



PROCESS SYSTEMS INTERNATIONAL, INC.

FEDERAL EXPRESS

TO: CALTECH (LIGO)
391 S. HOLLISTON AVE.
LIGO PROJECT MS 51-33
PASADENA, CA 91125

DATE: 01/10/96
TRANS. NO.: CT015
PROJECT NO.: V59049

ATTN: LINDA TURNER

SENT BY: RICH BAGLEY

THE FOLLOWING [ ] DRAWINGS
[ ] DOCUMENTS
[ X ] SPECIFICATIONS

[ X ] ARE ATTACHED
[ ] SENT SEPARATELY

Table with 5 columns: Document No., Rev., Title, Dwg. Size, Sheets. Row 1: V049-2-010, 0, PORTABLE SOFT-WALLED CLEANROOM, A, 7.

CC:

ISSUED FOR: [ X ] APPROVAL [ ] PRELIMINARY
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[ ] INFORMATION [ ] DISTRIBUTION

ENCL: [ 5 ] PRINTS [ ] REPRODUCIBLES

PAGE 1 OF 1

**Title: SPECIFICATION FOR PORTABLE SOFT-WALLED CLEANROOMS**

**SPECIFICATION FOR  
PORTABLE SOFT-WALLED CLEANROOMS  
FOR  
LIGO VACUUM EQUIPMENT**

Hanford, Washington  
and  
Livingston, Louisiana

**PREPARED BY:** Stan Ch...

**QUALITY ASSURANCE:** Alan & Beadbrook

**TECHNICAL DIRECTOR:** D. W. Miller

**PROJECT MANAGER:** Burt Bayly

Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

			JAN 10 1996
0	SJC - 1/9/96	D. W. Miller	RELEASE PER DEO 0039
REV LTR.	BY-DATE	APPD. DATE	DESCRIPTION OF CHANGE
<b>PROCESS SYSTEMS INTERNATIONAL, INC.</b>			<b>SPECIFICATION</b>
INITIAL APPROVALS	PREPARED SJC	DATE 1-9-96	APPROVED BJS
		DATE 1/9/96	DATE 1/9/96
			Number <b>V049-2-010</b> LIGO - E960002 - 00 - V
			Rev. 0

**SPECIFICATION TABLE OF CONTENTS**

- 1.0 Scope
- 2.0 Schedule
- 3.0 Equipment Requirements
- 4.0 Design Requirements
- 5.0 Required Documentation
- 6.0 Shop Testing
- 7.0 Inspection
- 8.0 Warranty

- Attachment A LIGO QA Requirements Summary
- Attachment B General Equipment Requirements PSI Specification V049-2-033, Rev. 2

Number  
Rev.

**SPECIFICATION**

Number	A	V049-2-010	Rev.	0
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**1.0 SCOPE**

This specification covers the minimum requirements for the design, materials, fabrication, assembly, inspection, testing, preparation for shipping, and shipment of the portable soft-walled cleanrooms for the LIGO vacuum system.

All attachments are part of this specification.

The specified equipment is intended for use as part of the Vacuum Equipment supplied for the Laser Interferometer Gravitational-Wave Observatory (LIGO). LIGO, which is operated by Caltech and MIT under an NSF contract, includes two installations at widely separated sites: near Hanford, WA and Livingston, LA. Each installation contains laser interferometers in an L shape with 4 km arms, a vacuum system for the sensitive interferometer components and optical beams, and other support facilities.

Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

**2.0 SCHEDULE**

2.1 Equipment delivery shall be as follows:

Cleanroom A (10'L x 16'W x 12'H) (HAM)  
(All dimensions are internal)

	<u>Quantity</u>	<u>Date</u>
Washington Site:	1	9/1/97
Louisiana Site:	1	3/1/98
Total Required	2	

**SPECIFICATION**

Number

**A**

V049-2-010

Rev.

0

Page 3 of 7

Number

Rev.

