Product Comparison

PROSPECTOR®
www.ulprospector.com

Technical Data

Product Description	
LEXAN™ 101 resin	UL rated HB as of 10/97. 200 series recommended when V-2 rating required. Nonhalogenated, 7.0 MFR, for thicker sections without sinks.
Makrolon® 2405	MVR (300 °C/1.2 kg) 19 cm³/10 min; general purpose; low viscosity; easy release; injection molding - melt temperature 280 - 320 °C; available in transparent, translucent and opaque colors

General	LEXAN™ 101 resin	Makrolon® 2405
Manufacturer / Supplier	• SABIC Innovative Plastics	• Covestro - Polycarbonates
Generic Symbol	• PC	• PC
Material Status	• Commercial: Active	• Commercial: Active
Literature [1]	• Technical Datasheet	• Technical Datasheet (Chinese (Traditional)) • Technical Datasheet (Chinese) • Technical Datasheet (English) • Technical Datasheet (German) • Technical Datasheet (Japanese)
UL Yellow Card [2]	• E121562-220861	• E41613-100441688
Search for UL Yellow Card	• SABIC Innovative Plastics • LEXAN™	• Covestro - Polycarbonates • Makrolon®
Availability	• North America	• Africa & Middle East • Asia Pacific • Europe • Latin America • North America
Features	• Halogen Free	• General Purpose • Good Mold Release • Low Viscosity
Uses	--	• General Purpose
RoHS Compliance	--	• RoHS Compliant
Automotive Specifications	• CHRYSLER MS-DB-145 Type A CPN3060 Color: Black	• GM GMP.PC.001 • GM GMP.PC.015 • GM GMW16727P-PC-T4 • GM QK 005941 R Color: 551105 Colorless
Appearance	--	• Clear/Transparent • Colors Available • Opaque • Translucent
Processing Method	• Injection Molding	• Injection Molding
Multi-Point Data	• Coefficient of Thermal Expansion vs. Temperature (ASTM E831) • Elastic Modulus vs Temperature (ASTM D4065) • Flexural DMA (ASTM D4065) • Instrumented Impact (Energy) (ASTM D3763) • Instrumented Impact (Load) (ASTM D3763) • Specific Heat vs. Temperature (ASTM D3417) • Tensile Creep (ASTM D2990) • Tensile Fatigue • Tensile Stress vs. Strain (ASTM D638) • Thermal Conductivity vs. Temperature (ASTM E1530) • Viscosity vs. Shear Rate (ASTM D3835)	• Creep Modulus vs. Time (ISO 11403-1) • Isochronous Stress vs. Strain (ISO 11403-1) • Isothermal Stress vs. Strain (ISO 11403-1) • Secant Modulus vs. Strain (ISO 11403-1) • Shear Modulus vs. Temperature (ISO 11403-1) • Specific Volume vs Temperature (ISO 11403-2) • Viscosity vs. Shear Rate (ISO 11403-2)

Physical	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Density / Specific Gravity				
--	1.20	--		ASTM D792
73°F	--	1.20	g/cm³	ISO 1183
--	1.19	--	g/cm³	ASTM D792
Specific Volume	23.1	--	in³/lb	ASTM D792
Apparent (Bulk) Density [4]	--	0.66	g/cm³	ISO 60
Melt Mass-Flow Rate (MFR)				
300°C/1.2 kg	7.0	--	g/10 min	ASTM D1238
300°C/1.2 kg	--	20	g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	--	1.16	in³/10min	ISO 1133
Molding Shrinkage				
Flow : 0.126 in	5.0E-3 to 7.0E-3	--	in/in	Internal Method
Across Flow	--	0.50 to 0.70	%	ISO 2577
Flow	--	0.50 to 0.70	%	ISO 2577
Across Flow : 0.0787 in [5]	--	0.70	%	ISO 294-4
Flow : 0.0787 in [5]	--	0.65	%	ISO 294-4
Water Absorption				
24 hr	0.15	--	%	ASTM D570
Saturation, 73°F	--	0.30	%	ISO 62
Equilibrium, 73°F	0.35	--	%	ASTM D570
Equilibrium, 212°F	0.58	--	%	ASTM D570
Equilibrium, 73°F, 50% RH	--	0.12	%	ISO 62
Outdoor Suitability	f2	--		UL 746C

Mechanical	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Tensile Modulus (73°F)	--	348000	psi	ISO 527-2/1
Tensile Strength				
Yield [6]	9000	--	psi	ASTM D638
Yield, 73°F	--	9430	psi	ISO 527-2/50
Break [6]	10000	--	psi	ASTM D638
Break, 73°F	--	9430	psi	ISO 527-2/50
Tensile Elongation				
Yield [6]	7.0	--	%	ASTM D638
Yield, 73°F	--	6.0	%	ISO 527-2/50
Break [6]	140	--	%	ASTM D638
Break, 73°F	--	130	%	ISO 527-2/50
Nominal Tensile Strain at Break (73°F)	--	> 50	%	ISO 527-2/50
Tensile Creep Modulus				ISO 899-1
1 hr	--	319000	psi	
1000 hr	--	276000	psi	
Flexural Modulus				
1.97 in Span [7]	340000	--	psi	ASTM D790
73°F [8]	--	341000	psi	ISO 178
Flexural Stress				
73°F [8]	--	14100	psi	ISO 178
3.5% Strain, 73°F [8]	--	10600	psi	ISO 178
Yield, 1.97 in Span [7]	14200	--	psi	ASTM D790
Flexural Strain at Flexural Strength [9] (73°F)	--	7.1	%	ISO 178
Taber Abrasion Resistance				ASTM D1044
1000 Cycles, 1000 g, CS-17 Wheel	10.0	--	mg	

Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

Films	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Water Vapor Transmission Rate				ISO 15106-1
73°F, 85% RH, 3.9 mil	--	0.97	g/100 in²/24 hr	
Gas Permeation				ISO 2556
Carbon Dioxide : 73°F, 1.0 mil	--	18900	cm³/m²/bar/24 hr	
Carbon Dioxide : 73°F, 3.9 mil	--	4000	cm³/m²/bar/24 hr	
Nitrogen : 73°F, 1.0 mil	--	630	cm³/m²/bar/24 hr	
Nitrogen : 73°F, 3.9 mil	--	130	cm³/m²/bar/24 hr	
Oxygen : 73°F, 1.0 mil	--	3150	cm³/m²/bar/24 hr	
Oxygen : 73°F, 3.9 mil	--	700	cm³/m²/bar/24 hr	
Impact	**LEXAN™ 101 resin**	**Makrolon® 2405**	**Unit**	**Test Method**
Charpy Notched Impact Strength [10]				ISO 7391
-22°F, Complete Break	--	6.7	ft·lb/in²	
73°F, Partial Break	--	31	ft·lb/in²	
Charpy Unnotched Impact Strength				ISO 179/1eU
-76°F	--	No Break		
-22°F	--	No Break		
73°F	--	No Break		
Notched Izod Impact				
73°F	17	--	ft·lb/in	ASTM D256
-22°F, Complete Break [11]	--	7.1	ft·lb/in²	ISO 7391
73°F, Partial Break [11]	--	31	ft·lb/in²	ISO 7391
Unnotched Izod Impact (73°F)	60	--	ft·lb/in	ASTM D4812
Instrumented Dart Impact				
73°F, Energy at Peak Load	575	--	in·lb	ASTM D3763
-22°F	--	47.9	ft·lb	ISO 6603-2
73°F	--	40.6	ft·lb	ISO 6603-2
Multi-Axial Instrumented Impact Peak Force				ISO 6603-2
-22°F	--	1350	lbf	
73°F	--	1150	lbf	
Gardner Impact (73°F)	1500	--	in·lb	ASTM D3029
Tensile Impact Strength [12]	300	--	ft·lb/in²	ASTM D1822
Hardness	**LEXAN™ 101 resin**	**Makrolon® 2405**	**Unit**	**Test Method**
Rockwell Hardness				ASTM D785
M-Scale	70	--		
R-Scale	118	--		
Ball Indentation Hardness	--	16700	psi	ISO 2039-1
Thermal	**LEXAN™ 101 resin**	**Makrolon® 2405**	**Unit**	**Test Method**
Deflection Temperature Under Load				
66 psi, Unannealed, 0.252 in	280	--	°F	ASTM D648
66 psi, Unannealed	--	279	°F	ISO 75-2/B
264 psi, Unannealed, 0.252 in	270	--	°F	ASTM D648
264 psi, Unannealed	--	255	°F	ISO 75-2/A
Glass Transition Temperature [13]	--	291	°F	ISO 11357-2
Vicat Softening Temperature				
--	310	--	°F	ASTM D1525 [14]
--	--	293	°F	ISO 306/B50
--	--	295	°F	ISO 306/B120
Ball Pressure Test (277°F)	--	Pass		IEC 60695-10-2

