



Introduction

The **HI-GARD** 1600 coating solution is a non-tintable, high refractive index, thermal cure, sol-gel coating possessing excellent abrasion resistance and should have excellent AR compatibility. Commercial spin or dip coating processes and cure cycle should be easily developed based on PPG's developmental process.

Coating Solution Target Properties

Property	Results
% Solids	28% solids
Viscosity	6 cPs – 10 cPs @ 25°C
Specific Gravity	1.013 g/ml
PH	6
Flash point	27.0C or 80.60°F

Coating Properties

Property	Results
Bayer Abrasion	4.5 – 6.0 x uncoated CR-39™
Steel Wool	< 0.5% haze gain after 200 cycles
Refractive Index	1.58
Adhesion	Passes 3 hour boiling water test with no adhesion loss

Handling and Storage Recommendations

Storage Recommendations

Temperature	Length of Time
-20 °C	12 weeks
4°C	8 weeks
25°C	4 weeks

When warming the solution from temperatures below -4°C stir to dissolve any precipitate that may have formed.

Health Effects

The chronic and reproductive effects of the **HI-GARD** 1600 coating solution are summarized in the Material Safety Data Sheets (MSDS). Take all precautions that would normally be followed for handling these products.

Always read the HI-GARD 1600 coating solution MSDS, (product ID # 0811), and product label. Follow all instructions when handling this product.

General Application

HI-GARD 1600 coating solution is designed to be used on ophthalmic lenses made from plastic materials. Before coating lenses, the coating solution should be filtered through a 0.45-micron filter such as a polypropylene capsule filter (MSI Calyx). The coating can be applied by standard techniques for room temperature dip and spin coating.

For dip coating, draw speed can be adjusted to achieve desired coating thickness in accordance with environmental factors, such as temperature and humidity.

Recommended guidelines for processing of a lens cast from CR-39™ monomer:

Coating solution temperature at application:	20-25°C
Air temperature at application:	20-25°C
Relative humidity:	30-50%
Coating solution temperature overnight	0-10°C

Dip Coat

- Etch** 3-5 min. in 12.5% NaOH at 50°C*
Normal lens cleaning & preparation procedures will suffice.
- Soak time** 15 seconds
- Draw Speed** 6"/minute (150 mm/minute) to achieve a film thickness of ~ 3 microns
- Air Dry** 10 minutes
- Pre-Cure** 20 minutes at 60°C
- Cure** 3 hours at 120°C

Spin Coat

- Etch** same as Dip Coat.
- Application** 3-5 grams coating solution at rate of 1 gram/sec.
- Spin-Out Time** 13 seconds at 1100 rpm to achieve a film thickness of ~ 3 microns
- Air Dry** 10 minutes
- Pre-Cure** 20 minutes at 60°C
- Cure** 3 hours at 120°C

*12.5% NaOH is corrosive, be sure to wear protective eye goggles and impervious gloves when handling.

HI-GARD™ 1600

Last Updated April 20, 2006



% Solids Maintenance

Maintaining Coating Solution

Where Gas Chromatography is unavailable, the replacement solvent package for maintaining the % solids of the coating solution is a 50% Methanol, 40% n-Butanol and 10% of a 50% *Dowanol mixture.

Always pre-mix the solvents prior to adding the mixture to the **HI-GARD** 1600 coating solution. Never shock the system by adding large amounts or rapid additions of solvent. Add the solvent mixture to the overflow tank or reservoir and recirculate before application.

WARNING! The **HI-GARD** Coating solution solvent replacement package is flammable and contains methanol which may cause blindness or be fatal if swallowed.

Decreasing the % solids to achieve a thinner coating:

To achieve a thinner coating by decreasing the % solids add only the 50% *Dowanol mixture.

Note: Loss of Methanol and related alcohols without replenishment may reduce the stability or pot-life of the coating solution

*The Dowanol mixture is as follows:

50% = (50% Dowanol Glycol Ether) 1-Methoxy-2-propanol CAS #107-98-2

50% = (50 % Dowanol PM Acetate) 1-Methoxy -2-propanol acetate CAS #108-65-6

Alternative *Etching Solutions

NaOH Caustic Solution:

- 20% NaOH
- 40% Dowanol PM Glycol Ether
- 40% DI Water

KOH Caustic solution:

- 10% KOH
- 45% Dowanol PM Glycol Ether
- 45% DI Water

Order of Addition

The DI water is premixed with the Dowanol followed by Caustic addition with stirring. Caustic solutions are then sonicated and heated to 50°C

* Etching solutions are corrosive, be sure to wear proper protective eyewear and impervious gloves when handling.

Disposal

Follow established procedures for handling and discarding solvent-based coating materials. Dispose at an EPA-approved hazardous waste site in accordance with EPA hazardous waste regulations.

Samples and Services:

For additional information, please contact a PPG customer service representative at:

- Phone: **1-800-323-2487**
- Fax: **724-325-5042**

or: [send E-Mail](#)

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