

## Zinc Selenide (ZnSe)

## MATERIALS DATA

Zinc Selenide is produced by synthesis from Zinc vapour and H<sub>2</sub>Se gas, forming as sheets on a graphite substrate. Zinc Selenide is microcrystalline in structure, the grain size being controlled to produce maximum strength. Single crystal ZnSe is available, but is not common but has been reported as having lower absorption and thus more effective for CO<sub>2</sub> optics.

**APPLICATIONS:** ZnSe is used widely for IR components, windows and lenses, and for spectroscopic ATR prisms. Zinc Selenide is one of the materials of choice for CO<sub>2</sub> laser optics operating at 10.6μm.

Transmission Range	0.6 to 21.0μm
Refractive Index	2.4028 at 10.6μm
Reflection Loss	29.1% at 10.6μm (2 surfaces)
Absorption Coefficient	0.0005 cm <sup>-1</sup> at 10.6μm
Reststrahlen Peak	45.7μm
dn/dT	+61 x 10 <sup>-6</sup> K <sup>-1</sup> at 10.6μm at 298K
dn/dμ = 0	5.5μm
Density	5.27 g/cc
Melting Point	1525°C *See notes below
Thermal Conductivity	18 W m <sup>-1</sup> K <sup>-1</sup> at 298K
Thermal Expansion	7.1 x 10 <sup>-6</sup> K <sup>-1</sup> at 273K
Hardness	Knoop 120 with 50g indenter
Specific Heat Capacity	339 J Kg <sup>-1</sup> K <sup>-1</sup>
Dielectric Constant	n/a
Youngs Modulus (E)	67.2 GPa
Shear Modulus (G)	n/a
Bulk Modulus (K)	40 GPa
Elastic Coefficients	Not Available
Apparent Elastic Limit	55.1 MPa (8000 psi) (1)
Poisson Ratio	0.28
Solubility	0.001g/100g water
Molecular Weight	144.33
Class/Structure	FCC Cubic, F43m (#216), Zinc Blende Structure (Polycrystalline)

*\* Zinc Selenide oxidizes significantly at 300°C, exhibits plastic deformation at about 500°C and dissociates about 700°C. For safety, Zinc Selenide windows should not be used above 250°C in normal atmosphere*

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(1) Manufacturing Methods program ZnSe blanks. US Army R&D Feb 1980



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$\mu\text{m}$	No	$\mu\text{m}$	No	$\mu\text{m}$	No	$\mu\text{m}$	No	$\mu\text{m}$	No
0.54	2.6754	1.0	2.4892	5.8	2.4266	10.6	2.4028	15.4	2.3623
0.58	2.6312	1.4	2.4609	6.2	2.4251	11.0	2.4001	15.8	2.3579
0.62	2.5994	1.8	2.4496	6.6	2.4235	11.4	2.3974	16.2	2.3534
0.66	2.5755	2.2	2.4437	7.0	2.4218	11.8	2.3945	16.6	2.3487
0.7	2.5568	2.6	2.4401	7.4	2.4201	12.2	2.3915	17.0	2.3438
0.74	2.5418	3.0	2.4376	7.8	2.4183	12.6	2.3883	17.4	2.3387
0.78	2.5295	3.4	2.4356	8.2	2.4163	13.0	2.3850	17.8	2.3333
0.82	2.5193	3.8	2.4339	8.6	2.4143	13.4	2.3816	18.2	2.3278
0.86	2.5107	4.2	2.4324	9.0	2.4122	13.8	2.3781		
0.90	2.5034	4.6	2.4309	9.4	2.4100	14.2	2.3744		
0.94	2.4971	5.0	2.4295	9.8	2.4077	14.6	2.3705		
0.98	2.4916	5.4	2.4281	10.2	2.4053	15.0	2.3665		