Thermal	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
CLTE				
Flow : -40 to 203°F	3.8E-5	--	in/in/°F	ASTM E831
Flow : 73 to 131°F	--	3.6E-5	in/in/°F	ISO 11359-2
Transverse : 73 to 131°F	--	3.6E-5	in/in/°F	ISO 11359-2
Specific Heat	0.300	--	Btu/lb/°F	ASTM C351
Thermal Conductivity				
--	2.0	--	Btu·in/hr/ft²/°F	ASTM C177
73°F [15]	--	1.4	Btu·in/hr/ft²/°F	ISO 8302
RTI Elec				UL 746
--	266	--	°F	
0.06 in	--	257	°F	
RTI Imp				UL 746
--	266	--	°F	
0.06 in	--	239	°F	
RTI Str				UL 746
--	266	--	°F	
0.06 in	--	257	°F	

Electrical	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Surface Resistivity	--	1.0E+16	ohms	IEC 60093
Volume Resistivity				
--	> 1.0E+17	--	ohms·cm	ASTM D257
73°F	--	1.0E+16	ohms·cm	IEC 60093
Dielectric Strength				
0.126 in, in Air	380	--	V/mil	ASTM D149
73°F, 0.0394 in	--	860	V/mil	IEC 60243-1
Dielectric Constant				
50 Hz	3.17	--		ASTM D150
60 Hz	3.17	--		ASTM D150
1 MHz	2.96	--		ASTM D150
73°F, 100 Hz	--	3.10		IEC 60250
73°F, 1 MHz	--	3.00		IEC 60250
Dissipation Factor				
50 Hz	9.0E-4	--		ASTM D150
60 Hz	9.0E-4	--		ASTM D150
1 MHz	0.010	--		ASTM D150
73°F, 100 Hz	--	5.0E-4		IEC 60250
73°F, 1 MHz	--	9.0E-3		IEC 60250
Comparative Tracking Index (CTI)	PLC 2	--		UL 746
Comparative Tracking Index				IEC 60112
Solution A	--	250	V	
Solution B	--	125	V	
High Amp Arc Ignition (HAI)	PLC 1	--		UL 746
High Voltage Arc Tracking Rate (HVTR)	PLC 2	--		UL 746
Hot-wire Ignition (HWI)	PLC 2	--		UL 746

Flammability	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Flame Rating				UL 94
0.028 in	HB	--		
0.11 in	--	HB		
0.014 in	--	V-2		
0.030 in	--	V-2		

Form No. TDS-4566-35082-en

Document Created: Thursday, October 19, 2017

Flammability	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Glow Wire Flammability Index				IEC 60695-2-12
0.030 in	--	1560	°F	
0.06 in	--	1610	°F	
0.12 in	--	1710	°F	
Glow Wire Ignition Temperature				IEC 60695-2-13
0.030 in	--	1610	°F	
0.04 in	--	1610	°F	
0.06 in	--	1610	°F	
0.12 in	--	1610	°F	
Oxygen Index [16]	--	27	%	ISO 4589-2
Application of Flame from Small Burner - Method K and F				DIN 53438-1, -3
78.7 mil	--	K1, F1		
Burning Rate - US-FMVSS (> 39.4 mil)	--	passed		ISO 3795
Flash Ignition Temperature	--	896	°F	ASTM D1929
Needle Flame Test				IEC 60695-11-5
Method F : 59.1 mil	--	1.0	min	
Method F : 78.7 mil	--	2.0	min	
Method F : 0.12 in	--	2.0	min	
Method K : 59.1 mil	--	0.1	min	
Method K : 78.7 mil	--	0.1	min	
Method K : 0.12 in	--	0.2	min	
Radiant Panel Listing (UL)	YES	--		
Self Ignition Temperature	--	1022	°F	ASTM D1929

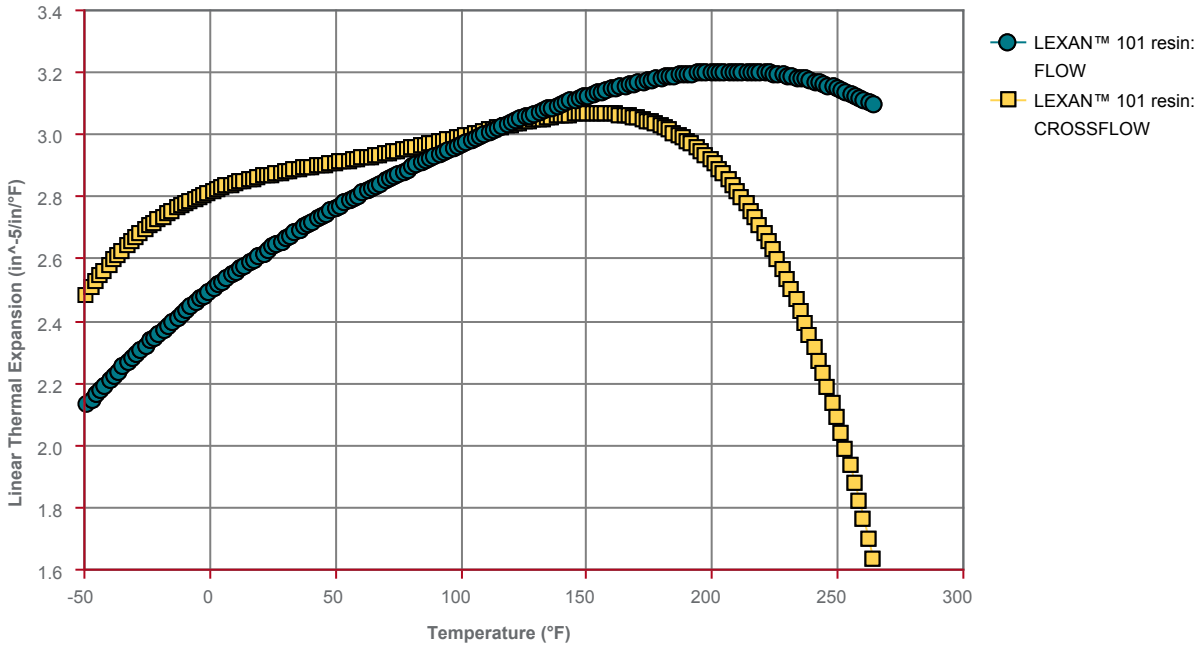
Optical	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Refractive Index				
--	1.586	--		ASTM D542
-- [17]	--	1.585		ISO 489
Transmittance				
39.4 mil	--	89.0	%	ISO 13468-2
78.7 mil	--	89.0	%	ISO 13468-2
100 mil	88.0	--	%	ASTM D1003
118 mil	--	88.0	%	ISO 13468-2
157 mil	--	87.0	%	ISO 13468-2
Haze				
100 mil	1.0	--	%	ASTM D1003
118 mil	--	< 0.80	%	ISO 14782

Additional Information	LEXAN™ 101 resin	Makrolon® 2405	Unit	Test Method
Electrolytical Corrosion (73°F)	--	A1		IEC 60426
ISO Shortname	--	ISO 7391-PC,MR,(,,)-18-9		

Injection	LEXAN™ 101 resin	Makrolon® 2405	Unit
Drying Temperature	250	--	°F
Drying Time	3.0 to 4.0	--	hr
Drying Time, Maximum	48	--	hr
Suggested Max Moisture	0.020	--	%
Suggested Shot Size	40 to 60	--	%
Rear Temperature	550 to 590	--	°F
Middle Temperature	570 to 610	--	°F
Front Temperature	590 to 630	--	°F

