Designation: F204 – 76 (Reapproved2009)

Standard Test Method for Surface Flaws in Tungsten Seal Rod and Wire[1]

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1. Scope

1.1 This test method covers the determination of the presence of surface flaws in tungsten-seal rod and wire of random or cut lengths, and in the tungsten section of multiple-piece-through leads used in electronic devices, by means of examination of a glass bead sealed to the tungsten.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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:*

2.1.1 *beaded length*—the actual length through which a glass-to-tungsten seal exists as evidenced by the color of the interface.

2.1.2 *fault*—a tungsten-glass seal in which a fissure, either delineated by a line of bubbles or in itself clearly discernible, is observed when inspected as prescribed in this test method.

2.1.3 *fissure*—any narrow opening or cleft in the surface of the tungsten.

2.1.4 *line of bubbles*—one long or several small bubbles so arranged in the otherwise substantially bubble-free glass bead that they are in an almost straight line immediately adjacent to the tungsten-glass interface.

3. Apparatus

3.1 *Beading Equipment*—Suitable beading equipment capable of producing glass-to-tungsten seals as prescribed in Section 4.

3.2 *Microscope*—A low-power microscope capable of magnification up to 30 diameters, preferably of the binocular type.

3.3 *Light Source*—A suitable white light source, preferably diffuse for illumination of the bead under the microscope.

4. Preparation of Test Specimen

4.1 The test specimen shall be a beaded tungsten rod prepared in the following manner:

4.1.1 Clean the surface to be beaded in the usual manner employed by the user of the tungsten.

4.1.2 *Alternative Methods of Specimen Preparation*—In case of disagreement between the manufacturer and the purchaser, substitute one of the following alternative methods of preparing the tungsten rod for that in 4.1.1.

4.1.2.1 Boil the tungsten for 2 min in a 5 % solution of 27 % hydrogen peroxide. Pour off the hydrogen peroxide and rinse the tungsten twice in distilled water. Dry rapidly with pure alcohol or in an oven heated to 100°C.

4.1.2.2 Place the tungsten in a solution (20 weight %) of sodium hydroxide or potassium hydroxide and pass sufficient electrical current through it to induce electrolytic action sufficient to clean the specimen.

4.2 Bead the cleaned tungsten rod over the area to be examined with glass, of the type and wall thickness commonly used for beading, to a length of not less than 5 mm bead length.

4.3 To permit examination of the glass-tungsten interface, the bead shall be substantially free from bubbles, from causes other than the tungsten defects, and shall have been so prepared that the surface of the tungsten is clearly visible through the bead.

4.4 The color of the glass-to-tungsten seal shall be such as to indicate the proper application of heat to the bead to obtain a satisfactory seal.

NOTE 1—The usual preferred seal color shall be a golden-yellow hue.

5. Procedure

5.1 Hold the beaded tungsten in focus under the microscope in such a manner that the beaded length may be observed.

5.2 Rotate the specimen through 360° on its axis so that the entire surface of the tungsten-glass interface may be examined.

5.3 Observe whether fissures or lines of bubbles are present in the seal. If either are present, record the seal as a fault.

[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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