PTM&W Industries, Inc.

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Flexible Urethanes For Prototype and Production Parts

DESCRIPTION

The four elastomer systems listed on this bulletin are excellent materials for use in casting a wide variety of tough flexible prototype and/or short-run production parts. They vary in hardness from 40 Shore A to 70 Shore A, to provide a range that is suitable for softer parts requirements. These products combine ease of use with tough cured properties to allow rapid production of attractive, durable cured parts. They are low in color, so it is easy to add dyes or pigments to achieve a broad range of colors in the finished castings. All four have low, very fluid mixed viscosities, which allow easy mixing and pouring, and efficient mold filling, even in thin wall sections.

These four systems have been designed specifically for the pouring of prototype and production parts, and they can be adjusted for rather rapid curing, for faster production rates. The base working times and associated demold times for these systems can be shortened by the addition of a catalyst - PA8399 - to achieve the optimum demold time for individual part size and configuration. A table on the next page provides guidelines for the use of PA8399 catalyst to achieve different working and demold times with these urethanes.

PRODUCT SPECIFICATIONS

		Color	Viscosity	Specific Gravity	Mix Ratio By Wt.	Pot Life, 4 fl. oz. Mass
ASTM Test Method		Visual	D2392	D1475	PTM&W	D2471
40 A	PT8442 Part A	Lt. Amber	1175 cps	1.04	100 : 75	25 minutes
	PT8442 Part B	Lt. Amber	25 cps	1.08		
50 A	PT8452 Part A	Lt. Amber	1600 cps	1.04	100 : 70	20 minutes
	PT8452 Part B	Lt. Amber	20 cps	1.08		
60 A	PT8462 Part A	Lt. Amber	1600 cps	1.04	100 : 55	15 minutes
	PT8462 Part B	Lt. Amber	30 cps	1.10		
70 A	PT8472 Part A	Lt. Amber	1600 cps	1.04	100 : 25	8 minutes
	PT8472 Part B	Lt. Amber	30 cps	1.18		

HANDLING and CURING

These four urethane systems will cure completely at room temperature, but they can also be heat cured for faster production rates. The working times of the systems - without any catalyst added - allow demolding of the castings in from one to two hours, depending upon which system is being cast. These cure times are sometimes too slow for a production schedule, so it is best to heat cure the uncatalyzed systems for most efficient processing. With the addition of PA8399, demold times at room temperature can be shortened to the point where room temperature cures are acceptable in many cases. The catalyzed systems can also be heat cured, for even better production rates. The final catalyst content, working time cure method and demold time must be determined by the user, based on the part size, mold type and production requirements. The table and chart on the next page will provide additional information to aid in these decisions.

PACKAGING WEIGHTS

	PT8442 (40 A)		PT8452 (50 A)		PT8462 (60 A)		PT8472 (70 A)	
	Part A	Part B	Part A	Part B	Part A	Part B	Part A	Part B
Quart Klt	2 lb.	1.5 lb.	2 lb.	1.4 lb.	2 lb.	1.1 lb.	2 lb.	.5 lb.
Gallon Kit	8 lb.	6 lb.	8 lb.	5.6 lb.	8 lb.	4.4 lb.	8 lb.	2 lb.
Pail Kit	40 lb.	30 lb.	40 lb.	28 lb.	40 lb.	22 lb.	40 lb.	10 lb.

WORK LIFE and CURE TIME REDUCTION with THE USE OF PA8399 CATALYST

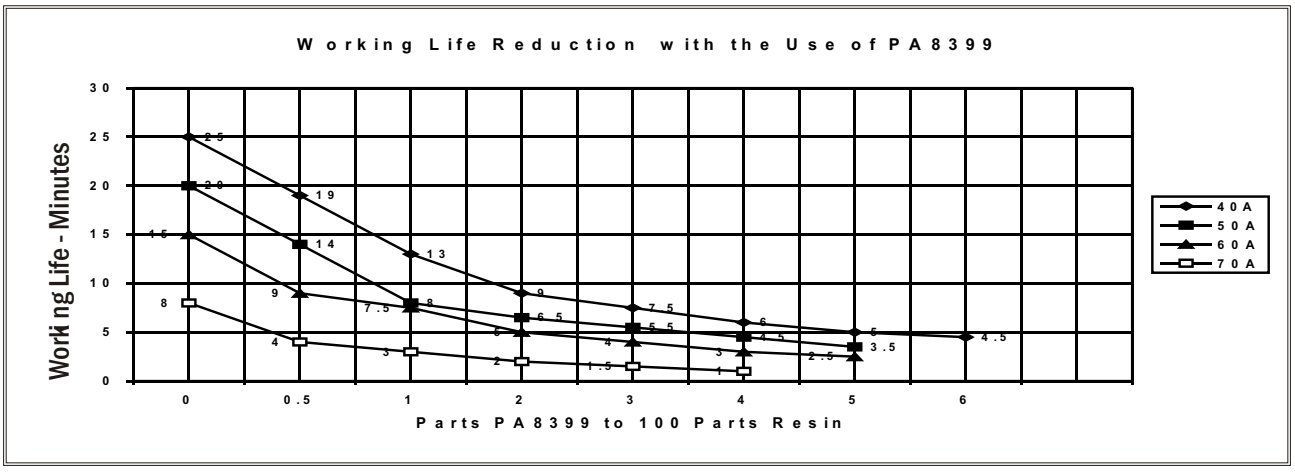
PA8399 is a low viscosity, liquid catalyst that can be used to accelerate the cure of the urethane systems listed in this bulletin. It is designed to be added in small quantities to achieve a faster demold time to meet required production rates. PA8399 is either added to the correctly proportioned resin and hardener at the time of mixing, or, it can be added to the resin ahead of time to make a master batch of a certain curing speed if desired. PA8399 should not be added to the hardener alone, as it will react with this component and yield undesirable results. The table and chart below outline the effects of different levels of PA8399 catalyst on the four urethane systems.