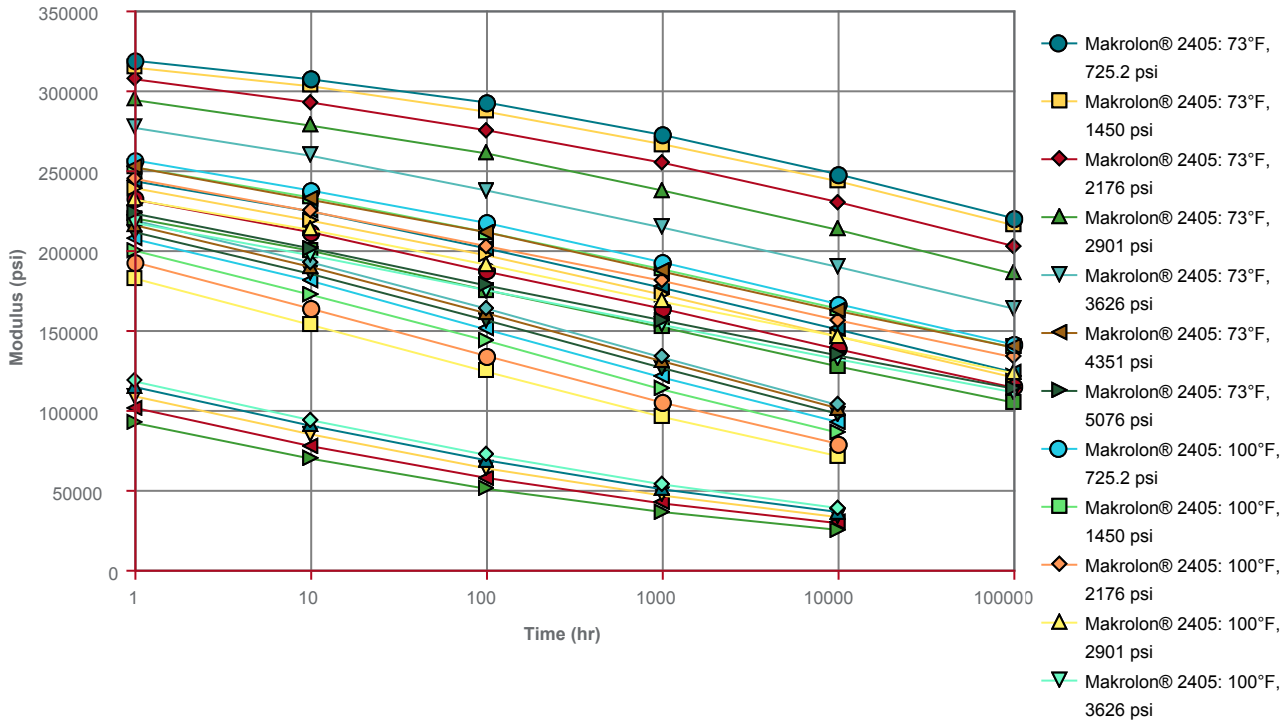
Injection	LEXAN™ 101 resin	Makrolon® 2405	Unit
Nozzle Temperature	580 to 620	--	°F
Processing (Melt) Temp	590 to 630	--	°F
Mold Temperature	180 to 240	--	°F
Back Pressure	50.0 to 100	--	psi
Screw Speed	40 to 70	--	rpm
Vent Depth	1.0E-3 to 3.0E-3	--	in

Coefficient of Thermal Expansion vs. Temperature (ASTM E831)

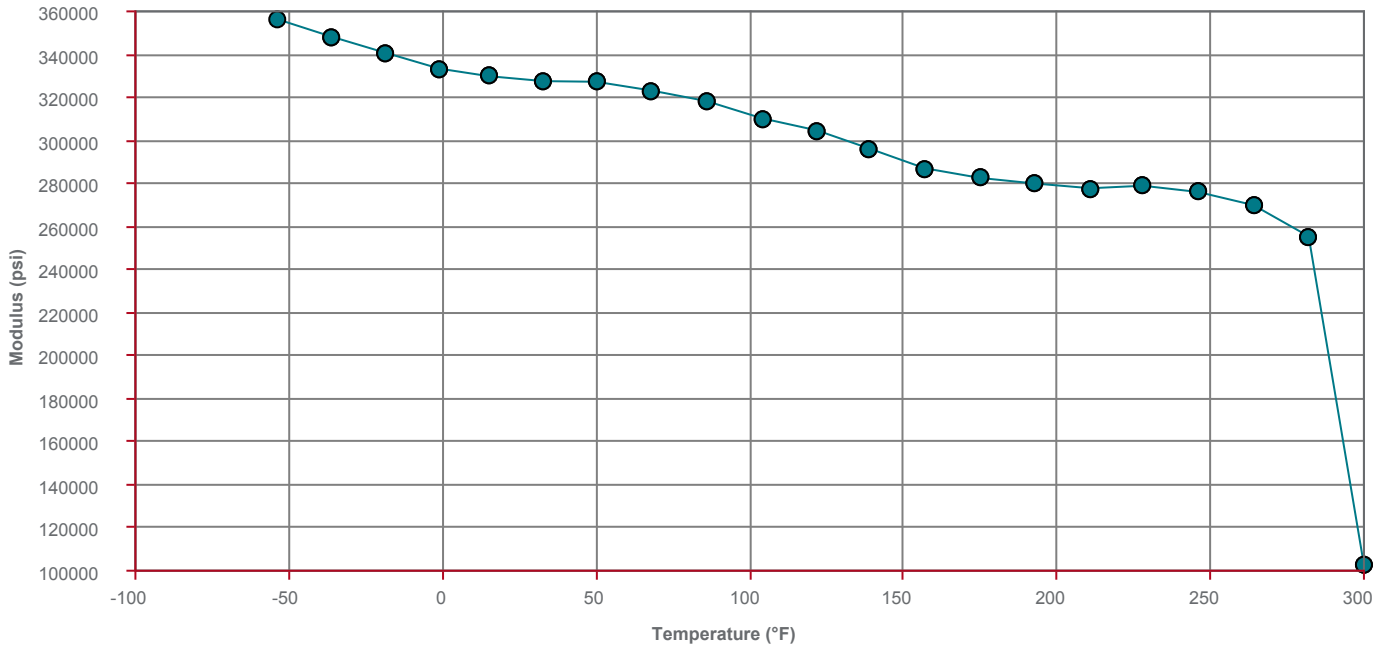


Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

Creep Modulus vs. Time (ISO 11403-1)



Elastic Modulus vs Temperature (ASTM D4065)

