LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

LIGO-E0900051-v1 *Advanced LIGO* Date: February 23, 2009

Output Mode Cleaner Suspension Inspection Plan

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Distribution of this document:
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1. Introduction

This document addresses the methods and procedures for producing the Advanced LIGO production output mode cleaner (OMC) suspensions (SUSs.) The inspection plan addresses QA on parts, when supplied and performed by vendors, by us, or after our own fabrication/processing. This inspection plan indicates the level of inspections, and who is responsible (company/vendor, LIGO or perhaps both for critical parameters).

For reference, the top level assembly drawing tree for the Advanced LIGO Output Mode Cleaner Suspension Overall Assembly and Assembly Fixtures is D0900293.

2. Procurement QA

Procurement of the OMC suspensions is broken up into the following categories, which will be detailed further. QA will be addressed by category.

2.1. Weldments

2.2. Machined parts

2.3. Off-the-shelf hardware

2.4. Viton

2.5. Magnets

2.6. Helicoils

2.7. Music wire

2.8. Maraging steel blades

2.9. Assembly Tooling/Fixtures

2.10. Birmingham OSEMs

2.1 Weldments

A weldment specification/requirements document provided by the Systems group will be referenced on the weldment drawing. The QA for the welding is included. Full dimensional and material certifications for all weldments will be required and included in the RFQ. Certs for the Brite Dip process will be required with the procurement of this process.

2.2 Machined Parts

Full dimensional and material certificates of conformance will be required for all parts. If there are many small/simple parts, dimensional data may be performed on 20% of the deliveries.

2.3 Off-the-shelf hardware

Material certifications will be provided with all deliveries.

2.4 Viton

Material certifications will be provided with all deliveries

2.5 Magnets

Material and magnetization certifications will be provided with all deliveries.

2.6 Helicoils

Material certifications will be provided with all deliveries.

2.7 Music Wire

Material/chemical composition, diameter dimension and yield strength are provided with all deliveries. Certification for hard temper is required. LIGO will hand-clean and inspect all wire before installation into suspension assemblies.

2.8 Maraging Steel Blades

The blades will be bought to a specification, E0900023, currently being worked on by the Systems group. A dimensional check, with LIGO-provided clamps per the inspection specification, E080538, will be provided by the vendor. A certification on the heat treatment (post-nickel-plating bake and age hardening bake) will be provided by the vendor. A certification on the nickel-plating process, including phosphorous content, will be provided. LIGO QA will pre-certify the vendor before awarding the contract for the blades.

LIGO will perform full characterization, including deflection, frequency measurements, etc. LIGO will perform the vacuum clean and bake step with RGA. LIGO will perform the creep bake under load as well.

2.9. Assembly Tooling/Fixtures

Full dimensional and material certificates of conformance will be required for all parts. If there are many small/simple parts, dimensional data may be performed on 20% of the deliveries.

2.10. Birmingham OSEMs

Assembly inspection steps are called out in the Assembly Specification, T060233. All of the testing requirements for the assembled osems are detailed in T070107. Both documents may be found at http://www.sr.bham.ac.uk/dokuwiki/doku.php?id=bal:osems

3. Assembly QA

All assemblies will be tested to the test plan.