

## TUFFAK LS POLYCARBONATE SHEET

### LASER SAFETY

TUFFAK LS sheet is a tinted, transparent polycarbonate sheet designed with high optical density at targeted wavelengths for laser shielding applications. It features outstanding impact strength, superior dimensional stability, high temperature resistance, high optical density and high clarity. This lightweight sheet is also easy to fabricate. TUFFAK LS sheet is offered with a five (5) year Limited Product Warranty against breakage. The terms of the warranty are available upon request.

### APPLICATIONS

Laboratory viewing windows, area protective barriers, laser viewing table enclosures, laser viewing ports, safety screens or beam blocking curtains for medical applications, safety screens in laser cutting operations and laser research

### Regulatory code compliance and certifications

ANSI Z136.7 Appendix C - Procedure for Laser Based Testing of Optical Density for Absorptive Filters. American National Standard for Laser Protective Equipment

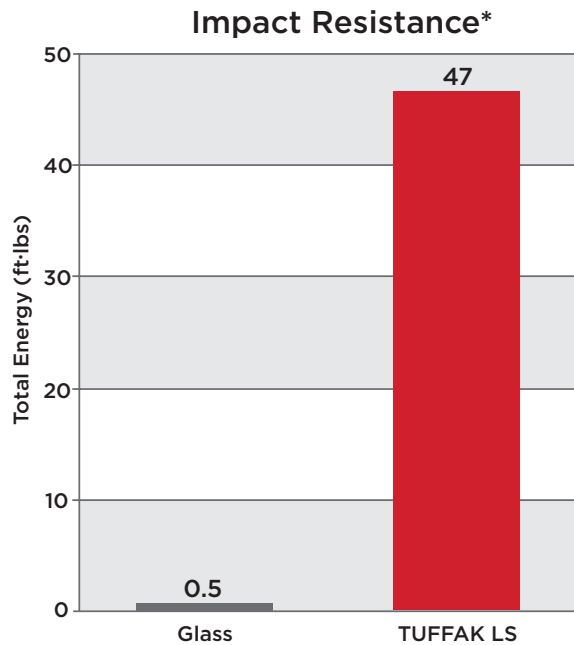
### TYPICAL PROPERTIES

Property	Test Method	Units	Values
<b>PHYSICAL</b>			
Specific Gravity	ASTM D792	-	1.2
Refractive Index	ASTM D542	-	1.586
Light Transmission, LSG Gray	ASTM D1003	%	70
10600 nm (IR) @ 0.118"	ANSI Z136.7	OD	>7.3
9300 nm (IR) @ 0.118"	ANSI Z136.7	OD	>7.7
Light Transmission, LSA Amber	ASTM D1003	%	28
532 nm (VIS) @ 0.118"	ANSI Z136.7	OD	>6.3
Light Transmission, LSY Yellow	ASTM D1003	%	28
355 nm (UVA) @ 0.118"	ANSI Z136.7	OD	>7.8
308 nm (UVB) @ 0.118"	ANSI Z136.7	OD	>6.0
266 nm (UVC) @ 0.118"	ANSI Z136.7	OD	>7.8
Water Absorption, 24 hours	ASTM D570	%	0.15
Poisson's Ratio	ASTM E132	-	0.38
<b>MECHANICAL</b>			
Tensile Strength, Ultimate	ASTM D638	psi	9,500
Tensile Strength, Yield	ASTM D638	psi	9,000
Tensile Modulus	ASTM D638	psi	340,000
Elongation	ASTM D638	%	110
Flexural Strength	ASTM D790	psi	13,500
Flexural Modulus	ASTM D790	psi	345,000
Compressive Strength	ASTM D695	psi	12,500
Compressive Modulus	ASTM D695	psi	345,000
Izod Impact Strength, Notched @ 0.125"	ASTM D256	-	18
Izod Impact Strength, Unnotched @ 0.125"	ASTM D256	-	60 (No Break)
Instrumented Impact @ 0.125"	ASTM D3763	-	47
Shear Strength, Ultimate	ASTM D732	psi	10,000
Shear Strength, Yield	ASTM D732	psi	6,000
Shear Modulus	ASTM D732	psi	114,000
Rockwell Hardness	ASTM D785	-	M70 / R118
<b>THERMAL</b>			
Coefficient of Thermal Expansion	ASTM D696	in/in/°F	3.75 x 10 <sup>-5</sup>
Coefficient of Thermal Conductivity	ASTM C177	hr/ft <sup>2</sup> /°F	1.35
Heat Deflection Temperature @ 264 psi	ASTM D648	°F	270
Heat Deflection Temperature @ 66 psi	ASTM D648	°F	280
Brittleness Temperature	ASTM D746	°F	-200
<b>ELECTRICAL</b>			
Dielectric Constant @ 10 Hz	ASTM D150	-	2.96
Dielectric Constant @ 60 Hz	ASTM D150	-	3.17
Volume Resistivity	ASTM D257	-	8.2 x 10 <sup>16</sup>
Dissipation Factor @ 60 Hz	ASTM D150	-	0.0009
Arc Resistance			
Stainless Steel Strip electrode	ASTM D495	Seconds	10
Tungsten Electrodes	ASTM D495	Seconds	120
Dielectric Strength, in air @ 0.125"	ASTM D149	V/mil	380
<b>FLAMMABILITY</b>			
Horizontal Burn, AEB	ASTM D635	in	<1
Ignition Temperature, Self	ASTM D1929	°F	1022
Ignition Temperature, Flash	ASTM D1929	°F	824

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TUFFAK LS				Type of Laser	Spectral Region	Typical Applications
Targeted Protection Wavelength	Optical Density (OD)	Color	Visible Light Transmission (%)			
10.6 micrometer	>7.3	LSG Gray	70	CO <sub>2</sub>	IR	Cutting, welding engraving surgical and dental lasers
9.3 micrometer	>7.7	LSG Gray	70	CO <sub>2</sub>	IR	Dental laser
532 nm	>6.3	LSA Amber	28	Neodymium	VIS	Green laser pointer, fluorescence spectroscopy, optical alignment, dermatology
355 nm	>7.8	LSY Yellow	67	DPSS, Nd:YAG, Nd:YVO4	UVA	Fluorescence excitation, Raman spectroscopy, R&D, 3-D scanning
308 nm	>6.0	LSY Yellow	67	Xenon-chloride excimer	UVB	Dermatological disorders, micro-electronic chip manufacturing, eye surgery
266 nm	>7.8	LSY Yellow	67	DPSS, Nd:YAG	UVC	Raman spectroscopy, material processing, biological experimentation

TUFFAK LS is intended for protection against incidental laser exposure. It is not intended for use as a filter in the direct path of a laser beam.



\*Instrumented Impact per ASTM D 3763, sample thickness is 0.125" nominal

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determines the suitability of our materials and suggestions before adopting them on a commercial scale.

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**PLASKOLITE**

400 W Nationwide Blvd, Suite 400  
Columbus, OH 43215  
800.848.9124 • Fax: 877.538.0754  
plaskolite@plaskolite.com  
www.plaskolite.com