

# EPU 43

**EPU 43 is an energy-damping elastomer that is soft while offering good energy damping and excellent durability under high-cycle flexing.**

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# EPU 43

Tensile Properties	Test Standard	Metric	US
Tensile Modulus	ASTM D412 Die C 500 mm/min	10 MPa	1450 psi
Elongation at Break		380%	380%
Stress at 50% Elongation		2 MPa	290 psi
Stress at 100% Elongation		4 MPa	580 psi
Stress at 200% Elongation		13 MPa	1900 psi
Ultimate Tensile Strength		17 MPa	2500 psi

Other Mechanical Properties	Test Standard	Metric	US
Tear Strength	ASTM D624 Die C (die cut)	23 kN/m	131 lbf/in
Compression Set	ASTM D395-B 23 °C, 72 h	39%	
Ross Flex, 23 °C	ASTM D1052	> 350,000 cycles (with crack growth < 500%)	

Thermal Properties	Test Standard	Metric	US
T <sub>g</sub> (DMA, tan(d))	ASTM D4065, 2 °C/min, 1 Hz	4 °C	39 °F

Dielectric/Electric Properties	Test Standard	Metric	US
Dielectric Constant	ASTM D150	6.75	
Dissipation Factor		0.0015	
Dielectric Strength	ASTM D149	16 kV/mm	
Volume Resistivity	ASTM D257	2.7 x 10 <sup>14</sup> ohm-cm	

General Properties	Test Standard	Metric	US
Shore A Hardness	ASTM D2240	76 (Instant), 71 (5 sec)	
Bulk Density	ASTM D792	1.03 g/mL	
Relative Abrasion Volume Loss	ISO-4649 A	213 mm <sup>3</sup>	

Parts were processed using an L series printer and centrifugal spinner. The cleaned test articles were baked following the standard baking schedule for EPU 43.

# EPU 43

Liquid Properties	
Liquid Density (Part A)	0.99 g/mL
Liquid Density (Part B)	0.94 g/mL
Liquid Density (Part A+B)	0.99 g/mL
Part A:B Volume Ratio (Mass Ratio)	11.3 (11.9)
25 °C Viscosity (Part A)	2900 cP
25 °C Viscosity (Part B)	80 cP
25 °C Viscosity (Part A+B)	2400 cP

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# EPU 43

## Extended TDS

## EPU 43 with IPA Washing

Tensile Properties	Test Standard	Metric	US
Tensile Modulus	ASTM D412 Die C 500 mm/min	11 MPa	1600 psi
Elongation at Break		420%	420%
Stress at 50% Elongation		2 MPa	290 psi
Stress at 100% Elongation		4 MPa	580 psi
Stress at 200% Elongation		13 MPa	1900 psi
Ultimate Tensile Strength		19 MPa	2750 psi
Tear Strength	ASTM D624 Die C (die cut)	26 kN/m	148 lbf/in

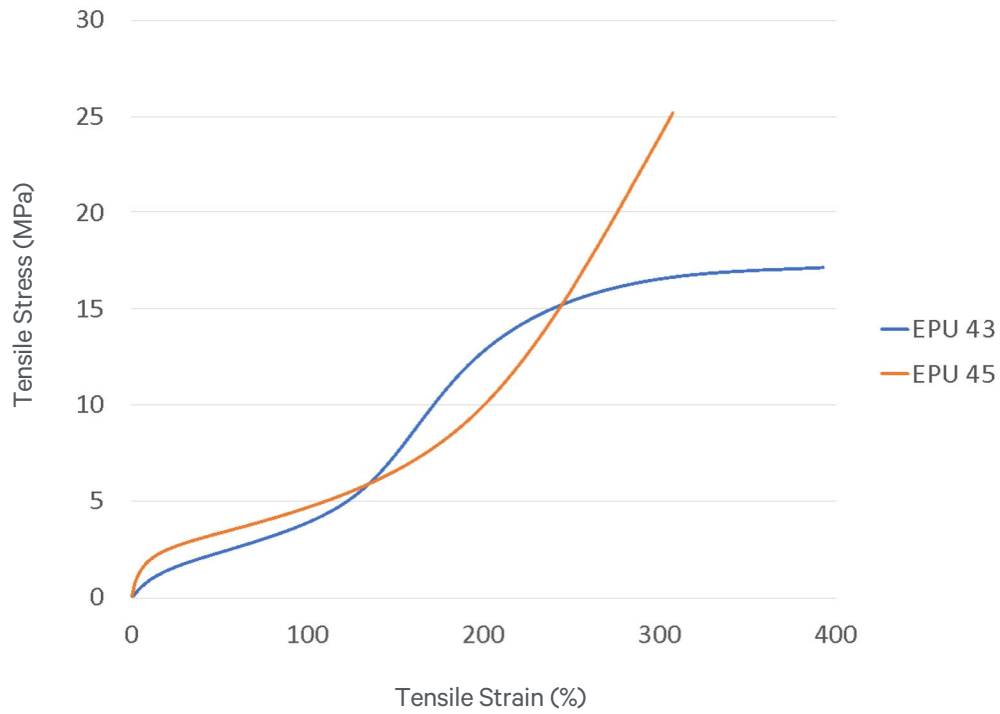
Other Mechanical Properties	Test Standard	Metric	US
Tear Strength	ASTM D624 Die C (die cut)	26 kN/m	148 lbf/in

Parts were processed using an L series printer and washed by isopropanol for 1 min. The cleaned test articles were baked following the standard baking schedule for EPU 43.