Effects of PA8399 Catalyst on The Working Time of Urethane Systems:

Resin/Hardener Ratio by Weight	Parts PA8399 to 100 Parts Resin (1)							
	0	0.5	1	2	3	4	5	6
PT8442 A/B 100 : 75	25 min.	19 min.	13 min.	9 min.	7.5 min.	6 min.	5 min.	4.5 min.
PT8452 A/B 100 : 70	20 min.	14 min.	8 min.	6.5 min.	5.5 min.	4.5 min.	3.5 min.(2)	xx(2)
PT8462 A/B 100 : 55	15 min.	9 min.	7.5 min.	5 min.	4 min.	3 min.(2)	2.2 min.(2)	xx(2)
PT8472 A/B 100 : 25	8 min.	4 min.	3 min.	2 min.(2)	1.5 min.(2)	1 min.(2)	xx(2)	xx(2)

(1) The amount of PA8399 catalyst listed is the parts of catalyst per hundred parts resin to use in the mixture. For example, to get a five minute work life with the PT8442 A/B (Shore A-40 System) the mix would be: 100 Parts Resin to 75 Parts Hardener to 5 Parts Catalyst.

(2) A full range of catalyst additions and resulting working times is listed, however, it is usually impractical to work with a system faster than five minutes. Therefore, the portion of the table with times faster than five minutes is shaded as a recommendation to avoid these mixtures. With a material that is gelling too fast, the resultant inadequate mold filling, improper cures, and greatly increased shrinkage, will usually yield unacceptable parts.



SPECIAL INFORMATION

It is possible to produce castings with cured hardnesses of Shore A-55 and Shore A-65 with the resins and hardeners on this bulletin. The table below gives details regarding the hardener blends to use with PT8452 A Resin to achieve these intermediate hardnesses. The cured properties for these two systems will be similar to results obtained with the individual hardeners.

Hardness Required	Hardener Blend Details	Mix Ratio of Hardener Blend with PT8452 A Resin
Shore A - 55	50% PT8452 B + 50% PT8462 B	100 Parts Resin to 60 Parts Hardener Blend
Shore A - 65	50% PT8452 B + 50% PT8472 B	100 Parts Resin to 34 Parts Hardener Blend

TYPICAL MECHANICAL PROPERTIES

	PT8442 A/B	PT8452 A/B	PT8462 A/B	PT8472 A/B	ASTM Method
Mix Ratio, By Weight	100 : 75	100 : 70	100 : 55	100 : 25	PTM&W
Color	Lt. Amber	Lt. Amber	Lt. Amber	Lt. Amber	Visual
Mixed Viscosity, @ 77°F, centipoise	825 cps	950 cps	1350 cps	2500 cps	D2393
Working Time, 4 fl.oz. mass @77°F	25 min.	20 min.	15 min.	8 min.	D2471
CURING DETAILS:					
Material w/ zero PA8399 Catalyst:					
Demold Time w/RT Cure (75°F)	2.5 - 3 hrs	2 - 2.5 hrs.	2 - 2.5 hrs.	2 - 2.5 hrs.	PTM&W
Demold Time w/ 150°F Cure	30-40 min.	30-40 min.	30-40 min.	30-40 min.	
Material w/ PA8399 Catalyst added to Attain A 5-minute Working Time:					
Demold Time w/RT Cure (75°F)	20-25 min.	20-25 min.	20-25 min.	20-25 min.	
Demold Time w/ 150°F Cure	10-12 min.	10-12 min.	10-12 min.	8-10 min.	
Cured Hardness, Shore A	40 A ± 5	50 A ± 5	60 A ± 5	70 A ± 5	D2240
Shrinkage, in/in, Mold Number 1, Volume: .053 Gal.	.0006	.0009	.0008	.0015	D2566
Specific Gravity, grams, cc	1.057	1.056	1.061	1.065	D1475
Tensile Strength, psi	800 psi	775 psi	1400 psi	1375 psi	D638
Elongation at Break, %	525 %	450 %	500 %	400 %	D638
Modulus @ 100% Elongation	175 psi	200 psi	300 psi	500 psi	D412
Modulus @ 200% Elongation	300 psi	375 psi	560 psi	875 psi	
Modulus @ 400% Elongation	520 psi	550 psi	1010 psi	1200 psi	
Tear Strength, pli, Die C	180 pli	165 pli	195 pli	340 pli	D624
Compression Set, %	45 %	30 %	29 %	27 %	D395
Bashore Rebound	65 %	64 %	60 %	60 %	D2632
Taber Abrasion, H18 Wheel, 1000 grams, 1000 cycles, mg loss	6 mg.	5 mg.	10.2 mg.	2 mg.	D1044

SAFETY and HANDLING

PTM&W urethane 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, 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, nitrile rubber 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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