

SPECIFICATION FOR CLEANLINESS TESTING

APPROVALS	DATE	REV	DCN NO.	BY	CHECK	DCC	DATE
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1.0 GENERAL

The Advanced LIGO Instrumentation System is acutely sensitive to hydrocarbon film and particulate contamination. Certain harmful classes of residual contamination are difficult to detect, trace to sources, or remove once a completed Vacuum Component has been vacuum baked.

The buyer requires testing of vacuum surfaces for hydrocarbon and particulate contamination *after* completion of all fabrication and detergent cleaning steps, *prior* to vacuum bakeout.

In addition to certifying conformance with all material and process specifications of the contract, the Seller will be required to submit a Contamination Control Plan as part of their overall QA Plan. The Seller QA Plan must be approved by the Buyer as part of the PDR and FDR approvals.

The Contamination Control Plan must address all phases of the project from material procurement, fabrication, testing, storage and delivery. All test equipment and fixtures (such as blank flanges, pump sets and valves) exposed to the vacuum components must also conform to these surface contamination standards.

While the Vacuum Component is open and exposed to the atmosphere for testing, it shall be protected by a cleanroom certified to ISO –STD- 14644 Class 5 requirements.

2.0 Pre-Bakeout Inspection and Process Requirements

1. Vacuum Components must be fully inspected under both visible and ultraviolet light (“Black Light”) prior to the initial leak tests after steam cleaning. Any gross contamination shall be removed prior to leak testing. All visual inspections shall be conducted per Buyer Specification E0900409-v1 Spec. for Black Light Inspections.

The Vacuum Components shall be visually inspected again after the detergent cleaning of each component.

2. Cleanliness testing shall be performed on all Vacuum Components to verify they are clean prior to vacuum baking as follows:

All Vacuum Components shall meet or exceed the requirements as specified in “Non Volatile Residue (NVR) level **A/20** and Particulate Contamination Level (PCL) **100** as defined in **IEST-STD-CC1246D**, *Product Cleanliness Levels and Contamination Control Program* (Institute for Environmental Science and Technology, www.iest.org).

The Seller shall submit sampling and test procedures (with corresponding example QA documentation) as part of their Final Design Review Presentation (FDR) which comply with the above IEST standard. All procedures must be approved by the buyer prior to use.



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3. Sampling and inspection procedures shall provide for representative surface examination, as well as specific probing of recesses, corners, holes, grooves and other features liable to harbor contamination or pooling of wash fluid.
4. The Contamination Control Plan shall also specify sampling and cleanliness verification for leak test and bakeout fixtures, pumping and backfill equipment, and other deliverable and non-deliverable temporary equipment which may either contact deliverable articles or join to an evacuated volume with them after cleaning.

3.0 Additional Buyer Testing

The Seller shall provide advance notification and plant access for additional Buyer QA sampling and analysis after each Vacuum Component has passed the IEST Cleanliness Testing specified herein and in the Vacuum Equipment Design and Fabrication Specification E0900411-v1.