Bayer MaterialScience

TEXIN® 390

Thermoplastic Polyurethane

Aromatic Polyester-Based Grade

Product Information

Description

Texin 390 resin is an aromatic polyester-based thermoplastic polyurethane with a Shore hardness of approximately 88A*. It can be processed by injection molding; extrusion processes are not recommended.

Applications

Texin 390 resin offers outstanding abrasion resistance, impact strength, toughness, and flexibility. It also exhibits excellent fuel and oil resistance, low compression set and good hydrolytic stability. Typical applications include gears, goggle frames, gaskets, seals, bumpers, athletic shoe soles, and casters. As with any product, use of Texin 390 resin in a given application must be tested (including but not limited to field testing) in advance by the user to determine suitability.

Storage

Texin thermoplastic polyurethane resins are hygroscopic and will absorb ambient moisture. The presence of moisture can adversely affect processing characteristics and the quality of parts. Therefore, the resins should remain in their sealed containers and be stored under cool and dry conditions until used. Storage temperature should not exceed 86°F (30°C). Unused resin from opened containers, or reground material that is not to be used immediately, should be stored in sealed containers.

Drying

Prior to processing, Texin 390 resin must be thoroughly dried in a desiccant dehumidifying hopper dryer. Hopper inlet air temperature should be 210°–230°F (100°–110°C). To achieve the recommended moisture content of less than 0.03%, the inlet air dew point should be -20°F (-29°C) or lower. The hopper capacity should be sufcient to provide a minimum residence time of 2 hours. Additional information on drying procedures is available in the Bayer brochure *General Drying Guide*.

Injection Molding

General-purpose screws are satisfactory for use with Texin 390 resin. The recommended screw length-to-diameter (L/D) ratio is 20:1 with a compression ratio of 2.5–3:1. Screws with a compression ratio greater than 4:1 should be avoided. Recommended shot weight is 40 - 80% of rated barrel capacity.

Typical starting conditions are noted below. Actual processing conditions will depend on machine size, mold design, material residence time, shot size, etc.

Typical Injection Molding Conditions

Barrel Temperature:	
Rear	360°–390°F (185°–199°C)
Middle	360°–400°F (182°–204°C)
Front	360°–410°F (182°–210°C)
Nozzle	370°–415°F (188°–213°C)
Melt Temperature	385°–405°F (195°–205°C)
(Melt temperature should not exceed 410°F (210°C)	
Mold Temperature	60°–100°F (15°–40°C)
Injection Pressure	6,000–15,000 psi
Hold Pressure	60-80% of Injection Pressure
Back Pressure	200 psi
Screw Speed	40–80 rpm
Injection Speed	Slow to Moderate
Cushion	1/8 inch max
Clamp	3–5 ton/in²
Timers (per 0.125-in cross section):	
Boost	5-10 sec
2nd Stage	10-30 sec
Cool	30-50 sec

Typical values for mold shrinkage are given below. For treatments such as postcuring, an additional 1 to 1.5 mil per inch should be added.

Cross Section	Mold Shrinkage*
Less than 1/8 inch	7–10 mils per inch
1/8 to 1/4 inch	10–15 mils per inch
Over 1/4 inch	15–20 mils per inch

Additional information on injection molding may be obtained by consulting the Bayer publication *Texin and Desmopan Thermoplastic Polyurethanes — A Processing Guide for Injection Molding* and by contacting a Bayer MaterialScience technical service representative.

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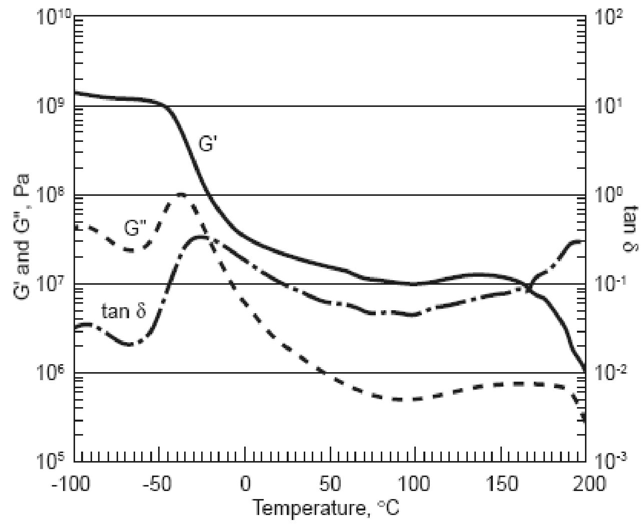
Regrind Usage

Where end-use requirements permit, up to 20% Texin resin regrind may be used with virgin material, provided that the material is kept free of contamination and is properly dried (see section on Drying). Any regrind used must be generated from properly molded/extruded parts, sprues, runners, trimmings, and/or films. All regrind used must be clean, uncontaminated, and thoroughly blended with virgin resin prior to drying and processing. Under no circumstances should degraded, discolored, or contaminated material be used for regrind. Materials of this type should be properly discarded.

Improperly mixed and/or dried regrind may diminish the desired properties of Texin resin. It is critical that you test finished parts produced with any amount of regrind to ensure that your end-use performance requirements are fully met. Regulatory or testing organizations (e.g., Underwriter's Laboratories) may have specific requirements limiting the allowable amount of regrind. Because third party regrind generally does not have a traceable heat history or offer any assurance that proper temperatures, conditions, and/or materials were used in processing, extreme caution must be exercised in buying and using regrind from third parties.

The use of regrind material should be avoided entirely in those applications where resin properties equivalent to virgin material are required, including but not limited to color quality, impact strength, resin purity, and/or load-bearing performance.

