Texin® 270D

Characterization	Texin 270D resin is an aromatic polyester-based thermoplastic polyurethane with a Shore hardness of approximately 70D*. It can be processed by injection molding; extrusion processes are not recommended.
Properties / Applications	Texin 270D resin exhibits excellent fuel and oil resistance. It also provides high stiffness, tensile and tear properties. Texin 270 natural color resin complies with FDA food-contact regulations 21 CFR 177.1680 (Polyurethane Resins) and 177.2600 (Rubber Articles Intended for Repeated Use), subject to the limitations of these and any other applicable regulations. Typical applications include caster wheels, gears, sprockets, and sporting equipment. As with any product, use of Texin 270D resin in a given application must be tested (including field testing, etc.) 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 270D 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 sufficient to provide a minimum residence time of 4 hours. Additional information on drying procedures is available in the brochure - General Drying Guide.

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Injection Molding

General-purpose screws are satisfactory for use with Texin 270D 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, etc.

Typical Injection Molding Conditions

Barrel Temperature: Rear	410°–435°F (210°–2245°C)
Barrel Temperature: Middle	415°–440°F (210°–227°C)
Barrel Temperature: Front	415°–440°F (210°–227°C)
Barrel Temperature: Nozzle	420°–445°F (216°–229°C)
Melt Temperature	420°–445°F (216°–229°C)
Mold Temperature	85°–120°F (29°–49°C)
Injection Pressure	10,000 - 18,000 psi
Hold Pressure	60 - 80% of Injection Pressure
Back Pressure	800 psi max.
Screw Speed	40 - 80 rpm
Injection Speed	Slow to Moderate
Cushion	1/8 in max
Clamp	3 - 5 ton/in^2
Timers (per 0.125-in cross section)	
Boost	5 -10 sec
2nd Stage	10- 20 sec
Cool	20 - 30 sec

Mold Shrinkage

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 Injection Molding Information

Additional information on injection molding may be obtained by consulting the publication Texin and Desmopan Thermoplastic Polyurethanes — A Processing Guide for Injection Molding and by contacting a Covestro 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.

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Typical Properties* for Natural Resin

Property	ASTM Test Method (Other)	Texin 270D Resin U.S. Units	Texin 270D Resin S.I. Units
General			
Specific Gravity	D 792 (ISO 1183)	1.24	1.24
Shore Hardness	D 2240 (ISO 868)	70D	70D
Taber Abrasion: H-18, 1,000-g Load, 1,000 Cycles	D 3489 (ISO 4649)	90 mg Loss	90 mg Loss
Bayshore Resilience	D 2632	55%	55%
Mold Shrinkage, 100-mil thickness	D 955 (ISO 2577)		
Flow Direction		0.008 in/in (mm/mm)	0.008 in/in (mm/mm)
Cross-Flow Direction		0.008 in/in (mm/mm)	0.008 in/in (mm/mm)
Mechanical			
Tensile Strength	D 412 (ISO 37)	8,200 lb/in^2	56.6 MPa
Tensile Stress at 50% Elongation	D 412 (ISO 37)	4,100 lb/in^2	28.3 MPa
Tensile Stress at 100% Elongation	D 412 (ISO 37)	4,200 lb/in^2	29.0 MPa
Tensile Stress at 300% Elongation	D 412 (ISO 37)	6,200 lb/in^2	42.8 MPa
Ultimate Elongation	D 412 (ISO 37)	400%	400%
Flexural Modulus:	D 790 (ISO 178)		
158°F (70°C)		15,000 lb/in^2	103 MPa
73°F (23°C)		105,000 lb/in^2	724 MPa
-22°F (-30°C)		422,000 lb/in^2	2,910 MPa
Tear Strength, Die C	D 624 (ISO 34)	1,300 lbf/in	228 kN/m
Compression Set:	D 395-B (ISO 815)		
As molded [postcured][a]		85 [45]	85 [45]
22 Hours at 158°F (70°C)		50 [30]	50 [30]
22 Hours at 73°F (23°C)			

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Typical Properties* for Natural Resin (CONT'D.)

