

# Magnesium Fluoride

## MgF<sub>2</sub>

### ◆ Key Properties of Magnesium Fluoride (MgF<sub>2</sub>)

- 🌈 Ultra-Broad Transmission: Excellent from ~0.12 μm to 7 μm — ideal for VUV, UV, visible, and IR systems.
- 🔍 Low Refractive Index: ~1.38 at 1 μm, enabling efficient optical coupling and broad system compatibility.
- 🧪 Non-Hygroscopic: Fully moisture-resistant and far more durable than hygroscopic salts like NaCl and KBr.
- 🧠 Highly Durable: Hard, chemically stable, and excellent for harsh-environment or field-deployed optics.
- gMaps Low Dispersion: Smooth refractive index behaviour supports high-precision imaging and instrumentation.
- ⚡ Laser-Compatible: Suitable for high-power UV and VUV laser systems thanks to high damage threshold.
- 📡 Radiation Resistant: Excellent material for space optics, detectors, sensors, and vacuum UV systems.

## 🔧 Applications of Magnesium Fluoride ( $MgF_2$ )

- 🔬 VUV & UV Spectroscopy: Outstanding transparency makes  $MgF_2$  ideal for deep-UV and vacuum-UV instruments.
- ⚡ Excimer & UV Laser Optics: Commonly used in  $F_2$ ,  $ArF$ ,  $KrF$  and other UV laser platforms.
- 📡 Space & Aerospace Optics: High radiation resistance enables long-term orbital and high-energy use.
- 🔭 Imaging & Analytical Systems: Low dispersion and high durability support precision UV–IR imaging.
- oculars UV–IR Windows & Lenses: Used for rugged windows, lenses, prisms, and protective covers.
- ⚙️ Industrial & Scientific Instruments: Ideal for harsh-environment sensors, detectors, and inspection systems.

## Technical Parameters of Magnesium Fluoride ( $MgF_2$ )

Property	Typical Value
Transmission Range	0.12 $\mu m$ – 7.0 $\mu m$
Refractive Index	1.38 @ 1 $\mu m$
Density	3.18 g/cm <sup>3</sup>
Melting Point	1261 °C
Hardness (Knoop)	~415 kg/mm <sup>2</sup> (hard)
Thermal Expansion	$13.7 \times 10^{-6}$ /°C
Crystal Type	Tetragonal (single crystal)
Hygroscopic	No
Chemical Formula	$MgF_2$
Applications	UV/VUV spectroscopy, excimer lasers, aerospace optics, IR

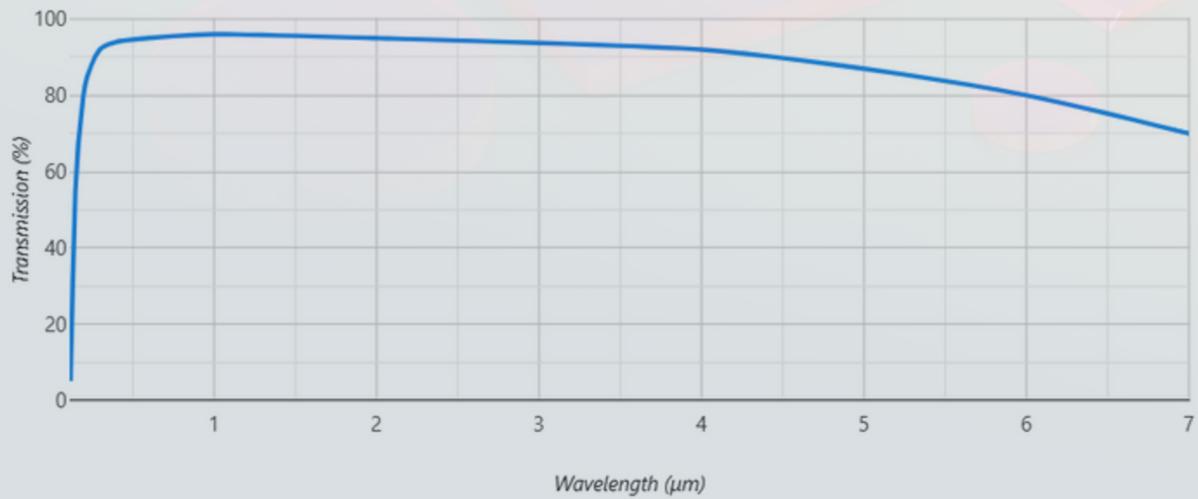
Magnesium Fluoride ( $MgF_2$ ) is a durable, wide-band optical material with excellent transmission from 0.12–7.0  $\mu m$ , making it ideal for VUV/UV spectroscopy, excimer laser systems, thermal imaging, and aerospace optics.

