

Title: **LIGO GENERAL REPAIR PROCEDURE FOR MATERIALS AND WELDING**

**LIGO  
GENERAL REPAIR PROCEDURE  
FOR  
MATERIALS AND WELDING**

REV/LTR.	BY-DATE	APPD. DATE	DESCRIPTION OF CHANGE
0	GS 10/10/96		Release Fa Fab Per DEO # 0302
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<b>PROCESS SYSTEMS INTERNATIONAL, INC.</b>				<b>SPECIFICATION</b>	
INITIAL APPROVALS	PREPARED	DATE	APPROVED	DATE	Number
	<i>GRS</i>	3/26/96	<i>RGS</i>	3/26/96	LIGO-EG60182-00-V A V049-2-074
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# LIGO GENERAL REPAIR PROCEDURE FOR MATERIALS AND WELDING

## 1.0 SCOPE

- 1.1 This procedure covers the requirements for repairing all nonconformities in base metal surfaces, the repair of nonconformities in edge preparation and the repair of unacceptable defects in inspected weld joints.
- 1.2 Cleaning of repaired areas shall be performed in accordance with PSI Specification V-049-2-015.

## 2.0 GENERAL PROCEDURE

### 2.1 REPAIRS TO BASE METAL SURFACE NONCONFORMITIES

#### 2.1.1 For Repairs Not Requiring Welding

- A. Surface defects shall be removed by grinding with CARBIDE BURR CUTTERS only. Abrasive-type wheels and stones are not allowed on vacuum base metal surfaces.
- B. Ground surface repairs shall be visually inspected to verify that the nonconformity has been removed or the indication reduced to an acceptable limit.
- C. The reduced material thickness shall be checked by a depth micrometer or an ultrasonic thickness gauge.

#### 2.1.2 For Repairs Requiring Welding

- A. Remove the defect by grinding with CARBIDE BURR CUTTERS only or by chipping and grinding with CARBIDE BURR CENTERS to an acceptable level. Abrasive-type wheels and stones are not allowed on vacuum welds.
- B. Visually inspect the area prepared for welding.
- C. Weld in accordance with PSI Procedure Numbers:

WPS #150	P8-P8	PAW	Manual	
WPS #151	P8-P8	PAW	Manual	PWHT
WPS #153	P8-P8	GTAW	Manual	PWHT
WPS #073-3	P8-P8	GTAW	Manual	

- D. Welded repairs shall be visually inspected after welding.

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**LIGO GENERAL REPAIR PROCEDURE FOR MATERIALS AND WELDING**

2.2 REPAIRS TO EDGE PREPARATION

2.2.1 For Repairs Not Requiring Welding

- A. Defects shall be removed by grinding with CARBIDE BURR CUTTERS only. Abrasive-type wheels and stones are not allowed on vacuum materials, weld preps. The cavity shall be blended uniformly into the surrounding surfaces.
- B. Ground surface repairs shall be visually inspected to verify that the nonconformity has been removed or the indication reduced to an acceptable limit.

2.2.2 For Repairs Requiring Welding

- A. Remove the defect by grinding (as specified above) or by chipping and grinding (as specified above) to an acceptable level.
- B. Visually inspect the area prepared for welding.
- C. Weld in accordance with PSI Procedure Numbers:

WPS #150	P8-P8	PAW	Manual	
WPS #151	P8-P8	PAW	Manual	PWHT
WPS #153	P8-P8	GTAW	Manual	PWHT
WPS #073-3	P8-P8	GTAW	Manual	

2.3 REPAIRS TO WELDS

2.3.1 For Repairs Not Requiring Welding

- A. Weld defects shall be removed by grinding with CARBIDE BURR CUTTERS only. Abrasive-type wheels and stones are not allowed on the interior or the exterior of vacuum welds.
- B. Visually inspect the area prepared for welding to ensure that the defect has been removed or the indication reduced to an acceptable limit.
- C. The reduced material thickness shall be checked by a depth micrometer or an ultrasonic thickness gauge.

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## 2.3.2 For Repair Requiring Welding

- A. Remove the defect by grinding (as specified in A. above) or by chipping and grinding ( as specified in A. above) to an acceptable level.
- B. Visually inspect the area prepared for welding.
- C. Weld in accordance with PSI Procedure Numbers:
 

WPS #150	P8-P8	PAW	Manual	
WPS #151	P8-P8	PAW	Manual	PWHT
WPS #153	P8-P8	GTAW	Manual	PWHT
WPS #073-3	P8-P8	GTAW	Manual	
- D. The repaired area can be left in the as-welded condition or can be blended by grinding. Grinding is restricted to the use of CARBIDE BURR CUTTERS only. The repaired area shall blend uniformly into the surrounding surface and shall be visually inspected after welding.

## 2.3.3 For Fillet Weld Repairs Requiring Welding

- A. remove the unacceptable weld metal by an approved method (as specified in A. above).
- B. If the full fillet weld is not completely removed, visually inspect the area prepared for welding.
- C. Weld in accordance with PSI Procedure Numbers:
 

WPS #150	P8-P8	PAW	Manual	
WPS #151	P8-P8	PAW	Manual	PWHT
WPS #153	P8-P8	GTAW	Manual	PWHT
WPS #073-3	P8-P8	GTAW	Manual	
- D. Welded repairs shall be visually inspected after welding.

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**3.0 BASE MATERIAL CLEANUP PROCEDURE**

**3.1 SCOPE**

- 3.1.1 This procedure describes the acceptable methods of base metal cleanup (plate, pipe, forgings, etc.).
- 3.1.2 This includes the removal of such things as temporary attachments, clamp marks, fit-up weld marks, undercut, gouges, crater cracks and other imperfections.

**3.2 REMOVAL METHODS**

- 3.2.1 Cleanup of imperfections or items listed in 3.1.2 above are limited to chipping and grinding with a carbide burr cutter only. Abrasive-type wheels and stones are not allowed on vacuum vessel materials because of the binder material used in the manufacturing of the wheel. The binder is embedded in the metal and will off-gas causing a loss of vacuum over a period of time.
- 3.2.2 After removal, the affected area shall be repaired by blending or welding. Repair welding can be left in the as-welded condition. The repaired area shall blend uniformly into the surrounding surface and shall be visually inspected after welding.

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