



Standard Practice for Visual Inspection of Semiconductor Lead-Bonding Wire¹

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1. Scope

1.1 This practice covers conditions for nondestructive visual inspection of the surface finish of spooled aluminum and gold wire used for making internal semiconductor device connections and hybrid microelectronic connections.

1.2 This practice specifies the recommended lighting, magnification, and specimen positioning for inspecting spooled wire under an optical microscope.

1.3 Photographs (Figs. X1.1-X1.5) are included in Appendix X1 as guides to aid the inspector in identifying particular surface conditions. These photographs are not intended as standards for specifying wire surface quality.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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. Referenced Documents

2.1 ASTM Standards:²

F 72 Specification for Gold Wire for Semiconductor Lead Bonding

F 487 Specification for Fine Aluminum-1 % Silicon Wire for Semiconductor Lead-Bonding

F 638 Specification for Fine Aluminum-1 % Magnesium Wire for Semiconductor Lead-Bonding

2.2 Federal Standard:

Fed. Std. No. 209B Clean Room and Work Station Require-

ments, Controlled Environment³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *chatter marks*—for the purposes of this practice—repetitive closely spaced wire surface blemishes.

3.1.2 *dark area*—for the purposes of this practice—wire surface shadowed from direct light-source illumination.

3.1.3 *fingerprint*—for the purposes of this practice—residual surface contamination deposited during handling.

4. Summary of Practice

4.1 The wire spool to be inspected is first mounted on a holding fixture that permits rotation of the spool about its axis. The spool fixture is then placed on the stage of a binocular microscope. The wire surface is illuminated with light incident at a grazing angle; the microscope and fixture are positioned so that the microscope field shows the partially shadowed wire wrap just adjacent to the brilliantly lit surface at the top of the spool.

4.2 Inspection is accomplished by slowly rotating the spool about its axis and moving the fixture over the microscope stage until the operator has viewed the entire exposed wire surface area under partially shadowed illumination.

4.3 The defects to be identified, the manner in which their presence is reported, and the manner in which the wire surface quality is to be characterized should be agreed upon by the parties to the inspection.

NOTE 1—Viewing a wire spool in the partial shadow of glancing illumination is particularly revealing of surface flaws and soil. The viewing arrangement amounts to dark-field illumination with imperfections appearing as bright glints on the wire surface.

5. Significance and Use

5.1 Spooled wire viewed under bright direct lighting or in deep shadow generally exhibits a flawless appearance. Proper arrangement of the viewing angle and illumination, however, permits accurate observation of wire-surface condition. This

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