Bayer MaterialScience

TEXIN® 255

Thermoplastic Polyurethane

Polyester-Based Grade

Product Information

Description

Texin® 255 resin is a polyester-based thermoplastic polyurethane with a Shore hardness of approximately 55D.* It can be processed by injection molding; extrusion processes are not recommended. Texin 255 natural color resin is in chemical compliance with FDA food contact regulations 21 CFR 177.1680 (Polyurethane Resins) and 177.2600 (Rubber Articles Intended for Repeated Use), for use in articles that contact food except articles used for packing or holding food during cooking, subject to the limitations of these and any other applicable regulations.

Applications

Texin 255 resin offers excellent fuel and oil resistance, as well as outstanding abrasion resistance, impact strength, toughness, and flexibility. Typical applications include toplifts, seals, gaskets, sleeves, casters, and gears. As with any product, use of Texin 255 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 255 resin must be thoroughly dried in a desiccant dehumidifying hopper dryer. Hopper inlet air temperature should be 200°–220°F (93°–104°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 2 hours. Additional information on drying procedures is available in the Bayer brochure *General Drying Guide*.

Injection Molding

Texin 255 resin may be easily processed on commercially available equipment suitable for injection molding of thermoplastic polyurethane elastomers. 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.

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	380°–410°F (193°–210°C)
Middle	380°–420°F (193°–216°C)
Front	390°–430°F (199°–221°C)
Nozzle	400°–440°F (204°–227°C)
Ideal Melt Temperature	410°F (210°C)
Mold Temperature:	
Stationary Part	60°–110°F (16°–43°C)
Moving Part	60°–110°F (16°–43°C)
Injection Pressure:	
1st Stage	7,000–13,000 psi
2nd Stage	6,000–10,000 psi
Clamp Pressure	3–5 ton/in² of projected part area
Shot Weight	40–80% of rated barrel capacity
Timers (per 0.125-in cross section):	
Boost	5–15 sec
2nd Stage	10–25 sec
Cool	25–40 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.

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

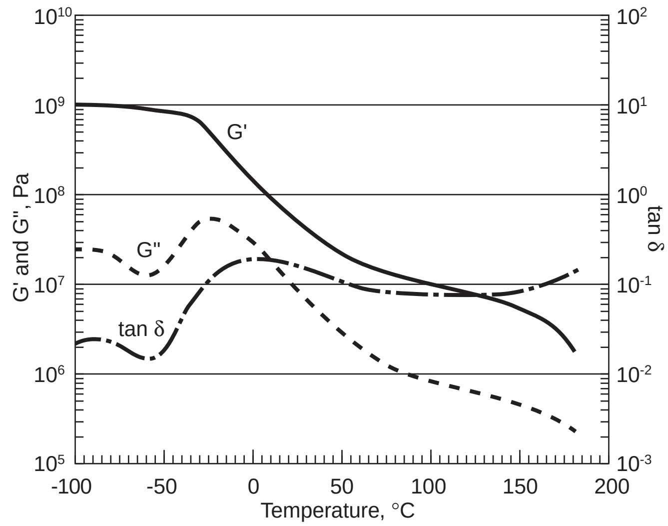
Regrind Usage

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 parts, sprues, and/or runners. 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., UL) 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 255 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 255 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* of Natural Resin	ASTM Test Method (Other)	Texin® 255 Resin U.S. Conventional	Texin® 255 Resin Si Metric
General			
Specific Gravity	D 792 (ISO 1183)	1.21	
Shore Hardness	D 2240 (ISO 868)	55D	
Taber Abrasion:	D 3489 (ISO 4649)		
H-18, 1000-g Load, 1,000 Cycles		50 mg Loss	
Bayshore Resilience	D 2632	40%	
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 50% Elongation	D 412 (ISO 37)	1,800 lb/in^2	12.4 MPa
Tensile Stress at 100% Elongation	D 412 (ISO 37)	2,000 lb/in^2	13.8 MPa
Tensile Stress at 300% Elongation	D 412 (ISO 37)	4,000 lb/in^2	27.6 MPa
Ultimate Elongation	D 412 (ISO 37)	500%	
Shear Strength	D 732	5,585 lb/in^2	38.5 MPa
Tear Strength, Die C	D 624 (ISO 34)	900 lbf/in	157.6 kN/m
Flexural Modulus:	D 790 (ISO 178)		
158°F (70°C)		9,000 lb/in^2	62 MPa
73°F (23°C)		20,000 lb/in^2	138 MPa
-22°F (-30°C)		175,000 lb/in^2	1,207 MPa
Compression Set:	D 395-B (ISO 815)		
As Molded			
22 Hours at 212°F (100°C)		75%	
22 Hours at 158°F (70°C)		65%	
22 Hours at 73°F (23°C)		20%	
Post-Cured**			
22 Hours at 212°F (100°C)		50%	
22 Hours at 158°F (70°C)		35%	
22 Hours at 73°F (23°C)		15%	
Compressive Load:	D 575		
2% Deflection		140 lb/in^2	1.0 MPa
5% Deflection		565 lb/in^2	3.9 MPa
10% Deflection		1,075 lb/in^2	7.4 MPa
15% Deflection		1,465 lb/in^2	10.1 MPa
20% Deflection		1,840 lb/in^2	12.7 MPa
25% Deflection		2,245 lb/in^2	15.5 MPa
50% Deflection		5,890 lb/in^2	40.6 MPa
Instrumented Impact, Total Energy:	D 3763 (ISO 6603)		
100-mil Thickness, 5 mph, 3-in Clamp			
73°F (23°C)		42.6 ft·lb	57.8 J
-22°F (-30°C)		36.9 ft·lb	50.0 J
Thermal			
Deflection Temperature Under Load:	D 648 (ISO 75)		
66 psi		139°F	59°C
Coefficient of Linear Thermal Expansion	D 696	7.3 E-05 in/in°F	13.1 E-05 mm/mm/°C
Low-Temperature Brittle Point	D 746 (ISO 974)	<-90°F	<-68°C
Glass Transition Temperature (Tg)	(DMA)[a]	-15°F	-26°C
Vicat Softening Temperature (Rate A)	D 1525 (ISO 306)	334°F	168°C
Flammability* **			
UL94 Flame Class:	(UL94)		
1.5-mm (0.059-in) Thickness		HB[b] Rating	