It has a low refractive index (~1.38), very low dispersion, and is non-hygroscopic, offering strong environmental stability and far better durability than salts like NaCl or KBr. As a hard, chemically robust crystal,  $MgF_2$  can be fabricated into windows, lenses, prisms, and polarisation optics for UV–IR applications while maintaining excellent long-term performance.

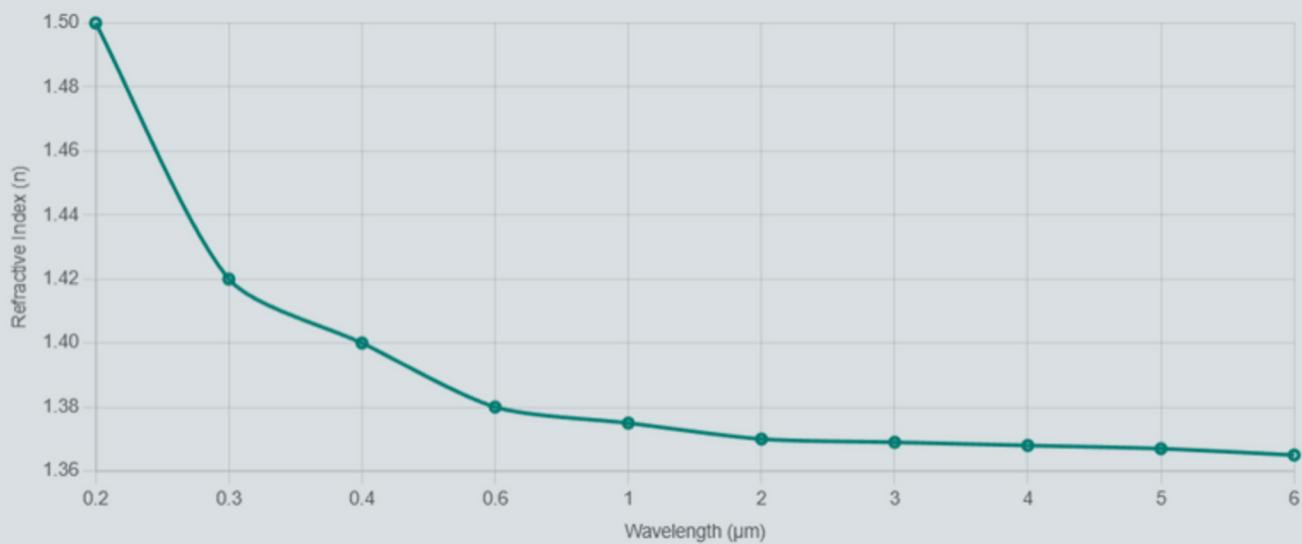


## Magnesium Fluoride ( $MgF_2$ ) – Optical & Thermal Graphs

### $MgF_2$ Transmission (0.12–7.0 $\mu m$ )



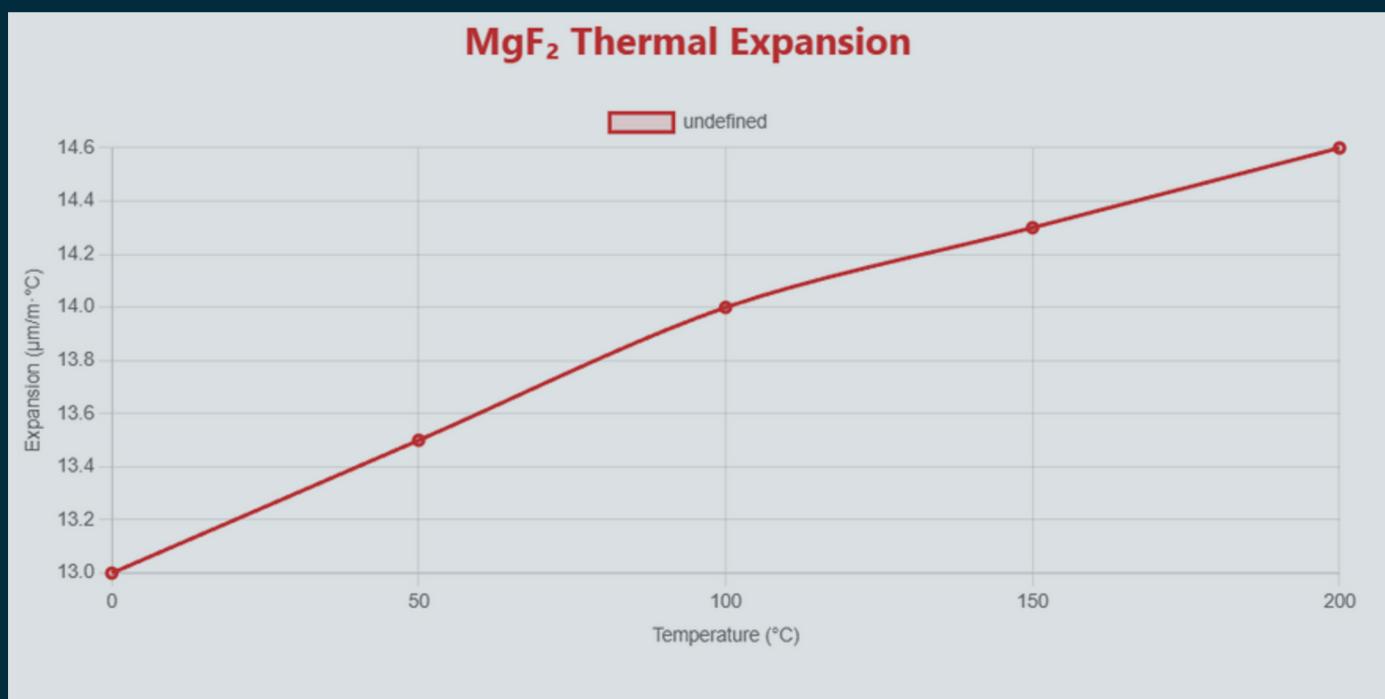
### $MgF_2$ Refractive Index



Magnesium Fluoride ( $\text{MgF}_2$ ) provides excellent broadband transmission from  $0.12\text{ }\mu\text{m}$  to  $7.0\text{ }\mu\text{m}$ , spanning the deep-UV through to the infrared. With its low refractive index ( $\sim 1.38$ ) and very low dispersion,  $\text{MgF}_2$  is well suited for VUV/UV optics, excimer laser systems, spectroscopy, and broadband UV–IR windows and lenses.

$\text{MgF}_2$  offers strong thermal stability and maintains reliable optical performance under laboratory and field conditions. As a hard and durable material, it can be fabricated to high precision for windows, prisms, polarisation optics, and UV–IR components.

Being non-hygroscopic and chemically stable,  $\text{MgF}_2$  is easy to handle and remains a dependable choice for UV, VUV, aerospace, and broadband optical applications.



# FAQ

## Q: What is Magnesium Fluoride ( $MgF_2$ ) used for?

A: Magnesium Fluoride is widely used in VUV/UV spectroscopy, excimer laser systems, aerospace and satellite optics, thermal imaging, and broadband UV–IR windows, prisms, and lenses thanks to its excellent 0.12–7.0  $\mu m$  transmission.

