



TITLE MACRO EXAMINATION OF SPIRAL WELDS FOR FULL FUSION		IDENTIFICATION MACRO EXAM LIGO-8970186-02-B			
		REFERENCE NO. 953570		SHT 1 OF 2	
PRODUCT LIGO BEAM TUBE MODULES CALIFORNIA INSTITUTE OF TECHNOLOGY		OFFICE LIGO		REVISION 2	
		MADE BY RAJ	CHKD BY MLT	MADE BY RAJ	CHKD BY MLT
		DATE 3/6/96	DATE 3/7/96	DATE 2/14/97	DATE 2/17/97

1.0 PURPOSE:

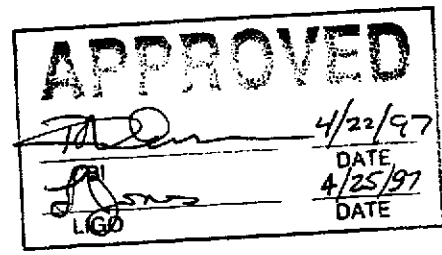
1.1 This procedure describes the activities required to evaluate spiral welded tube sections for full penetration and fusion. An examination shall be made of the most recently severed cut edge of each tube. The examination shall be performed as soon after tube manufacture as practical and prior to stiffener attachment.

2.0 REFERENCES:

- 2.1 LIGO-C951080-00-B, DRD 03 (d)
- 2.2 Welding Procedure WPS Spiral

3.0 LIST OF EQUIPMENT:

- 3.1 Grinding and polishing equipment.
- 3.2 Aqua Regia etchant.
- 3.3 Heater. The heater may be an open flame heater such as a propane heater or an electrical heater such as a hair dryer.
- 3.4 Cotton swabs.
- 3.5 Tongs
- 3.6 Abrasive paper or pastes





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4.0 PROCEDURE:

- 4.1 Prepare Aqua Regia etchant. Proportions are 1 part concentrated Nitric acid and 2 parts concentrated Hydrochloric acid.
- 4.2 Grind and polish section from the end of each tube to a 100 grit or finer finish. Protect any adjacent tube material from contamination. The end of the tube may be examined in place or a section may be removed and polished at another location. Examined areas of tube sections shall be removed prior to performing the circumferential weld.
- 4.3 Heat the polished end to warm the surface to a minimum of 200F.
- 4.4 Use tongs and a clean cotton swab to apply Aqua Regia etchant to the polished surface until the surface is etched sufficiently for examination.
- 4.5 Examine the etched surface visually to confirm that the weld passes from each side of the joint provide complete penetration (See Drawing 4 - Sheet 1). Lighting and magnification may be used to enhance viewing of the etched surface but are not required.

5.0 Documentation:

- 5.1 Record results of the macro examination on the Record Drawing for the tube assembly examined.
- 5.2 If the Macro Examination reveals inadequate penetration and fusion, place a "Hold Tag" on the assembly. In addition, the Project Welding & QA/QC Manager shall enter the nonconforming assembly on the Nonconformance Control list in accordance with QAP 13.1 for control and resolution.
- 5.3 The Project Welding & QA/QC Manager shall resolve any nonconformities with LIGO.