# EPU 43 Mechanical Properties

## Representative Tensile Curve & Comparison with EPU 45

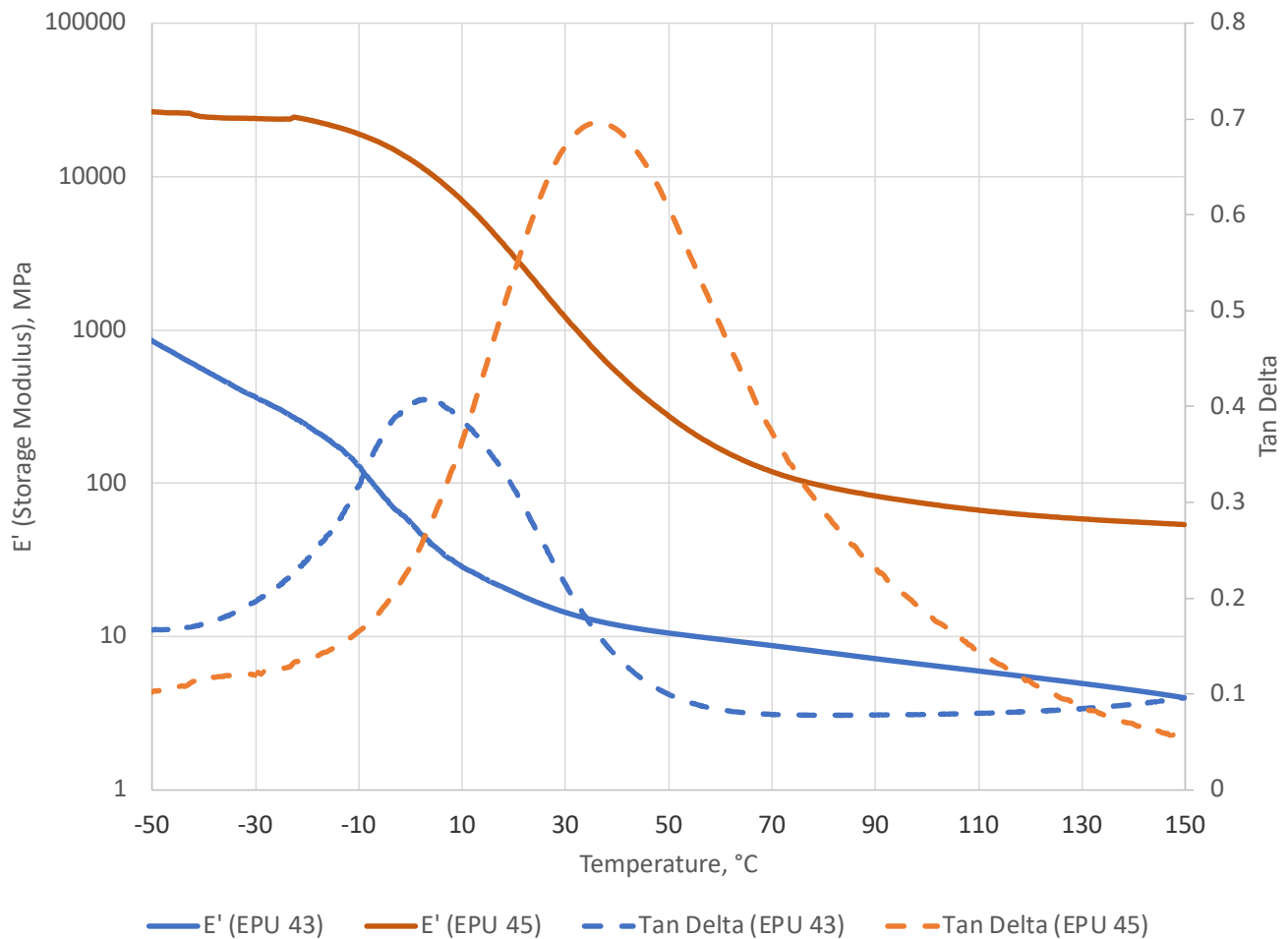
ASTM D412, Die C, 500 mm/min



# EPU 43 Dynamic Mechanical Analysis (DMA)

## EPU 43 vs. EPU 45

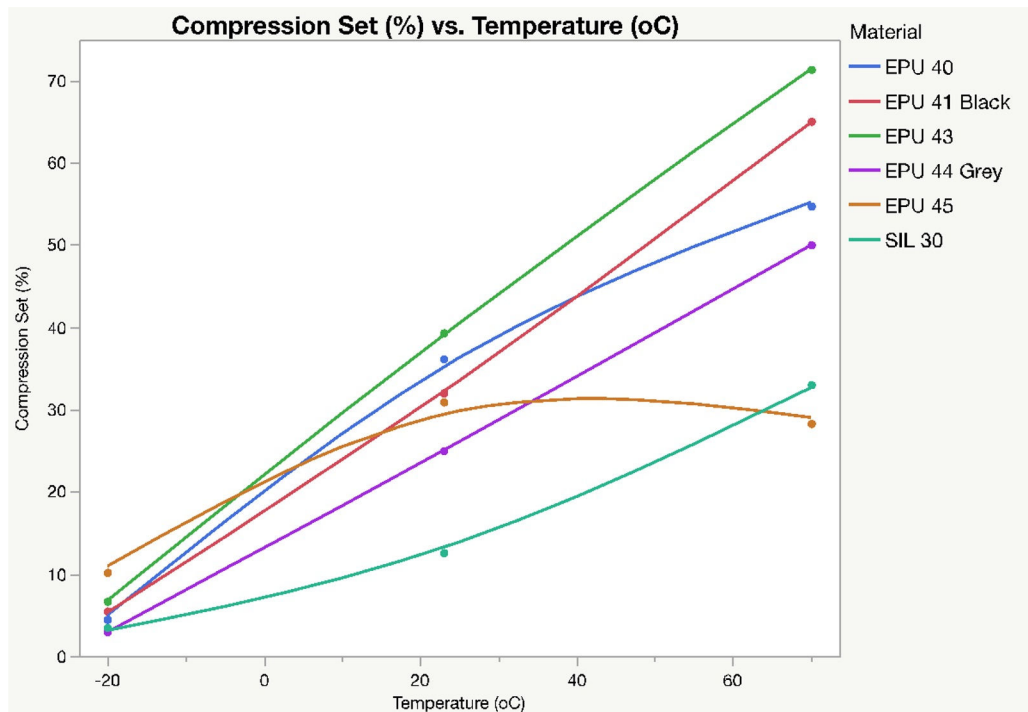
The figure below shows the thermomechanical behavior of EPU 43 compared to EPU 45. EPU 43 has a  $T_g$  at 4 °C and a room temperature storage modulus around 18 MPa.





# EPU 43 Compression Set

In many elastomeric applications, compression set is an important property that reflects the amount of residual deformation after holding compression at a fixed time, temperature, and displacement. EPU 40, EPU 41 Black, EPU 43, EPU 44 Gray, EPU 45, and SIL 30 were compressed to 25% of its original sample height and held at various temperatures (-20, 23, and 70 °C) for 72 hours. The compression set measurement is the residual deformation of a test specimen where 0% represents full recovery of the original thickness and 100% indicates no recovery. The image below summarizes the compression set results for various Carbon elastomers.



ASTM D395-B

# EPU 43 Chemical Compatibility

	Mass Gain* (%)
<b>Household Chemicals</b>	
Bleach (NaClO, 5%)	< 5%
Sanitizer (NH <sub>4</sub> Cl, 10%)	< 5%