## Q: What makes $MgF_2$ different from other fluoride materials?

A:  $MgF_2$  is extremely hard and durable, offers excellent UV and VUV transmission, has a low refractive index (~1.38), and is non-hygroscopic, making it more robust than salts such as NaCl and KBr. It also has very good radiation and environmental resistance.

## Q: Is Magnesium Fluoride hygroscopic?

A: No.  $MgF_2$  is fully non-hygroscopic, meaning it does not absorb moisture and remains stable even in humid or outdoor environments.

## Q: Is $MgF_2$ suitable for high-power UV and excimer lasers?

A: Yes.  $MgF_2$  is commonly used in  $F_2$ , ArF, KrF, and other excimer laser systems due to its high damage threshold and deep-UV transparency.

## Q: What types of optical components can be made from $MgF_2$ ?

A: Common components include windows, lenses, prisms, wedges, polarisation optics, and broadband UV–IR elements.  $MgF_2$  can also be birefringence-cut for polarising applications.

## Q: How durable is Magnesium Fluoride?

A:  $MgF_2$  is one of the hardest UV-transmitting optical materials, offering strong resistance to scratching, chemical exposure, and environmental wear, making it ideal for rugged field applications.

## Q: Can $MgF_2$ optics be anti-reflection coated?

A: Yes.  $MgF_2$  optics can be supplied uncoated or with UV/IR AR coatings, depending on the wavelength range and application requirements.

## Q: Is $MgF_2$ safe to handle?

A: Yes.  $MgF_2$  is chemically stable and non-toxic. Standard optical-handling precautions (gloves, lint-free wipes) are recommended to protect the surface.