Dynamic Mechanical Analysis
of Texin 390 Resin



Health and Safety Information

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling Texin 390 resin. Before working with this product, you must read and become familiar with the available information on its hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your Bayer MaterialScience representative or contact Bayer's Product Safety and Regulatory Affairs Department in Pittsburgh, PA.

Typical Properties* for Natural Resin	ASTM Test Method (Other)	Texin® 390 Resin U.S. Conventional	Texin® 390 Resin SI Metric
General			
Specific Gravity	D 792 (ISO 1183)	1.22	
Shore Hardness	D 2240 (ISO 868)	88A	
Taber Abrasion:	D 3489 (ISO 4649)		
H-18, 1,000-g Load, 1,000 Cycles		40 mg Loss	
Bayshore Resilience	D 2632	35%	
Mold Shrinkage at 100-mil Thickness:	D 955 (ISO 2577)		
Flow Direction		0.008 in/in	0.008 mm/mm
Cross-Flow Direction		0.008 in/in	0.008 mm/mm
Mechanical			
Tensile Strength	D 412 (ISO 37)	7,000 lb/in^2	48.3 MPa
Tensile Stress at 100% Elongation	D 412 (ISO 37)	1,500 lb/in^2	10.3 MPa
Tensile Stress at 300% Elongation	D 412 (ISO 37)	3,750 lb/in^2	25.9 MPa
Ultimate Elongation	D 412 (ISO 37)	460%	
Flexural Modulus:	D 790 (ISO 178)		
73°F (23°C)		5,500 lb/in^2	38 MPa
-22°F (-30°C)		26,000 lb/in^2	179 MPa
Tear Strength, Die "C"	D 624 (ISO 34)	700 lbf/in	123 kN/m
Compression Set:	D 395-B (ISO 815)		
As Molded [Postcured][a]			
22 Hours at 158°F (70°C)		50 [25]	
22 Hours at 73°F (23°C)		16 [12]	
Compressive Load:	D 575		
2% Deflection		100 lb/in^2	0.7 MPa
5% Deflection		200 lb/in^2	1.4 MPa
10% Deflection		400 lb/in^2	2.8 MPa
15% Deflection		600 lb/in^2	4.1 MPa
20% Deflection		800 lb/in^2	5.5 MPa
25% Deflection		1,000 lb/in^2	6.9 MPa
50% Deflection		3,050 lb/in^2	21.0 MPa
Thermal			
Coefficient of Linear thermal Expansion	D 696	8.3 E-05 in/in/°F	14.9 E-05 in/in/°C
Low-Temperature Brittle Point	D 746 (ISO 974)	<-90°F	<-68°C
Glass Transition Temperature (Tg)	(DMA)[b]	-33°F	-36°C
Vicat Softening Temperature, Rate A	D 1525 (ISO 306)	246°F	119°C

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[a] Postcured for 16 hours at 230°F (110°C).

[b] DMA — Dynamic Mechanical Analysis.

Property Changes after Aging Texin® 390 Resin*	ASTM Test Method (Other)	Unit of Change	70 Hours	7 Days	14 Days	21 Days
Hot Air at 212°F (100°C)	D 573 (ISO 216)					
Tensile Strength		%	+12	+12	+17	+12
Tensile Stress at 100% Elongation		%	-6	-7	-10	- 8
Tensile Stress at 300% Elongation		%	-2	-5	-5	-7
Ultimate Elongation		%	0	+7	+5	0
Hardness		Shore A	-1	-1	-1	-1
ASTM Oil #1 at 212°F (100°C)	D 471 (ISO 175)					
Tensile Strength		%	+15	+26	+18	+20
Tensile Stress at 100 % Elongation		%	+3	-2	+2	+2
Tensile Stress at 300% Elongation		%	+14	+1	+6	+5
Ultimate Elongation		%	+1	+12	+13	+11
Hardness		Shore A	-2	-1	-1	0
Volume		%	-1	-1	0	-1
ASTM Oil #3 at 212°F (100°C)	D 471 (ISO 175)					
Tensile Strength		%	+24	+36	+21	+19
Tensile Stress at 100% Elongation		%	-2	-3	-1	-2
Tensile Stress at 300% Elongation		%	+4	+2	0	-1
Ultimate Elongation		%	+6	+3	+17	+18
Hardness		Shore A	-2	-1	-1	-1
Volume		%	+4	+5	+6	+7
Fuel A at 73°F (23°C)	D 471 (ISO 175)					
Tensile Strength		%	+3	+27	+7	+18
Tensile Stress at 100% Elongation		%	0	- 6	- 4	-5
Tensile Stress at 300% Elongation		%	0	- 3	0	-3
Ultimate Elongation		%	+1	+1	+2	+2
Hardness		Shore A	-1	+1	+2	0
Volume		%	0	0	0	+1
Fuel C at 73°F (23°C)	D 471 (ISO 175)					
Tensile Strength		%	-26	-32	-28	-30
Tensile Stress at 100% Elongation		%	-19	-20	-15	-20
Tensile Stress at 300% Elongation		%	-30	-28	-27	-29
Ultimate Elongation		%	+4	-3	0	0
Hardness		Shore A	-2	-4	-2	-2
Volume		%	+17	+20	+20	+20

** This table shows property changes for Texin 390 resin after exposure to hot air, oil, and fuel. As is the case with any compatibility test, the results are dependent on variables, such as concentration, time, temperature, part design, and residual stresses, and should serve only as a guideline. It is imperative that production parts be evaluated under actual application conditions prior to commercial use.*

Note: The information contained in this bulletin is current as of June 2008. Please contact Bayer MaterialScience to determine whether this publication has been revised.

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