Cleanroom B (16'L x 16'W x 16'H) (BSC)

(All dimensions are internal)

	<u>Quantity</u>	<u>Date</u>
PSI (Westborough, MA)	1	4/1/96
PSI (Westborough, MA)	1*	4/1/96
PSI (Westborough, MA)	1	8/1/96
PSI (Westborough, MA)	1*	8/1/96
Washington Site:	3*	9/1/97
Washington Site:	1	9/1/97
Louisiana Site:	1	3/1/98
Louisiana Site:	1*	3/1/98
Total Required	10	

\* With external attached gowning rooms

Gowning Rooms (4'L x 4'W x 8'H)

(All dimensions are internal)

	<u>Quantity</u>	<u>Date</u>
Washington Site	1	9/1/97
Louisiana Site	1	3/1/98
Total Required	2	

2.2 Acceptances at the sites (the start of Vendor's warranty periods) are expected to occur on a staggered basis, with final acceptance expected to occur no later than 9 months after shipment. Portions of the equipment may be accepted earlier.

**SPECIFICATION**

Number

**A**

V049-2-010

Rev.

0

Page 4 of 7

Number

Rev.

### 3.0 EQUIPMENT REQUIREMENTS

The portable soft-walled cleanrooms are used to isolate sections of the interferometer vacuum envelope from the Fed. Std. 209 Class 50,000 building environment when opening chamber ports. The cleanrooms shall provide a Class 100 environment. Two different size cleanrooms are required, six with an externally attached garment/changing area. In addition, two stand-alone gowning rooms are required.

### 4.0 DESIGN REQUIREMENTS

#### 4.1 Mechanical Requirements

- 4.1.1 Filter modules shall be ducted to one or two blower units with prefilter capability. The blower units should be mounted to the ceiling frame design, but also have the capability to be remotely mounted up to 10 feet away.
- 4.1.2 Cleanroom ceiling structures (containing filter modules) shall be designed so that they can be lifted, moved and lowered onto the frame structure by an overhead crane.
- 4.1.3 Cleanrooms shall have casters (compatible with a cleanroom environment) to allow location adjustment of the cleanrooms after they have been lowered into place.
- 4.1.4 Cleanrooms shall be designed to mate and seal with each other to form larger cleanroom working spaces (velcro type closures).
- 4.1.5 Walls shall be clear vinyl curtain (40 mil).
- 4.1.6 Sealed fluorescent lighting shall be provided to give adequate illumination at work surface height.
- 4.1.7 Cleanroom shall be equipped with a means to seal around various diameter tubes entering the cleanroom. Approximate tube diameter may be from 3 to 5 ft. in as many as all four sides (only two sides for HAM cleanrooms) of the cleanrooms. When not in use, these holes shall be sealed with a velcro-attached piece. The bottom of these diameters shall have a velcro-sealed slit directly under it extending to the bottom of the wall to allow lowering the cleanroom into place over the tube.

Number

Rev.

## SPECIFICATION

Number

A

V049-2-010

Rev.

0

Page 5 of 7

4.1.8 Cleanrooms B shall have an opening in the ceiling to accommodate a 10' diameter chamber dome. The dome will be lifted by a crane approximately its entire length through the cleanroom ceiling. The cleanroom design shall provide contamination protection (e.g., bellows-sealed tube) to allow the dome to be raised to any position. A means of attaching the crane hook to the top of the dome shall be provided (e.g., velcro-sealed arm hole). The dome hole, when not in use, shall be closed by some form of velcro seal.

4.1.9 Cleanrooms B shall have some form of adjustable legs (2) that allow a reduction of height of approx. 3' on one side of the cleanroom.

4.1.10 Components shall be identical to the maximum possible extent to minimize the number of required spare parts.

4.1.11 The following shall also be supplied: (priced separately)

Two airborne particle counters ( to 0.3 micron)

28 remote magnehelic gauges for measuring internal static pressure buildup and filter pressure drop

Eight Gowning Racks

Two Gowning Benches

4.2 Electrical Requirements

4.2.1 Controls Requirements

Separate controls shall be provided for the HEPA filtering system and for the lighting.

