

HANDLING LIGO OPTICS CONTAINERS

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Purpose: The optical components used in LIGO interferometers are extremely sensitive to environmental conditions and physical handling. Special care must be taken to prevent exposure to harmful environments and contamination by improper handling. Personnel who handle LIGO optics must be familiar with and follow these procedures.

Opening The Shipping Case

1. The *optics container* is shipped within a hard plastic **shipping case**. The **shipping case** must be transported using a cart or hand truck, or, if no such implements are available, it is to be transported by two people.
2. Gloves are to be worn at all times when handling LIGO optics or *optics containers*. The gloves must be powder-free and are to be discarded after each use. Do not touch door knobs, light switches, etc., with gloved hands. If the gloves are contaminated by touching objects that have not been cleaned with the proper solvents, discard the contaminated gloves and use a new pair.
3. LIGO optics have extremely delicate optical surfaces. The *optics container* must be opened only by trained optical personnel who are familiar with handling fragile optical surfaces.
4. The *optics container* is not to be carried by hand more than 10 feet. If the distance the optic is to be transported is greater than 10 feet, a wheeled cart or other carrier (such as a dolly or hand truck) must be used.
5. The *optics container* must be removed from the **shipping case** before it is brought into a clean room environment. Wipe down the exterior of the *optics container* with a clean cloth before bringing it into the clean area.
6. The *optics container* is to be opened only in a clean environment. At no time is any portion of the clear aperture (the central 20 cm. of the optic) to come into physical contact with any object. Once the *optics container* has been opened, all tools and other loose items must be kept well away from the optic. Make sure that fingers do not come in contact with the clear aperture.

Opening The Optics Container

1. Depress the red button on the pressure equalization valve located at the center of the container cover.
2. Use a properly cleaned Phillip's screwdriver to loosen the 1/4 turn Camloc fasteners. The fasteners **DO NOT** come free of the lid. Turn the fasteners only until they "pop up."
3. Carefully remove the aluminum cover, and place it several feet away from the remaining container assembly.

4. Remove the protective cover plate which is over the optical component. Unscrew the 1/4-20 screws until they "pop up": these are "captive screws" and **DO NOT** come free of the cover plate.
5. Loosen the two set screws in the Teflon locating pad on the stand off. This pad holds the optic in place during transport. Backing off the screws allows the optic to move freely in the horizontal plane thereby facilitating removal of the optic from the container assembly.
6. Pivot the hinged-stand off downward to aid in the safe removal of the optic from the container.
7. Gently, and with great care, remove the optic by placing the fingers of both gloved hands firmly under the bottom edges of the optic and the thumbs on the top edges of the optic. Take care to avoid touching the clear aperture on the top surface. Gloved fingers may contact the optic **ONLY** within 2 cm of the edge.
8. Lift the optic over the pivoted stand off and place it on a prepared working surface. Place the remaining container assembly with the cover away from the immediate work area around the container assembly..

Closing The Optics Container

1. Wipe the contact points with solvent before placing the optic in the container to remove any dust, etc.. Carefully return the processed optic to the container assembly, being sure to touch **ONLY** the outer 2 cm of the optic faces. Snug the optic up to the back stand offs.
2. Return the hinged-stand off to an upright position.
3. Replace the cover plate (clamp ring) on the container assembly. Carefully tighten the 1/4-20 screws into the three stand offs. **DO NOT** force the screws. Hand-tighten the screw as much as possible. Use only firm pressure if a ball driver is needed. Take care not to over-tighten the screws.
4. Tighten the set screws on the locating pad until the optic is held firmly in the horizontal position. Do Not over-tighten the set screws.
5. Carefully place the cover back over the container assembly. Use the Phillip's screwdriver to set the 1/4 turn Camloc fasteners. The fasteners may not sit flush with the cover but they will sit firmly in place (they are no longer in the "pop-up" position).
6. Place the container assembly back into the **shipping case**.
7. For identification, label the outside of the **shipping case** with the serial number of the optic enclosed.