RPU 70 is a tough, rigid material that is a good choice for parts requiring strength, toughness, and moderate heat-resistance.

Table of Contents

Standard Technical Data Sheet: Page 2-		<u>Page 2-3</u>
Extended Technical Data Sheet:		<u>Page 4-10</u>
-	Mechanical Properties	Page 5
-	Thermomechanical and Creep Properties	<u>Page 6-7</u>
-	Chemical Compatibility	Page 8
-	UV Aging	Page 9
-	Biocompatibility	Page 10

Vale Strangth Astra DB38 Type I Spomm/min Astra DB38 Signal at Yield Astra DB38 Signal at Yield Astra DB38 Signal at Yield Signal at Yield	Tensile Properties	Test Standard	Metric	US
ASTM D628 Type I Somm/min S% S% Elongation at Break 6 ksi Elongation at Break 30% 30% Tensile Modulus 30% 30% Yield Strength 40 MPa 6 ksi Strain at Yield 6 ksi 30% Yield Strength 40 MPa 6 ksi Strain at Yield 6 ksi 5% Ultimate Tensile Strength 6 ksi 5% Elongation at Break 5% 6% Ultimate Tensile Strength 6 ksi 6 ksi Elongation at Break 700 MPa 6 ksi Flexural Properties Test Standard Metric 00% Flexural Stress at 5% strain 8 ksi 100% 20 ksi Impact Properties Test Standard Metric 02 ksi Unnotched Charpy 150 179-1/teU 35 kJ/m² 07 t-lb/m² Natched Charpy Kost Marking 00.1/m (220 J/m) 6 t-lb/m (03 t-lb/m² Notched Charpy ASTM D4812 30.0 J/m (220 J/m) 6 t-lb/m (03 t-lb/m² Notched	Tensile Modulus	ASTM D628	1700 MPa	245 ksi
Strain at YieldSype I SO mm/minS%S%Ultimate Tensile Strength6 ksiElongation at Break30%Tensile Modulus700 MPaYield Strength700 MPaStrain at Yield6 ksiStrain at Yield6 ksiUltimate Tensile Strength6 ksiUltimate Tensile Strength6 ksiElongation at Break5%Flexural PropertiesTest StandardFlexural Properties7est StandardFlexural Stress at 5% strain8 ksiFlexural Modulus (Chord, 05-1%)550 MPaStandard Charpy150 179-1/PdIndected Charpy150 179-1/PdNatched Charpy150 179-1/PdNatched Charpy150 179-1/PdNatched Charpy0.3 ft-Ib/m²Natched Izod, 23 °C (-30 °C)ASTM D4812Matched Izod, 23 °C (-30 °C)ASTM D4812Heat Deflection Temperature at 0455 MPa/66 psiASTM D648Heat Deflection Temperature at 182 MPa/264 psiASTM D648Grefficient of Thermal Expansion (-40, 40 °C)ASTM D648Coefficient of Thermal Expansion (-40, 40 °C)ASTM D648Coefficient of Thermal Expansion (-40, 40 °C)ASTM D648Coefficient of Thermal Expansion (-40, 40 °C)ASTM B631Coefficient of Thermal Expansion (-	Yield Strength		40 MPa	6 ksi
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Yield Strength ATTM D638 Type V ATTM D638 Type V ATTM D638 Type V AttM D638 S% AttM D638 Ultimate Tensile Strength 10 mm/min 5% 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Elongation at Break		30%	30%
ASTM D638 Type V ASTM D638 Type V Imm/min S% Utimate Tensile Strength 40 MPa 6 ksi Elongation at Break 100% 100% Flexural Properties Test Standard Metric US Flexural Stress at 5% strain ASTM D790-B 55 MPa 8 ksi Flexural Modulus (Chord, 0.5-1%) Test Standard Metric US Impact Properties Test Standard S5 MPa 8 ksi Innotched Charpy ISO 179-1/1eU 35 kJ/m² 07 ft-lb/in² Notched Charpy ISO 179-1/1eU 300 J/m (320 J/m) 6ft-lb/in (03 ft-lb/in) Notched Izod, 23 °C (-30 °C) ASTM D256 15 J/m² 0.3 ft-lb/in (03 ft-lb/in) Notched Izod, 23 °C (-30 °C) ASTM D256 15 J/m (20 J/m) 03 ft-lb/in (03 ft-lb/in) Nethed Izod, 23 °C (-30 °C) ASTM D648 Metric US US Heat Deflection Temperature at 182 MPa/264 psi 60 °C 140 °F 140 °F Heat Deflection Temperature at 182 MPa/264 psi ASTM D648 60 °C 140 °F Heat Deflection Temperature at 182 MPa/264	Tensile Modulus		1700 MPa	245 ksi