4.2.2 Power Requirements

A single, centrally located electrical service box shall be provided.

## 5.0 REQUIRED DOCUMENTATION

In addition to the documentation listed in Attachment A, the following documentation shall be provided prior to shipment (schedule later):

- System assembly and operating manual.
- The vendor is requested to provide an itemized list of all pertinent peripherals (apparel, etc.) for use in class 100 cleanroom.

## SPECIFICATION

Number

**A**

V049-2-010

Rev.

Page 6 of 7

Number

Rev.

**Title**

**SPECIFICATION FOR PORTABLE SOFT-WALLED CLEANROOMS**

**6.0 SHOP TESTING**

The Vendor shall perform his standard testing.

**7.0 INSPECTION**

The inspections called for in Attachment A shall be performed by the Vendor.

**8.0 WARRANTY**

Refer to Specification V049-2-034, Purchased Equipment Commercial Requirements (attached to the Requests for Quotation), for warranty requirements.

**9.0 Q.A. REQUIREMENTS**

Q.A. requirements shall be provided as specified on Attachment A.

Number

Rev.

**SPECIFICATION**

Number

**A**

V049-2-010

Rev.

0

Page 7 of 7



ATTACHMENT "A"  
LIGO QUALITY ASSURANCE REQUIREMENTS SUMMARY

LIGO VACUUM EQUIPMENT	VENDOR: V59049.					JOB NO.: V59049
EQUIPMENT: PORTABLE CLEAN ROOMS	VENDOR ENG. OFFICE:					DWG. NO.:
PSI P.O. NO:	VENDOR FACTORY:					SPECNO: V049-2-010
TESTING INSPECTION AND DOCUMENTATION RECORD	Submittal After P.O.	Witnessed by PSI	Approval by PSI	Copies Req'd for PSI Files	Record in Mfr's File	Remarks:  Inspector:  Date:
MILESTONE SCHEDULE			X	2	X	
VENDOR Q.A. PLAN			X	2	X	
PREP FOR SHIPMENT PROCEDURE			X	2	X	
ASSEMBLY DRAWINGS			X	2	X	
DESIGN REVIEW		X			X	
OPERATION & MAINTENANCE MANUALS				5	X	
SHOP TEST PLAN (Vendor Std.)			X	2	X	
SHOP TEST (WITH REPORT)		X		2	X	
SHOP DIMENSIONAL INSPECTION		X		2	X	

**DATE:**  
**RFQ No. 96-010**  
**DUE DATE:**

**TO:**

**SUBJECT: REQUEST FOR QUOTATION - THIS IS NOT AN ORDER - URGENT**

**DESCRIPTION: Portable Softwall Cleanrooms**

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1. The RFQ No. must be on all quotations and correspondence.
2. This inquiry implies no obligation on the part of the Buyer.
3. We welcome any suggestions regarding substitute products, materials, or designs that will reduce price and/or technical risk.
4. Any deviations must be identified in bidder's quotation.
5. Quotations must state place of manufacture, submittal and delivery dates.
6. Attachments:
  - a. Instruction to Bidders
  - b. Pricing Sheet(s)
  - c. Certificate of Compliance
  - d. Specification No. V049-2-010
  - e. Specification No. V049-2-033, Rev. 2

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Ronald B. Bento  
Materials Manager

**DATE:**  
**RFQ No.**

**Instruction To Bidders**

1. Quotations are due by the close of business on 1/19/96.

Send quotations in triplicate to:

Process Systems International, Inc.  
ATTN: Mr. R. Bento  
20 Walkup Drive  
Westborough, MA 01581  
(508) 898-0205, Fax: (508) 898-0351

2. Please submit all questions, both technical and commercial, in writing to:

Process Systems International, Inc.  
ATTN:  
20 Walkup Drive  
Westborough, MA 01581  
(508) 898-0205; Fax (508) 898-0351

3. Quotations must be for firm-fixed pricing for the specified period of performance and valid for acceptance by Buyer through 60 days.

