

**Ground Glass Freon wipe cleaning procedure**

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		see LIGO DCC record Status

**1 Objective**

This procedure is the recommended procedure for cleaning optics with ground glass barrels. This procedure replaces the liquinox cleaning procedure for optics with ground glass, as the aqueous liquinox cleaning can contaminate optics if the DI water used is not clean enough. Cleaning with Freon is also faster and uses much less solvent. Reference the video of this procedure, T1200112, for visuals.

**SAFETY NOTES:**

Chemical splash goggles shall be worn when using the ion gun to dry off methanol.

The ion gun should be de-energized by disconnecting from the power source for at least 5 minutes prior to the use of the gun to ensure that the gun is de-energized. The ion gun should be kept unplugged at all times when using around any flammable solvents such as methanol, isopropyl alcohol or acetone.

**2 Applicable Documents**

T1200112 Video of Freon wipe

E000007 Liquinox cleaning procedure

T1100286 Methanol spray

E1000079 First Contact

**3 Materials**

Freon 113: 99.99% pure 1,1,2-<sup>o</sup>C- Trichlorotrifluoroethane,, from <http://www.order113.com/>

Berkshire lensx 90 lens tissue

Ion gun AND filter, Terra Univeral Part#2005-55 or equivalent

Chemical splash goggles

UHP or research grade nitrogen gas cylinder for use with ion gun

Spectroscopic grade methanol

Glass dropping bottle

Methanol squeeze bottle

LED flashlight

Small applicator bottle of Red First Contact



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### 4 General Requirements and Pre-requisites

All personal must follow the cleanliness protocols and requirements of the LIGO Contamination Control Plan ([E0900047](#)).

All work is to be performed in an ISO Class 5 (Fed Std class 100) cleanroom.

All lab safety protocol must be followed based on the SOP for the assigned work area.

### 5 Cleaning the Ground Glass Barrels

1. Clean a designated work area and lay down a few Berkshire wipes.
2. Rest the optic on its barrel on the Berkshire wipes and inspect with LED flashlight for scratches and contaminants. Note any defects.
3. Pour some Freon into a clean dropping bottle. Rotate the stopper until you get a drip out of the bottle, not a stream.
4. Fold 2 lens tissues 4-5 times, making sure you get a nice rounded edge.
5. Drip Freon onto the rounded edge of the wipe, until the tip is saturated.
6. Holding the optic with one hand and the Freon soaked tissue in the other, wipe the barrel of the optic. Take care NOT to get Freon on your gloves and then touch the optic, the Freon will eat the latex enough to leave some on the optic's surface. Grip wipe by dry end only. If the optic is too large to hold rest it on its barrel on a clean Berkshire tissue.
7. The Freon evaporates very quickly so it's more difficult to tell when the wipe is dry. Pay attention to how the wipe feels under the gloves, if it feels cold there is probably enough solvent on there still. If it doesn't, stop to refold the wipe or get a new one. Saturate with Freon. For a 2'' optic rewet a tissue 2-3 times. Only refold a tissue once so there is always a clean tissue surface. Wipe the whole barrel two times.

### 6 Cleaning the Optical Faces

8. Inspect the optic with a bright LED flashlight. **If it does not have visible dust on its surfaces** then skip steps 9-11. **If it is very dirty**, ie. has a large amount of dust visible on the surface, then make sure you do steps 9 and 10.
9. Take off safety glasses and don chemical splash goggles.
10. Pour some spectroscopic grade methanol into a spray bottle. Spray methanol over the entire optical face and dry using the unplugged ion gun, following procedure T1100286-v2. Repeat on other face/side.
11. Inspect with LED flashlight or barlight for methanol residue and dust.



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12. A) **For out of vacuum optics:** Drag wipe with spectroscopic methanol from a dropping bottle. Inspect again with flashlight.  
B) **For in vacuum optics:** Inspect to **make sure there is no liquid methanol anywhere on the optic.** First contact will react badly to liquid methanol, but will remove dry methanol residue. Pour red first contact onto the optic straight from a small applicator bottle, then use the small applicator brush to get a uniform coating. Add peek mesh and let dry for 3-4 hours before putting back into a storage container.
13. If storing clean optics in PET-G cases, wipe inside of PET-G cases with isopropyl alcohol and then put the optic in. If you have to store them in foil, wrap in Berkshire lens tissue first, then foil.
14. Dispose of chemical waste appropriately. Do not re-use more than a day old methanol to clean optics.

Optics can be stored with red first contact on their faces for extended periods of time.