

OPTICS HANDLING NOTE



Care and Use of Vacuum UV Coatings

Vacuum UV (VUV) coatings of Al & MgF₂ are relatively soft and care must be taken to avoid damage from contamination of the optical surfaces. Stains and fingerprints are extremely difficult to remove without damaging the coating. Dust and dirt can usually be removed by careful flushing of the surface with high-purity Vertrel XF[®] (see note at bottom of page) or Asahiklin AK-225 (see note at bottom of page) from a clean polyethylene squeeze bottle (**Figure 1**).

Starting at the top of the surface to be cleaned, squirt the above-mentioned cleaning liquid onto the optical surface in a back-and-forth horizontal sweeping motion. Work slowly to the bottom of the surface. Any droplets remaining at the lower edge of the device after rinsing may contain contaminants and should be gently blotted with absorbent tissue without touching the coated surface. NEVER brush or wipe the coated surface.



Figure 1. Flushing the optical device with Vertrel XF or Asahiklin AK-225.



Figure 2. Attaching a cover over an optical coated surface.

If the optic is to be used in a vacuum application, the normal contamination process that takes place in VUV instruments can be minimized by not allowing radiation to strike the optical coating until the vacuum in the system has reached the 10⁻⁵ torr range or below (never above 10⁻⁴ torr). Since deterioration of the optical surface is a function of flux density and time, light sources should be illuminated only when necessary to obtain reliable data.

Accidental contamination in a vacuum instrument can be a more serious problem, usually indicated by a severe reflectance loss in two wavelength bands centered around 130 nm and 190 nm. Extreme caution should be exercised to avoid high pressures in the chamber while the light source is in operation. This is clearly a danger during windowless light-source operation.

To summarize, these precautions should be taken to extend the useful life of VUV coatings:

Use extreme care when handling coated optics. Rinse with a recommended cleaning solution (**Figure 1**). Never wipe the coated surface.

Light sources should be illuminated only when necessary to collect data and only at the minimum power level needed to obtain reliable data.

The light source should never be turned on until vacuum has reached the 10⁻⁵ torr range or below.

The system should be operated windowless only when necessary and with extreme caution.

Care should be taken to avoid backstreaming of pump oils onto the optical surfaces.

The use of zeolite traps is advised in the roughing line and between the light source and mechanical pump used for the lamp gas system.

If coated optics are removed from the system for storage, a suitable cover should be used that contacts only the outer edges and storage should be in a clean dry atmosphere (**Figure 2**).

Optics should be examined periodically and cleaned only if absolutely necessary. Stripping and recoating of seriously contaminated optics can be considered if cleaning is not successful. Contact the Optics Sales Department for more information.

Note: Vertrel XF is a registered trademark of Dupont, Inc., and is available from Miller-Stephenson Chemical Company, Inc., Fairfield County, CT, tel. 800-992-2424. Asahiklin AK-225 is a product of Asahi Glass Co. Ltd., and is available from Tech-Spray Corp., Amarillo, TX, tel. 806-372-8523.