Bayer MaterialScience

DESMOPAN 445

Thermoplastic Polyurethane

Polyester-Based Grade

Description

Desmopan 445 resin is a polyester-based thermoplastic polyurethane with a Shore hardness of approximately 45D*. It can be processed by injection molding; extrusion processes are not recommended.

Applications

In addition to outstanding abrasion resistance, impact strength, toughness, and flexibility, Desmopan 445 resin offers excellent compression properties. Applications include diaphragms, seals, gaskets, boots, and casters. However, as with any product, use of Desmopan 445 resin in a given application must be tested (including field testing, etc.) in advance by the user to determine suitability.

Storage

Desmopan 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, Desmopan 445 resin must be thoroughly dried in a desiccant dehumidifying hopper dryer. Hopper inlet air temperature should be 210–230°F (99–110°C). To achieve the recommended moisture content of less than 0.03%, the inlet air dew point should be 0°F (-18°C) or lower. The hopper capacity should be sufficient to provide a minimum residence time of 2 hours.

Injection Molding

General-purpose screws are satisfactory for use with Desmopan 445 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 Injection Molding Conditions	
Barrel Temperature:	
Rear	360–390°F (180–200°C)
Middle	360–400°F (180–205°C)
Front	360–410°F (180–210°C)
Nozzle	370–415°F (185–215°C)
Ideal Melt Temperature	400°F (205°C)
Mold Temperature:	
Stationary Part	60–110°F (15–45°C)
Moving Part	60–110°F (15–45°C)
Injection Pressure:	
1st Stage	6,000–14,000 psi
2nd Stage	5,000–10,000 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	5–10 sec
2nd Stage	10–20 sec
Cool	20–30 sec

Typical values for mold shrinkage to be taken into account are as follows:

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

For treatments such as postcuring, an additional 1 to 1.5 mil per inch should be added.

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

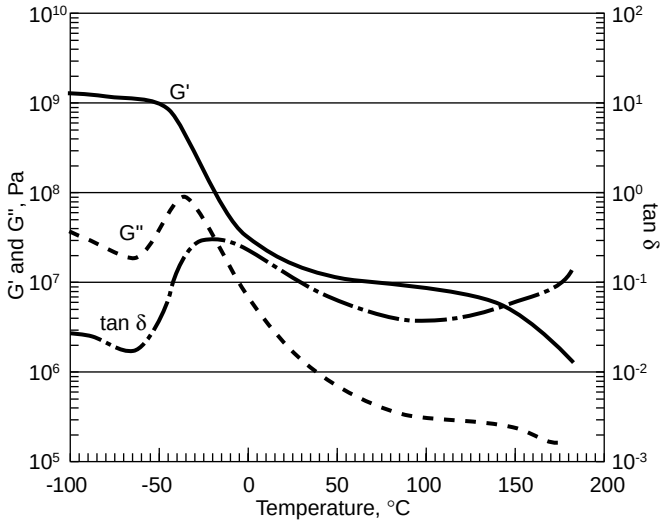
Regrind Usage

For Desmopan resin, up to 20% regrind may be used with virgin material, depending upon the end-use requirements of the molded part and 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 discarded.

Improperly mixed and/or dried resin may diminish the desired properties of Texin resin. You must conduct testing on finished parts produced with any amount of regrind to ensure that your end-use performance requirements are fully met. Regulatory 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, nor 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 Desmopan 445 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 Desmopan 445 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 local Bayer MaterialScience representative or contact Bayer's Product Safety and Regulatory Affairs Department in Pittsburgh, Pa.

Note: The information contained in this bulletin is current as of July 1995. Please contact Bayer MaterialScience to determine whether this publication has been revised.

