

LG-750 Phosphate Laser Glass

For High Energy Applications

Neodymium Laser Properties

Emission Peak, λ [nm]	1053.7
Emission Width, $\Delta\lambda_{em}$ [nm]	26.0
Radiative Lifetime, τ_{rad} [μ sec]	347
Emission Cross Section, σ_{em} [10^{-20} cm ²]	3.7
* Quenching Constant-Zero Concentration Lifetime, τ_0 [μ sec]	383
* Quenching Constant-Q Factor, Q [10^{20} cm ⁻³]	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/cm³

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 ² /N]	1.80
Stress-Optic Coefficient, $-K_{par}$ (632.8 nm, 25°C) [10^{-6} mm ² /N]	2.68
Stress-Optic Coefficient, $-K_{per}$ (632.8 nm, 25°C) [10^{-6} mm ² /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

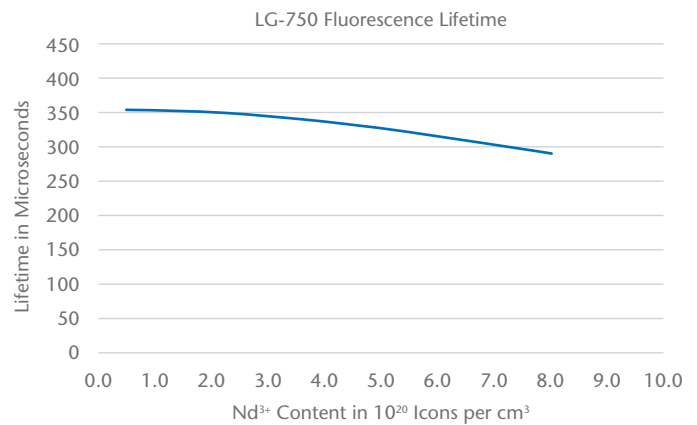
Sellmeier Coefficients

B1	C1
B2	C2
B3	C3

Attenuation Coefficient [cm⁻¹]

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

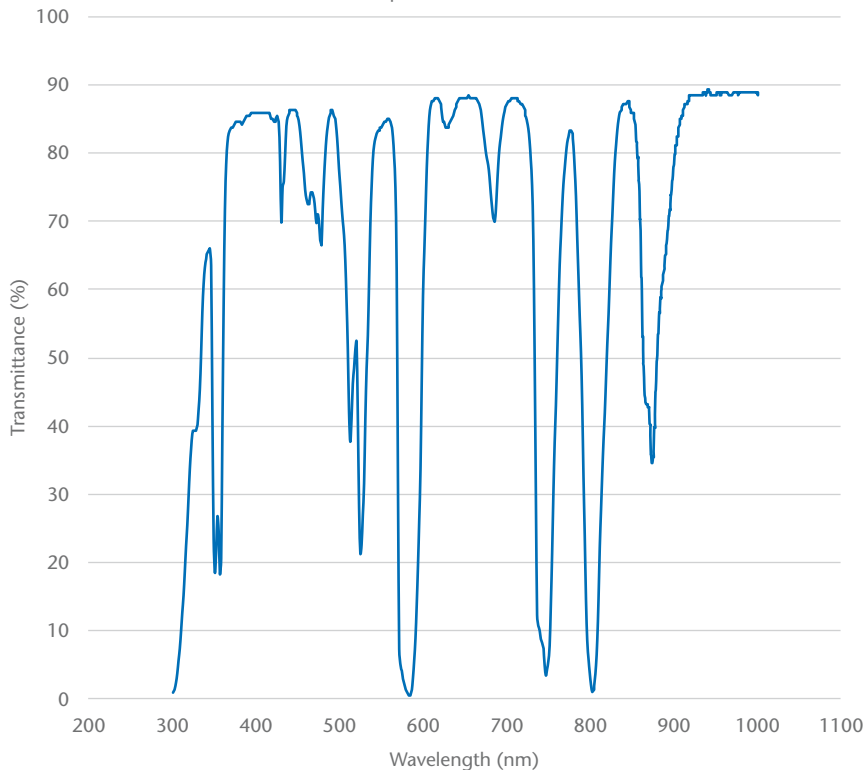
Density, ρ [g/cm ³]	2.830
Thermal Conductivity (25°C), κ [W/m•K]	0.49
Thermal Conductivity (90°C), κ [W/m•K]	0.52
Young's Modulus, E [GPa]	50.10
Poisson's Ratio, ν	0.256
Fracture Toughness, K_{Ic} [MPa•m ^{1/2}]	0.48
Knoop Hardness, $HK_{0.1/20}$	290
Heat Capacity (25°C), C_p [J/g°C]	0.72
Thermal Diffusivity (25°C), σ [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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 glass made of ideas

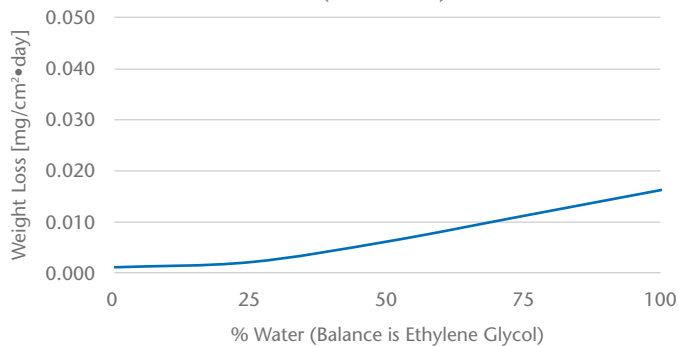
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Transmission Curve for LG-750
Neodymium Content 3.0wt%Nd₂O₃
Sample Thickness 5.0 mm



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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