

Title: ACCEPTANCE TEST PROCEDURE - 80K PUMP SYSTEM

ACCEPTANCE TEST PROCEDURE

LIGO VACUUM EQUIPMENT

Hanford, Washington

and

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PROCESS SYSTEMS INTERNATIONAL, INC.				SPECIFICATION		
INITIAL APPROVALS	PREPARED	DATE	Approved	DATE	Number	Rev.
	DM	5/6/96	ASB	5/6/96	A V049-2-102	Ø

LIGO-E960170-00-V

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**1.0 PURPOSE**

The purpose of this Acceptance Test Procedure (ATP) is to define the overall plan for acceptance testing of this piece of equipment in order to demonstrate that it meets the requirements of the LIGO Vacuum Equipment Specification, LIGO-E940002-02-V, Revision 2, dated August 31, 1995.

**2.0 GENERAL**

- 2.1 The procedure applies to all the stations. Slight differences among each station will be due to different vacuum equipment, size of the isolatable section sizes, surfaces, volumes, and quantities involved relating to instrumentation, equipment, etc.
- 2.2 Tests will be performed by PSI personnel, and will be witnessed by an agent designated by LIGO.

**3.0 REFERENCE DOCUMENTS**

The following documents shall be used in conjunction with this one for performing the ATP:

V049-2-014 Leak Test Plan

**4.0 RESPONSIBILITY**

It shall be the responsibility of the project engineer assigned to this component or subsystem to ensure that all procedures required by this acceptance test procedure are performed, and that a person from LIGO designated as the witnessing agent, and who has signoff authority, shall sign the data sheet /test certification attached to this procedure, verifying that the procedures have been performed. The data sheet shall also be signed by the project engineer or by someone designated by the project manager. Any test listed in the data sheet which is not applicable to this component or subsystem shall be noted by writing "N/A" in the appropriate space. Any deviations from the test procedures or parameters shall be noted on this data sheet.

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## 5.0 FIELD TEST

### 5.1 80K Pump Field Joint Leak Test

The specification requires all leaks greater than  $1 \times 10^{-9}$  torr-l/s of helium to be repaired in accordance with LIGO approved procedures. Prior to shipment to the site, the 80K pump will have been leak checked and all objectionable leaks will have been repaired. However, all joints and flanges on the 80K pump which are assembled in the field will be leak checked per the methods described in V049-2-014.

### 5.2 LN2 Dewar Site Acceptance Test

After dewar installation, but prior to filling it with LN2, the dewar shall be subjected to the following series of checks:

- 1) Visually inspect for damage that may have occurred during shipment or installation.
- 2) Briefly exercise all manual valves to verify operation. The dewar inner vessel contains a dry nitrogen charge at 5-10 psig, so a small quantity of gas will escape when the valves are exercised.
- 3) Check the vacuum level in the dewar jacket annulus with a thermocouple gauge to verify vacuum integrity. Refer to the dewar operating manual for the required level.

After filling the dewar with liquid nitrogen, the following checks shall be made:

- 1) Verify that the locally mounted level and pressure gauges have stabilized. Refer to the dewar operating manual and 80K pump operating procedures for correct readings.

### 5.3 Regeneration Heater Acceptance Test

Prior to any operating checks, visually inspect the heater for any signs of damage that may have occurred during shipment or installation.

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The acceptance test for the regen heater is a functional test to verify that the heater performs its intended function. It is recommended that in order to conserve liquid nitrogen, this test be performed prior cooling down the cryopump. The test sequence described below assumes the test is on one of the long cryopump regen heaters. Wherever the test for the short cryopump regen heater differs from that of the long cryopump heater, it is so noted. Equipment tag numbers are for cryopump WCP1 (Refer to drawing V049-0-006). The test procedure is as follows:

- 1) Verify that the manual globe valve (HVXX1) upstream of the heater is closed.
- 2) Open the dewar gaseous nitrogen supply valve, V-11, (refer to dewar operating manual for equipment tag numbers) upstream of the ambient vaporizer to admit nitrogen to the regen system.
- 3) Open the manual globe valve until the flowmeter indicator (FI104) upstream of the heater reads 10,600 SCFH (5,300 SCFH for the short pump regen system).
- 4) Set the heater controls for a gas outlet temperature of 360 deg. F (375 deg. F for the short pump heater).
- 5) Verify that the heater controls maintain the gas outlet temperature (TE103A) at the selected temperature. This concludes the test. The sequence required for stopping the test is as follows
  - 1) Shut down the heater.
  - 2) Close the dewar gaseous nitrogen supply valve, V-11, upstream of the vaporizer.
  - 3) Close the manual globe valve, HVXX1.

**5.4 Cryopump Acceptance Test**

The acceptance test for the cryopump is a functional test to verify that the pump liquid level control valve performs its intended function. This may be verified by simply monitoring the liquid level in the pump over a 24 hour period. If the level control valve is functioning properly, then neither the high level alarm nor the low level alarm will have tripped.

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LIGO VACUUM EQUIPMENT ACCEPTANCE TEST DATA/TEST VERIFICATION

Equip. Tag \_\_\_\_\_ S/N \_\_\_\_\_

Type of Test	ATP Para.	ATP Req'ment/ Actual Data	Comments	LIGO Witness Sign./date	PSI Sign./date
Visual Inspection					
Labelling Verification					
Bakeout					
Leak rate					
Factory Endurance Test					
Factory Speed Test					
Functional Test					
RGA Test					
Particle Count					
Pumpdown					

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