



TITLE	VISUAL INSPECTION REQUIREMENTS FOR BEAM TUBE AND COMPONENTS	IDENTIFICATION VI8X LIGO-8950059-01-B			
		REFERENCE NO. 930212		SHT	1 OF 3
PRODUCT	LIGO BEAM TUBE MODULES QUALIFICATION TEST CALIFORNIA INSTITUTE OF TECHNOLOGY	OFFICE RDE		REVISION 1	
		MADE BY RWK	CHKD BY HKH	MADE BY WLR	CHKD BY MRS
		DATE 9/1/89	DATE 9/3/93	DATE 1/5/95	DATE 2/14/95

1.0 SCOPE:

1.1 This procedure contains the Caltech visual inspection acceptance criteria requirements for completed welds and components. This procedure is to be used with the applicable standard or contract "X" general Visual Inspection Technique Procedure VI5.

2.0 REFERENCE:

- 2.1 LIGO Specification 1100004, "Beam Tube Module Specification", dated May 11, 1993.
- 2.2 1992 ASME Section VIII Code or with any of the following Addenda: '92.
- 2.3 1993 ASME B31.3 Edition with no Addenda.

3.0 ACCEPTANCE CRITERIA:

- 3.1 As-welded surfaces are permitted, provided the surface of welds are sufficiently free from coarse ripples, grooves, overlaps, and abrupt ridges and valleys.
- 3.2 The surface condition of the finished weld shall be suitable for proper interpretation of required nondestructive examinations when these examinations are required by contract drawings.
- 3.3 Undercut shall not exceed 1/32 inch (0.8mm) or T/4 (where T is the nominal wall thickness of the thinner of the components joined), whichever is less.
- 3.4 The surface of butt welded joints may be flush with the base material or may have uniform crowns. The height of reinforcement for each weld surface shall not exceed the following:

Nominal Wall Thickness (T), in. (mm)	Maximum Reinforcement, in. (mm) All LIGO Project Joints
0.100 to 0.130 (2.5 to 3.3), incl.	3/32 (2.4)

3.5 Concavity on the root side of a single side welded circumferential butt weld is permitted when the resulting thickness of the weld is at least equal to the thickness of the thinner member of the two (2) sections being joined and the contour of the concavity is smooth.

3.6 Offset of final butt welded joints shall not be greater than the following:

Nominal Wall Section Thickness, in. (mm)	Maximum Offset, in. (mm) All Ligo Project Joints
0.100 to 0.130 (2.5 to 3.3), include.	1/4 t

Note: t is the nominal thickness of the thinner section of the joint.

APPROVED

S. Jones 11/10/95
2160

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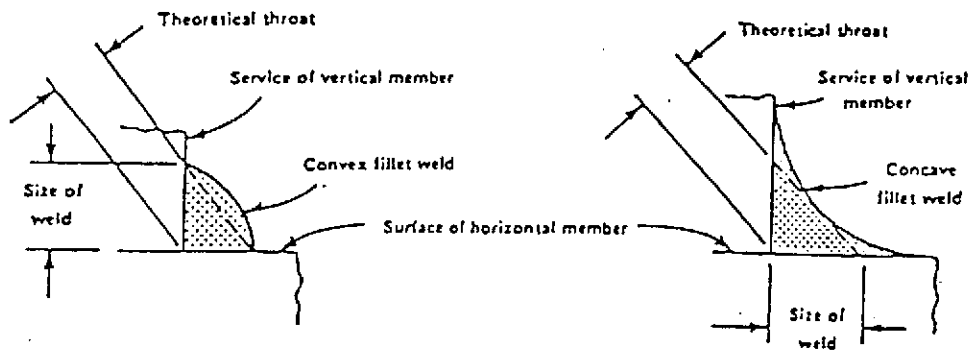
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3.7 Any offset within the allowable tolerance shall be faired at a three to one taper over the width of the finished weld, or if necessary, by adding additional weld metal beyond what would otherwise be the edge of the weld.

3.8 Fillet Welds;

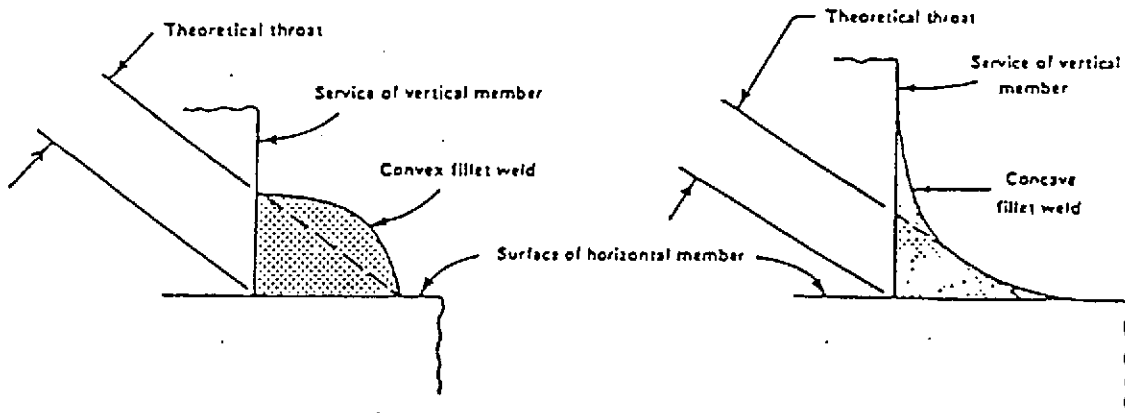
3.8.1 Fillet welds may vary from convex to concave.

3.8.2 The size of fillet welds shall be determined as follows:



NOTE: The size of an equal leg fillet weld is the leg length of the largest inscribed right isosceles triangle.
Theoretical throat = 0.7 X size of weld.

(a) Equal Leg Fillet Weld



NOTE: The size of an unequal leg fillet weld is the shorter leg length of the largest right triangle which can be inscribed within the fillet weld cross section.

(b) Unequal Leg Fillet Weld



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- 3.9 Cracks or other linear indications in welds are unacceptable.
- 3.10 Pin holes in pressure boundry welds are unacceptable.
- 3.11 Beam Tube Dents shall not be greater than 0.173" (4.4 mm) within any 12 inch length from the theoretical circular or cylinder form, measured radially or longitudinally on the outside of the beam tube.
- 3.12 Vacuum Stiffeners (including support rings) should be perpendicular to the beam tube shell. The angle between the vacuum stiffener and beam tube shell shall be within 80° to 100°.