Strain at YieldType V 10 mm/min5%5%Utimate Tensile Strength6 ksiElongation at Break100%Flexural PropertiesTest StandardMetricFlexural Stress at 5% strainASTM D790-B55 MPa8 ksiFlexural Modulus (Chord, 0.5-1%)Test StandardMetricUSImpact PropertiesTest StandardMetricUSImpact PropertiesSio 179-1/1eU35 kJ/m²17 ft-1b/in²Unnotched CharpyISO 179-1/1eA15 kJ/m²07 ft-1b/in²Notched Izod, 23 °C (-30 °C)ASTM D256300 J/m (320 J/m)6 ft-1b/in (03 ft-1b/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)03 ft-1b/in (03 ft-1b/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 182 MPa/264 psiASTM D64860 °C110 °FCeefficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Yield Strength		40 MPa	6 ksi
Ultimate Tensile Strength 40 MPa 6 ksi Elongation at Break 100% 100% Flexural Properties Test Standard Metric US Flexural Stress at 5% strain ASTM D790-B 55 MPa 8 ksi Flexural Modulus (Chord, 0.5-1%) Test Standard 1500 MPa 220 ksi Impact Properties Test Standard Metric US Innotched Charpy ISO 179-1/1eU 35 kJ/m² 17 ft-Ib/in² Notched Charpy ISO 179-1/1eA 15 kJ/m² 0.7 ft-Ib/in² Unnotched Izod, 23 °C (-30 °C) ASTM D4812 300 J/m (320 J/m) 6 ft-Ib/in (6 ft-Ib/in) Notched Izod, 23 °C (-30 °C) ASTM D256 15 J/m (20 J/m) 0.3 ft-Ib/in (0.3 ft-Ib/in) Thermal Properties Test Standard Metric US Heat Deflection Temperature at 0.455 MPa/66 psi ASTM D648 60 °C 140 °F Heat Deflection Temperature at 182 MPa/264 psi ASTM D648 60 °C 140 °F Gefficient of Thermal Expansion (-40, 40 °C) ASTM E831 100 pm/rC 50 pm/rF	Strain at Yield	Type V	5%	5%
Flexural PropertiesTest StandardMetricUSFlexural Stress at 5% strainASTM D790-B55 MPa8 ksiFlexural Modulus (Chord, 0.5-1%)Test StandardMetric220 ksiImpact PropertiesTest StandardMetricUSUnnotched CharpyISO 179-1/1eU35 kJ/m²17 ft-Ib/n²Notched CharpyISO 179-1/1eA15 kJ/m²0.7 ft-Ib/in²Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-Ib/in (6 ft-Ib/in)Notched Izod, 23 °C (-30 °C)Test StandardMetricUSThermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 182 MPa/264 psiASTM D64860 °C140 °FCereficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Ultimate Tensile Strength	IU mm/min	40 MPa	6 ksi
Flexural Stress at 5% strainASTM D790-B55 MPa8 ksiFlexural Modulus (Chord, 0.5-1%)Test Standard1500 MPa220 ksiImpact PropertiesTest StandardMetricUSUnnotched CharpyISO 179-1/1eU35 k.J/m²17 ft-lb/in²Notched CharpyISO 179-1/1eA1.5 k.J/m²0.7 ft-lb/in²Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-lb/in (6 ft-lb/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-lb/in (0.3 ft-lb/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D48160 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM D64860 °C110 °FGefficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Elongation at Break		100%	100%
