



**Statement of Work  
 Fabrication of Storage-Only Containers  
 for Advanced LIGO HAM-ISI**

The following documents are incorporated into and made a part this purchase order. Click on the following LIGO Document Control Center (DCC) links to access these documents or go on line to the LIGO Public DCC at <https://dcc.ligo.org/> to access the DCC#.

**1.0 Terms:**

<u>DCC #</u>	<u>Description</u>
<a href="#">C080185-v1</a>	Laser Interferometer Gravitational Wave Observatory (LIGO) Commercial Items or Services Contract General Provisions California Institute of Technology "Institute", LIGO Rev 11/12/08
<a href="#">F0810001-v4</a>	Technical Direction Memorandum.

**2.0 Quality Control:**

<u>DCC #</u>	<u>Description</u>
<a href="#">Q0900001-v4</a>	Advanced LIGO Supplier Quality Requirements, dated 2/10/10, describes following contractor/supplier QA/QC actions for this procurement:
<input type="checkbox"/> 3.1 Pre-Award Inspection	<input checked="" type="checkbox"/> 3.9 Discrepant Material Storage
<input checked="" type="checkbox"/> 3.2 Supplier In Process Quality Control	<input checked="" type="checkbox"/> 3.10 Quality Records
<input checked="" type="checkbox"/> 3.3 In Process Inspection	<input type="checkbox"/> 3.11 Drawing and Specification Change Control
<input checked="" type="checkbox"/> 3.4 Pre-Ship Inspection	<input checked="" type="checkbox"/> 3.12 Welding Certification
<input checked="" type="checkbox"/> 3.5 Receiving Inspection	<input checked="" type="checkbox"/> 3.13 End Item Data Package (including Certifications of Compliance)
<input checked="" type="checkbox"/> 3.6 Discrepant Material	<input type="checkbox"/> 4.1 Design Verification
<input checked="" type="checkbox"/> 3.7 Material Review Action	<input type="checkbox"/> 4.2 Raw Material Procurement
<input checked="" type="checkbox"/> 3.8 Material Review Actions at Contractor	<input checked="" type="checkbox"/> 4.3 Traceability of Materials
	<input checked="" type="checkbox"/> 4.4 Calibration Program
	<input type="checkbox"/> 4.5 Critical Interface
	<input checked="" type="checkbox"/> 4.6 Cleanliness
	<input checked="" type="checkbox"/> 4.7 Packaging
	<input checked="" type="checkbox"/> 4.8 Storage
	<input checked="" type="checkbox"/> 4.9 Transport
	<input type="checkbox"/> 4.10 Customs

For the above list the Supplier shall: 1) Identify the corresponding sections/paragraphs in their existing QA/QC system 2) meet or exceed the design requirements contained in the attached engineering documents for each area called out.

### 3.0 End Item Data Package:

At the time of delivery of the parts, the Supplier shall also provide the following data, as a minimum:

- Any as-built modifications (with approval of the LIGO Contracting Officer) as mark-ups to the drawings
- Certification of the material used
- Dimensional & QC inspection reports—this shall include a report showing that parts have been inspected and fall within specified tolerances.
- Certificate or statement of compliance with all contract and drawing process restrictions.

### 4.0 Included Documents:

Drawings of the overall assembly, HAM ISI Storage Only Container, D1000917-v1 as well as drawings for all parts, both “off-the-shelf” and fabricated parts, are included in the drawing package. In addition to the drawings, the contractor will be provided with CAD solid models of the parts (SolidWorks Professional 2009, SP5.1)

<u>DCC #</u>	<u>Description</u>
<a href="#">D1000709-v1</a>	Drawing package for HAM ISI Storage Only Container
<a href="#">E0900364-v2</a>	Metal components intended for use in the AdvLIGO Vacuum System

### 5.0 Scope:

This SOW is for eight (8) assembled storage containers using parts fabricated from the drawings in this package. (Please see D1000709-v1 in section 4.0.) These storage containers will provide long term storage for the HAM internal seismic isolation system. This system is a clean system built for use in ultra high vacuum (UHV) and the containers must ensure that it stays clean and unaffected by the surrounding environment.

### 6.0 Quantity Required:

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D1000917-v1 (final assembly of all part drawings in D1000709-v1)	Storage Containers	quantity: 8
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### 7.0 Delivery Requirements:

The deliveries are FOB at these destinations, i.e. the contractor has responsibility for shipping title and control of goods until they are delivered and the transportation has been completed. The contractor selects the carrier and is responsible for the risk of transportation and for filing claims for loss or damage.

Shipping Locations - These items will be shipped to:

LIGO Livingston Observatory (LLO)  
Attn: Tom Gentry and Celine Ramet  
19100 LIGO Lane  
Livingston, LA 70754

and

LIGO Hanford Observatory (LHO)  
Attn: Hugh Radkins and Jodi Fauver  
127124 North Route 10  
Richland, WA 99354

#### Shipping Containers:

The contractor is responsible for providing shipping containers and transportation which protects these parts from damage from the transportation environment (weather, handling, accidents, etc.). Mating edges of parts should be especially protected from damage during shipping.

## 8.0 Manufacturing:

### 8.1 Precedence

The Statement of Work (SOW) sections below regarding processing or fabrication of the parts are meant to convey the scope and nature of the requested work. If there is a conflict between the SOW and the drawing, the drawing has precedence.

The parts are to be produced using the drawings and CAD models. CAD models will be provided to the contractor upon award. If there are discrepancies between the drawings and the CAD model, the model takes precedence.

### 8.2 Restrictions

- Machine all surfaces of machined parts to remove oxides and mill finish. Abrasive removal techniques are not acceptable.
- All machining fluids must be fully synthetic, water soluble (not simply water miscible) and free of sulfur, chlorine, and silicone.
- Thoroughly clean part to remove all oil, grease, dirt, and chips with soap and water. Follow with solvent (acetone) wipe. Pay close attention to holes.
- Note: Interior of storage container will be cleaned and will store a UHV-cleaned HAM ISI. The exterior of the container will be stored in air.
- No epoxy or other non-approved material may be used within these shipping containers.

### 8.3 Materials

Materials are noted on the drawings. Manufacturer part numbers are listed on drawings where “off-the-shelf” parts can be used. Equivalent parts from other manufacturers may be substituted with LIGO approval but no material changes may be made.

### 8.4 Machining

For all machined parts and faces internal to the storage container:

All parts are to be machined. No grinding or lapping with abrasive wheels, cloth or stones is permitted. No sanding of any type. No parts shall be cast or molded. Water soluble (not just water miscible) cutting fluid (lubrication) is to be used for all machining operations. The use of cutting fluids or lubricants, which contain sulfur, chlorine or silicone compounds is prohibited.

## **8.5 Welding**

Subassemblies 1021, 1039, 1044 require welds as detailed in the drawings.

## **8.6 Finishing**

Any required surface finish is defined in the drawings.

Localized scratches, digs and blemishes should be minimized internal to the shipping containers to enable cleaning.

## **8.7 Painting**

Painting noted on drawings is to be done with:

Smooth white, Sherwin Williams Polane T-Plus Polyurethane Enamel

Prime with: Sherwin Williams Industrial Wash Primer P60G2

## **8.8 Marking**

All shipping containers should be marked with a final part number (D1000917) and a serial number.

Marking is to be accomplished by mechanically scribing, stamping or engraving (no dyes or inks).

If not indicated in the drawing, mechanically scribe, stamp or engrave as follows:

<drawing number> - <revision code>

<unique 3 digit serial number starting at 001 for the first part and incrementing thereafter>

As an example:

D1000917-v1

001