Property	ASTM Test Method (Other)	Texin 270D Resin U.S. Units	Texin 270D Resin S.I. Units
Mechanical			
Compressive Load:	D 575		
2% Deflection		550 lb/in^2	3.8 MPa
5% Deflection		1,900 lb/in^2	13.1 MPa
10% Deflection		3,150 lb/in^2	21.7 MPa
15% Deflection		3,750 lb/in^2	25.9 MPa
20% Deflection		4,250 lb/in^2	29.3 MPa
25% Deflection		4,900 lb/in^2	33.8 MPa
50% Deflection		9,550 lb/in^2	65.8 MPa
Thermal			
Deflection Temperature Under Load	D648 (ISO 75)		
264 psi (1.82 MPa)		100°F	38°C
66 psi (0.46 MPa)		115°F	46°C
Coefficient of Linear Thermal Expansion	D 696	5.5 E-05 in/in°F	9.9 E-05 mm/mm°C
Low Temperature Brittle Point	D 746 (ISO 974)	< -90°F	< -68°C
Glass Transition Temperature (Tg)	(DMA)[b]	32°F	0°C
Vicat Softening Temperature Rate A	D 1525 (ISO 306)	316°F	158°C

**These items are provided as general information only. They are approximate values and are not part of the product specifications.*

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

b DMA — Dynamic Mechanical Analysis.

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Property Changes after Aging Texin 270D Resin

Property	ASTM Test Method (Other)	70 Hours	7 Days	14 Days	21 Days
Hot Air at 212°F (100°C)	D 573 (ISO 216)				
Tensile Strength		+17%	+10%	+9%	+21%
Tensile Stress at 100% Elongation		+10%	+2%	+2%	+1%
Tensile Stress at 300% Elongation		+12%	+6%	+4%	+2%
Ultimate Elongation		+3%	+3%	+3%	+15%
Hardness, Shore D		+1	-6	-5	-1
ASTM Oil #1 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		+20%	+7%	+2%	+8%
Tensile Stress at 100% Elongation		+2%	-1%	-3%	-6%
Tensile Stress at 300% Elongation		+8%	+7%	-3%	-11%
Ultimate Elongation		+8%	-4%	+4%	+17%
Hardness, Shore D		-1	-3	-4	-2
Volume		0%	0%	0%	0%
ASTM Oil #3 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		+13%	+29%	+32%	+20%
Tensile Stress at 100% Elongation		0%	-1%	-2%	-8%
Tensile Stress at 300% Elongation		+8%	+4%	-2%	-11%
Ultimate Elongation		+4%	+19%	+36%	+51%
Hardness, Shore D		-4	-5	-2	-5
Volume		0%	+1%	+2%	+2%

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Property Changes after Aging Texin 270D Resin (CONT'D.)

Property	ASTM Test Method (Other)	70 Hours	7 Days	14 Days	21 Days
Fuel A at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		-4%	-5%	0%	-2%
Tensile Stress at 100% Elongation		-4%	-3%	-3%	-1%
Tensile Stress at 300% Elongation		-2%	-4%	+4%	-1%
Ultimate Elongation		0%	0%	-7%	-1%
Hardness, Shore D		-1	-5	-1	+2
Volume		0%	0%	0%	0%
Fuel C at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		+10%	-+3%	+8%	+9%
Tensile Stress at 100% Elongation		-4%	-6%	-18%	-21%
Tensile Stress at 300% Elongation		-1%	+10%	-4%	-2%
Ultimate Elongation		+15%	-17%	+12%	+10%
Hardness, Shore D		0	-1	-4	-5
Volume		+1%	+2%	+2%	+2%

** This table shows property changes for Texin 270D 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.*

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Health and Safety Information	Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling this product. Before working with this product, you must read and become familiar with the available information on its risks, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., safety data sheets and product labels. For further information contact your Covestro LLC representative or the Product Safety and Regulatory Affairs Department in Pittsburgh, PA.
Note	***The purchaser/user agrees that Covestro LLC reserves the right to discontinue this product without prior notice.***

Editor: Covestro LLC
1 Covestro Circle
Pittsburgh, Pennsylvania 15205
United States
www.covestro.com

Contact:
TPU Single Point of Contact
e-mail: tpuinfo@covestro.com