



IDENTIFICATION			
C-VAC-1			
LIGO-8950027-03-13			
REFERENCE NO.		SHT 1 OF 4	
930212		3	
OFFICE NOEC		REVISION	
MADE BY	CHKD BY	MADE BY	CHKD BY
WJC	SWP	SWP	MLT
DATE	DATE	DATE	DATE
3/7/94	3/7/94	5/11/95	5/12/95

TITLE  
VACUUM STIFFENER FABRICATION SPECIFICATION

PRODUCT LIGO BEAM TUBE MODULES  
CALIFORNIA INSTITUTE OF TECHNOLOGY

0.1 SCOPE

This specification gives the technical requirements for the supply, fabrication, inspection, cleaning, packaging and shipping of shop fabricated beam tube vacuum stiffeners. The stiffeners shall be attached to a nominal 49 inch O.D. vacuum tube by the Purchaser.

1.0 APPLICABLE DOCUMENTS

- 1.1 ASME SA-240, "Specification for Heat-Resisting and Chromium Nickel Stainless Steel Plate, Sheet, and Strip".
- 1.2 ASME Boiler and Pressure Vessel Code, Section II, "Materials", 1992 Edition with the 1993 Addenda.
- 1.3 Sketch 1 -- "Beam Tube Vacuum Stiffener".

2.0 MATERIALS

- 2.1 All material for the vacuum stiffeners shall conform to ASME Specification SA-240 Type 304L. The stiffeners shall be fabricated from 1<sup>3</sup>/<sub>4</sub>" x 3<sup>3</sup>/<sub>16</sub>" bars.
- 2.2 All material for the stiffeners shall be supplied by the vendor.

3.0 SUBMITTALS -- INFORMATION REQUIRED WITH QUOTATION

- 3.1 The vendor shall state in his quotation that the quotation complies with this specification with any exceptions or alternates noted and explained. The Purchaser will assume complete conformance unless exceptions are noted.
- 3.2 A description of the vendor's manufacturing facility and the equipment required to perform the work covered by this specification.
- 3.3 A description of the procedures for making and documenting measurements of stiffener dimensions with the tolerances specified.

APPROVED

*J.D.* L160 11/10/95

*M. Jellalian* 11/19/95

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**4.0 INFORMATION REQUIRED AFTER RECEIPT OF ORDER AND 4 WEEKS PRIOR TO FABRICATION FOR REVIEW AND APPROVAL**

- 4.1 The vendor shall supply shop drawings to the Purchaser for review and approval prior to the start of fabrication.
- 4.2 Packaging and shipping procedures.

**5.0 FABRICATION**

- 5.1 A stiffener shall be fabricated by rolling a continuous  $1\frac{3}{4}$ " x  $\frac{3}{16}$ " bar of A240 Type 304L stainless steel about its strong axis to the radius and tolerances shown on Sketch 1 of this Specification.
- 5.2 Welded splices of bar material is not permitted.
- 5.3 The ends of a fabricated stiffener shall overlap to the dimension and tolerances shown on Sketch 1 of this Specification. The ends of the fabricated stiffener may be cut in order to obtain the required overlap.

**6.0 WELDING**

- 6.1 There shall be no welding of any kind on the stiffeners.

**7.0 CLEANLINESS AND CLEANING**

- 7.1 All contact made with the stainless steel material during fabrication shall be such as to prevent carbon steel contamination.
- 7.2 After fabrication and prior to packaging, the stiffeners shall be cleaned with a solvent wipe to remove all visible traces of oil and grease. A detergent and water cleaning mix shall not be used. The vendor shall submit a cleaning procedure stating the solvents used to the Purchaser for review and approval.



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## 8.0 PACKAGING FOR SHIPPING

- 8.1 After cleaning, the stiffeners shall be placed on pallets for shipping. The stiffeners shall be sealed from contamination by wrapping securely in plastic. The vendor shall submit a packaging and shipping procedure to the Purchaser for review and approval.
- 8.2 The stiffeners shall be shipped as specified in the Purchase Order.

