

Magnesium Fluoride (MgF₂)

MATERIALS DATA

Magnesium Fluoride is grown by vacuum Stockbarger technique in ingots of various diameters. Magnesium Fluoride is a tough material and polishes well. Therefore, it can be worked to the highest standards. MgF₂ is slightly birefringent and usually supplied with the optic axis cut perpendicular to the window faces.

APPLICATIONS: Magnesium Fluoride transmits well into the VUV region to the hydrogen Lyman-alpha line (121nm) and beyond. Magnesium Fluoride is used mostly for UV optics and is excellent for Excimer laser applications.

Transmission Range	0.12 to 7 μ m(1)
Refractive Index	No 1.413 at 0.22 μ m (4)
Reflection Loss	5.7% at 0.22 μ m (2 surfaces)
Absorption Coefficient	5.5 x 10 ⁻³ cm ⁻¹ at 2.8 μ m (5)
Reststrahlen Peak	20 μ m (1)
dn/dT	2.3 (para) 1.7 (perp) at 0.4 μ m (1)
dn/d μ = 0	1.4 μ ms
Density	3.1766g/cc at 25°C
Melting Point	1255°C
Thermal Conductivity	21 (para) 33.6 (perp) W m ⁻¹ K ⁻¹ at 300K (3)
Thermal Expansion	13.7 (para) 8.9 (perp) x 10 ⁻⁶ /K (1)
Hardness	Knoop 415
Specific Heat Capacity	1003 J Kg m ⁻¹ K ⁻¹
Dielectric Constant	4.87 (para) 5.45 (perp) at 1MHz (1)
Youngs Modulus (E)	138 GPa (2)
Shear Modulus (G)	54.66GPa (2)
Bulk Modulus (K)	101.32 GPa (2)
Elastic Coefficients	C ₁₁ =140 C ₁₂ =89 C ₄₄ =57 C ₁₃ =63 C ₆₆ =96 (2)
Apparent Elastic Limit	49.6 MPa (7200 psi)
Poisson Ratio	0.276 (2)
Solubility	0.0002g/100g water
Molecular Weight	62.32
Class/Structure	Tetragonal P42/mnm (#136) Rutile Structure. Can cleave on c-axis but not easily.

(1) Duncanson et.al. Proc.Phys.Soc. V72, p1001, 1958

(2) Kandil et.al. J.App.Phys. V52, p749, 1981

(3) Kashnow & McCarthy, J.Phys.Chem. V30, p813, 1969

(4) Laporte et. al. J.Opt. Soc. Am. V73, No 8, p1062

(5) Corning Inc published data

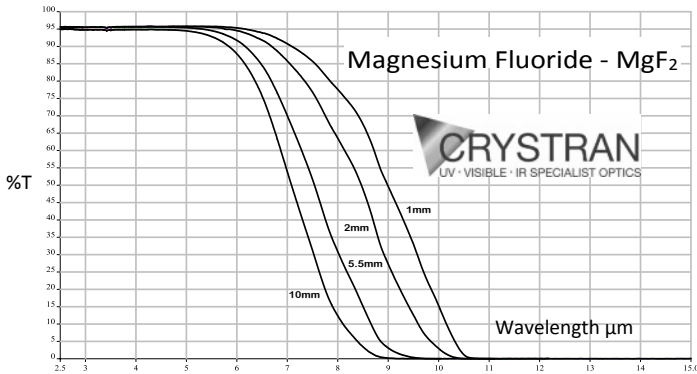


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μm	No	Ne
0.1137	1.7805	
0.1179	1.6800	
0.121	1.628	1.632
0.140	1.5095	1.523
0.160	1.461	1.475
0.180	1.439	1.453
0.200	1.423	1.437
0.248	1.403	1.416
0.266	1.399	1.412
0.300	1.393	1.405
0.337	1.389	1.401
0.355	1.386	1.399
0.546	1.379	1.390
1.087	1.373	1.385
2.000	1.368	1.379
3.030	1.360	1.370
4.000	1.349	1.359
5.000	1.334	1.343
6.060	1.314	1.321

μm	No	Ne
0.1149	1.7420	
0.1198	1.6510	
0.130	1.566	1.568
0.150	1.480	1.494
0.170	1.448	1.462
0.190	1.431	1.444
0.220	1.413	1.426
0.257	1.401	1.414
0.280	1.396	1.409
0.330	1.389	1.402
0.350	1.387	1.400
0.400	1.384	1.396
0.700	1.376	1.388
1.512	1.370	1.382
2.5	1.364	1.375
3.571	1.354	1.364
4.546	1.341	1.350
5.556	1.324	1.332



Routine transmission at 121nm is usually a minimum of 40% through a 2mm sample. This curve represents the maximum transmission that we can achieve under ideal conditions of material and polish at high cost.

