

## Calcium Fluoride (CaF<sub>2</sub>)

Calcium fluoride (CaF<sub>2</sub>) is an optical material that occurs naturally as the mineral fluorite. Fairfield Crystal uses a unique source purification process with a vertical-Bridgman method to grow synthetic high-purity CaF<sub>2</sub> single crystals. Our material has a number of important optical properties including excellent ultraviolet (UV) transmittance; high laser-damage threshold; low axial and radial-stress birefringence; and high refractive-index homogeneity. The high laser-damage threshold of CaF<sub>2</sub> has made it the material of choice for use in excimer laser optics but also IR applications; CaF<sub>2</sub> has transmission range 0.15 to 7.0µm. Degradation from moisture is minimal, and polished surfaces can withstand years of exposure to normal atmospheric conditions. Low solubility and wide transmission makes this material useful for many applications, including beam splitters, windows, lenses and prisms for UV and IR applications.



Substance	Form	Diameter Range	Thickness Range	Transmission Range (µm)	Standard Surface Finish
Calcium Fluoride	Single Crystal	5 to 250mm	1 to 76mm*	0.15 to 7.00	Fine Ground**

\*Special orders available

\*\*Standard finish – other finish available upon request

### OPTICAL PROPERTIES

<b>Transmission Range</b>	0.15 to 7.0 microns
<b>Internal Transmission</b>	>99.5% from 193nm to 7µm
<b>Refractive Index Homogeneity</b>	Range 3 to 15ppm @632.8nm PV
<b>Bubbles &amp; Inclusions</b>	1/1 x 0.050 (typ.)
<b>Stress Birefringence</b>	Range 0.5nm/cm to 15 nm/cm @632.8nm
<b>Crystal Orientation</b>	<111>, <100> or Random

### PHYSICAL PROPERTIES

<b>Density</b>	3.18 gm/cc
<b>Melting Point</b>	1420°C
<b>Poisson Ratio (µ)</b>	0.260
<b>Knopp Hardness</b>	158.3 Knoop
<b>Crystal Structure</b>	Cubic
<b>Young's Modulus [GPa]</b>	75.8
<b>Shear Modulus [GPa]</b>	33.77

### AVAILABLE GRADES

<b>Transmission Range</b>	UV, VUV, Excimer (193 to 400nm), VIS & IR Grades
<b>Internal Transmission</b>	>99.5% from 193nm to 7µm
<b>Refractive Index of Inhomogeneity</b>	3 to 15ppm @632.8nm PV
<b>Stress Birefringence</b>	0.5 to 15 nm/cm @632.8nm
<b>Crystal Orientation</b>	<111>, <100> & Random
<b>Surface Figure</b>	1/20λ to 2λ @ 632.8nm
<b>Surface Quality</b>	Fine ground to 10/5 S/D

Fabrication

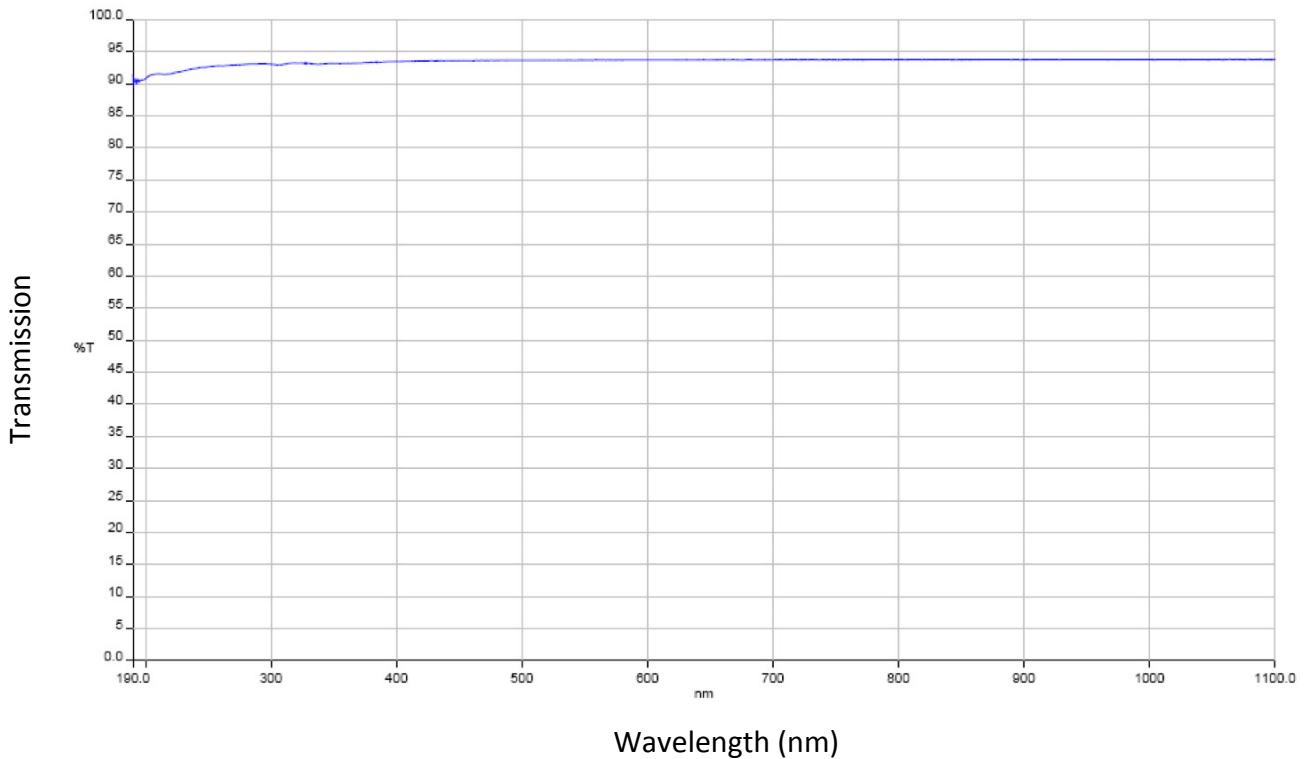
CaF<sub>2</sub> can be oriented and cut along customer specified axes such as <111> or <100>. The material can be polished using diamond turning or standard pitch polish. Fairfield Crystal also provides polishing services. Our expertise in crystal growth and understanding of the crystal structure gives us an advantage and enables us to offer superior polished surfaces and surface figure to customers' rigorous specifications. For other specifications or specific requirements please contact our sales team.



