGHT.

IT IS ESSENTIAL TO MIX THESE MATERIALS BY WEIGHT TO INSURE THAT THE BEST HANDLING, THE PROPER CURED PROPERTIES AND REPEATABLE RESULTS ARE OBTAINED.

TYPICAL MECHANICAL PROPERTIES

	PT8902 A/B Casting System with:		ASTM Method
	Fibertec 7216M	OC 731 ED 1/32"	
Mix Ratio, Resin:Filler:Hardener, By Weight	100 : 50 : 50	100 : 50 : 50	PTM&W
Pot Life, @ 77°F	9 - 10 minutes	9 - 10 minutes	D2471
Mixed Viscosity, @ 77°F, centipoise	2,000 cps	1,200 cps	D2393
Cured Hardness, Shore D	87 Shore D	87 Shore D	D2240
Specific Gravity, grams, cc	1.2 - 1.25	1.2 - 1.25	D1475
Tensile Strength, psi	10,686 psi	5,805 psi	D638
Tensile modulus, psi	627,944 psi	567,900 psi	D638
Flexural Strength, psi	19,170 psi	12,265 psi	D790
Flexural Modulus, psi	821,583 psi	641,315 psi	D790
Compressive Strength, psi	14,477 psi	Not Tested	D695
Compressive Modulus, psi	547,922 psi	Not Tested	D695
Izod Impact Strength, Method A, Notched	.82	1.19	D256
Glass Transition Temp., DMA: Tg	219°F	222°F	D4065

SAFETY and HANDLING

PTM&W 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 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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