

STANDARDIZED TESTING: CAPABILITIES LIST

The Polymer Laboratory at Stress Engineering Services (SES) offers standalone testing services for many polymer, plastic, and chemical characterization methods. We provide high quality test data and analytical reports at competitive rates.

ISO 9001:2008 & ISO 13485:2003 Certified
ISO 17025:2005 Compliant (Pending Accreditation) for several of these methods

Type	Instrument / Service	Typical Outputs	Standards (ASTM if not specified)
POLYMER	Differential Scanning Calorimetry (DSC)	Material ID, Glass Transition, Melting Transition, Crystallization Behavior, Oxidation Induction Time	Std: D3418, D7426, E1356, E793, E928, E1269, D1519 OIT: D3895, E1858, MDSC: E1269, E1952
	Thermo Gravimetric Analysis (TGA)	Material ID, Water Content, Volatile/Semi-Volatile/Ash Content, Decomposition Rate or Onset Temperature	Comp/RTD: E1131, D6370, D3850 Const T: E2550
	Dynamic Mechanical Analysis (DMA)	Complex Modulus / Thermal Transitions; t-T Superposition and Master Curves	General: D4065, Tg: E1640, D7028
	Thermo Mechanical Analysis (TMA)	Softening Point; Tg; CTE; Expansion/Contraction due to Thermal History	Softening T: E2347 CTE: E831 Tg: E1545
	Fourier Transform Infrared Spectroscopy (FTIR) & FTIR Microscopy	Material ID Composition/Spatial Mapping	E168, E1252, E573
	Ultraviolet-Visible Spectrometry (UV-vis)	Transmittance (Directional, Total), Haze, Color; Solute Conc.	E275, E169, E2193 Haze: D1003; YI: E313
	Melt Flow Rate/Index	MFR, MFI	D1238
	Gel Permeation Chromatography (GPC)	Molecular Weight Distribution	D6474
	Intrinsic Viscosity	Intrinsic Viscosity	D2857, D4603
	Capillary Rheometry	Viscosity as function of Temp & Shear Rate	D3835
PHYSICAL	Hardness	Shore A & D	D2240
	Density (Solids)	Specific Gravity, Density	D792
	Color	Tristimulus Color, ΔE	E1347, E313
	Liquid Surface Tension	Capillary Surface Tensiometer (low viscosity)	Custom
	Spindle Viscosity	Viscosity as function of Temp and Shear Rate, for low $\dot{\gamma}$ T range: -20 to 90 °C	D2196, various
CHEMICAL	QTOF, GC/MS, TD/MS, PY/MS, ICP/MS, GC, HPLC/UV, GC-FID, NMR	Compositional Analysis, Often includes Extraction step	Various / Custom
	Crosslink Density, Gel Content, Solubility	Analysis of Olefins and Other Resins	XL: D2765, F3203; Gel Content: D5492; Sol.: D5029
	Light Scattering	Dynamic Light Scattering, Particle Size Analysis	Various / Custom
	pH	pH	D1293, various

Typical Lead Time = 3-5 business days for Polymer tests. 5-8 business days for Physical, Mechanical, Adhesives/Coatings, and Microscopy tests. 3-4 weeks for Chemical tests. Rush service is available for an additional surcharge.

As needed SES, will generate test specimens from raw resin, via Injection Molding, Compression Molding, Casting + Cure, etc.

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MECHANICAL	Tensile	Tensile L-d or Stress-Strain Temp capabilities: -80 to 300 °C	Plastic: D638 Elastomer: D412
	High Strain Rate Tensile	Stress Strain, up to 250 s ⁻¹ Strain Rate	Custom
	Compression	Compressive L-d or Stress Strain Temp capabilities: -80 to 300 °C	D695, D2166, D6641
	Biaxial	Biaxial Stress Strain	Custom
	Flexural	Compressive L-d or Stress Strain Temp capabilities: -80 to 300 °C	3-point: D790 4-point: D6272
	Friction	Coefficient of Friction	D1894
	Izod Impact	Notched Impact Strength	D256
	Tear	Tear Strength (various modes)	D624, D1922, D2261, D1004, D1938
	Fatigue	Cyclic L-d or Stress Strain Cycles to Failure	D3479, D7791
	Creep	Tensile Creep, Flexural Creep	D2990
	Pressure / Leakage	Pressure Loss as function of P or t	Custom
ELASTOMERS	Seal Materials Characterization	Elastomer, Rubber, O-Ring performance	D1414, D471, Others
PACKAGING	Transportation & Packaging	Various Environmental & Transportation Test Procedures	ISTA, various ASTM
	Packaging Performance	UV Protection, Water Transport	USP 37 <671>, D7709
ADHESIVES & COATINGS	Peel	Peel Strength	T: D1876, 90°: D6862, 180°: D3330
	Lap Shear	Adhesion Strength – Shear Mode	D1002, D3163, D5868
	Pull-Off Adhesion	Adhesion Strength – Pull-Off Mode	D4541
	Scratch / Pencil Hardness / Solvent Double Rub	Adhesion Rating	D7027, D3363, D5402
	Mandrel Bend	Adhesion Rating	D522
	Crosshatch Adhesion	Adhesion Rating	D3359
	Taber Abrasion	Wear: Pin on Disk (Rotary)	D4060
ENVIRONMENTAL	Storage Stability	Real time aging in tight T/RH range	Custom
	Environmental Chambers	Accelerated Aging, T/RH Cycling, etc. Small & Large chambers.	Custom. For Accel Aging, F1980
	UV Exposure	QUV exposure	G154
	Chemical / T / P Autoclaves	Various chemical, pressure, and temperature environments	Custom
MICROSCOPY & INORGANIC	Optical Microscopy (OM)	Optical Imaging to 2000X Depth Profiling	Custom
	SEM-EDS	Imaging to 70kX, SE & BSE modes Atomic composition for Z≥6	Custom
	X-Ray Diffraction (XRD)	Material & Phase ID	Custom
	X-Ray Fluorescence (XRF)	Atomic composition for Z≥6	E1621

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