

Subject: L1100046-v1, VRB request: no baking for optics?

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L1100046-v1

To the VRB:

Our current (iLIGO) cleaning procedures for in-vacuum commercial optics (other than Core or IO Optics), is [E000007](#)-x0. The vacuum preparation document, [E960022](#)-v10, states:

12.17.1. Fused silica 1" and 2" mirrors and substrates

For completely polished mirrors from REO (edges also polished!), no baking required.

Clean as per E000007.

For mirrors with ground edges clean as per E000007, then vacuum bake at 120 deg C for 48 hours.

I suspect that baking the optics with un-polished barrels/edges is not necessary and simply increases the risk/likelihood that the optical surfaces will have a thin layer of contaminant coated on them from the vacuum bake. There are ~110 in-vacuum optics with un-polished barrels per interferometer but they are relatively small (2" dia x 3/8" th or 1" dia x 1/4" th). Most of these optics are in the HAM1/6 and HAM 7/12 chambers. While HAM1/7 are intended to always be isolated from the main vacuum volume, HAM6/12 will likely be opened to the main volume eventually.

In addition to these small (1" and 2" dia) optics, there are also the Transmission Monitor telescope elements which do not have polished barrels. The primary optic is 230 mm dia x ~50 mm thick. The fold mirror #1 is 160 mm dia x 25 mm thick. The fold mirror #2 is 84 mm dia x 25 mm thick

I suggest that no optics be baked after cleaning. Is this acceptable?

We are looking into the possibility of quickly testing the outgassing rate for unpolished optic substrates (with significant surface area in the bake load, order of 2000 cm²) as a check.

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