



LIGO-E1200686-v2

ADVANCED LIGO

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aLIGO HAM-ISI
Common Documentation Acceptance

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Distribution of this document:
LIGO Science Collaboration

This is an internal working note
of the LIGO Project.

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Purpose and general description

This document provides links to the HAM-ISI acceptance documentation package (as defined in M1100282-v1).

It focuses on the “Common documentation”, which includes all the general documents (requirements, drawings, procedures...) by opposition to documents specific to a particular unit (unit specific documentation, typically a testing report).

This document also provides links to the DCC trees used to group the “unit specific” documentation. The unit specific documentation will be grouped/linked in DCC trees by module type (i.e. a DCC page containing all the testing reports related to a specific HAM-ISI).

1 Requirements documentation

The design requirements document must be brought up to date, and pointers to background material, analyses, etc. added to the Requirements document. Pointers to prototyping endeavors should be included here.

- Design Requirements:

[E030180-02 Design Requirements for the In-Vacuum Mechanical Elements of the Advanced LIGO Seismic Isolation System of the HAM Chamber.](#)

- Performances requirements

[T060075-00 HAM Seismic Isolation Requirements](#)

- Actuators requirements

[E0900037-v3, Statement of Work for Advanced LIGO Linear Voice Coil Actuators](#)

2 Design overview and detailed design documentation

The Final Design Document must be brought up to date, and the detailed design made available via a tree structure pointing to the DCC and design vaults. Lower-level software (control laws, basic machine state and reporting) should be documented in this way, pointing to a software version control system.

2.1 Preliminary Design Review

The HAM-ISI PDR page is in the Advanced LIGO wiki:

[HAM_Preliminary_Design_Review](#)

https://awiki.ligo-wa.caltech.edu/aLIGO/HAM_Preliminary_Design_Review

The main documents are:

[G080569 HAM System Overview](#)

[G080570 HAM ISI Preliminary Performance Review](#)

2.2 Final Design Review

2.3 SolidWorks Model

The HAM-ISI top assembly Solidworks Model is checked in the LIGO Caltech PDM vault, in the SEI folder:

[eLIGO: D071400 HAM Isolation Table](#)

[aLIGO: D0900124 aLIGO, SEI, HAM ISI Table](#)

Revision xxxx as of 07/13/2012

The entire HAM-ISI system and models of the tooling necessary for assembly are checked in under this top assembly.

All the sub-assemblies (*.sldasm), parts models (*.sldprt) and their corresponding drawings (*.slddrw) are checked in the vault under this top assembly

2.4 Drawings package

The top assembly, sub-assembly and parts drawings are all posted in the DCC in the pdf formats drawings are

[LIGO-T0900305: Bills of Materials for HAM ISI, Advanced LIGO](#)

2.5 Electronics

The electronic design is linked to the following DCC page:

[T1300173 SEI Electronics Document Hub](#)

3 Materials and Fabrication specifications:

Any special materials, or treatment of materials including preparation for in-vacuum use; this may be integrated into the Design documentation.

4 Parts and spares

Parts and spares inventoried: All elements of aLIGO must be recorded in the ICS or in the DCC using the S-number scheme. As-built modifications for parts or assemblies should be found here.

5 Assembly procedures:

All assembly procedures must be in the DCC and annotated or updated for lessons learned. Storage, if used, should be described here along with procedures to maintain the equipment in good condition (e.g., purge frequency). Transportation procedures and cautions must be noted. Assembly procedures for the larger sub-assemblies like the high power laser, 35W front-end laser, DBB are available from LZH, neoLASE or AEI.

Installation procedures: *All installation procedures must be in the DCC and annotated or updated for lessons learned.*

The assembly documentation is posted in the DCC under the document page:

[E070154-02 Single Stage HAM Assembly Procedure](#)

This page contains:

6 Test documents

Test rationale, plans, and data for each unit must be documented as described in M1000211. That tree structure should be pointed to by the overall tree structure laid out in this Acceptance prescription. The top-level objective is to make clear how the measurements performed, which often will not directly measure a required performance parameter, give confidence that the subsystem will fulfill the requirements.

The SEI testing documentation is posted in the DCC under.

[LIGO-E1000304: aLIGO SEI Testing and Commissioning Documentation](#)

The document describes how the SEI testing and documentation are organized. The DCC page contains the links to the Seismic Group testing and commissioning documentation of the Advanced LIGO SEI installation. In particular, the testing page of sub-assemblies used on the HAM-ISI:

[LIGO-E1100786: aLIGO SEI Instruments Testing Reports and Tracking Lists](#)

And the HAM -ISI testing page:

[LIGO-E1000305: aLIGO HAM-ISI Testing and Commissioning Documentation](#)

This HAM -ISI testing page contains the link to the testing procedures:

- **[LIGO-E1000309: aLIGO HAM-ISI Testing Procedure, Phase I: Assembly Validation](#)**
- **[LIGO-E1100994: aLIGO HAM -ISI Testing Procedure, Phase II : Integration process](#)**
- **[LIGO-E1100995: aLIGO HAM -ISI Testing Procedure, Phase III: Control Commissioning](#)**

And to the testing reports of all the units:

- **[LIGO-E1100996: aLIGO HAM-ISI, Phase I Testing Reports \(Assembly Validation\)](#)**
- **[LIGO-E1100997: aLIGO HAM-ISI, Phase II Testing Reports \(Integration process\)](#)**
- **[LIGO-E1100998: aLIGO HAM-ISI, Phase III Testing Reports \(Control Commissioning\)](#)**

7 User's manual:

A manual appropriate for operators, covering alignment/adjustments and normal operations, must be available (and in the DCC). It must describe what not to do as well, and give clear guidance and cross-pointers to activities which require safety considerations. It must be accessible from standard user screens.

- **E1200762: User interfaces Overview and restart procedure of the Seismic systems**

8 Troubleshooting:

A guide must be developed that helps understand common error messages and events, and provides guidance for recovery and repair procedures as appropriate. Safety issues must be flagged.

- **G1200757 HAM-ISI MEDM screens and troubleshooting for LHO Operators**
- **Safety** documentation
Safety documentation must be in the DCC for all phases of the subsystem development, including any needed for normal use or foreseen maintenance/repair scenarios.

Acronyms

BSC	Beam Splitter (and core optics) Chamber
DCC	Document Control Center
EPICS	Experimental Physics and Industrial Control System: a set of Open Source software tools, libraries and applications developed collaboratively and used worldwide to create distributed soft real-time control systems for scientific instruments
FE	Front End
ISI	Internal Seismic Isolation System
LHO	LIGO Hanford Observatory
LLO	LIGO Livingston Observatory
LVEA	Laser Vacuum Equipment Area
medm	a Motif graphical user interface for designing and implementing control screens, called displays, that consist of a collection of graphical objects that display and/or change the values of EPICS process variables