

EPU 45

EPU 45 is an energy-damping elastomer that has exceptional damping performance and printability.

Table of Contents

Standard Technical Data Sheet:	Page 2-3
Extended Technical Data Sheet:	Page 4-10
- Properties with IPA Washing	Page 5
- Mechanical Properties	Page 6
- Thermomechanical Properties	Page 7
- Compression Set	Page 8
- Chemical Compatibility	Page 9
- Biocompatibility	Page 10

EPU 45

Tensile Properties	Test Standard	Metric	US
Tensile Modulus	ASTM D412 Die C 500 mm/min	17 MPa	2400 psi
Elongation at Break		290%	290%
Stress at 50% Elongation		3 MPa	430 psi
Stress at 100% Elongation		4 MPa	580 psi
Stress at 200% Elongation		9 MPa	1300 psi
Ultimate Tensile Strength		24 MPa	3500 psi

Other Mechanical Properties	Test Standard	Metric	US
Tear Strength	ASTM D624 Die C (die cut)	28 kN/m	160 lbf/in
Compression Set	ASTM D395-B 23 °C, 72 h	31%	

Thermal Properties	Test Standard	Metric	US
T _g (DMA, tan(d))	ASTM D4065, 2 °C/min, 1 Hz	30 °C	86 °F

Dielectric/Electric Properties	Test Standard	Metric	US
Dielectric Constant	ASTM D150	5.51	
Dissipation Factor		0.0024	
Dielectric Strength	ASTM D149	19 kV/mm	
Volume Resistivity	ASTM D257	4.0 x 10 ¹⁴ ohm-cm	

General Properties	Test Standard	Metric	US
Shore A Hardness	ASTM D2240	77 (Instant), 62 (5 sec)	
Bulk Density	ASTM D792	1.06 g/mL	
Relative Abrasion Volume Loss	ISO-4649 A	457 mm ³	

Parts were processed using an L series printer and centrifugal spinner. The test articles were baked following the standard baking schedule for EPU 45.

EPU 45

Liquid Properties	
Liquid Density (Part A)	1.04 g/mL
Liquid Density (Part B)	0.97 g/mL
Liquid Density (Part A+B)	1.02 g/mL
Part A:B Volume Ratio (Mass Ratio)	2.665 (2.857)
25 °C Viscosity (Part A)	3800 cP
25 °C Viscosity (Part B)	150 cP
25 °C Viscosity (Part A+B)	1400 cP

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EPU 45

Extended TDS

EPU 45 with IPA Washing

Tensile Properties	Test Standard	Metric	US
Tensile Modulus	ASTM D412 Die C 500 mm/min	18 MPa	2600 psi
Elongation at Break		240%	240%
Stress at 50% Elongation		3 MPa	430 psi
Stress at 100% Elongation		4 MPa	580 psi
Stress at 200% Elongation		9 MPa	1300 psi
Ultimate Tensile Strength		24 MPa	3500 psi

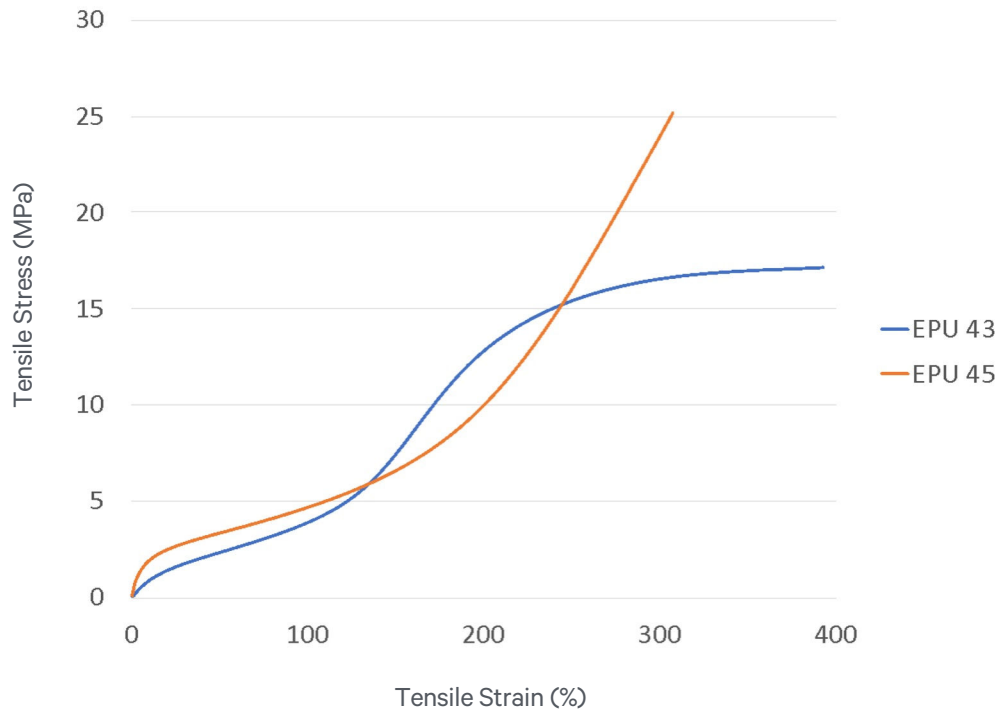
Other Mechanical Properties	Test Standard	Metric	US
Tear Strength	ASTM D624 Die C (die cut)	30 kN/m	171 lbf/in

