Texin® 950DU

Characterization	Texin 950DU resin is a polyether-based thermoplastic polyurethane with a Shore hardness of approximately 50D*. It can be processed by injection molding or extrusion.
Properties / Applications	In addition to inherent resistance to salt water stress cracking, hydrolysis, Texin 950DU resin offers outstanding abrasion resistance, impact strength, toughness, and flexibility. It is also stabilized against degradation due to heat and UV exposure. Applications include gasketed hose, tubing, shoe inserts, connectors, belting, and miscellaneous molded articles. In addition, Texin 950DU natural color resin is listed under NSF stanard 61 for use in potable water applications. As with any product, use of Texin 950DU 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 950DU resin must be thoroughly dried in a desiccant dehumidifying hopper dryer. Hopper inlet air temperature should be 190° –210°F (88° –99°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.

Document contains important information and must be read in its entirety.

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Injection Molding

General-purpose screws are satisfactory for use with Texin 950DU 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. 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	390°–410°F (199°–210°C)
Barrel Temperature: Middle	395°–415°F (202°–213°C)
Barrel Temperature: Front	395°–415°F (202°–213°C)
Barrel Temperature: Nozzle	400°–420°F (204°–216°C)
Ideal Melt Temperature	400-410°F (204-210°C)
Mold Temperature	80°–120°F (27°–49°C)
Injection Pressure	8,000 - 15,000 psi
Back Pressure	800 psi
Clamp Pressure	3 - 5 ton/in^2 of projected part area
Shot Weight	40 - 80% of rated barrel capacity
Timers (per 0.125-in cross section)	
Boost	3 -10 sec
2nd Stage	8 - 20 sec
Cool	20 - 35 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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Extrusion

Texin 950DU resin possesses a satisfactory melt strength and can be controlled over a wide range of temperature conditions to produce tubing, sheet, and extruded profiles. Typical starting conditions are noted below. Actual processing conditions vary and are dependent on size of extruders, extrusion rate, part geometry, etc.

Typical Temperature Profile for Extrusion

Zone 1 (Feed)	380°–400°F (193°–204°C)
Zone 2 (Transition)	385°–405°F (196°–207°C)
Zone 3 (Metering)	385°–405°F (196°–207°C)
Die	390°–410°F (199°–210°C)
Ideal Melt	390°–410°F (199°–210°C)

Additional Extrusion Information

The preferred screw design should have a compression ratio of 3:1 and should feature a long, gradual transition zone and a long meter zone. The recommended length- to-diameter (L/D) ratio is at least 24:1. Typical recommendations for 3:1 compression ratio screws on various sizes of 24:1 L/D extruders are given in the table below. Additional information on extrusion may be obtained by consulting the publication - Texin and Desmopan Thermoplastic Polyurethanes - A Processing Guide for Extrusion and by contacting a Covestro technical service representative.

Section	Number of Diameters	Depth ("h") in inches		
		2 1/2-in Extruder	3 1/2-in Extruder	4 1/2-in Extruder
Feed	5	0.375	0.450	0.525
Transition	7 - 13			
Meter	6 - 12	0.125	0.150	0.175

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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.

Regulatory Compliance Information

Some of the end uses of the products described in this bulletin must comply with applicable regulations, such as FDA, NSF, USDA, and CPSC. If you have any questions on the regulatory status of these products, contact your Covestro representative or Regulatory Affairs Manager in Pittsburgh, PA.

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.

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Typical Properties* for Natural Resin

