



<b>Title:</b> <b>HELIUM MASS SPECTROMETER        LEAK DETECTION OF BELLWS        ASSEMBLIES FOR HYTEC</b>	<b>Rev.</b> <b>N/C</b>	<b>Date:</b> <b>12/8/97</b>	<b>No:</b> <b>MPP L009</b> <i>LIGO-E970190-00-D</i>
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**Subject:** The helium mass spectrometer leak detection of bellows assemblies for Hytec Inc., or others, for the LIGO project.

**1.0 PURPOSE**

- 1.1. The procedure defines the process to be utilized for helium mass spectrometer dry leak testing of components, sub-assemblies and assemblies without the use of leak test grease for Hytec Inc., or others, for the LIGO project.

**2.0 SCOPE**

- 2.1. This procedure covers all Hytec part numbers manufactured by S.F.M.B. for the LIGO project.

**3.0 DEFINITIONS**

- 3.1. **Hytec** - Hytec Inc. or other agents procuring products for the LIGO project.
- 3.2. **S.F.M.B.** - Senior Flexonics Metal Bellows Division.
- 3.3. **M.O.S.** - Methods Operation Sheet - A shop traveler with detailed work instructions.
- 3.4. **IPA** - Isopropyl Alcohol.

**4.0 DOCUMENTATION**

- 4.1. Hytec Technical Specification No. TS-LIGO-04a, LIGO-E970129-01-D, Rev. a, dated 9/10/97.
- 4.2. Hytec Drawing D972122, Rev. 0, dated 6/16/97.
- 4.3. Hytec Drawing D972611, Rev. 0, dated 8/11/97.

**5.0 EQUIPMENT**

- 5.1. Alcatel Model ASM180TD Helium Mass Spectrometer Dry Leak Detector or equiv.



- 5.2. Tooling designed for dry leak testing (without leak test grease). See M.O.S. for specific P/N's.
- 5.3. Assorted gaskets, plugs (required to seal tooling).

## **6.0 GENERAL REQUIREMENTS**

- 6.1. These parts are to be considered U.H.V. components and are not to be handled with unprotected hands. Clean U.H.V. quality gloves (Nitrilite™ brand only) must be worn when handling components. **Finger cots are not permitted.** If the gloves should touch unclean surfaces, such as the face, clothing, tools, bench, chairs, etc. they must be replaced immediately. (Nitrilite™ gloves, mfr. by Ansell Edmont Industrial, Inc.)
- 6.2. These parts are to be cleaned and packaged in a manner that will yield parts suitable for U.H.V. service. Personnel responsible for the processing of parts shall exercise good judgment and skill such that the area or parts do not become contaminated.
- 6.3. Certified personnel with a working knowledge of leak detection and leak detection equipment shall perform the leak detection procedure described.
- 6.4. The leak detection equipment utilized shall be capable of detecting leakage to a level of  $1 \times 10^{-10}$  scc/sec Helium.
- 6.5. **The use of any leak test grease to seal the components during testing is forbidden.** All equipment and tooling required for the leak testing of the parts shall be suitable for use with U.H.V. service parts. All tooling, **including gaskets**, shall be pre-cleaned to remove gross contamination then final cleaned with IPA prior to each use.
- 6.6. The M.O.S. with additional details will supersede this procedure.
- 6.7. **The use of bubble wrap directly on parts is forbidden.** This is due to the fact that its polymers will penetrate into the surface of the metal and cannot be removed during cleaning. Anti-static bubble wrap may be used if the part has first been wrapped in polyethylene sheet or bag.

## **7.0 PROCEDURE**

- 7.1. The leak detector port and all seals shall be wiped clean with IPA prior to the start of any testing per this procedure. All parts waiting test shall be stored in a clean covered container to prevent contamination.
- 7.2. The Helium Mass Spectrometer shall be calibrated using the manufacturer's standard leak in accordance with the equipment manufacturer's calibration procedure. This calibration should be done or verified prior to the start of any testing per this procedure.
- 7.3. Leak test the component, sub-assembly or final assembly as per the following instructions:

- 7.3.1. Set the range selector of the leak indicator one scale below the leak rate specified on the M.O.S.
  - 7.3.2. Select the tooling specified on the M.O.S. for the component, sub-assembly or final assembly to be leak tested. Place the tooling on the Helium Mass Spectrometer leak detector, utilizing the necessary gasket to seal the tooling to the seal plate.
  - 7.3.3. Place the component, sub-assembly or final assembly on the specified tooling, place a polybag over the test item and the leak test port. Insert Helium supply line into polybag and seal around the line.
  - 7.3.4. Verify that the component, sub-assembly or final assembly and tooling set-up are leak tight to the required scale. Evacuate the leak detector then spray Helium slowly into the polybag until slightly inflated, checking the component, sub-assembly or final assembly and all seals. Seal off bag and hold for 1 minute minimum or until the leak indicator stabilizes.
  - 7.3.5. Note that the final leakage reading is below the specified leak rate then vent the leak detector and remove the component. Record acceptance on the M.O.S.
- 7.4. Repeat Sections 7.3.1 – 7.3.5 until all components, sub-assemblies or final assemblies in the lot have been tested.

#### **7.5. Success Criteria**

- 7.5.1. A component, sub-assembly or final assembly showing a leak rate less than the rate specified on the M.O.S. is acceptable; while a component, sub-assembly or final assembly showing a leak rate in excess of the specified rate is cause for rejection.
- 7.5.2. Segregate and tag any rejected component, sub-assembly or final assembly from the balance of the lot.

### **8.0 RESPONSIBILITY**

- 8.1. The Vacuum Group Manufacturing Manager is responsible for the adherence of this procedure.
- 8.2. The Engineering Department and Quality Assurance for the Vacuum Group are responsible for the maintenance of this procedure.