

Barium Fluoride (BaF2)

Specialist Data Sheet

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|------------------------|--|
| Product Name | Barium Fluoride (BaF2) |
| Transmission Range | 0.15 ~ 12 μ m |
| Refractive Index | 1.45 @ 5 μ m |
| Reflection Loss | 6.5% @ 5 μ m (2 surfaces) |
| Absorption Coefficient | $3.2 \times 10^{-4} \text{ cm}^{-1}$ @ 6 microns |
| Reststrahlen Peak | 47 μ m |
| dN/dT | $-15.2 \times 10^{-6}/^{\circ}\text{C}$ |
| dN/du | 1.95 microns |
| Density | 4.89 g/cc |
| Melting Point | 1386 $^{\circ}\text{C}$ |
| Thermal Conductivity | $11.72 \text{ W m}^{-1} \text{ K}^{-1}$ @ 286 K |
| Thermal Expansion | $18.1 \times 10^{-6}/^{\circ}\text{C}$ @ 273 K |
| Hardness | Knoop 82 with 500g indenter |
| Specific Heat Capacity | $410 \text{ J Kg}^{-1} \text{ K}^{-1}$ |
| Dielectric Constant | 7.33 @ 1Mhz |
| Youngs Modulus (E) | 53.07 Gpa |
| Shear Modulus (G) | 25.4 Gpa |
| Bulk Modulus (K) | 56.4 Gpa |
| Elastic Coefficients | C11=89.2 C12=40.0 C44=25.4 |
| Apparent Elastic Limit | 26.9 Mpa (300psi) |
| Poisson Ratio | 0.343 |
| Solubility | 0.17g/100g water @ 23 $^{\circ}\text{C}$ |
| Molecular Weight | 175.36 |
| Class/Structure | Cubic CaF2, Fm3m, (111) cleavage |

Notes:

Barium Fluoride is grown by vacuum Stockbarger technique in diameters up to about 150mm. Unlike CaF2, BaF2 is not found in the native state and all material must be synthesised chemically making BaF2 relatively expensive to produce. Barium Fluoride cleaves easily and is highly susceptible to thermal shock.

Application:

Barium Fluoride is used in spectroscopic components and is often suitable for applications in the passive IR band (8 to 14 μ m) and often used as a viewport window for thermography. For an equivalent thickness the material extends approximately 1 micron further into the IR than CaF2. The highest quality BaF2 also has application as the fastest known scintillator material and is used in High Energy Physics Experiments.



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Refractive Index:

| | | | | | | | |
|---------------|--------|---------------|--------|---------------|--------|---------------|---------|
| μm | No | μm | No | μm | No | μm | No |
| 0.1408 | 1.8150 | 0.3254 | 1.4887 | 0.8521 | 1.4699 | 3.2434 | 1.4602 |
| 0.1452 | 1.7820 | 0.3403 | 1.4844 | 0.8944 | 1.4694 | 3.4220 | 1.4594 |
| 0.1477 | 1.7670 | 0.3466 | 1.4759 | 1.0140 | 1.4685 | 5.1380 | 1.4501 |
| 0.1500 | 1.6780 | 0.3610 | 1.4744 | 1.1287 | 1.4678 | 5.5490 | 1.44932 |
| 0.2000 | 1.5570 | 0.3663 | 1.4730 | 1.3673 | 1.4667 | 6.2380 | 1.4422 |
| 0.2652 | 1.5122 | 0.4046 | 1.4722 | 1.5295 | 1.4661 | 6.6331 | 1.4390 |
| 0.2803 | 1.5066 | 0.5461 | 1.4718 | 1.6810 | 1.4656 | 7.0442 | 1.4353 |
| 0.2893 | 1.5039 | 0.5893 | 1.4699 | 1.7012 | 1.4655 | 7.2680 | 1.4331 |
| 0.2967 | 1.4925 | 0.6438 | 1.4694 | 1.9701 | 1.4647 | 9.7240 | 1.4051 |
| 0.3021 | 1.4915 | 0.6563 | 1.4685 | 2.3254 | 1.4636 | 10.346 | 1.3936 |
| 0.3130 | 1.4894 | 0.7065 | 1.4678 | 2.6738 | 1.4623 | | |

Transmission Range Graph:

