

Corning® Laser Durable Grade Calcium Fluoride (LDG CaF₂)

High Quality Calcium Fluoride Optimized for Microlithography and Laser Optics Applications

Corning Advanced Optics is a trusted, premier supplier of calcium fluoride crystal components. For harsh laser exposure levels, or where maximizing optic lifetime and equipment uptime are critical, Corning® LDG CaF₂ is optimized to be the material of choice. Corning offers a range of geometries and finishes, including complex multi-faceted and highly polished parts. With its comprehensive coating engineering expertise, Corning also provides design engineering, fabricating, polishing and coating capabilities. Let Corning be the supplier of choice for your most complex laser optic requirements.

Products

- Windows
- Lenses
- Mirrors
- Prisms
- Beam Splitters
- Optical Modules

Surface Finishes

Industry leading metrology to assure:

- Low surface roughness (<4 Å) with < 10/5 cosmetics
- Ultra-low sub surface damage
- Wavefront errors <1/10 wave
- Surface cleanliness to enable high laser durability

Custom Coatings

- Anti-Reflective
- Highly Reflective
- Partially Reflective
- Low Absorption
- Protective/Enhanced Durability
- Custom Solutions Upon Request

Our coatings are designed to ensure optimum performance and durability. Cutting-edge technology for finishing and coating is available for maximizing optic lifetime for highly transmissive, highly reflective, or partially reflective optics with high fluence. Our rigorous manufacturing process enables us to produce high-quality components to meet customer specifications. Every component is tested using state-of-the-art interferometers and optical profilers.

Corning's LDG CaF₂ has unmatched durability to withstand the high energy levels of deep ultraviolet lasers.

Physical and Chemical Properties

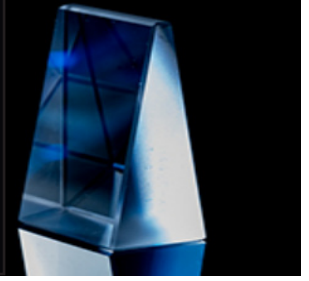
Molecular Weight	78.075 g/mol
Crystal Structure	Cubic, fluorite type, space group Fm3m
Lattice Constant	5.462 Angstroms
Cleavage Plane	(111)
Density	3.18 g/cm ³ at 25°C
Melting Point	1420°C
Thermal Conductivity	9.71 W/cmK at 25°C
Dielectric Constant	6.76 at 1 MHz

Mechanical and Elastic Properties

Young's Modulus (E)	146 GPa <100>, 89.6 GPa <111>
Shear Modulus (G)	60.4 Gpa <100>
Bulk Modulus (K)	84.8 GPa
Poisson Ratio	0.21 <100>
Elastic Compliance	S ₁₁ = 0.6829 S ₁₂ = -0.1448 S ₄₄ = 2.9563
Elastic Stiffness (x 102 GPa)	C ₁₁ = 1.653 C ₁₂ = 0.445 C ₄₄ = 0.338
Knoop Hardness (200 gram load)	156-168 Kg/mm ² in (111)



Corning® Laser Durable Grade Calcium Fluoride (LDG CaF₂) for Laser Optic applications



CaF₂ Refractive Index

Refractive Index of CaF₂ measured in 1 atm of N₂

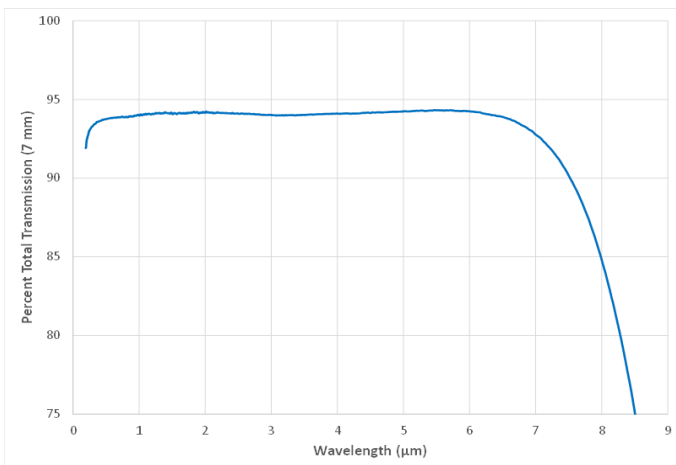
λ (nm)	Spectral Line	Measured 20°C	Measured 25°C	dn/dT x 10 ⁻⁶ K ⁻¹
2326.05		1.422132	1.422084	-9.6
1530.00		1.426143	1.426091	-10.5
852.344	[s]	1.430042	1.429990	-10.3
656.454	[C]	1.432471	1.432420	-10.2
546.227	[e]	1.434945	1.434897	-9.7
435.957	[g]	1.439480	1.439433	-9.5
365.119	[i]	1.444900	1.444852	-9.6
334.244		1.448498	1.448454	-8.9
289.444		1.456183	1.456141	-8.4
253.728		1.465997	1.465959	-7.6
228.872		1.476372	1.476339	-6.6
214.506		1.484572	1.484544	-5.7
206.266		1.490325	1.490300	-5.2
194.227		1.500606	1.500587	-3.9
184.950		1.510562	1.510546	-3.2

Additional Information

Depending on customer requirements, Corning can provide solutions ranging from crystal blanks to complete turnkey optical packages. Corning can precisely manufacture a wide variety of laser optic components including: windows, prisms, mirrors, plano convex, plano concave, and hemispherical optics. With its comprehensive coating engineering expertise, Corning can customize final optical performance to enhance transmission, reflectivity, and/or laser durability to customer specification in order to provide a comprehensive optical path solution.

Internal Transmittance	> 99.9% @ 193.3 nm
Stress Birefringence	< 2 nm/cm or < 5 nm/cm (max), [111], measured @ 592 nm
Bubbles/Inclusions	ISO 10110 - 1/1 x 0.02
Orientation	(111) ±3° typical, others upon request

Total Transmission



CORNING

For more information about Corning's fluoride crystals and our worldwide sales office locations please visit our website:

Corning Advanced Optics

www.Corning.com/worldwide/en/products/advanced-optics

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