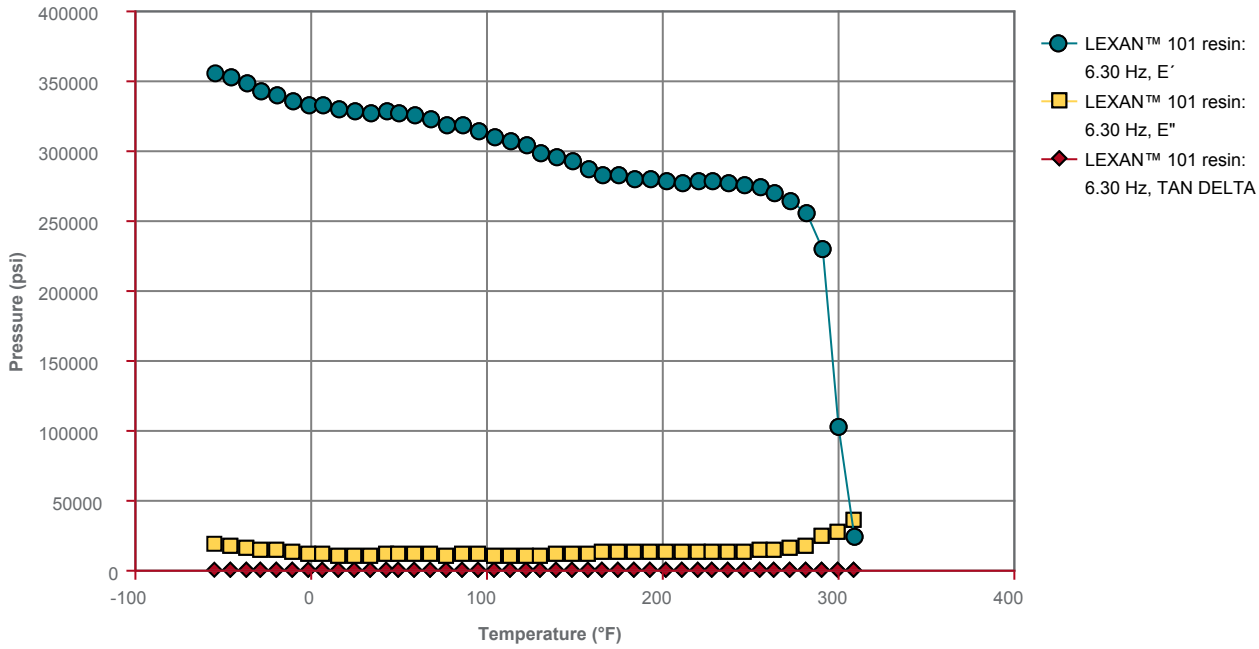


870.2 psi
Makrolon® 2405: 250°F, 1160 psi
Makrolon® 2405: 250°F, 1450 psi

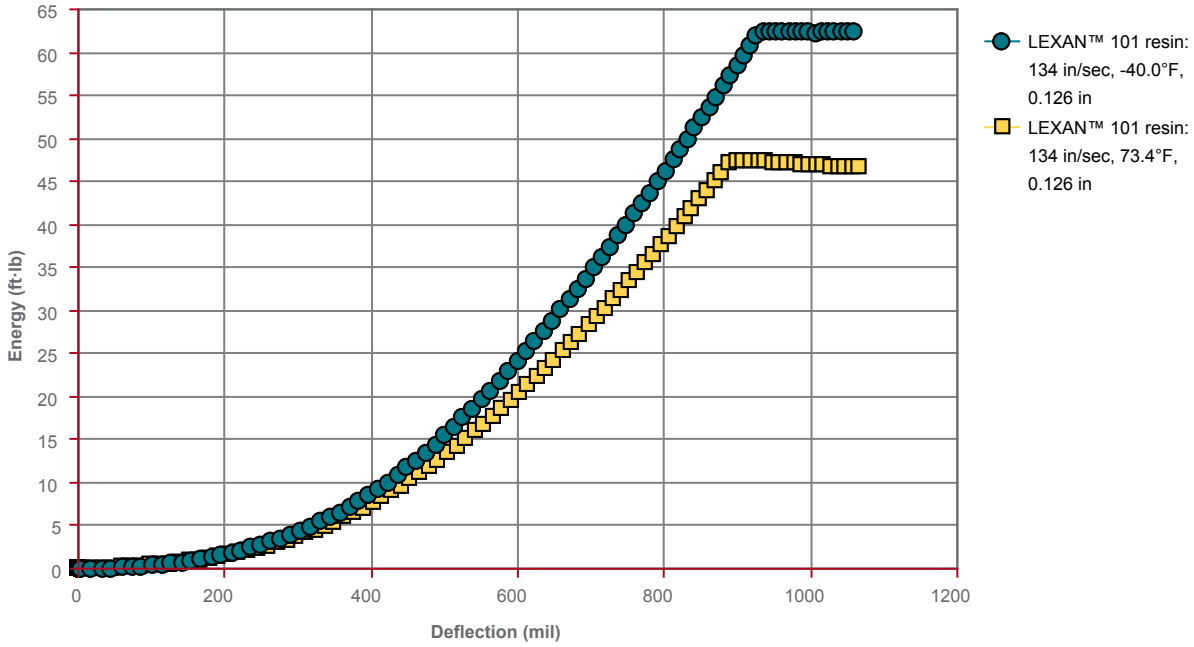
Form No. TDS-4566-35082-en

Document Created: Thursday, October 19, 2017

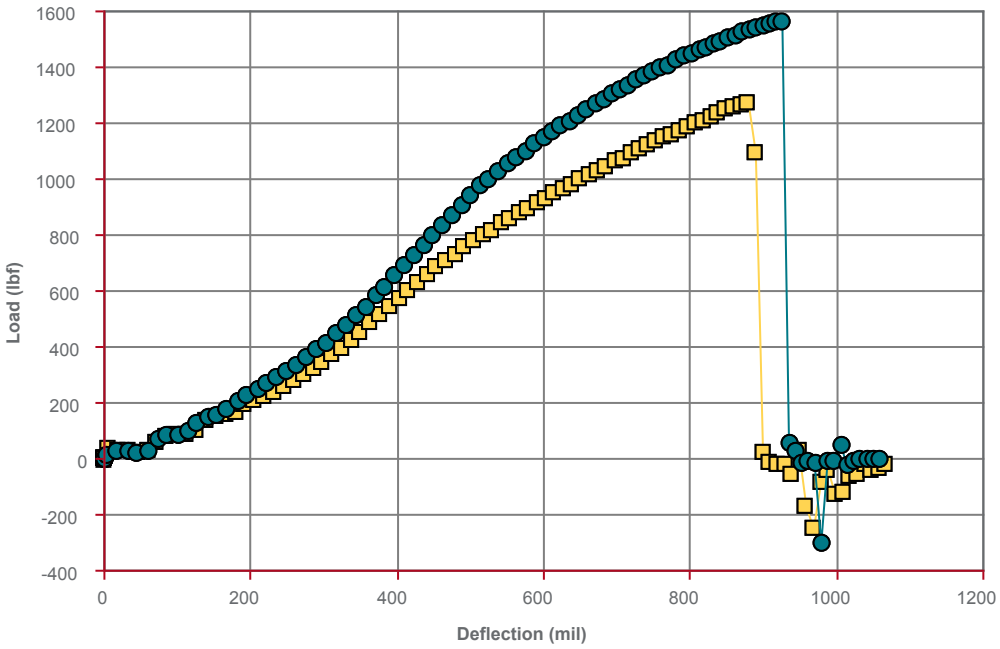
Flexural DMA (ASTM D4065)



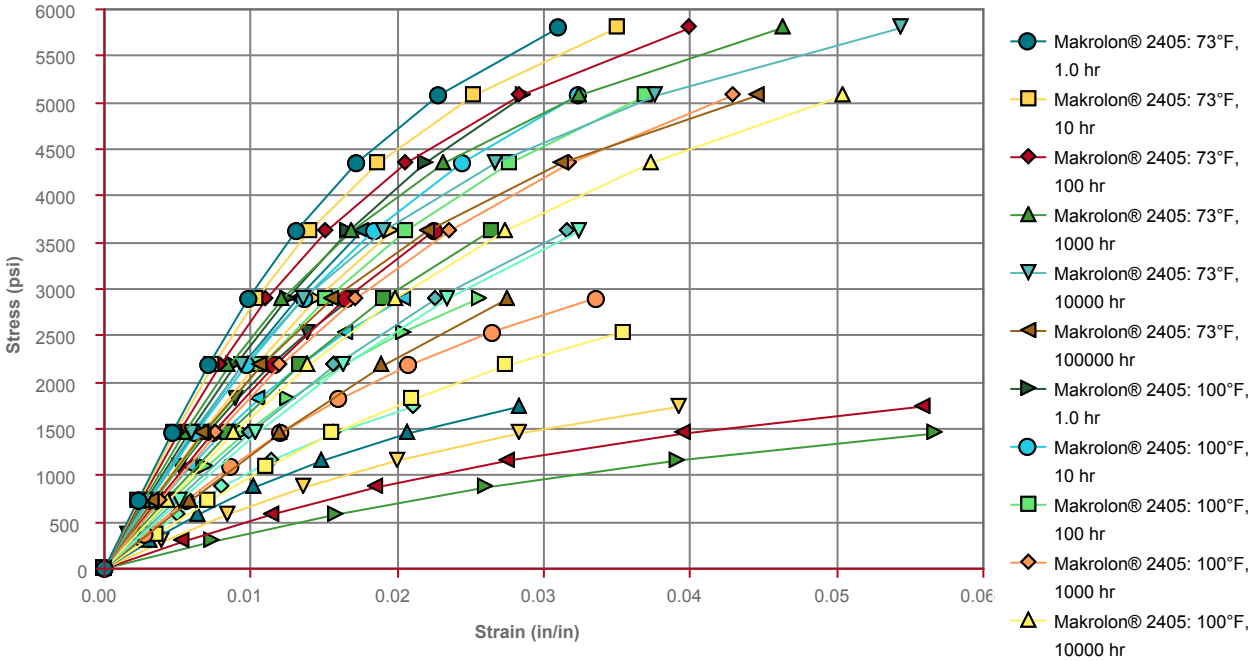
Instrumented Impact (Energy) (ASTM D3763)



Instrumented Impact (Load) (ASTM D3763)