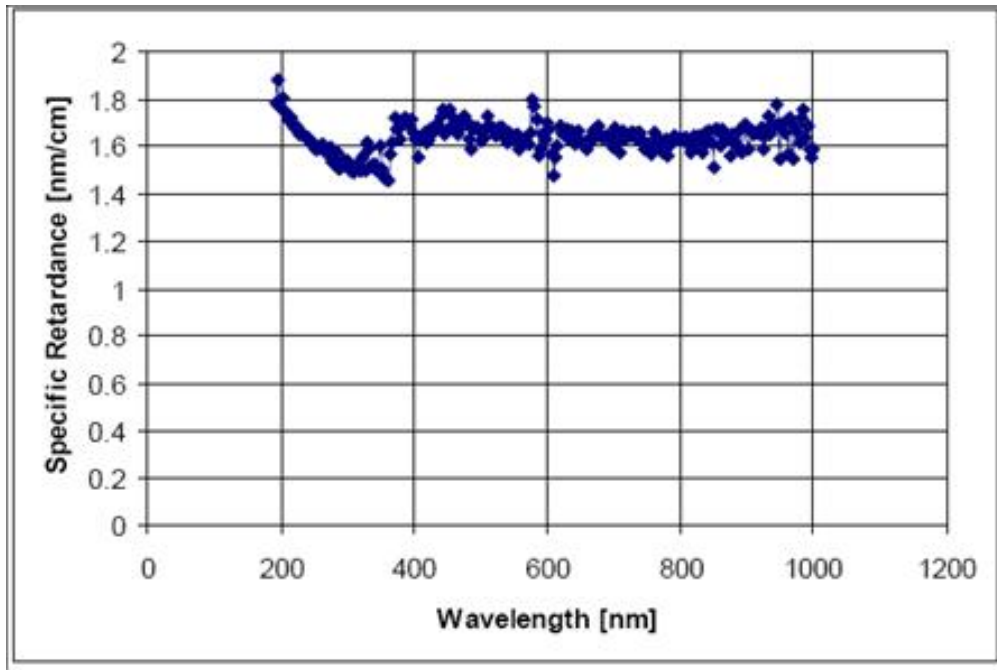
Polishing Capabilities

- Surface figure: 1/20λ @ 632.8nm
- Surface quality: 10/5 S/D, <5 angstrom RMS
- Parallelism: < 10 arc seconds
- Sizes: 4.0 to 300 mm Diameter

CaF<sub>2</sub> Transmission Graph  
(5.0mm thick sample)



Stress Birefringence Graph



Hazard Labeling: Not regulated by Department of Transportation (DOT)

Shipping Classification: UPS or FedEx: Ground, Air

Fairfield Crystal Technology will be pleased to quote you price and delivery.

[Contact us](#)

Sales email: [atimmerman@fairfieldcrystal.com](mailto:atimmerman@fairfieldcrystal.com)

Telephone: (860) 354-2111 ext 200

Fax: (860) 354-3093