

## First Contact™ Polymer Solution

### Cleaning a Fused Silica, Etched Transmission Grating or Phase Mask

**Next Generation Clean!**

*Not for use on plastic lenses or eyeglasses*

<p><b>What is First Contact™?</b></p>	<p><b>First Contact™</b> is an easy to use one-part polymer solution that cleans and protects precision optics and other surfaces. The liquid is applied and allowed to dry to a flexible film that peels off leaving an amazingly clean surface! <b>First Contact™</b> is a solution of designer polymers in a complex solvent system that provides optimal surface adhesion for safe and effective cleaning without thermal shock. No dragging, scratching, or residue. Easily poured, painted, dipped, or sprayed.</p>
<p><b>Cleaning and Protection</b></p>	<p><b>First Contact™</b> removes fingerprints, oils, water spots, and particulates to the nano-scale. It provides a barrier to oxygen, sulfur compounds, water, and water vapor. The tough, flexible film prevents abrasion damage and eliminates re-contamination issues.</p>
<p><b>Safe for use on:</b></p>	<p><b>First Contact™</b> is safe on fused silica, quartz, all glasses, metals, and silica. Use it on Si, Ge, NaCl, KBr, KRS-5, and all polar inorganic crystals including nonlinear optical crystals like coated BBO. It is safe for use on all coatings, including AR &amp; reflective coatings as well as most first surface mirrors and gratings. Do not use on plastics that dissolve in polar organic solvents such as acetone. Do not use on plastic eyeglass lenses.</p>

**First Contact™** is available in a variety of kits and package sizes. See [www.PhotonicCleaning.com](http://www.PhotonicCleaning.com) for details and ordering information. An ounce of **First Contact™** cleans dozens of 1 inch diameter optics. Order direct, on-line or from a distributor.

[www.PhotonicCleaning.com](http://www.PhotonicCleaning.com) (Telephone) +1 608 467-5396 (Fax) +1 608 467-5397 [sales@PhotonicCleaning.com](mailto:sales@PhotonicCleaning.com)

#### SAFETY AND HANDLING

**First Contact™ SOLUTIONS ARE FLAMMABLE. KEEP AWAY FROM SPARKS AND OPEN FLAME.** **First Contact™** solutions contain alcohols and acetone. Use only with adequate ventilation. Wear protective outer garments including gloves and goggles. Keep out of eyes and mucous membranes. If splashed into eye, rinse with copious amounts of water. Consult a physician. If ingested induce vomiting, consult physician. **First Contact™** polymer film is inert and not flammable.

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**First Contact™** is ready to use from the bottle. **Testing and trial application is recommended before attempting a critical use.** The film must be thick enough and completely dry for successful peel removal with no tears or residue. Contact Photonic Cleaning Technologies, [sales@PhotonicCleaning.com](mailto:sales@PhotonicCleaning.com), if you have questions. **DO NOT USE ON MATERIALS THAT DISSOLVE IN ACETONE!**

### HOW TO CLEAN A FUSED SILICA, ETCHED TRANSMISSION GRATING OR PHASE MASK

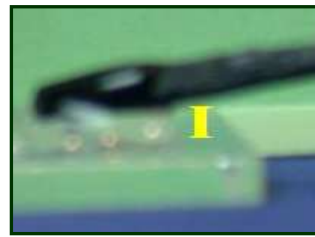
- 1. APPLY First Contact™** to the optic. Use a brush, nylon or natural hair bristle, or eye dropper/pipette to apply a generous amount of the solution. Application rate varies with the type of optic and contaminants. Small, smooth optics contaminated with only airborne particulates need very little **First Contact™**, about 0.2 ml per inch<sup>2</sup>, but larger optics or optics with fingerprints need more solution. **Do not allow First Contact™** to get under retaining rings or optic mounts.



Apply solution using a pipette or brush. In this image the solution is dropped onto the surface using a pipette to form a pool of liquid.

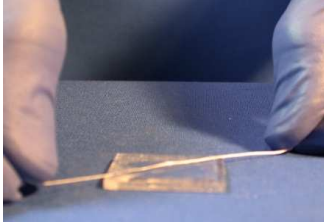
2. **SPREAD First Contact™** using a brush, if necessary.

Small gratings or phase masks may be covered by careful application with an eyedropper. When using a brush, use the bristles on the top of the liquid to push the solution across the surface. Do not paint or use the brush in a way that allows the bristles to touch the optic's surface.



**NEVER TOUCH THE OPTIC'S SURFACE WITH THE BRUSH!** Note in this picture that the brush rides on the polymer solution and does not touch the optic. The yellow bar shows the separation between brush and optic.

3. If the dry film is to be removed without using an adhesive peel tab, place unwaxed dental floss, cloth, nylon mesh, or other suitable 'pull tab' on the polymer film. Place another drop or two of First Contact™ solution on the tab to ensure it is embedded in the final film.



When First Contact Polymer Solution is tacky, place dental floss or other adhesive-free pull tab on tacky film. Then use the brush or a pipette to place a couple drops of fresh polymer solution at the edges of the tab to embed it in the polymer film. Let the polymer dry thoroughly.