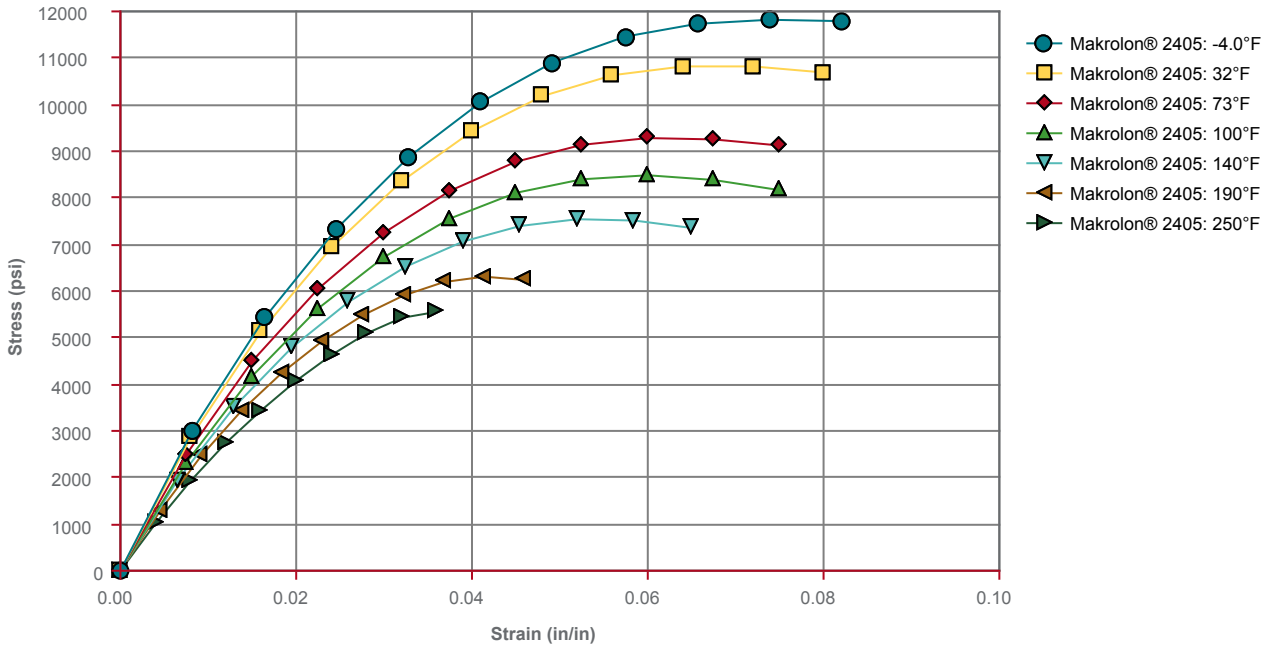


Isochronous Stress vs. Strain (ISO 11403-1)

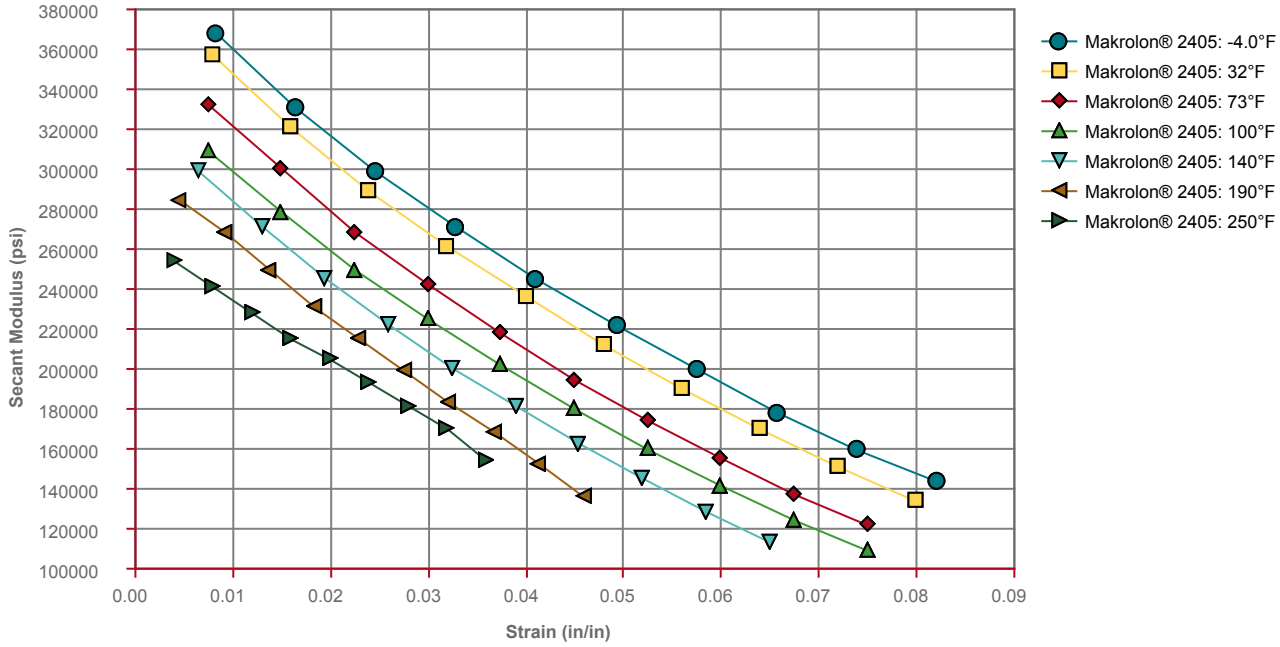


Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

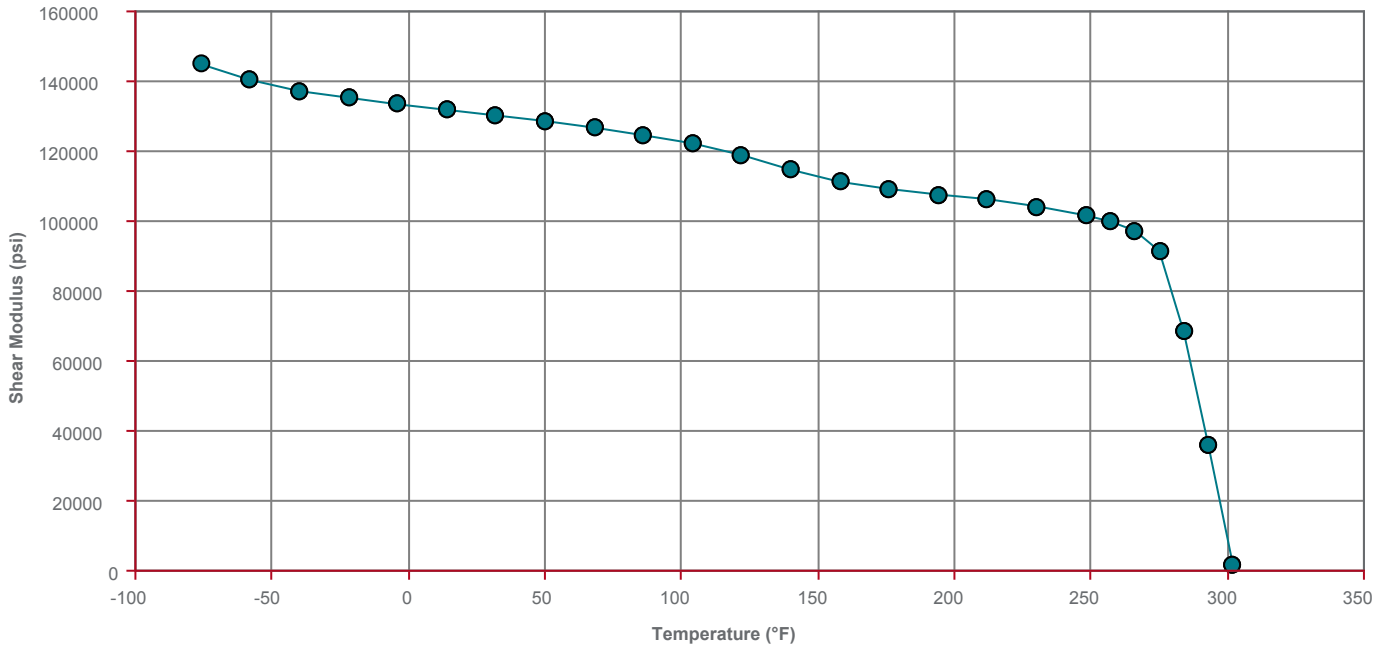
Isothermal Stress vs. Strain (ISO 11403-1)



