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Antireflection (AR) Coatings

Single-Layer MgF_2 Coatings

Magnesium fluoride (MgF_2) is commonly used for single-layer antireflection coatings because of its almost ideal refractive index (1.38 at 550 nm) and high durability. These coatings are optimized for 550 nm for normal incidence, but as can be seen from the reflectance curves, they are extremely insensitive to wavelength and incidence angle. Many standard lenses in stock are coated with MgF_2.

Single-layer antireflection coatings are routinely available for almost any angle of incidence and any wavelength between 200 nm in the ultraviolet and 1.6 µm in the infrared. As the 1.6-µm wavelength is approached, the angle-of-incidence range becomes restricted to near-normal incidence. This is because of practical limitations on physical coating thickness. It is usually inadvisable to request a MgF_2 coating for any wavelength greater than 1.6 µm. Thicker MgF_2 coatings are possible, but they tend to exhibit crazing, poor adhesion, and significantly increased scattering.

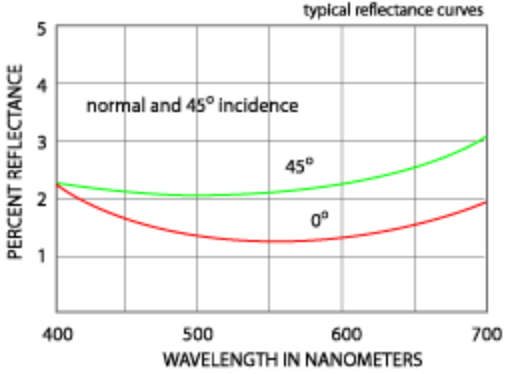
Single-layer antireflection coatings for use on very steeply curved or short-radius surfaces should be specified for an angle of incidence approximately half as large as the largest angle of incidence encountered by the surface. Depending on the specific application, determination of the best wavelength for use in a coating specification may require ray and energy tracing of the optical system in its anticipated environment.

The effectiveness of MgF_2 as an antireflection coating is increased dramatically with increasing refractive index of the component material. This means that, for use on high-index materials, there is often little point in using more complex coatings. The reflectance curves shown later in this section are for MgF_2 on BK7 optical glass.

Single Versus Multilayer Coatings

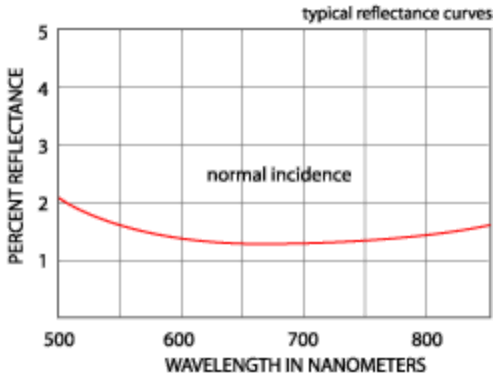
While MgF_2 does not offer the same performance as multilayer coatings, such as HEBBAR™, it is preferred in some circumstances. Specifically, on lenses with very steep surfaces, such as our 01 LAG series aspherics, MgF_2 will actually perform better than HEBBAR near the edge of the lens because the performance of a coating shifts with the angle of incidence. The shifted MgF_2 will never be worse than an uncoated lens, but, at very high angles, HEBBAR can actually be shifted to a region where its performance is worse than if there were no coating at all.

Melles Griot Single-Layer MgF_2 coatings



Standard /066 MgF_2 coating

- The most popular and versatile antireflection coating for visible wavelengths
- Highly durable and most economical
- Optimized for 550 nm, normal incidence
- relatively insensitive to changes in incidence angle
- Damage threshold: 13.2 J/cm^2 ± 10%, 10 nsec pulse (1050 MW/cm^2) at 532 nm



IR-shifted, /067 MgF_2 coating

- Optimized for 670 nm, normal incidence
- Useful for most visible and near-infrared diode wavelengths
- Highly durable and insensitive to angle
- Damage threshold: 13.2 J/cm^2 ± 10%, 10 nsec pulse (1050 MW/cm^2) at 532 nm

Single Layer MgF_2 Antireflection Coating, Normal incidence

	Maximum Reflectance		
Wavelength Range (nm)	On BK7 (%)	On Fused Silica (%)	COATING SUFFIX
400-700	2.0	2.25	/066
520-820	2.0	2.25	/067

Note: to order this coating, append coating suffix to product number and specify which surfaces are to be coated.

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