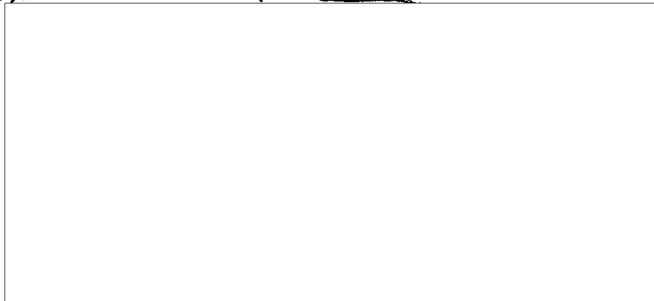


THESE INSTRUCTIONS REFER TO CLEAR COATING  
ON VIEWING SIDE OF SCREENS, FOR FINGER  
PRINTS, CLEANING PROCEDURE I BELOW, USING  
JOY LIQUID DETERGENT AND SOFT, CLEAN CLOTH  
IS SATISFACTORY. KEEP DETERGENT & WATER OFF



SCATTERING STAT  
ON OTHER SIDE,  
COATING

GENERAL CLEANING AND HANDLING INSTRUCTIONS  
FOR  
ELEMENTS COATED WITH  
HIGH EFFICIENCY ANTIREFLECTION COATINGS (HEA)

1.0 Purpose

The purpose of this outline is to define certain handling and cleaning techniques which, if properly followed, will result in greater satisfaction in the application and use of HEA coatings.

2.0 Scope

This outline pertains to coated glass elements only. Materials other than glass require special considerations. Consult  Sales Engineering on these specific occasions.

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3.0 General

HEA coatings generally do not deteriorate when exposed to varying environmental or climatic conditions, and they are quite durable (abrasion-resistant). However, to insure maximum useful life of elements coated with HEA it is wise to employ certain precautionary measures - within practical and economical limits.

Also, because of the extreme efficiency of HEA, certain contaminants superimposed on the coating will appear more objectionable than they would on any other type of reflection-reducing coating.

To minimize adverse effects, the following instructions should be followed, as applicable, during assembly of equipment utilizing elements coated with HEA.

4.0 Handling Optical Elements

Generally, it is good practice to handle optical elements, whether coated or not, only as frequently as is positively necessary. Each time an element is picked up, transported, and set down, it is vulnerable to being damaged.

When handling an optical element, it is advisable to wear gloves, (preferably light-weight nylon or cotton gloves which are relatively lint-free) and/or rubber finger cots. Whenever possible, grasp the part at its edges - not across the polished surfaces. This will reduce the amount of contamination of the surfaces which would otherwise result in a more difficult cleaning operation later. Also,

certain types of glasses will become permanently etched by perspiration being in contact with their surfaces .

All handling of optics should be done over a work area which is adequately covered with a soft, clean cloth. (Baby diapers have been found to be quite satisfactory.) This will allow a person to set a part down on a work surface without damaging the optical surfaces .

During transportation or in storage , the elements should be contained within a material-handling device which will provide adequate protection against damage. The elements should generally:

- A. Rest on a clean, soft surface .
- B. Be positioned to rest on a surface which is not a critical optical surface .
- C. Be separated so they cannot come into physical contact .
- D. Be adequately covered to protect against contamination from the surrounding environment and from physical damage .

It is advisable that optical elements be stored in a restricted-access area , and that only those individuals who have been properly instructed in the handling of optical elements have access to this storage area .

## 5.0 Cleaning Elements Coated With HEA

### 5.1 General

Imperfections resulting from fingerprints , dust, and dirt will greatly reduce the reflection-reducing effectiveness of an HEA coating. Removal of these imperfections will restore the coated surface to normal high performance characteristics .

A series of recommended procedures have been developed to effect proper cleaning of HEA-coated surfaces . Two different cleaning methods are discussed , each suited for particular applications . These procedures are designed for removal of imperfections without damaging the coated surfaces .

