

	LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY		E990034	C	D
	SPECIFICATION		Drawing No	Rev.	Group
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Small Optics Cleaning Procedures

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DCC RELEASE							

1 Equipment, Tools and Materials

Class 100 laminar flow bench / sink with an ionizing bar from Terra Universal 11”L with 2 emitters –Part# 2005-05A
 Deionized water, 18 Megohms, filtered (0.2 micron filter) at point of use.
 Dry nitrogen 99.995% pure, water vapor content under 1 part per million (ppm).
 Ionizing blow-off gun with 0.2 micron filter.
 AlphaSorb 10 wipes
 Alpha 10 wipes
 Pyrex container for washing (150mm. dia.x 75mm. ht.)
 Clean, storage mirror holders.
 (Holders should be cleaned with Liquinox solution, as prepared below, and thoroughly rinsed under DI water, pat dry with AlphaSorb 10 wipes and blown dry using ionizing gun and dry nitrogen.)
 Hot plate
 Gloves - VWR Certi-Clean Class 100 Latex Gloves or Accu Tech Ultra Clean 91300 Gloves.

Liquinox solution prepared as follows:

To 2 liters of filtered DI water, add 40 ml. of Liquinox detergent.
 Place beaker on a hot plate.
 While stirring the solution, increase temperature to 50 degrees C; once the temperature is reached, keep stirring for at least 15 minutes.
 Remove from hot plate – Allow to cool. Solution is ready to use.

Life shelf of the solution is one week while covered.

2 Washing and Drying - Coated surfaces 1 and 2 -

Cleaning steps 1 thorough 15 are formulated to remove heavy contamination from the optics and applies to optics without magnet assemblies.

All procedures listed under these Cleaning Procedures must be performed under a Class 100 laminar flow bench, while suited-up in clean room garments including, but not limited to: coat, booties, bonnet, gloves, facial mask. This applies to anyone handling or near any optics being cleaned.

1. Line the bottom of the Pyrex dish with a piece of Alpha 10 tissue cut to size. Place the mirrors to be cleaned in the dish.
2. Cover with Liquinox solution ensuring that the mirrors are completely immersed.

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3. Warm the solution to 50 degrees C.
 4. Soak the immersed parts, keeping the dish on the hot plate, for 15 min. at 50 degrees C.
 5. Bring the temperature down to 40 degrees C.
 6. Remove the mirror from the dish and immediately place under running DI water.
 - Never allow any surface wetted with Liquinox to get dry!!!!**
 7. With a soft lens tissue (Alpha 10), wetted with the detergent solution, wipe the edges of the optic. Discard the tissue.
 8. Repeat the procedure wiping the bevels of both surfaces. Discard tissue.
 9. Clean both coated surfaces under running DI water, utilizing Alpha 10 tissue wetted with Liquinox and scrubbing with smooth, soft strokes.
 10. Rinse the parts under running DI water while scrubbing gently (smooth and soft strokes) with a fresh Alpha 10 tissue
 11. Final rinse, spraying only deionized water over the entire part for at least 10 seconds. Stop DI water flow.
 12. Place the mirror, resting on its edge over a sheet of AlphaSorb 10 wipe.
 13. Allow the water to dry off for 15 minutes insuring that the particle count under the flow bench meets the spec of Class 10 clean room (ISO4), would not contain more than 10 particles bigger than half a micron in a cubic foot of air.
 14. Inspect for remnants of water at the bottom of the optic. If any are present, carefully remove with the corner of a folded Alpha 10 wipe dampened with methanol.
- Final inspect the surfaces of the mirrors for streaks or water marks in a dark room, over a dark background, with a high intensity light.
15. Place the cleaned mirrors in their appropriate storage holders. Keep in a clean area until ready to use.

2.1 To clean mirrors with magnet assemblies:

16. Wet the mirror surfaces with DI water.
17. Wet a Alpha 10 wipe with warm (50 degrees C) Liquinox solution.
18. Gently and thoroughly scrub both surfaces of the mirror with the tissue, exercising caution when wiping around the magnets.
19. Rinse under running DI water scrubbing softly the surfaces with a fresh tissue.
20. Final rinse by spraying only DI water over the entire mirror for at least 10 seconds. Stop the water flow.
21. Place the mirror, resting on its edge over one AlphaSorb 10 wipe.
22. With the ionizing gun, utilizing pure, dry nitrogen, slowly blow the sides of the mirror and the coated surfaces starting from the top.
Blow on the magnets from top to bottom to ensure that they are well dry.
23. Continue blowing downwards ensuring that the bottom magnets are dry. Be sure that no water remains on the surfaces.
24. If needed wipe edges with alcohol.



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25. Inspect the mirror surfaces for streaks or water marks in a dark room, over a dark background, with a high intensity light.
26. Place the cleaned mirrors in the appropriate storage until ready to balance.