



Standard Test Method for Hermeticity of Hybrid Microcircuit Packages Prior to Lidding¹

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1. Scope

1.1 The hermetic integrity of hybrid microcircuit packages is an important material or parts acceptance requirement. Determination of this parameter should be made before the hybrid circuit is assembled and sealed inside the package.

1.2 This test method covers a test for leaks in a package that is intended to be hermetically sealed after hybrid circuit assembly. Various types of hybrid packages may be tested by this test method. The test method is nondestructive and therefore suitable for 100 % inspection.

1.3 *This standard does not purport to address the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

F 78 Test Method for Calibration of Helium Leak Detectors by Use of Secondary Standards

F 134 Test Methods for Determining Hermeticity of Electron Devices with a Helium Mass Spectrometer Leak Detector³

2.2 Federal Standard:

Fed. Std. No. 209 Clean Room and Work Station Requirements, Controlled Environment⁴

3. Summary of Method

3.1 The specimen package is placed on an elastomer surface with the inside cavity of the package facing an orifice in the elastomer. This orifice is an opening to the vacuum section of a mass spectrometer leak detector. Helium gas, to which the

mass spectrometer is sensitive, is flooded over the outside of the package. Indication of a leak is detected by suitable instrumentation on the mass spectrometer.

4. Significance and Use

4.1 Hermeticity test methods, for example, Test Methods F 134, deal with sealed packages only and do not apply directly to unsealed packages. This test method is most applicable for determining the hermeticity of a package before it has been sealed with a lid or a cover. Packages that are intended for hermetic seal use are manufactured so as to prevent leakage of helium at a rate in excess of 1×10^{-8} atm cc/s under a pressure differential of 1 atm when tested on a helium mass spectrometer leak detector. This test should be conducted in a clean work area such as would be provided by a laminar flow clean bench as specified in Fed. Std. No. 209. This test method is not recommended for use in commerce until the precision has been determined.

4.2 Acceptance and rejection criteria for this test method shall be agreed upon by the purchaser and the supplier as part of the purchase contract.

NOTE 1—Packages that are not capable of meeting a maximum leak rate of 1×10^{-8} atm cc/s of helium at a pressure differential of 1 atm are customarily rejected on the basis that good quality assurance is achieved with this performance level.

5. Apparatus

5.1 *Fixtures and Fittings*, suitable for vacuum apparatus applications that will properly fit to the input plumbing on the mass spectrometer and hold the package style of interest on the seal gasket (see Fig. 1).

5.2 *Surgical Rubber Gasket*, or equivalent that has a surface dimension matching that of the seal ring on the package specimen.

5.3 *Vacuum Grease*.⁵

5.4 *Helium Mass Spectrometer Leak Detector*, with a detection sensitivity of one part of helium in ten million parts of air

¹ This test method is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.03 on Metallic Materials.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Discontinued; see *1996 Annual Book of ASTM Standards*, Vol 10.04.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁵ The sole source of supply of vacuum grease, Apiezon Type M or N known to the committee at this time is Miconite Ltd., P. O. Box 136 Manchester, M601AN, England, U.K. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.