Distilled Water	< 5%
Sunscreen (Banana Boat, SPF 50)	< 5%
Detergent (Tide, Original)	< 5%
Windex Powerized Formula	< 5%
Hydrogen Peroxide (30%)	15-30%
Ethanol (95%)	> 30%
<b>Industrial Fluids</b>	
Diesel (Chevron #2)	5 - 15%
<b>Strong Acid/Base</b>	
Sulfuric Acid (30%)	5 - 15%
Sodium Hydroxide (10%)	< 5%
Sebum	15-30%

\*Percent weight gained after one week submersion following ASTM D543. Values do not represent changes in dimension or mechanical properties.

# EPU 43 Biocompatibility

## Biocompatibility Testing

Test articles in the form of printed parts were provided to NAMSA for evaluation and met the requirements of the following test:

Biocompatibility Testing	Test Standard
Sensitization	ISO 10993-10: Biological evaluation of medical devices – Part 10: Tests for skin sensitization (Closed patch sensitization study in guinea pigs)

Test articles were processed using an L series printer and centrifugal spinner. The cleaned test articles were baked following the standard baking schedule for EPU 43 (see below). Additional details about the test are available upon request.

*Baking schedule: Ramp from room temperature to 140 °C over 90 minutes; Hold at 140°C for 90 minutes.*

## Disclaimer

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