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Sucker plate O-ring Tests

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LIGO Scientific Collaboration

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1 Introduction

This document is a summary of tests done with clean sucker plates on plate glass “dummy optics”. The purpose of the tests was to see if the o-rings were leaving any sort of residue on the optic, and secondarily to make sure the sucker plates held vacuum well after 1-3 days. In all tests the sucker plate was set on horizontal plate glass in a clean room, air pumped out, and left for 1-3 days.

2 Tests

2.1 Clean plate glass & clean o-ring(DI water soak and isopropyl wipe):

Left sucker plate on glass over the weekend, did not lose vacuum after that 72 hours. No visible residue on plate glass after removal.

2.2 First Contact (FC) coated plate glass & clean o-ring (DI water soak and isopropyl wipe):

Left sucker plate on glass over the weekend, did not lose vacuum after that 72 hours. Could see impression of o-ring in the dried FC, when it was removed there was no visible residue on the glass surface. Additionally, the dried film did not show any signs of degradation or stripping where it was compressed by the o-ring.

2.3 Clean plate glass & clean o-ring (DI water soak and methanol wipe):

Left sucker plate on glass overnight, there was no loss of vacuum after 24 hours. A small ring of residue was visible. It was easily removed with isopropyl and clean room wipes.

2.4 Dirty plate glass and clean o-ring (DI water soak and isopropyl wipe):

Left sucker plate on overnight, no loss of vacuum over 24 hours. When sucker plate was removed a ring was visible. We were unable to determine if the ring was residue or simply the absence of dust (the rest of the surface was very dusty, since it had not been cleaned)

3 Summary

The only test where a residue definitely showed up on the plate glass was when the o-ring was cleaned with methanol. This was only one test, so it should not be viewed as conclusive. However, there has not been any problems with o-rings cleaned with the procedure outlined in LIGO # T1000105.

Note:

For o-rings already in clean sucker plates, avoid taking them out to clean them, it is very easy to puncture the o-ring trying to take them out. A punctured o-ring shouldn't be used, since it may cause the sucker plate to lose vacuum. If they look dirty, a quick wipe with isopropyl should be adequate.

