

# LG-750 Phosphate Laser Glass

For High Energy Applications

## 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 <sup>2</sup> ]	3.7
* Quenching Constant-Zero Concentration Lifetime, $\tau_0$ [ $\mu$ sec]	383
* Quenching Constant-Q Factor, Q [ $10^{20}$ cm <sup>-3</sup> ]	7.4

\* Lifetime as a function of neodymium content is approximated by:  
 $T = T_0 / (1 + (Nd/Q)^2)$ , Nd = Nd concentration in  $10^{20}$  ions/cm<sup>3</sup>

## Optical Properties

$n_d$	1.5260
$v_d$	68.20
$n_{633\text{ nm}}$	1.5240
$n_{1054\text{ nm}}$	1.5160
Nonlinear Refractive Index at 1054 nm, $n_2$ [ $10^{-13}$ esu]	1.08
Stress-Optic Coefficient, K (588 nm, 22°C) [ $10^{-6}$ mm <sup>2</sup> /N]	1.80
Stress-Optic Coefficient, $-K_{par}$ (632.8 nm, 25°C) [ $10^{-6}$ mm <sup>2</sup> /N]	2.68
Stress-Optic Coefficient, $-K_{per}$ (632.8 nm, 25°C) [ $10^{-6}$ mm <sup>2</sup> /N]	4.46
Temperature Coefficient of Refractive Index, $dn/dT_{rel}$ (1060 nm, 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

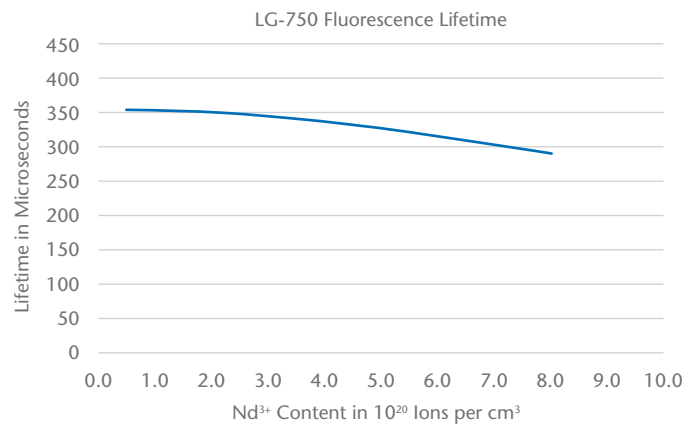
## Sellmeier Coefficients

B1	C1
B2	C2
B3	C3

## Attenuation Coefficient [cm<sup>-1</sup>]

400 nm	≤ 0.20	3000 nm	≤ 0.80
1054 nm	≤ 0.0015	3333 nm	≤ 2.00

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).



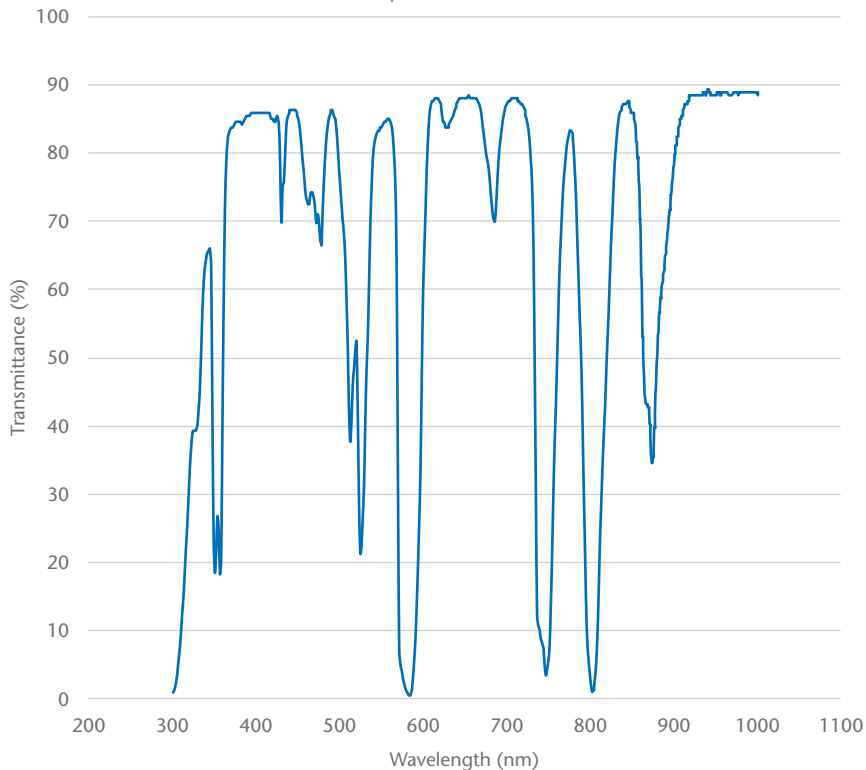
## Physical Properties

Density, $\rho$ [g/cm <sup>3</sup> ]	2.830
Thermal Conductivity (25°C), $\kappa$ [W/m•K]	0.49
Thermal Conductivity (90°C), $\kappa$ [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 <sup>2</sup> /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

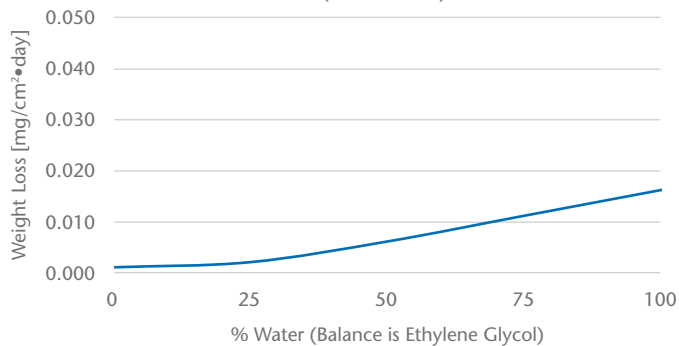
# LG-750 Phosphate Laser Glass

For High Energy Applications

Transmission Curve for LG-750  
Neodymium Content 3.0wt%Nd<sub>2</sub>O<sub>3</sub>  
Sample Thickness 5.0 mm



LG-750 Ethylene Glycol/Water  
Resistance Testing  
(24hr at 50°C)



## Chemical Properties

Weight Loss in 50°C Water [mg/(cm²*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 = 4.6 100 h at 25°C	1
Climatic Resistance CR Water Vapor at 40-50°C for 30 h	2

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