



Designation: F18 – 12

Standard Specification and Test Method for Evaluation of Glass-to-Metal Headers Used in Electron Devices¹

This standard is issued under the fixed designation F18; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification and test method cover acceptance requirements for headers used in electron devices and describes procedures for determining conformance to these requirements.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following safety hazard caveat pertains only to the test method (Sections 7-13) described in this specification. *This standard does not purport to address all of 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. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 The header may be described as an external metal member of cylindrical, oval, or other shape into which is sealed one or more wire leads or metal tubulations through a glass medium. The metal parts may be plated or unplated and the glass may be clear or opaque.

3. Significance and Use

3.1 This standard covers procedures for conducting mechanical and vacuum leak tests on glass-to-metal headers and is suitable for quality control and research and development use.

3.2 This standard is suitable for assessing both the quality of materials as well as the manufacturing techniques used.

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

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4. Acceptance Requirements

4.1 The headers shall conform to the requirements as specified in 4.1.1 and 4.1.2 when tested in accordance with the prescribed methods of test (Sections 5-13).

4.1.1 Visual:

4.1.1.1 Cracks around the lead shall be restricted axially and radially to one lead diameter. Specimens showing any other type of crack shall be rejected.

4.1.1.2 The glass shall be free of inclusions exceeding one half of the smallest lead diameter. Gas bubbles entirely enclosed by glass are permissible up to a diameter not exceeding that of the smallest lead.

4.1.1.3 Metallic parts shall be as free of draw lines or grooves longer (by visual estimate) than one half of the seal length as best commercial practice will permit.

4.1.1.4 In the case of clear glass seals, reference is made to the seal area only.

4.1.1.5 In the case of opaque glass seals, reference is made to any portion of the exposed metal parts.

4.1.2 Leak:

4.1.2.1 With the header sealed to the mass spectrometer leak detector, the number of detectable leaks in a sample lot shall be less than the limit agreed upon between the purchaser and the seller.

TEST METHODS

5. Apparatus

5.1 *Microscope*, of 10 power magnification, unless otherwise specified, in combination with suitable incandescent white light source.

5.2 *Mass Spectrometer Leak Detector*, adjusted to respond to a tracer gas such as helium and capable of detecting leaks of 10^{-9} mL/s at standard temperature and pressure.

5.3 *Hood*, having a volume of approximately 250 cm^3 ($2.5 \times 10^{-4} \text{ m}^3$), to cover the test specimen completely with the tracer gas. (The hood should be flushed with the tracer gas for at least 10 s).

5.4 *Fixture*, suitable for making a seal between the header under test and the lead detector. A suggested jig is shown in Fig. 1.