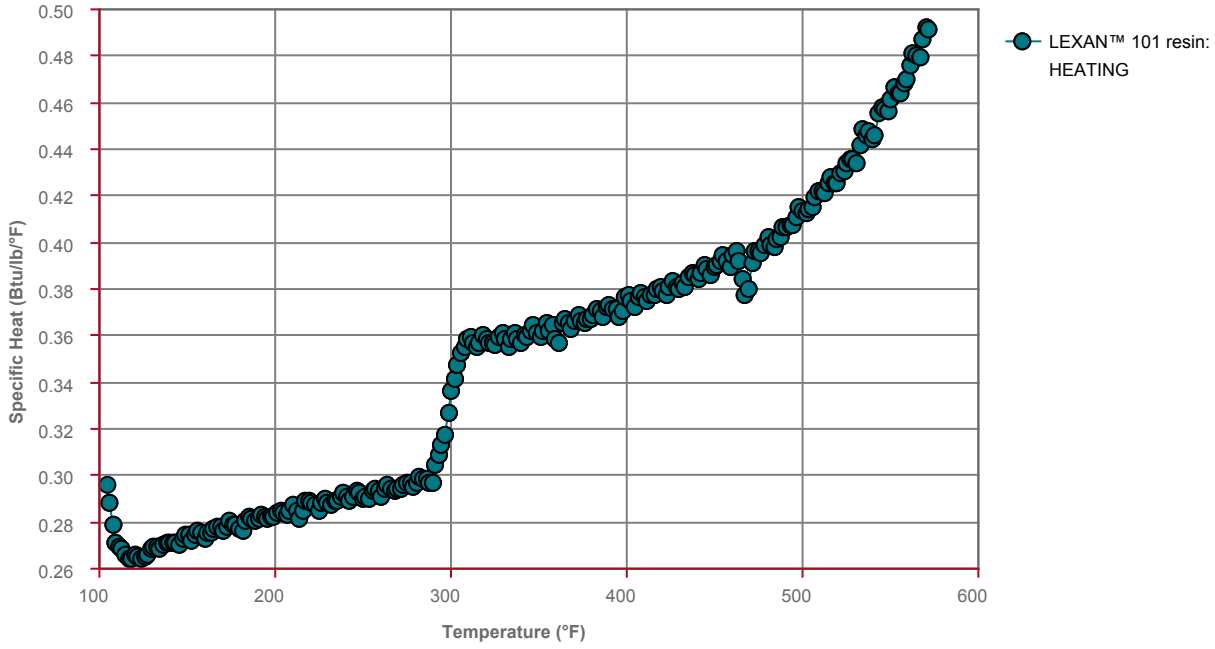
Secant Modulus vs. Strain (ISO 11403-1)



Shear Modulus vs. Temperature (ISO 11403-1)

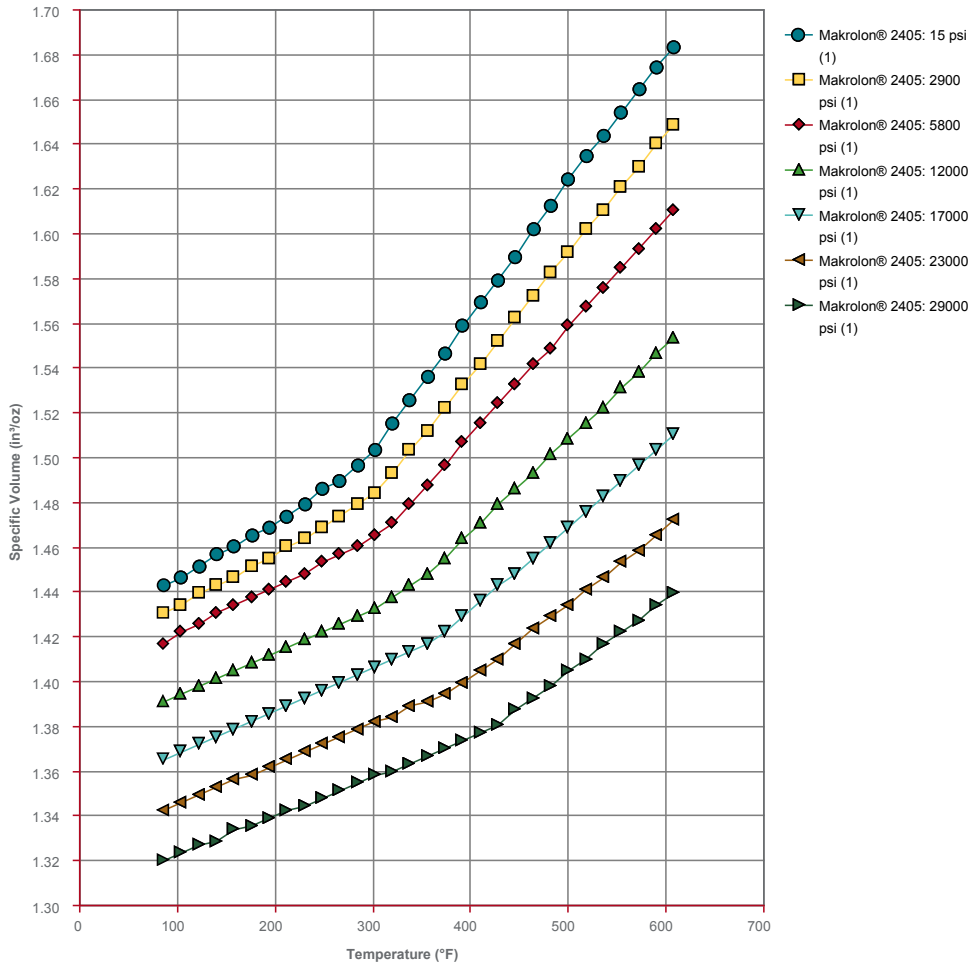


Specific Heat vs. Temperature (ASTM D3417)



Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

Specific Volume vs Temperature (ISO 11403-2)