Property	ASTM Test Method (Other)	Texin 950DU Resin U.S. Units	Texin 950DU Resin S.I. Units
General			
Specific Gravity	D 792 (ISO 1183)	1.15	1.15
Shore Hardness	D 2240 (ISO 868)	50D	50D
Taber Abrasion: H-18, 1,000-g Load, 1,000 Cycles	D 3489 (ISO 4649)	75 mg Loss	75 mg Loss
Bayshore Resilience	D 2632	35%	35%
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)	7,100 lb/in^2	49.0 MPa
Tensile Stress at 50% Elongation	D 412 (ISO 37)	1,750 lb/in^2	12.1 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)	470%	470%
Flexural Modulus:	D 790 (ISO 178)		
158°F (70°C)		6,800 lb/in^2	46.9 MPa
73°F (23°C)		16,500 lb/in^2	113.8 MPa
Tear Strength, Die C	D 624 (ISO 34)	750 lbf/in	131.3 kN/m
Compression Set:	D 395-B (ISO 815)		
As molded [postcured][a]		70 [40]	70 [40]
22 Hours at 158°F (70°C)		20 [15]	20 [15]
22 Hours at 73°F (23°C)			
Compressive Load:	D 575		
2% Deflection		150 lb/in^2	1.0 MPa
5% Deflection		425 lb/in^2	2.9 MPa
10% Deflection		800 lb/in^2	5.5 MPa
15% Deflection		1,100 lb/in^2	7.6 MPa
20% Deflection		1,500 lb/in^2	10.3 MPa
25% Deflection		1,800 lb/in^2	12.4 MPa
50% Deflection		4,500 lb/in^2	31.0 MPa

Texin® 950DU

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

Property	ASTM Test Method (Other)	Texin 950DU Resin U.S. Units	Texin 950DU Resin S.I. Units
Thermal			
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)[b]	-17°F	-27°C
Vicat Softening Temperature Rate A	D 1525 (ISO 306)	262°F	128°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 950DU Resin

Property	ASTM Test Method (Other)	70 Hours	7 Days	14 Days	21 Days
Hot Air at 257°F (125°C)	D 573 (ISO 216)				
Tensile Strength		-11%	-27%	-40%	-44%
Tensile Stress at 100% Elongation		+1%	+4%	0%	-5%
Tensile Stress at 300% Elongation		-7%	-18%	-22%	-25%
Ultimate Elongation		+22%	+29%	+12%	+9%
Hardness, Shore D		+1	-1	-1	+1
Hot Air at 212°F (100°C)	D 573 (ISO 216)				
Tensile Strength		+2%	+2%	+4%	+38%
Tensile Stress at 100% Elongation		+4%	+4%	+4%	+5%
Tensile Stress at 300% Elongation		+2%	-1%	-2%	-3%
Ultimate Elongation		+10%	+15%	+19%	+16%
Hardness, Shore D		-1	0	-2	-1
ASTM Oil #1 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		+2%	0%	-2%	-3%
Tensile Stress at 100% Elongation		+7%	+4%	+8%	+4%
Tensile Stress at 300% Elongation		0%	0%	0%	-7%
Ultimate Elongation		+18%	+19%	+23%	+32%
Hardness, Shore D		0	+2	0	+2
Volume		0%	0%	0%	0%

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Property Changes after Aging Texin 950DU Resin (CONT'D.)

Property	ASTM Test Method (Other)	70 Hours	7 Days	14 Days	21 Days
ASTM Oil #3 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		+10%	+12%	-3%	+1%
Tensile Stress at 100% Elongation		+2%	-7%	-2%	-9%
Tensile Stress at 300% Elongation		+3%	-11%	-9%	-18%
Ultimate Elongation		+17%	+25%	+27%	+38%
Hardness, Shore D		+5	+5	-4	-2
Volume		+9%	+10%	+12%	+13%
Fuel A at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		+16%	+16%	+7%	+13%
Tensile Stress at 100% Elongation		-3%	+6%	+1%	-4%
Tensile Stress at 300% Elongation		0%	+2%	+3%	-4%
Ultimate Elongation		+5%	+7%	+3%	+8%
Hardness, Shore D		+1	+1	0	+2
Volume		0%	+1%	+1%	+1%
Fuel C at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		-17%	-17%	-20%	-15%
Tensile Stress at 100% Elongation		-42%	-36%	-36%	-36%
Tensile Stress at 300% Elongation		-36%	-30%	-33%	-51%
Ultimate Elongation		0%	-6%	-2%	-2%
Hardness, Shore D		-11	-13	-10	-13
Volume		+22%	+26%	+26%	+26%

** This table shows property changes for Texin 950DU 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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Note

The purchaser/user agrees that Covestro LLC reserves the right to discontinue this product without prior notice.

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether our products, technical assistance and information are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance, and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with any claim of any patent relative to any material or its use. No license is implied or in fact granted under the claims of any patent.

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