4. Payment Terms:

90% upon delivery of the item to the specified destination.  
10% upon final acceptance of the item by Buyer's Customer.

Alternate payment terms specifying the price reduction will be considered. Payment terms will be considered in the price evaluation.

5. Shipping Terms are FOB destination to specified location. Bidder's pricing is to include freight and insurance.

6. Sales tax is to be excluded. Buyer will provide a resale exemption number.
7. Bidder to include in its quotation applicable field service rates valid through final acceptance.
8. Bidder to specify and price recommended spares for each site for start-up and for the first year of operation separately.
9. Items will be delivered as specified in the attached Equipment Specification. The Bidder shall specify the required release date to meet that schedule. Buyer will not be responsible for cost incurred by Bidder on items not released in writing. The Bidder shall submit a completed copy of the attached pricing sheet. Bidder shall also confirm drawing(s) and specification(s) submittal date.
10. All quotations must be submitted in strict compliance with this request for quotation in order to be considered for award. Quotations containing bidder's standard terms and conditions will be considered nonresponsive and subject to rejection at Buyer's option.
11. Quotations will be evaluated based on technical compliance with the specification, pricing, delivery, schedule of drawings, specifications and equipment, acceptance of the commercial terms and conditions, past experience for similar goods, and overall responsiveness and conformance to this request for quotation including proposed pricing reductions. Buyer reserves the right to purchase from other than the low price bidder.
12. All quotations must include a signed Certificate of Compliance, RFQ/CC-95.

**DATE:**  
**RFQ No. 96-010**

**PRICING SHEET**  
(To Be Completed By Bidder)

**DESCRIPTION:** The base price must be in full compliance with the request for quotation. Option(s) are to be priced as requested by Buyer. Bidder is requested to submit additional options that offer price reductions and specify where the deviation is specifically addressed.

**BASE:** Attachments may be used to supplement and/or support the required information.

<b>Item No.</b>	<b>Description</b>	<b>Qty.</b>	<b>Destination</b>	<b>Release Date</b>	<b>Delivery Date</b>	<b>Unit Price</b>	<b>Total Price</b>
1.	Cleanroom A	2	As noted in spec.				
2.	Cleanroom B with integral gowning room	6	As noted in spec.				
3.	Cleanroom B	4	As noted in spec.				
4.	Gowning room	2	As noted in spec.				

**Buyer Requested Options:**

1. The vendor shall supply a quote for (2) airborne particle counters (to 0.3 microns).
2. The vendor shall supply a quote for (28) magnehelic gauges for measuring static pressure buildup and filter pressure drop.
3. The vendor shall supply a quote for (8) gowning racks and (2) gowning benches.

**Bidder Offered Options:**

**Spare Parts: (Attach List by Grouping)**

**Supply Bond:**

**CERTIFICATE OF COMPLIANCE**

**PSI INQUIRY NO.** \_\_\_\_\_  
**BIDDER NAME:** \_\_\_\_\_  
**BIDDER'S PROPOSAL NO.** \_\_\_\_\_

**INSTRUCTIONS:**                    **This form must be completed by each bidder and must accompany the quotation. Any quotation not accompanied by a properly executed copy of this form will be considered nonresponsive.**

**CHECK ONE BOX ONLY:**

**We certify that this proposal complies with the Request for Quotation, and all attachments thereto, as well as all referenced industry codes and standards.**

**We certify that this quotation complies with the Request for Quotation, and all attachments thereto, as well as all referenced industry codes and standards, except for the comments/exceptions listed on the following page(s) \_\_\_\_\_.**

**\***

**BY:** \_\_\_\_\_  
          **(Signature of Company Officer)**

\_\_\_\_\_  
**(Name Typed or Printed)**

**TITLE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

**\*NOTE:**    **Each Request for Quotation document should be addressed separately. It will be assumed that Bidder is in complete compliance with any document not so addressed.**

**RFQ/CC-95**