# Helium Leak Test Procedure for U.H.V. Components

**CEBAF Specification #22634-S-001**

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# HELIUM LEAK TEST PROCEDURE FOR ULTRA HIGH VACUUM COMPONENTS

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## 1.0 SCOPE

Following welding and inspection, vacuum assemblies shall be leak tested using a mass spectrometer helium leak detector fitted with a liquid nitrogen cold trap.

## 2.0 COLD TRAPS AND ISOLATION

A liquid nitrogen cold trap is used to protect the internal area of the vacuum component from leak detector roughing pump vapors. It shall be installed between the vacuum component's connecting flange or test plate, and the leak detector inlet. On some leak detectors, this requirement precludes the use of the built-in test port. In these cases, a side port inlet to the leak detector with an external valve and liquid nitrogen cold trap fitted to it must be used. The trap must be kept full of liquid nitrogen throughout the time testing is taking place.

2.1 A valve isolating the vacuum component from the test system should be installed between the component or test plate and the cold trap.

## 3.0 U.H.V. HANDLING

The vacuum component being tested shall be handled cleanly. Leak testing must be performed in an area remote from other operations to lessen the threat of airborne contamination. Food, drink and smoking shall be prohibited within proximity to the leak testing area. All work surfaces used shall be covered with clean aluminum foil.

## 4.0 ACCEPTANCE STANDARDS

Leak detector sensitivity for helium shall be calibrated to a minimum sensitivity of $2 \times 10^{-10}$ standard cc of He/sec per leak meter division on the most sensitive range. Reject any vacuum component or assembly that when surrounded for at least one minute by a vessel or bag containing a nominally all helium atmosphere, results in a two percent deflection on the most sensitive range of the leak rate meter. Calibration of the leak detector sensitivity shall be performed just prior to leak testing.

## 5.0 SEALS AND LEAK DETECTORS

O-rings or rubber flat stock used as a temporary seal for the purpose of testing vacuum components that do not have flanged ends shall be new rubber, clean and dry. No lubricants or grease of any kind are permitted without prior approval. Experience has shown that low durometer O-rings or pure gum rubber sheet works satisfactorily if the seal loading is adequate. Solvents accelerate the deterioration of rubber, therefore, the recommended procedure for cleaning rubber stock is hand washing with soap and water followed by a thorough rinsing in water. Immediately following leak testing, those areas which have come in contact with the rubber seal must be wiped clean using new lint-free wipe and trichloroethane or freon TF.

5.1 Use of the leak detector, including periodic maintenance, must conform to the manufacturer's recommendations.