

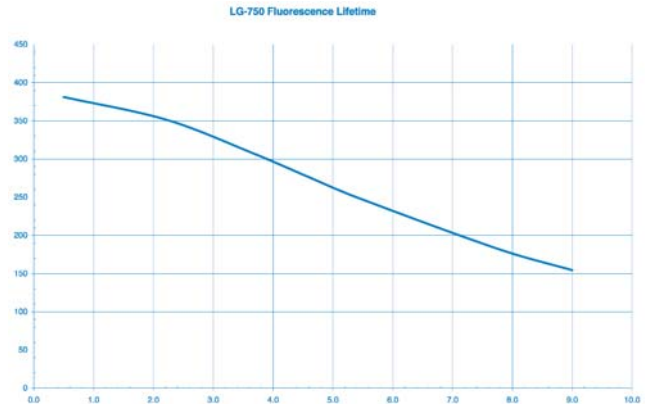
# LG-750 Phosphate Laser Glass

For High Energy Applications

LG-750 is the potassium-barium-aluminum-phosphate based glass with a high cross section for stimulated emission, low nonlinear refractive index, and good athermal characteristics. This glass was initially developed for the US DOE NOVA Laser Facility. The glass property space of this glass is extensively discussed in "Effect of composition on the thermal, mechanical, and optical properties of phosphate laser glasses" Proc SPIE, Vol 1277, 121-139 (1990).

Neodymium Laser Properties	
Emission Peak, $\lambda$ [nm]	1053.7
Emission Width, $\Delta\lambda_{em}$ [nm]	26.0
Radiative Lifetime $\tau_{Rad}$ [ $\mu$ sec]	347
Emission Cross Section $\sigma_{em}$ [ $10^{-20}cm^2$ ]	3.7
*Quenching Constant-Zero Concentration Lifetime, $\tau_0$ [ $\mu$ sec]	383
*Quenching Constant-Q Factor, Q [ $10^{20}cm^{-3}$ ]	7.4

\*Lifetime as a function of neodymium content is approximated by:  $\tau = \tau_0 / (1 + (Nd / Q)^2)$ ,  
Nd = Nd concentration in  $10^{20}$  ions/cm<sup>3</sup>