## 9.0 INSPECTION

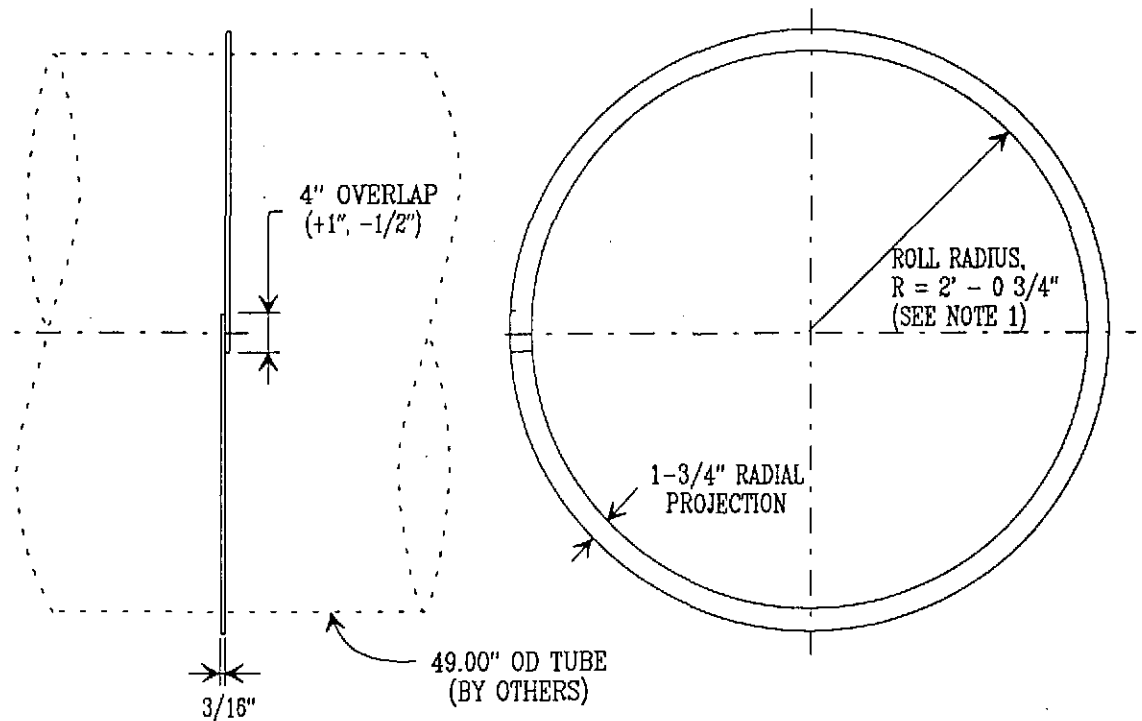
- 9.1 The Purchaser shall have the right of inspecting the vendor's facility and witnessing the fabrication of the stiffeners.
- 9.2 Written notification shall be provided to the Purchaser no less than 5 working days prior to beginning fabrication.

## 10.0 NON-ESCORT PRIVILEGES AND INSPECTION RIGHT

The National Science Foundation (NSF) and Caltech, through their authorized representatives, have the right to inspect and evaluate the work performed or being performed under this specification, including the premises where the work is being performed at all reasonable times. The NSF and Caltech shall have non-escort privileges to all areas of the facilities where the work is being performed under this specification. This shall include access to fabrication, assembly, cleaning, and test areas for the purpose of monitoring activities. The vendor shall furnish all reasonable facilities and assistance for the safe and convenient inspection of the work if requested.



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STIFFENER MATERIAL: SA240 TYPE 304L STAINLESS STEEL  
ROLL RADIUS,  $R = 2' - 0 \frac{3}{4}" (+1/4", -0")$

**NOTES:**

1. STIFFENERS TO BE A SINGLE CONTINUOUS PIECE FORMED BY ROLLING  $3/16"$  x  $1-3/4"$  FLATS; ONLY THE ENDS OF THE STIFFENER TO BE CUT EDGES.
2. BOTH ENDS OF THE STIFFENERS SHALL BE FORMED TO THE SPECIFIED RADIUS. STIFFENERS THAT ARE NOT FORMED AT THE ENDS WILL BE REJECTED.

SKETCH 1  
BEAM TUBE VACUUM STIFFENERS