ASTM D790-BASTM D790-B1500 MPa220 ksiImpact PropertiesTest StandardMetricUSUnnotched CharpyISO 179-1/IeU35 kJ/m²17 ft-lb/in²Notched CharpyISO 179-1/IeA15 kJ/m²0.7 ft-lb/in²Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-lb/in (6 ft-lb/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-lb/in (0.3 ft-lb/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 182 MPa/264 psiASTM E831100 ppm/°C50 ppm/°F	Flexural Properties	Test Standard	Metric	US
Flexural Modulus (Chord, 0.5-1%)Test StandardMetric220 ksiImpact PropertiesTest StandardMetricUSUnnotched CharpyISO 179-1/IeU35 kJ/m²17 ft-Ib/in²Notched CharpyISO 179-1/IeA15 kJ/m²0.7 ft-Ib/in²Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-Ib/in (6 ft-Ib/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-Ib/in (0.3 ft-Ib/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM E831100 ppm/°C50 ppm/°F	Flexural Stress at 5% strain		55 MPa	8 ksi
Image: Constraint of the second sec	Flexural Modulus (Chord, 0.5-1%)	АSTM D790-В	1500 MPa	220 ksi
Notched CharpyISO 179-1/1eA1.5 kJ/m²0.7 ft-lb/in²Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-lb/in (6 ft-lb/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-lb/in (0.3 ft-lb/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM E831100 ppm/°C50 ppm/°F	Impact Properties	Test Standard	Metric	US
Line Unnotched Izod, 23 °C (-30 °C)ASTM D4812300 J/m (320 J/m)6 ft-lb/in (6 ft-lb/in)Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-lb/in (0.3 ft-lb/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM E831100 ppm/°C50 ppm/°F	Unnotched Charpy	ISO 179-1/1eU	35 kJ/m ²	17 ft-lb/in ²
Notched Izod, 23 °C (-30 °C)ASTM D25615 J/m (20 J/m)0.3 ft-lb/in (0.3 ft-lb/in)Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM D648110 °F110 °FCoefficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Notched Charpy	ISO 179-1/1eA	1.5 kJ/m ²	0.7 ft-lb/in ²
Thermal PropertiesTest StandardMetricUSHeat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM D648100 °F110 °FCoefficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Unnotched Izod, 23 °C (-30 °C)	ASTM D4812	300 J/m (320 J/m)	6 ft-lb/in (6 ft-lb/in)
Heat Deflection Temperature at 0.455 MPa/66 psiASTM D64860 °C140 °FHeat Deflection Temperature at 1.82 MPa/264 psiASTM E831100 ppm/°C110 °FCoefficient of Thermal Expansion (-40, 40 °C)ASTM E831100 ppm/°C50 ppm/°F	Notched Izod, 23 °C (-30 °C)	ASTM D256	15 J/m (20 J/m)	0.3 ft-lb/in (0.3 ft-lb/in)
Heat Deflection Temperature at 1.82 MPa/264 psi ASTM D648 Coefficient of Thermal Expansion (-40, 40 °C) ASTM E831	Thermal Properties	Test Standard	Metric	US
Heat Deflection Temperature at 182 MPa/264 psi 45 °C 110 °F Coefficient of Thermal Expansion (-40, 40 °C) ASTM E831 100 ppm/°C 50 ppm/°F	Heat Deflection Temperature at 0.455 MPa/66 psi		60 °C	140 °F
	Heat Deflection Temperature at 1.82 MPa/264 psi	ASTM D648	45 °C	110 °F
Heat Capacity, 23 °C ASTM E1269 1.8 J/g-°C 0.5 BTU/lb-°F	Coefficient of Thermal Expansion (-40, 40 °C)	ASTM E831	100 ppm/°C	50 ppm/°F
	Heat Capacity, 23 °C	ASTM E1269	1.8 J/g-°C	0.5 BTU/lb-°F