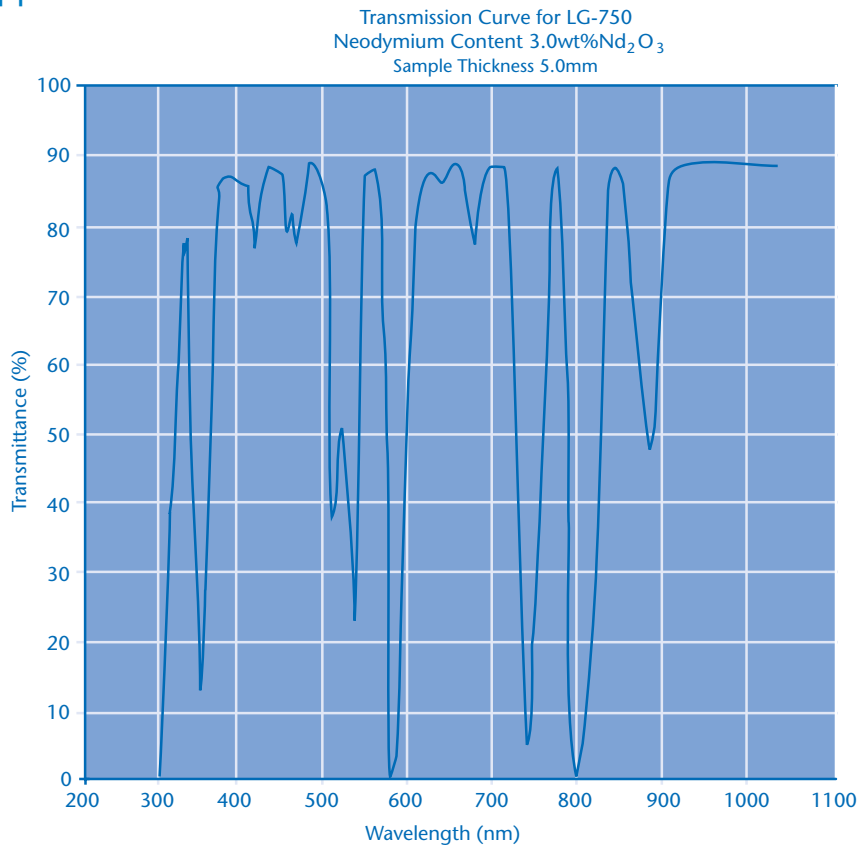


Optical Properties			
$n_d$	1.5260		
$v_d$	68.20		
$n_{633nm}$	1.5240		
$n_{1054nm}$	1.5160		
Nonlinear Refractive Index at 1054nm, $n_2$ [ $10^{-13}$ esu]	1.08		
Stress-Optic Coefficient, K (588nm, 22°C)[ $10^{-6}mm^2/N$ ]	1.80		
Stress-Optic Coefficient, $-K_{par}$ (632.8nm, 25°C)[ $10^{-6}mm^2/N$ ]	2.68		
Stress-Optic Coefficient, $-K_{per}$ (632.8nm, 25°C)[ $10^{-6}mm^2/N$ ]	4.46		
Temperature Coefficient of Refractive Index, $dn/dT_{rel}$ (1060nm, 20-40°C) [ $10^{-6}/^\circ C$ ]	-5.1		
Temperature Coefficient of Optical Pathlength, $W = \alpha_{20-40^\circ C} (n-1) + dn/dT$ [ $10^{-6}/^\circ C$ ]	0.8		
Sellmeier Coefficients			
B1		C1	
B2		C2	
B3		C3	
Attenuation Coefficient [ $cm^{-1}$ ]			
400nm	$\leq 0.20$	3000nm	$\leq 0.80$
1054nm	$\leq 0.0015$	3333nm	$\leq 2.00$

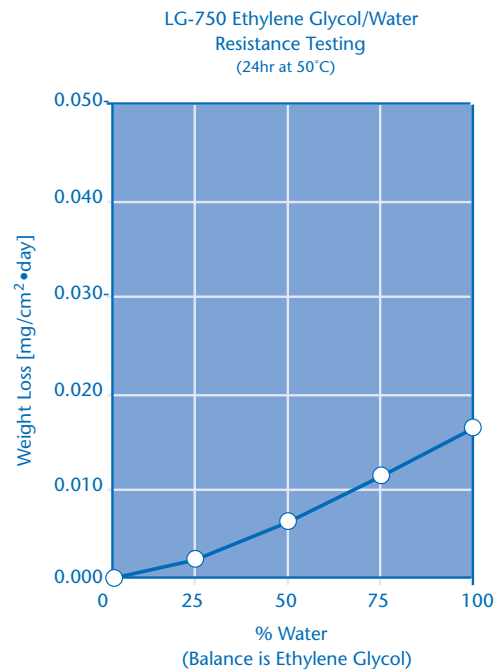
Physical Properties	
Density, $\rho$ [g/cm <sup>3</sup> ]	2.830
Thermal Conductivity (25°C), K [W/m•K]	0.49
Thermal Conductivity (90°C), K [W/m•K]	0.52
Young's Modulus, E [GPa]	50.10
Poisson's Ratio, $\nu$	0.256
Fracture Toughness, $K_{Ic}$ [MPa•m <sup>1/2</sup> ]	0.48
Knoop Hardness, $HK_{0.1/20}$	290
Heat Capacity (25°C), $C_p$ [J/g°C]	0.72
Thermal Diffusivity (25°C), $\sigma$ [ $10^{-7}m^2/sec$ ]	2.43
Thermal Expansion, $\alpha_{20-300^\circ C}$ [ $10^{-7}/^\circ C$ ]	130.1
Thermal Expansion, $\alpha_{20-40^\circ C}$ [ $10^{-7}/^\circ C$ ]	114.0
Transformation Temperature, $T_g$ [°C]	450

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Chemical Properties	
Weight Loss in 50°C Water [mg/(cm <sup>2</sup> •day)]	0.016
Acid Resistance SR pH=0.3 at 25°C	3.0
Alkali Resistance AR pH=12 at 50°C	3.0
Staining Resistance FR pH=4.6 100h at 25°C	1
Climatic Resistance CR Water Vapor at 40-50°C for 30 h	2



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