

**ACCEPTANCE TEST PROCEDURE FOR
LARGE GATE VALVES
FOR
LIGO VACUUM EQUIPMENT**

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and
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Information contained in this specification and its attachments is proprietary in nature and shall be kept confidential. It shall be used only as required to respond to the specification requirements, and shall not be disclosed to any other party.

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PROCESS SYSTEMS INTERNATIONAL, INC.				SPECIFICATION	
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Title

ACCEPTANCE TEST PROCEDURE FOR LARGE GATE VALVES

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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 component 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 of the stations. Differences between the stations will be due to different vacuum equipment, size of the isolatable sections, surfaces, volumes and quantities of instrumentation and equipment.
- 2.2 Tests will be performed by PSI personnel, and will be witnessed by an agent (with sign-off authority) designated by LIGO.

3.0 REFERENCE DOCUMENTS

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

PSI Specification V049-2-005, 112 cm and 122 cm Gate Valves

4.0 RESPONSIBILITY

It shall be the responsibility of the project engineer assigned to this component or subsystem to ensure that all of the procedures required by this ATP are performed and that the LIGO witness signs 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 other PSI person 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 "NA" in the appropriate space. Any deviations from the test procedures or parameters shall be noted on the data sheet.

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5.0 TEST

5.1 The first eight large gate valves will be acceptance tested at the manufacturer's shop prior to shipment. These are slated for early delivery to Washington to close the beam tube. All other large gate valves will be tested at the manufacturer's shop prior to shipment and accepted in the field as the sections of equipment that they isolate are tested and accepted. The field test will consist of a valve functional check and the leak test of the isolated section of equipment.

5.2 Procedure

5.2.1 Each valve shall be inspected for dimensional conformance to approved assembly drawings.

5.2.2 Each valve shall be inspected for cleanliness by black light. Valves shall be re-cleaned if any contamination is found.

5.2.3 Each valve shall be functionally tested. Prior to final gate seal leak testing, operation of each valve for 20 cycles shall be demonstrated. The valves shall be shown to be capable of stroking in either direction in 5 minutes or less.

5.2.4 Each valve shall be tested for leakage (using oil-free pumping equipment and leak detector) prior to shipment from the manufacturer. Each valve shall be baked at 150 C prior to leak checking. For dual gate seals and end seals, each seal shall be individually tested. For the end seals, the Vendor's test fixture shall allow testing of each seal individually. An RGA with calibrated leak shall be used in performing the leak testing. Partial pressures of hydrocarbons greater than 2.0×10^{-10} Torr for any species will be cause for rejection. Body and flange leakage shall be measured to be less than 10^{-10} torr liter/sec of helium before shipment. Leak checking procedures shall conform to ASTM E498.

5.2.5 One valve of each size and type of actuation shall be tested for shock. The valve shall be tested in the vertical position resting on a pad that deflects at least 0.1" under the static load of the valve, so as not to simulate a "hard mount". Testing shall be done both at atmospheric pressure and with the valve under vacuum. An accelerometer shall be mounted near a connecting flange (or weld stub) on the valve housing or near the edge of one of the flange covers. Separate measurements shall be taken in each of the three axes. Valve actuation shall be shown to induce no more than 0.01g peak-to-peak acceleration at any point on the valve mounting flanges or weld stubs.

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6.0 DOCUMENTATION

The following documentation shall be provided prior to acceptance:

- Leak test procedure and report (including data).
- Shock test procedure and report (including data)
- Manufacturer's standard QA reports (including final functional test reports)

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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	5.2.1 5.2.2				
Labelling Verification					
Bakeout	5.2.4	150 C /			
Leak rate	5.2.4	1×10^{-10} torr l/sec He			
Factory Endurance Test	5.2.3	20 Cycles			
Factory Speed Test	5.2.3	Open <5 min. / Close <5 min. /			
Functional Test	5.2.3				
RGA Test	5.2.4	$<2 \times 10^{-10}$ torr for any HC /			
Particle Count	NA				
Pumpdown	NA				