Typical Physical Properties* of Natural Resin	ASTM Test Method (Other)	Units U.S. Conventional	Units SI Metric	Desmopan 445 Resin U.S. Conventional	Desmopan 445 Resin SI Metric
General					
Specific Gravity	D 792 (ISO 1183)			1.22	
Shore Hardness	D 2240 (ISO 868)	D Scale		45	
Taber Abrasion:	D 3489 (ISO 4649)				
H-18, 1000-g Load, 1,000 Cycles		mg Loss		45	
Bayshore Resilience	D 2632	%		40	
Mold Shrinkage at 100-mil Thickness:	D 955 (ISO 2577)				
Flow Direction		in/in (mm/mm)		0.008	
Cross-Flow Direction		in/in (mm/mm)		0.008	
Mechanical					
Tensile Strength	D 412 (ISO 37)	lb/in^2	MPa	4,500	31.0
Tensile Stress at 50% Elongation	D 412 (ISO 37)	lb/in^2	MPa	1,250	8.6
Tensile Stress at 100% Elongation	D 412 (ISO 37)	lb/in^2	MPa	1,400	9.7
Tensile Stress at 300% Elongation	D 412 (ISO 37)	lb/in^2	MPa	2,500	17.2
Ultimate Elongation	D 412 (ISO 37)	%		500	
Tear Strength, Die “C”	D 624 (ISO 34)	lbf/in	kN/m	700	122.6
Flexural Modulus:	D 790 (ISO 178)				
158°F (70°C)		lb/in^2	MPa	5,450	37.6
73°F (23°C)		lb/in^2	MPa	8,400	57.9
-22°F (-30°C)		lb/in^2	MPa	37,200	256.5
Compression Set:	D 395-B (ISO 815)				
As Molded (Post-Cured)**					
22 Hours at 158°F (70°C)		%		65 (30)	
22 Hours at 73°F (23°C)		%		16 (12)	
Compressive Load:	D 575				
2% Deflection		lb/in^2	MPa	100	0.7
5% Deflection		lb/in^2	MPa	275	1.9
10% Deflection		lb/in^2	MPa	500	3.4
15% Deflection		lb/in^2	MPa	750	5.2
20% Deflection		lb/in^2	MPa	975	6.7
25% Deflection		lb/in^2	MPa	1,250	8.6
50% Deflection		lb/in^2	MPa	3,625	25.0
Thermal					
Low-Temperature Brittle Point	D 746 (ISO 974)	°F	°C	<-90	<-68
Glass Transition Temperature (Tg)	(DMA)#	°F	°C	-40	-40
Vicat Softening Temperature (Rate A)	D 1525 (ISO 306)	°F	°C	248	120

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*** Postcured 16 hrs at 230°F (110°C).*
 # DMA—Dynamic Mechanical Analysis.

Desmopan 445 Resin Property Changes after Aging	ASTM Test Method (Other)	Unit of Change	7 Days	14 Days	21 Days
Hot Air at 212°F (100°C)	D 573 (ISO 216)				
Tensile Strength		%	-5	-13	-7
Tensile Stress at 100% Elongation		%	+4	-4	-1
Tensile Stress at 300% Elongation		%	+7	-12	-3
Ultimate Elongation		%	+18	+38	+25
Hardness		Shore D	0	-2	-2
ASTM Oil #1 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		%	-15	-8	-5
Tensile Stress at 100% Elongation		%	+3	+1	-2
Tensile Stress at 300% Elongation		%	+6	-2	-3
Ultimate Elongation		%	+7	+12	+4
Hardness		Shore D	-2	-2	-2
Volume		%	-1	-1	0
ASTM Oil #3 at 212°F (100°C)	D 471 (ISO 175)				
Tensile Strength		%	-8	-11	-17
Tensile Stress at 100% Elongation		%	0	-5	-2
Tensile Stress at 300% Elongation		%	+1	-11	-16
Ultimate Elongation		%	+31	+7	-2
Hardness		Shore D	-3	-2	-3
Volume		%	+4	+5	+8
Fuel A at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		%	+10	+16	+15
Tensile Stress at 100% Elongation		%	-7	-4	0
Tensile Stress at 300% Elongation		%	-13	-10	-1
Ultimate Elongation		%	+8	+13	0
Hardness		Shore D	0	-2	0
Volume		%	+1	+1	-1
Fuel C at 73°F (23°C)	D 471 (ISO 175)				
Tensile Strength		%	-19	-30	-33
Tensile Stress at 100% Elongation		%	-25	-23	-23
Tensile Stress at 300% Elongation		%	-33	-32	-31
Ultimate Elongation		%	+22	+24	+24
Hardness		Shore D	-5	-7	-6
Volume		%	+21	+21	+24

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