\* WE USE  
OPTICAL  
CLOTH  
PRODUCED  
BY  
TEX WIPE  
COMPANY,  
HILLSDALE,  
NEW JERSEY.

## 5.2 Surface Pre-cleaning Preparation

Prior to cleaning, all surfaces should be blown off with clean, dry air. The removal of large dust and dirt particles will reduce the abrasive action which could damage the coating.

The air can be supplied from a small hand device, (such as a syringe), or from a compressed air system, whichever is convenient. In either case, the air must be free of all oil, and the water content should be below 30% relative humidity.

## 5.3 Choosing a Solvent

The choice of solvent shall be governed mainly by the particular contaminant which is being removed from the coated surface. For example, benzine is a good solvent for removing oil; warm acetone can be used for some adhesives and for paint removal; trichloroethane can be used for paraffin removal, etc. Do not use strong acid or bases or abrasive products to clean coated glasses.

HEA performance is not adversely affected by any of the common solvents such as detergent and water, alcohol, trichloroethane, benzine, xylene, and methyl ethyl ketone.

## 5.4 Procedure I - Cleaning With a Liquid Detergent and Water

This method may be used for glass elements, regardless of size or shape, provided the element substrate material is not water-soluble. (Certain materials will etch when immersed in hot water.) This method should not be used in those instances where elements are mounted in assemblies which will be damaged by the hot water rinse.

Liquid detergents which have been used and have yielded satisfactory results are "Joy" and "Glim"; both types are available at most grocery stores and supermarkets.

The liquid detergent is mixed with hot tap water, using the proportions as recommended by the manufacturer. The element is then washed with this solution, rinsed with clean hot tap water and immediately wiped dry. Clean, soft cloths must be used for the cleaning and for the drying. Should the HEA coating not be satisfactorily cleaned, either repeat the above procedure or try Procedure II, (if applicable).

Precautionary Note:

If the parts are not wiped dry but are allowed to dry in air, a stain may result which will permanently damage the coating.

5.5 Procedure II - Cleaning With a Volatile Solvent, i.e., Isopropyl Alcohol or Acetone

This method is very universal. Most people usually have these solvents available and are familiar with their use. There are two limitations to the application of this method:

1. It should not be used when the element is mounted in any assembly, the finish of which may be soluble in the solvent.
2. Relatively inexperienced personnel will find it difficult to satisfactorily clean large surface areas.

It is very desirable to use this method on those elements which have a substrate material which is water soluble. To clean small parts, it is necessary merely to immerse them in the solvent, rubbing the surfaces during immersion with a clean, soft cloth, and then remove the parts and immediately wipe dry with a clean, soft towel.

To clean parts with a large surface area requires that relatively small areas be cleaned and that one progresses from area to area until the entire surface has been cleaned. Each small area is cleaned with a soft, clean cloth moistened with the solvent and then immediately wiped dry with another soft, clean cloth. Should the HEA coating not be satisfactorily cleaned, either repeat the above procedure or try Procedure I, (if applicable).

Precautionary Note

If the solvent is allowed to evaporate from the surface, a stain may result.

6.0 Comments on HEA

HEA has been specifically designed and optimized to reduce the reflection of glass surfaces through the visible portion of the spectrum; reflectance is generally less than 0.5% from 400 $\mu$  to 700 $\mu$ . However, in the ultraviolet and infrared regions adjacent to the visible, reflectance is quite high--as high as 12 percent per surface at certain wavelengths. In many applications (generally multi-element lens systems), this is a very desirable feature because unwanted energy is attenuated. However, a precaution must be mentioned. Although permanent ocular damage is unlikely, continuous viewing of extremely bright sources (such as the sun) by reflection from an HEA coated surface should be avoided.

7.0 Conclusion

All of the previous information has been an outline of methods and techniques which should be employed when handling and cleaning glass optical elements, whether coated with HEA or not and generally applies to conditions encountered within a production facility. It is certainly recognized that these same elements will ultimately be exposed to field operation and that different circumstances will exist. However, wherever possible, the above instructions should be followed.

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