	IDENTIFICATION			
	C-SUPSTF-1			
	LIGO-E950029-04-B			
TITLE SUPPORT RING FABRICATION SPECIFICATION	REFERENCE NO. 930212		SHT 1 OF 4	
	OFFICE NOE-C		REVISION 4	
PRODUCT LIGO BEAM TUBE MODULES CALIFORNIA INSTITUTE OF TECHNOLOGY	MADE BY WJC	CHKD BY MRS	MADE BY SWP	CHKD BY MLT
	DATE 3/14/94	DATE 4/1/94	DATE 10/17/95	DATE 10/20/95

0.1 SCOPE

This specification gives the technical requirements for the supply, fabrication, inspection, cleaning, packaging and shipping of shop fabricated support rings. The support rings 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 ASME Unfired Pressure Vessel Code, Section VIII, Division 1, 1992 Edition with the 1993 Addenda as applicable (Code stamping is not required).

1.4 *LIGO Beam Tube Drawing No. 16, "Support Ring".*

2.0 MATERIALS

2.1 All material for the support rings shall conform to ASME Specification SA-240 Type 304L. Each support ring shall be fabricated in 2 pieces.

2.2 All material for the support rings shall be supplied by the vendor.

3.0 SUBMITTALS -- INFORMATION REQUIRED WITH QUOTATION & PURCHASE ORDER

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 support ring *dimensions with the tolerances specified.*

APPROVED
LIGO 11/10/95
CDI 11/10/95 DATE

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. Refer to Section 6.2 of this Specification for additional information.

4.2 Packaging and shipping procedures.

5.0 DOCUMENTATION REQUIRED AFTER COMPLETION OF FABRICATION

5.1 The certified test reports for the material shall be mailed within 48 hours after shipment of the support rings.

5.2 Record of the as-built measurements of the outside and inside diameters for each support ring.

6.0 DRAWINGS

6.1 The Purchaser will furnish design drawings to the vendor. These drawings will show the following:

- The principal views of the structures.
- The controlling dimensions.
- The member sizes.
- Special details.

6.2 The vendor shall supply shop drawings to the Purchaser for review and approval prior to the start of fabrication. These shop drawings shall include fabrication details, bills of material, weight lists, field bolt lists, and product data information as required. Review by the Purchaser is to assure the correct interpretation of the work and compatibility with the erection plan, and does not relieve the vendor of the responsibility for the accuracy of the detailing. The vendor shall assume full responsibility for the correctness of details and dimensions. The cost of rectifying fabricating or detailing errors in the field will be charged to the vendor. The vendor shall show the weights of all shipping pieces either on the erection drawings or bill of material. Changes in details, splices in members, or substitution of member sizes shall not be made without the authorization of the Purchaser.

7.0 FABRICATION

7.1 Each half of a support ring shall be fabricated from SA-240 Type 304L stainless steel to the radius and tolerances shown on LIGO Beam Tube Drawing No. 16, "Support Ring". Sufficient stock shall be provided to permit machining the inside and outside diameters.

7.2 In each support ring, the vendor shall stack drill and ream a total of four (4) Type "A" holes to as shown on LIGO Beam Tube Drawing No. 16, "Support Ring".

7.3 In each support ring, the vendor shall stack drill and taper ream a total of two (2) Type "B" holes for a No. 7 taper dowel as shown on LIGO Beam Tube Drawing No. 16, "Support Ring".

7.4 The vendor shall securely bolt together each half of the support ring by installing $^1/_2$" socket head shoulder bolts in each of the four Type "A" holes and torquing to 50 foot-pounds.

7.5 The vendor shall install $^3/_8$" - 16 UNC bolts in each of the two Type "B" holes and torque to 40 foot-pounds.

7.6 The vendor shall then machine the outside diameter of the support ring to the diamater specified on LIGO Beam Tube Drawing No. 16, "Support Ring".

Note that the inside diameters of the support rings shall not be machined by the vendor. The vendor shall supply sufficient stock on the inside diameter to permit machine by others at a later time. The inside diameters will be machined later to match the "as fabricated" sizes of the beam tube at the support locations. Immediately after machining the inside diameters the stiffener rings shall be steel stamped with an "ID Size Designation".

7.7 After machining the outside diameter of the support ring, the vendor shall not, at any time, unbolt the two halves of the support ring.

7.8 The vendor shall scribe the cardinal centerlines of the support ring on each assembly.

7.9 If the support ring is a fixed support ring (16-B), drill the two (2) $^7/_8$" diameter holes as shown on LIGO Beam Tube Drawing No. 16, "Support Ring". Do not drill these holes in guided support rings .

7.10 If the support ring is guided support ring (16-C), drill the eight (8) $^7/_8$" diameter holes as shown on LIGO Beam Tube Drawing No. 16, "Support Ring". Do not drill these holes in fixed support rings.

7.11 Prepare the support ring for cleaning and shipment.

8.0 WELDING

8.1 There shall be no welding of any kind on the support rings.

9.0 CLEANLINESS AND CLEANING

9.1 After fabrication and prior to packaging, the support rings shall be cleaned with a solvent wipe or steam to remove all visible traces of oil and grease.

10.0 PACKAGING FOR SHIPPING

10.1 After cleaning, the support rings shall be placed on pallets for shipping. The support rings 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.

10.2 The support rings shall be shipped to the destination as specified in the Purchase Order.

11.0 INSPECTION

11.1 The Purchaser shall have the right of inspecting the vendor's facility and witnessing the fabrication of the support rings.

11.2 Written notification shall be provided to the Purchaser no less than 5 working days prior to beginning fabrication.

12.0 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.