HB (1.5 mm & 3mm) for L1, M1, M2, M3 and M3 Max printers UL Blue Card® file # E485325

Dielectric/Electric Properties	Test Standard	Metric	US
Dielectric Constant	ASTM D150	3.3	3.3
Dissipation Factor		0.017	0.017
Dielectric Strength	ASTM D149	16 kV/mm	390 V/mil
Volume Resistivity	ASTM D257	8.0 x 10 ¹⁴ ohm-cm	3.2 x 1014 ohm-in

UL 94

Parts were processed using an M series printer and a Smart Part Washer with VF 1 as the solvent. The washed test articles were baked following the standard baking schedule for RPU 70.

Flammability

General Properties	Test Standard	
Shore D Hardness	ASTM D2240	80
Bulk Density	ASTM D792	1.08 g/mL
Taber Abrasion	ASTM D4060 CS-17, 1 kg, 100% vacuum	70 mg / 1000 cycles
Water Absorption, Short Term (24 hours)	ASTM D570	< 0.5%
Water Absorption, Long Term (14 days)	ASTM D570	< 1.5%

Parts were processed using an M series printer and a Smart Part Washer with VF 1 as the solvent. The washed test articles were baked following the standard baking schedule for RPU 70.

Liquid Properties	
Liquid Density (Part A)	1.03 g/mL
Liquid Density (Part B)	0.98 g/mL
Liquid Density (Part A+B)	1.02 g/mL
Part A:B Volume Ratio (Mass Ratio)	10.0 (10.5)
25 °C Viscosity (Part A)	2800 cP
25 °C Viscosity (Part B)	70 cP
25 °C Viscosity (Part A+B)	2100 cP

Disclaimer

The information provided herein is for informational purposes only based on present data available to Carbon. This information should not be used for testing, design specification or quality control purposes. 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. End-use material performance and test results may vary based on printing and/or post-processing procedures. Many variables can affect the properties of the resin and printed article, including but not limited to, design, processing, color treatment, operating and end-use conditions, test conditions, etc. In addition, product specifications are subject to change without notice. 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. This information and Carbon's technical advice are given to you in good faith but without warranty. Carbon's sole warranty is that our products will meet our standard specifications in effect at the time of shipment and the exclusive remedy offered for breach of such warranty is limited to refund of purchase price or replacement of the product shown to be other than warranted.

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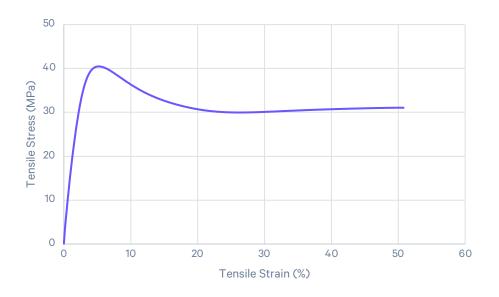
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Extended TDS

RPU 70 Mechanical Properties

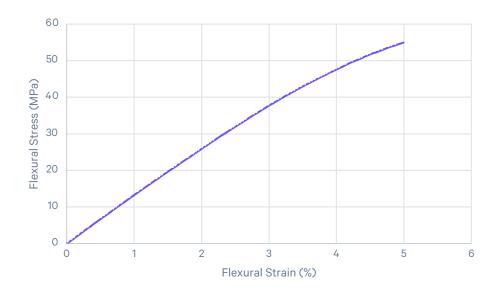
Representative Tensile Curve

ASTM D638, Type I, 50 mm/min



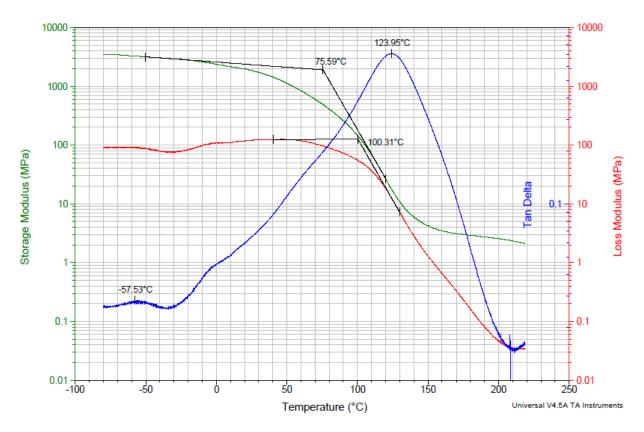
Representative Flexural Curve

ASTM D790-B Samples are tested to 5% extension.



RPU 70 Dynamic Mechanical Analysis (DMA)

Dynamic mechanical analysis provides insight into a resin's viscoelastic properties across a range of temperatures. The figure below shows a temperature ramp of RPU 70. RPU 70 exhibits a storage modulus softening temperature at 75 °C. The peak in the tan(d) curves indicates that the glass transition temperature of RPU 70 is approximately 125 °C.



Standard: ASTM D4065 Instrument: TA DMA Q800 DMA Mode: Tension Sample Dimensions: L=20mm, W=10mm, t=1mm (rectangular block) Strain Amplitude: 0.1% (linear regime of viscoelasticity) Oscillation frequency: 1 Hz

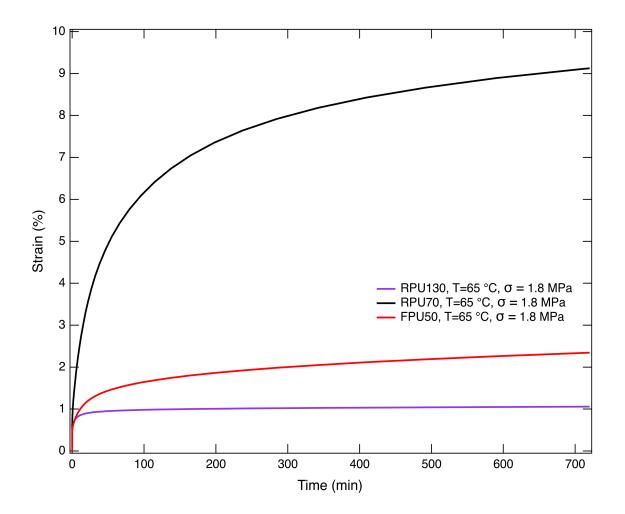
Temperature Range: -100°C to 200°C

Ramp Rate: 1.5 °C/min

Print Conditions: Samples were hand-wiped and not washed with solvent. The thermal cure for all materials complies with the Carbon user manual. Values may differ based on post processing conditions.