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 45.

EPU 45 Mechanical Properties

Representative Tensile Curve & Comparison with EPU 43

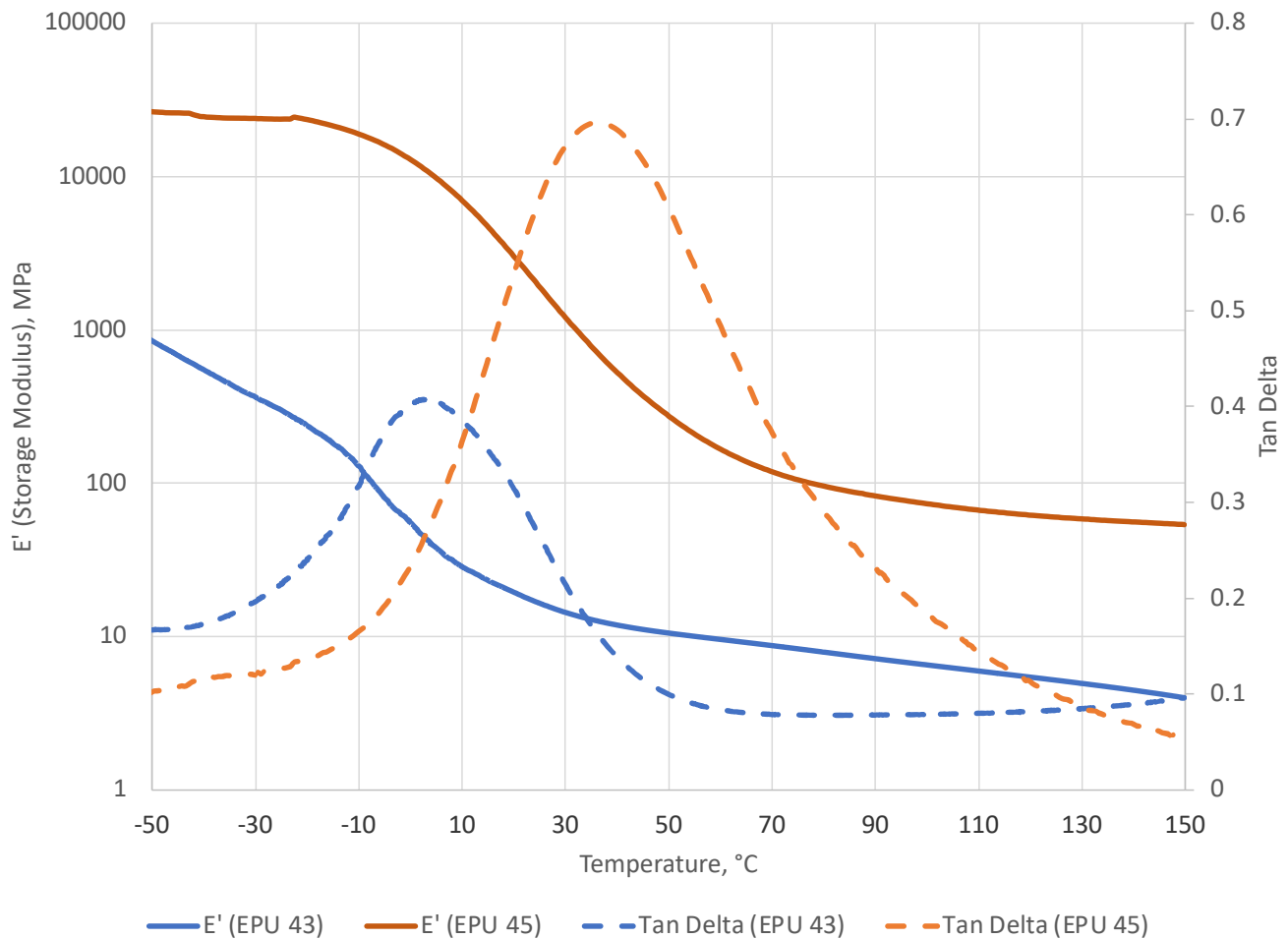
ASTM D412, Die C, 500 mm/min



EPU 45 Dynamic Mechanical Analysis (DMA)

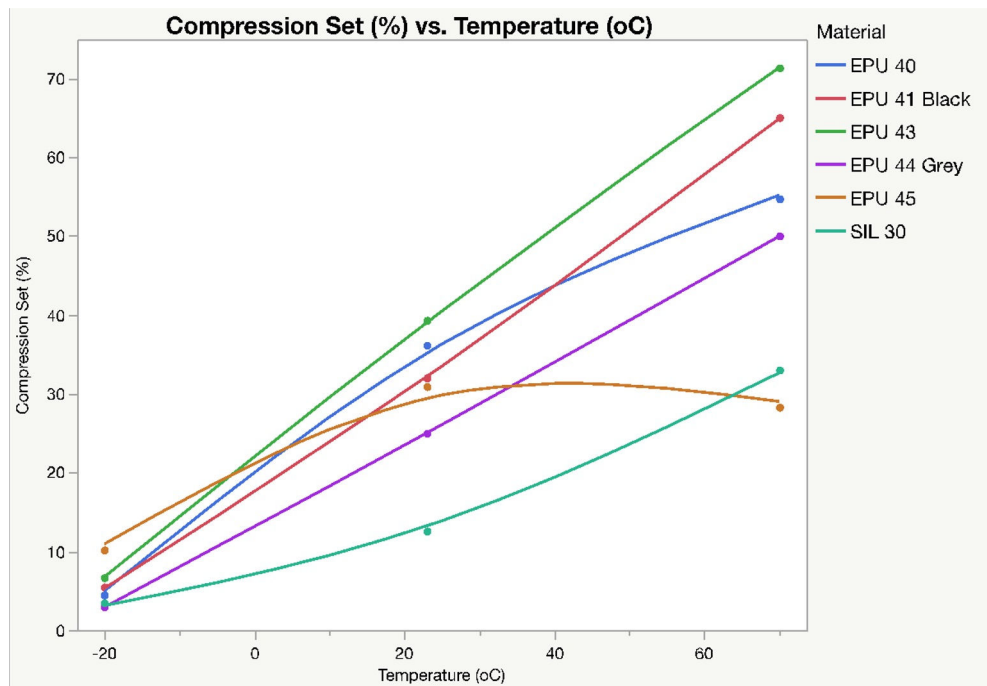
EPU 45 vs. EPU 43

The figure below shows the thermomechanical behavior of EPU 45 compared to EPU 43. EPU 45 has a T_g at 30 °C and a room temperature storage modulus around 65 MPa.



EPU 45 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 45 Chemical Compatibility

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

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

EPU 45 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 a centrifugal spinner. The cleaned test articles were baked following the standard baking schedule for EPU 45 (see below). Additional details about the test are available upon request.

Baking schedule: Ramp from room temperature to 120 °C over 75 minutes; Hold at 120 °C for 8 hours.

Disclaimer

Each Carbon customer using the resin is solely responsible for testing and evaluating the performance of any resin within the context of the customer's application or use of the resin. Many variables can affect the properties of the resin and printed article. Test results may vary based on printing and/or post-processing procedures. The information provided herein is for informational purposes only based on present data available to Carbon. The information applies only to the Resin designated herein as sold by Carbon as used to make the test article and does not apply to use in any process, use, application, or in combination with any other material. Accordingly, Carbon makes no guarantee or representation and assumes no liability for customer's use of a resin in any process, use, application, or in combination with any other material.

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