

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

*WAVELENGTH RANGES

Please see page 2 for Certified Optical Density Ranges

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

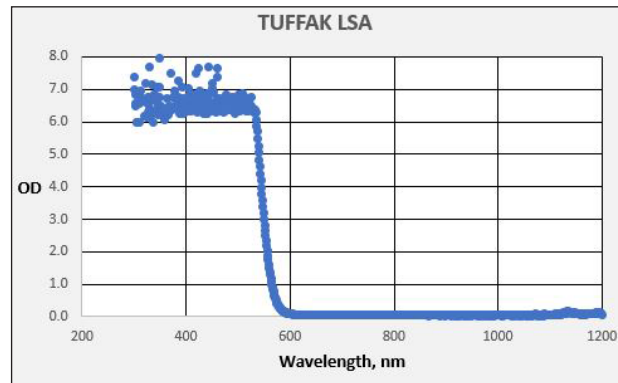
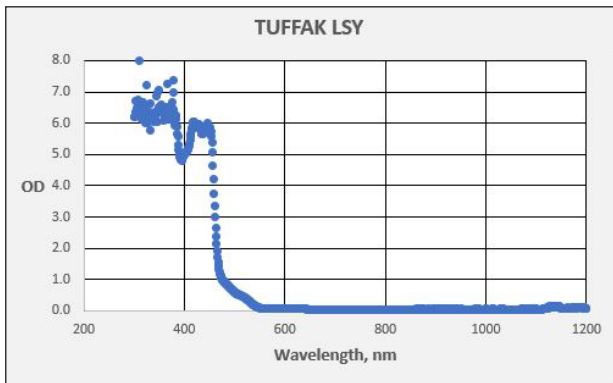
TYPICAL METRIC ISO PROPERTIES*

Property	Test Method	Units	Values
PHYSICAL			
Density	ISO 1183	g/m ³	1.2
Refractive Index	ISO 489	-	1.586
Light Transmission, LSG Gray	ASTM D1003	%	70
10600 nm (IR) @ 3mm	ANSI Z136.7	OD	>7.3
9300 nm (IR) @ 3mm	ANSI Z136.7	OD	>7.7
Light Transmission, LSA Amber*	ASTM D1003	%	28
532 nm (VIS) @ 3mm	ANSI Z136.7	OD	>6.3
Light Transmission, LSY Yellow*	ASTM D1003	%	28
355 nm (UVA) @ 3mm	ANSI Z136.7	OD	>7.8
308 nm (UVB) @ 3mm	ANSI Z136.7	OD	>6.0
266 nm (UVC) @ 3mm	ANSI Z136.7	OD	>7.8
Water Absorption, 24 hours	ASTM D570	%	0.15
Poisson's Ratio	ASTM E132	-	0.38
MECHANICAL			
Tensile Strength, Ultimate	ASTM D638	MPa	66
Tensile Strength, Yield	ISO 527-1,2	MPa	62
Tensile Modulus	ISO 527-1,2	MPa	2340
Elongation	ASTM D638	%	110
Flexural Strength	ISO 178	MPa	93
Flexural Modulus	ISO 178	MPa	2380
Compressive Strength	ASTM D695	MPa	86
Compressive Modulus	ASTM D695	MPa	2380
Izod Impact Strength, Notched	ISO 180/1A	kJ/m ²	>65
Izod Impact Strength, Unnotched	ISO 179/1fu	kJ/m ²	(No Break)
Instrumented Impact @ 3.2mm	ASTM D3763	J	64
Shear Strength, Ultimate	ASTM D732	MPa	69
Shear Strength, Yield	ASTM D732	MPa	41
Shear Modulus	ASTM D732	MPa	1
Rockwell Hardness	ASTM D785	-	M70 / R118
THERMAL			
Coefficient of Thermal Expansion	ISO 11359-2	um/m/°C	68
Heat Deflection Temperature @ 1.82 MPa	ISO 75-1,2	°C	132
Heat Deflection Temperature @ 0.46 MPa	ISO 75-1,2	°C	138
Brittleness Temperature	ASTM D746	°C	-128
ELECTRICAL			
Dielectric Constant @ 50 Hz	DIN 53483	-	3.0
Surface Resistivity	ISO 60093	Ohm	>10 ¹⁴
Volume Resistivity	ISO 60093	Ohm-cm	>10 ¹⁵
Dissipation Factor @ 100 Hz & 1MHz	DIN 53483	-	0.0006/0.009
Arc Resistance			
Stainless Steel Strip electrode	ASTM D495	Seconds	10
Tungsten Electrodes	ASTM D495	Seconds	120
Dielectric Strength, in air @ 3.2mm	ASTM D149	V/mm	15000
FLAMMABILITY			
Horizontal Burn, AEB	ASTM D635	cm	<2.54
Ignition Temperature, Self	ASTM D1929	°C	550
Ignition Temperature, Flash	ASTM D1929	°C	440

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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 nm	>7.3	LSG Gray	70	CO ₂	IR	Cutting, welding engraving surgical and dental lasers
9.3 nm	>7.7	LSG Gray	70	CO ₂	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.



TUFFAK LSY Certified Ranges*	TUFFAK LSA Certified Ranges*
OD 6+ @ 300-384nm	OD 6+ @ 300-535nm
OD 5+ @ 385-390nm 399-456nm	OD 5+ @ 536-540nm
OD 4+ @ 391-398nm	OD 4+ @ 541-544nm

*ANSI Z136.7 - Calibrated Optical Density Measurement



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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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