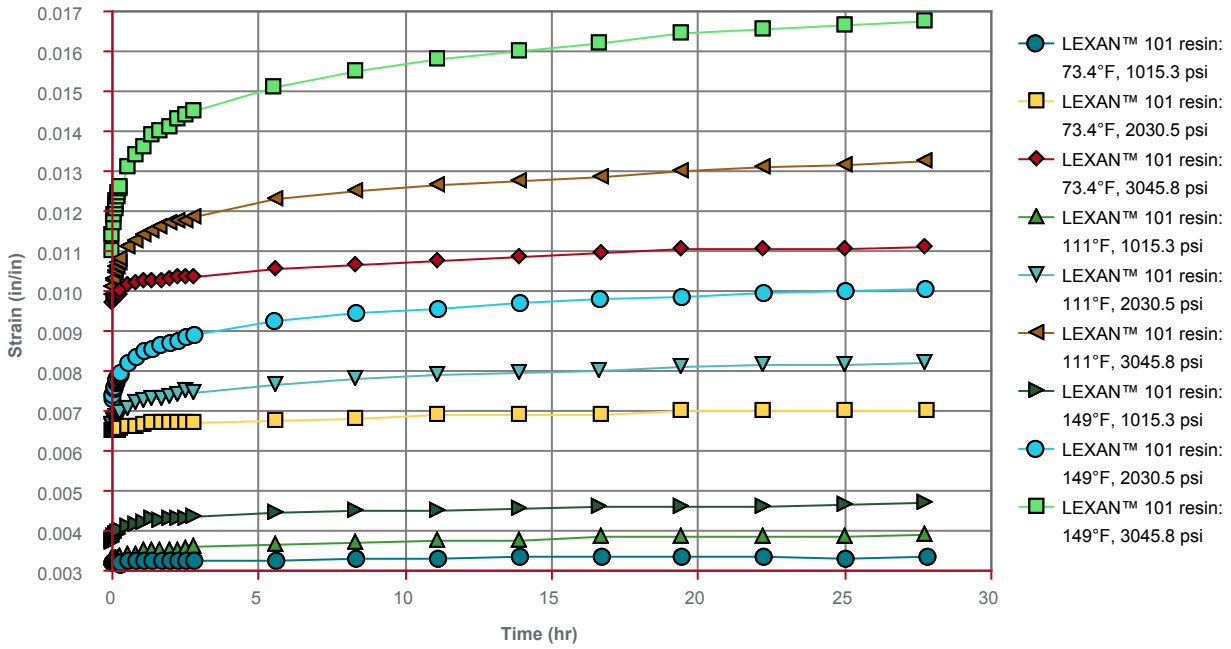


Data Notes

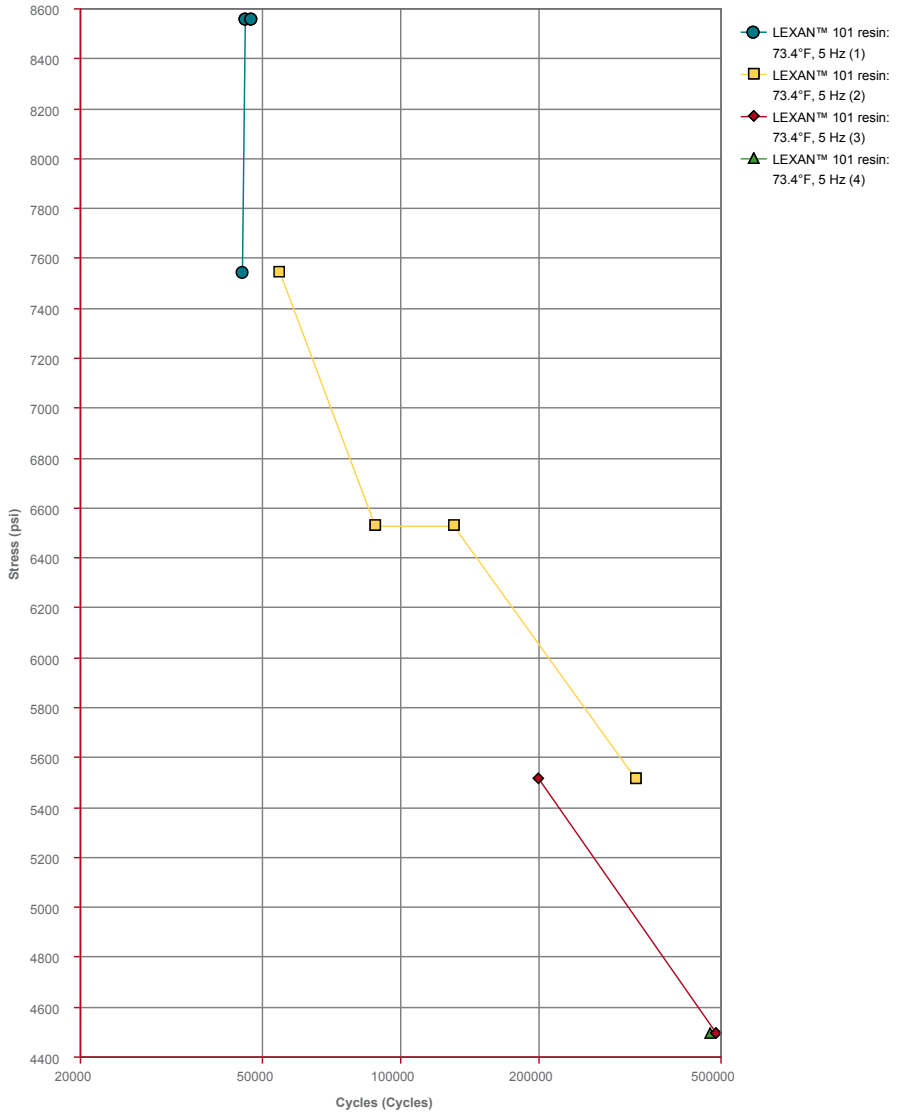
(1) - Tested using Generic PC

Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

Tensile Creep (ASTM D2990)



Tensile Fatigue

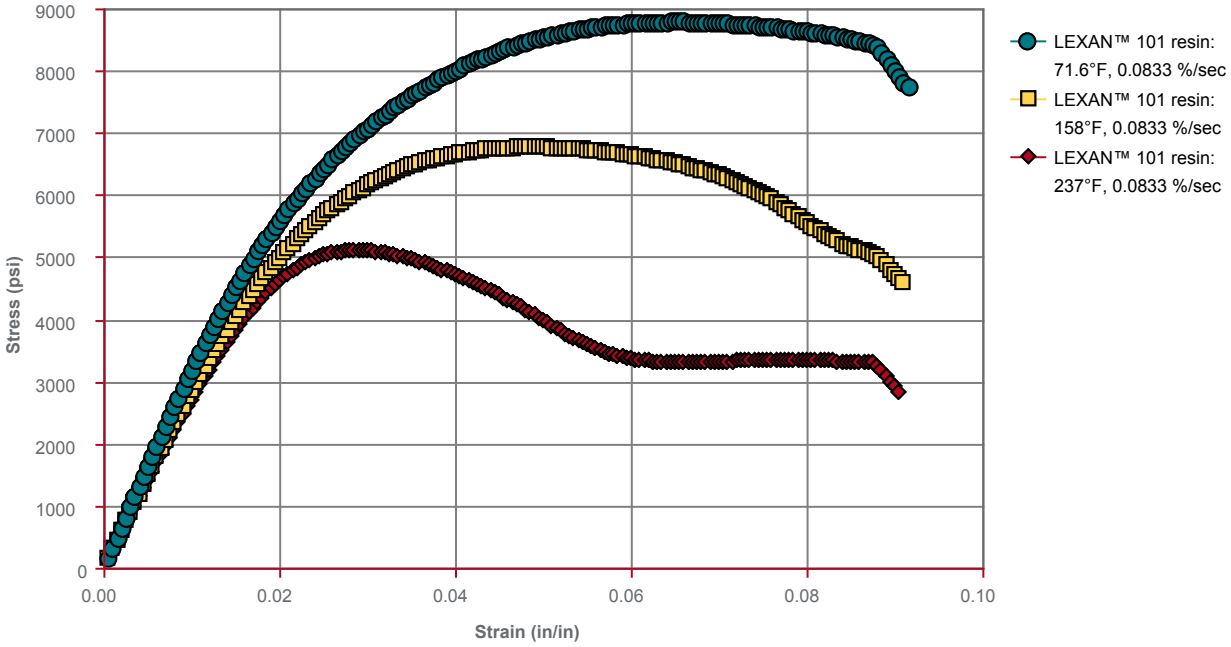


Data Notes
(1) - Series 1
(2) - Series 2
(3) - Series 3
(4) - Series 4

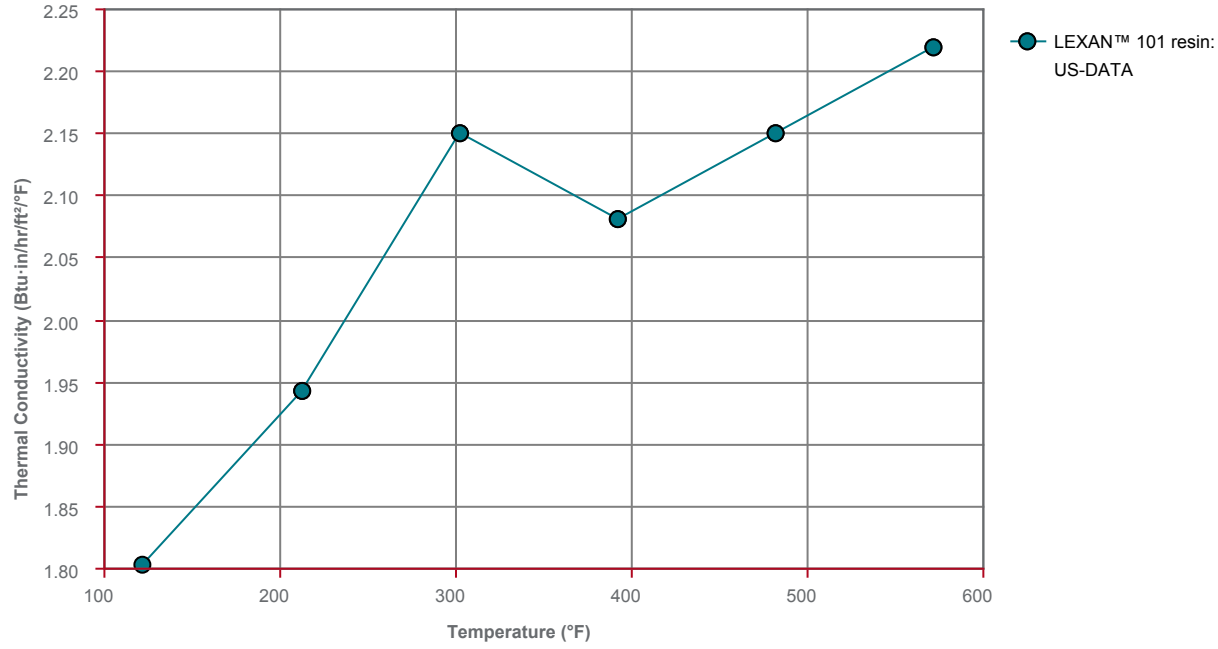
Form No. TDS-4566-35082-en

Document Created: Thursday, October 19, 2017

Tensile Stress vs. Strain (ASTM D638)