* *These items are provided as general information only. They are approximate values and are not part of the product specifications.*
** *Postcured 16 hrs at 230°F (110°C).*
*** *Flammability results are based on small-scale laboratory tests for purposes of relative comparison and are not intended to reflect the hazards presented by this or any other material under actual fire conditions.*
[a] *DMA—Dynamic Mechanical Analysis.*
[b] *Natural and black colors.*

Texin® 255 Resin Property Changes after Aging*	ASTM Test Method (Other)	Unit of Change	70 Hrs	7 Days	14 Days	21 Days
Hot Air at 257°F (125°C)	D 573 (ISO 216)					
Tensile Strength		%	-20	-11	-23	-27
Tensile Stress at 100% Elongation		%	+7	-2	+8	+4
Tensile Stress at 300% Elongation		%	-23	-15	-27	-30
Ultimate Elongation		%	+28	+24	+35	+30
Hardness		Shore D	+1	0	-5	-4
Hot Air at 212°F (100°C)	D 573 (ISO 216)					
Tensile Strength		%	+3	+8	+14	+14
Tensile Stress at 100% Elongation		%	+11	+4	+13	+14
Tensile Stress at 300% Elongation		%	+1	-5	-1	+1
Ultimate Elongation		%	-3	+7	+14	+11
Hardness		Shore D	-2	-1	0	0
ASTM Oil #1 at 212°F (100°C)	D 471 (ISO 175)					
Tensile Strength		%	+18	-4	-20	-29
Tensile Stress at 100% Elongation		%	+12	+14	+14	+15
Tensile Stress at 300% Elongation		%	+7	+2	-9	-14
Ultimate Elongation		%	+8	+12	+24	+16
Hardness		Shore D	+2	+1	-2	0
Volume		%	-1	0	-1	-1
ASTM Oil #3 at 212°F (100°C)	D 471 (ISO 175)					
Tensile Strength		%	+19	—	—	-18
Tensile Stress at 100% Elongation		%	+16	—	—	+13
Tensile Stress at 300% Elongation		%	+13	—	—	-12
Ultimate Elongation		%	+6	—	—	+20
Hardness		Shore D	+2	—	—	-1
Volume		%	+2	—	—	+4
Fuel A at 73°F (23°C)	D 471 (ISO 175)					
Tensile Strength		%	+6	-3	+6	-1
Tensile Stress at 100% Elongation		%	+2	-2	+3	+5
Tensile Stress at 300% Elongation		%	+5	-11	-1	+3
Ultimate Elongation		%	-4	+9	-4	-2
Hardness		Shore D	-4	+1	-1	+6
Volume		%	0	0	0	0
Fuel C at 73°F (23°C)	D 471 (ISO 175)					
Tensile Strength		%	+4	-4	-10	-11
Tensile Stress at 100% Elongation		%	-19	-27	-32	-27
Tensile Stress at 300% Elongation		%	-22	-34	-35	-28
Ultimate Elongation		%	+5	+6	-2	-8
Hardness		Shore D	-7	-4	-6	-8
Volume		%	+6	+10	+14	+14

* *This table shows property changes for Texin 255 resin after exposure to hot air, oil, and fuel. As is the case with any compatibility test, the results are dependent on such variables 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 October 2002. Please contact Bayer MaterialScience to determine whether this publication has been revised.

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