

## 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
0.54	2.6754	0.58	2.6312	0.62	2.5994
0.66	2.5755	0.7	2.5568	0.74	2.5418
0.78	2.5295	0.82	2.5193	0.86	2.5107
0.90	2.5034	0.94	2.4971	0.98	2.4916
1.0	2.4892	1.4	2.4609	1.8	2.4496
2.2	2.4437	2.6	2.4401	3.0	2.4376
3.4	2.4356	3.8	2.4339	4.2	2.4324
4.6	2.4309	5.0	2.4295	5.4	2.4281
5.8	2.4266	6.2	2.4251	6.6	2.4235
7.0	2.4218	7.4	2.4201	7.8	2.4183
8.2	2.4163	8.6	2.4143	9.0	2.4122
9.4	2.4100	9.8	2.4077	10.2	2.4053
10.6	2.4028	11.0	2.4001	11.4	2.3974
11.8	2.3945	12.2	2.3915	12.6	2.3883
13.0	2.3850	13.4	2.3816	13.8	2.3781
14.2	2.3744	14.6	2.3705	15.0	2.3665
15.4	2.3623	15.8	2.3579	16.2	2.3534
16.6	2.3487	17.0	2.3438	17.4	2.3387
17.8	2.3333	18.2	2.3278		