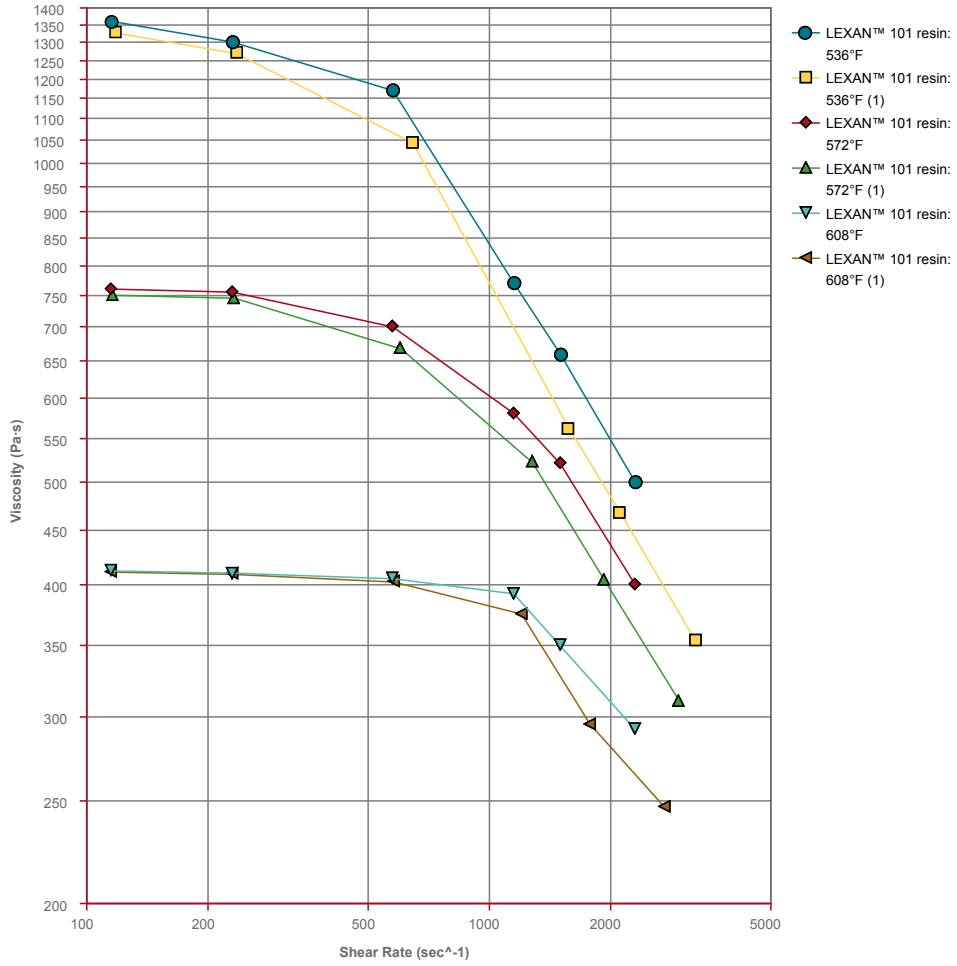
Thermal Conductivity vs. Temperature (ASTM E1530)



Form No. TDS-4566-35082-en

Document Created: Thursday, October 19, 2017

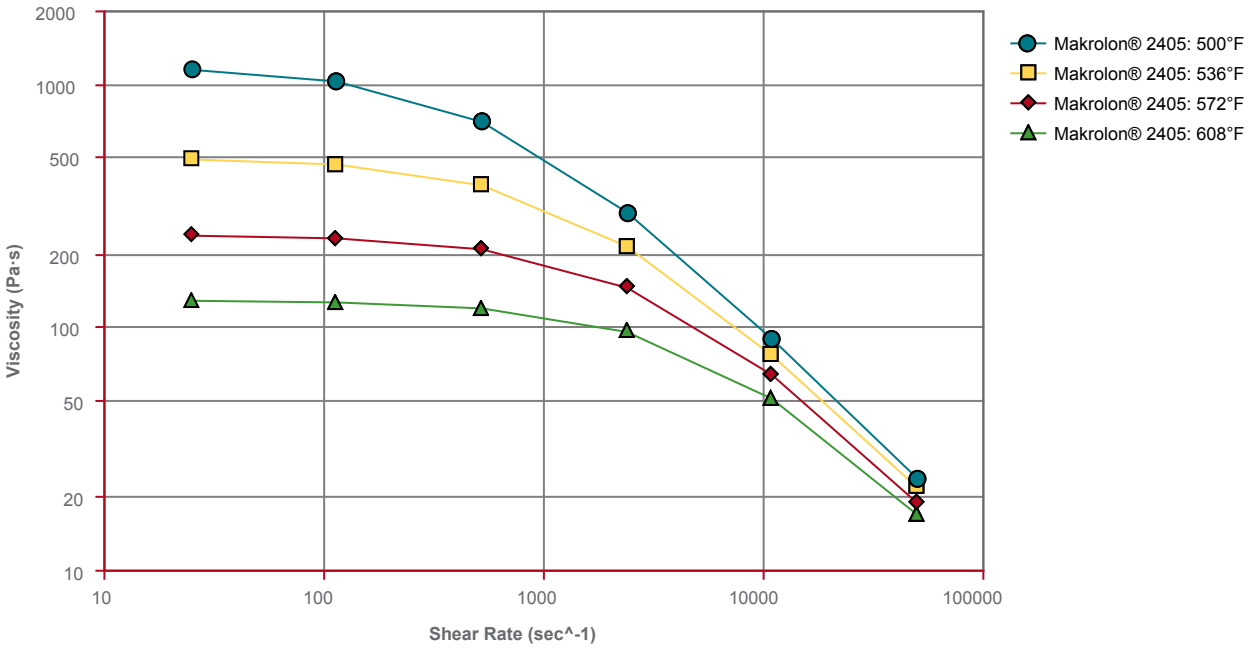
Viscosity vs. Shear Rate (ASTM D3835)



Data Notes
(1) - Rab. Corrected Data

Form No. TDS-4566-35082-en
Document Created: Thursday, October 19, 2017

Viscosity vs. Shear Rate (ISO 11403-2)



Notes

[1] These links provide you with access to supplier literature. We work hard to keep them up to date; however you may find the most current literature from the supplier.

[2] A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.

[3] Typical properties: these are not to be construed as specifications.

[4] Pellets

[5] 60x60x2 mm, 500 bar

[6] Type I, 2.0 in/min

[7] 0.051 in/min

[8] 0.079 in/min

[9] 2 mm/min

[10] Based on ISO 179-1eA, 3 mm

[11] Based on ISO 180-A, 3 mm

[12] Type S

[13] 10°C/min

[14] Rate B (120°C/h), Loading 2 (50 N)

[15] Cross-flow

[16] Procedure A

[17] Method A

Where to Buy

Supplier	
LEXAN™ 101 resin	**SABIC Innovative Plastics** Pittsfield, MA USA Telephone: 800-845-0600 Web: http://www.sabic-ip.com/
Makrolon® 2405	**Covestro - Polycarbonates** Leverkusen, Germany Telephone: +49-214-6009-2000 Web: http://www.plastics.covestro.com/

Distributor	
LEXAN™ 101 resin	**Nexeo Solutions** Telephone: 800-531-7106 Web: http://www.nexeosolutions.com/ Availability: North America
Makrolon® 2405	**ALBIS Plastic** *ALBIS Plastic is a global distribution and compounding company. Contact ALBIS Plastic for availability of individual products per country.* Telephone: +49-40-78105-0 Web: http://www.albis.com/ Availability: Algeria, Austria, Belgium, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hong Kong, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Spain, Sweden, Switzerland, Tunisia, Turkey, United Kingdom **Amco Polymers** Telephone: 800-262-6685 Web: http://www.amcopolymers.com/ Availability: North America **M. Holland Canada Company** Telephone: 905-665-1168 Web: http://www.mholland.com/ Availability: Canada **M. Holland Company** Telephone: 855-497-1403 Web: http://www.mholland.com/ Availability: Mexico, United States **PolyOne Distribution** *PolyOne Distribution is a global distribution company. Contact PolyOne Distribution for availability of individual products by country.* Telephone: 800-894-4266 Web: http://polyonedistribution.com/ Availability: Global

Reseller	
A Reseller is not a distributor authorized by the Supplier.	
LEXAN™ 101 resin	**Guangzhou Huaxiu Plastics Co., Ltd.** Telephone: +86-20-82582555 Web: http://www.va-so.com Availability: China
Makrolon® 2405	