

# Spectralon® EPV

## Care and Handling Guidelines

### Background

Labsphere manufactures Spectralon EPV material for extreme physics (high energy, UV wavelengths, radiation, very low-level energy detection) and vacuum environment applications. Spectralon in its most purified form is immune to change under all forms of electro-optical radiation. Spectralon EPV has been specially designed and processed so that its exposure to physical and particulate contamination and volatile molecular outgassing contamination (MOC) is minimized and any residual contaminants are negligible. Human contact and exposure to human environments have been minimized to keep the material pure. This is a premium product that requires special handling and use.

### Best Practices for EPV Clean and at Peak Optical Performance

Spectralon EPV material can be thought of as having similar contamination vulnerabilities to silicon wafers during use and handling. To keep the material pristine and promote best performance, the following considerations that should be adhered to when handling, deploying, assembling, and manufacturing Spectralon EPV.

**Handling:** Human contact or exposure to human environments should be minimized. EPV is an inherently molecularly pure PTFE-based product. Being in proximity to or in contact with any volatile, organic or hydrocarbon-based material will contaminate and pollute the products. Extra care needs to be taken when handling EPV to ensure avoidance with the above-mentioned contaminants. Gloves must always be worn while handling EPV and material, and parts are to be stored in non-outgassing (non-MOC) bags or clean room containers. Exposure to bodily fluids and gases (like human exhalation) will irrevocably contaminate Spectralon EPV.

**Storage:** When Spectralon EPV is not being used, it needs to be stored in purified air, vacuum, or dry, inert gas (pure Nitrogen). It should not be stored in plastic or nylon bags, and should not be in proximity to or contained with ANY potential sources of MOC.

**Cleaning Surfaces of Debris:** Spectralon EPV surfaces may be cleaned by gentle flow of purified air or inert gas to blow off dust or particulates. The surfaces may be wiped with optical grade isopropyl or ethyl alcohol and silicon-grade ultra-clean cloth (kim wipes).\*

**Contamination with Organic Liquids:** If Spectralon EPV comes into contact with any organic liquid other than isopropyl or ethyl alcohol the material is most likely unusable for most high energy applications. If you see a spot of contamination, DO NOT wipe this spot with any alcohol as you may dissolve and spread the contamination to other clean areas. Immersion in alcohol will similarly drive organic contaminants into solution, and possibly spread the area(s) of contamination (not recommended).\*

**Vacuum Baking and Volatile MOC Recovery:** In some cases, minor volatile contamination may be removed from the material by vacuum baking (in as high a vacuum as possible (>10e-6 Torr)) at 90C for 72 hours. This process does not guarantee a successful removal of organic contamination.\*

**Removing Embedded Contamination:** Topical embedded contamination can be removed by sanding the material or removing contaminated areas.\*

**Air Sources:** Dry inert gases can come in contact with the material, but take special care that the hardware to deliver the gas (regulators, hoses, sealants, o-rings) are not contaminated or are appropriately rated for non-MOC performance.

**Using Proper Surfaces:** Care and forethought should be taken that surfaces designed to come in contact with EPV products are wipeable or cleanable and do not have molecular or particulate contamination. Generally, surfaces should be chosen that are passivated (metalized, like nickel plating), or non-outgassing such as stainless steel, hard-boil anodize, passivated aluminum or non-oxidizing metals (gold, stainless steel, etc). Paints and coatings, unless qualified for their outgassing properties, should be avoided.

- Anodized (or non-anodized) carbon steel, copper or raw aluminum should be avoided as these are oxidizing surfaces.
- If the product is meant for use in a vacuum chamber then default materials should be chosen in stainless steel or nickel plated aluminum including screw hardware.
- Metals that come into contact with Spectralon EPV should be cleaned via high purity Isopropyl alcohol wipe or hypersonic water bath with high purity, de-ionized water.

## Summary

It is critical that we be very diligent to keep the area(s) that EPV is manufactured and stored in clean and contaminant free. Tools and materials utilized during the manufacturing process should be chosen based on the particular application and end use as to avoid further contamination at customer site. Failure to adhere to these standards could result in rejections during the manufacturing process, resulting in missed customer expected delivery dates. If you're unsure of the working environment, tools, materials, etc. that Spectralon EPV will come into contact with, please bring this to the attention of your supervisor, so an immediate corrective action can be taken.

**End Use Environment:** Customer environment for optical use should be considered as vital to maintain the cleanliness of the parts – generally vacuum and N2 (inert gas) purged environments are generally acceptable. Most situations when humans are in proximity to the parts, normal air (with humans or other volatile sources) or touching of the parts by unclean tools are unacceptable and should be questioned.

## Observation of Organic Contamination:

Most organic materials fluoresce under strong UV light (<370nm) and such contamination can be easily viewed with the human eye. If such contamination is visible under UV irradiation, then the material may be unusable.\*

\*Liability Disclaimer - Please consult Labsphere before moving forward with the above suggested cleaning and vacuum baking methods. The warranty on the product is void if the product is subjected to those processes without consultation and permission from Labsphere.