RPU 70 Creep Behavior

A creep test measures a polymer's rate of deformation under constant load at a fixed temperature and is a fundamental property for materials that need to operate under load. The figure below shows that RPU 70 creeps up to 10% strain over 12 hours at 65 °C and 1.8 MPa applied load. Low creep behavior is necessary for dimensional stability over time and loads.



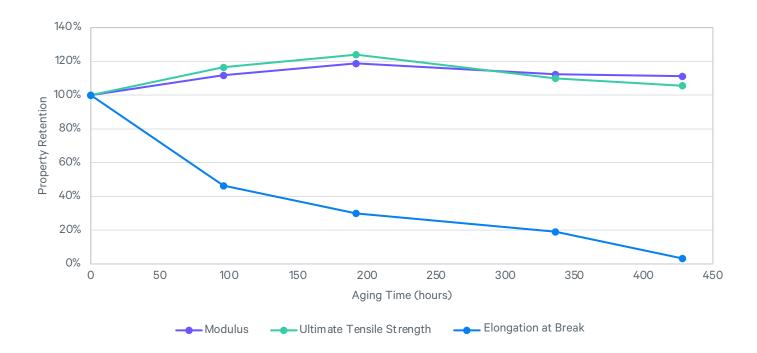
RPU 70 Chemical Compatibility

	Mass Gain* (%)
Household Chemicals	
Bleach (NaClO, 5%)	< 5%
Sanitizer (NH ₄ Cl, 10%)	< 5%
Distilled Water	< 5%
Sunscreen (Banana Boat, SPF 50)	< 5%
Detergent (Tide, Original)	< 5%
Windex Powerized Formula	< 5%
Hydrogen Peroxide (30%)	< 5%
Ethanol (95%)	15 – 30%
Industrial Fluids	
Engine Oil (Havoline SAE 5W-30)	< 5%
Brake Fluid (Castrol DOT-4)	< 5%
Airplane Deicing Fluid (Type I Ethylene Glycol)	< 5%
Airplane Deicing Fluid (Type I Propylene Glycol)	< 5%
Airplane Deicing Fluid (Type IV Ethylene Glycol)	< 5%
Airplane Deicing Fluid (Type IV Propylene Glycol)	< 5%
Transmission Fluid (Havoline Synthetic ATF)	< 5%
Engine Coolant (Havoline XLC, 50%/50% premixed)	< 5%
Diesel (Chevron #2)	< 5%
Gasoline (Chevron #91)	> 30%
Skydrol 500B-4	5 – 15%
Strong Acid/Base	
Sulfuric Acid (30%)	< 5%
Sodium Hydroxide (10%)	< 5%

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

RPU 70 UV Aging

Natural polymer aging can occur in the presence of light, sun, and heat. Carbon evaluated the UV aging performance of RPU 70 using ASTM D4459, which is intended to simulate indoor exposure of solar radiation through glass. RPU 70 retained up to 46% of the original elongation at break after 96 hours of exposure.



ASTM 4459: Q-Sun XE-1, 0.8 W/m²/nm at 420 nm, 55 °C ASTM D638: Type V, 10 mm/min, average values represented

RPU 70 Biocompatibility

Biocompatibility Testing

Test articles in the form of printed parts were provided to NAMSA or Pacific BioLabs for evaluation and met the requirements of each of the following tests:

Biocompatibility Testing	Test Standard
Cytotoxicity	ISO 10993-5: Biological evaluation of medical devices – Part 5: Tests for in vitro cytotoxicity (MEM extract)
Sensitization	ISO 10993-10: Biological evaluation of medical devices – Part 10: Tests for skin sensitization (Closed patch sensitization study in guinea pigs)
Irritation	ISO 10993-23: Biological evaluation of medical devices – Part 23: Tests for irritation (Intracutaneous study in rabbits)
Hemolysis	ASTM F756, Standard Practice for Assessment of Hemolytic Properties of Materials & ISO 10993-4, Biological evaluation of medical devices - Part 4: Selection of tests for interactions with blood (Extract and direct contact method)
Systemic Toxicity	ISO 10993-11: Biological evaluation of medical devices — Part 11: Tests for systemic toxicity (Acute systemic toxicity study in mice)

Test articles were processed using an M series printer and a Smart Part Washer with VF 1 as the solvent. The washed test articles were baked following the standard baking schedule for RPU 70: 120 °C for 4 hours. Additional details about the tests are available upon request.

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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