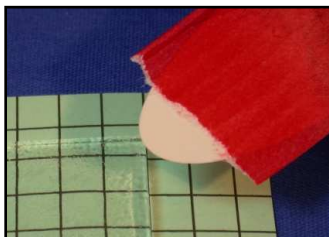
4. **ALLOW THE SOLUTION TO DRY THOROUGHLY.** Cure the polymer by allowing it to dry completely, minimum 20 minutes for small, flat optics. Dry time for a fused silica phase mask is about 45 minutes; for a metal grating, silver mirror, or gold mirror at least 2 hours and often longer. This is critically important and bears repeating: **Allow plenty of dry time so the adhesion is minimized!**

Oils need time and solvent to dissolve, use enough First Contact™ and cover the optic with an airtight container to slow the drying process. Film adhesion is high before curing is complete, but is low for dry film. The polymer film may not be dry even when the surface feels dry to the touch. Be patient. **Yes, once again, it is important to give the polymer solution plenty of time to dry!** Fresh polymer solution re-dissolves dry polymer film. If the film is too thin and begins to tear or leave pieces on the optic, apply a thicker coating of First Contact™ and allow to dry, then peel off as usual.

5. **REMOVE CURED First Contact™** polymer film by carefully starting to lift at an edge using a special peel tab provided with the polymer solution or the embedded material from step 3. Dry polymer peels off with minimal stretching and virtually no adhesion to the treated surface.

A poor or compromised coating is most likely to fail at the edges where it is weakest.

When using adhesive tabs, press the tab firmly onto the dry polymer film at an edge, allow the adhesive and polymer to bond for about 20 seconds, and lift. Be very careful to avoid attaching the adhesive tab to the edge of the optic coating whether it is a grating mounted on a substrate, a thin metal film like found on a mirror, or any other optic thin film. Accidentally lifting the edge of the film with the adhesive tab can cause an otherwise good optic to fail.



This is a modified lint free peel tab. The release paper was colored red for the photograph.



Remove a small portion of the release paper to expose the adhesive. Leave the rest of the release paper on the peel tab. This allows easier use of the sticky peel tab while wearing gloves.

Stick the peel tab onto the edge of the dry polymer film. Make certain the adhesive is on an edge of the polymer film or the dry film may not lift off the optic. Allow the adhesive a few seconds to grab the film before peeling.

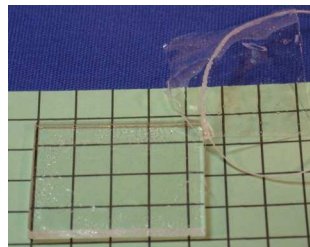
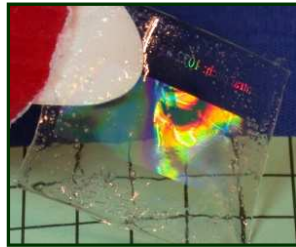
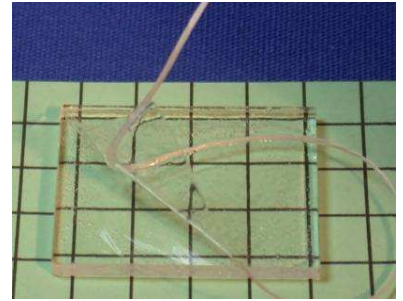
Gently and slowly lift the tab up and across the optic. Watch to be sure the polymer film, but nothing else, is coming with the peel tab. Look and feel: is the polymer tacky and stretching? Then it is probably not dry. Is the optic's thin film lifting or the grating starting to leave the substrate? STOP! Contact PCT at +1 608 770-7383 or [sales@PhotonicCleaning.com](mailto:sales@PhotonicCleaning.com).

If the polymer film did not start to lift, remove the peel tab and start again with a fresh adhesive surface. Inspect the polymer film and be sure to place the peel tab on an edge of the polymer film. If you get an edge, the film will peel off.

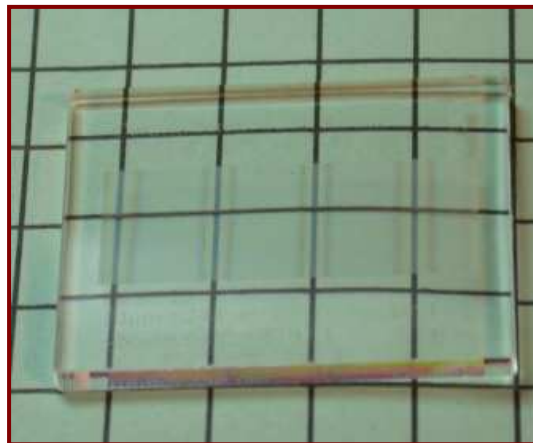
Peel across the optic with a slow, even pull. Watch for tears. If the film tears, it is too thin. Stop pulling and put more First Contact Solution on the thin film. Let it dry and remove the thicker, stronger film.

If there is a non-adhesive peel tab embedded in the dry First Contact polymer film, peeling is very similar to the description for lint-free peel tabs however there is no, or very limited, risk of pulling off a grating or thin film coating because there is no sticky adhesive to attach and lift.

Successful removal of the polymer film results in a strong film separated from the optic in single, intact piece. Phase masks, gratings, and other textured surfaces are more exciting than other optics because the polymer film is a perfect negative image of the cleaned surface. Note below the film attached to the peel tab is actually diffracting the transmitted light, exactly the same way as the Ibsen phase mask can do.



**6. CLEAN UP** by placing caps back on the bottles. Extra brushes may be cleaned in acetone or First Contact Thinner. The First Contact polymer is inert and may be disposed in a trash can.



A clean fused silica, etched transmission grating from Ibsen Photonics, Farum, Denmark

20 August 2007

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