



Designation: E 1161 – 95

Standard Test Method for Radiologic Examination of Semiconductors and Electronic Components¹

This standard is issued under the fixed designation E 1161; 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 test method provides a standard procedure for nondestructive radiographic examination of semiconductor devices, electronic components, and the materials used for construction of these items. This test method covers the radiographic testing of these items for possible defective conditions such as extraneous material within the sealed case, improper internal connections, voids in materials used for element mounting, or the sealing glass, or physical damage.

1.2 The quality level and acceptance criteria for the specimens being tested shall be specified in the detail drawing, purchase order or contract.

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. Referenced Documents

2.1 ASTM Standards:

E 94 Guide for Radiographic Testing²

E 431 Guide to Interpretation of Radiographs of Semiconductors and Related Devices²

E 801 Practice for Controlling Quality of Radiographic Examination of Electronic Devices²

E 1255 Practice for Radioscopy²

E 1316 Terminology for Nondestructive Examinations²

2.2 ASNT Standard:

SNT-TC-1A Personnel Qualification and Certification³

2.3 Federal Standard:

FED-STD-595 Color (Requirements for Individual Color Chits)⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology E 1316.

4. Significance and Use

4.1 This test method is useful for determination of voiding in semiconductor element to header mounting material, glass seal, and lid seal areas. It is also useful for examination of the internal cavities of devices for extraneous material, wire dress, and bond placement for unattached elements.

5. Apparatus

5.1 *Radiation Source*—Only x-radiation generating equipment shall be used. It shall provide the proper quality level and film density when used in accordance with this test method.

5.1.1 *Focal Spot*—The focal spot size shall be such that the resolution specified in 8.4 can be achieved.

5.2 *Radiographic Viewer*, capable of resolving a flaw of 0.025 mm at a density of 1.0 to 2.0.

5.3 *Holding Fixtures*, capable of holding specimens in the required positions without interfering with the accuracy or ease of interpretation.

5.4 *Lead-Topped Tables*—Perform all semiconductor and electronic component radiographic testing on a lead-topped table. The lead shall be at least 1.5 mm thick.

5.5 *Film Holders*—Film holders and cassettes shall be light tight. They may be flexible vinyl, plastic, or other durable material.

5.6 *IQI's*, shall be in accordance with Practice E 801.

5.7 *Density Measurement Apparatus*—Use a densitometer capable of repeatable measurements within 0.02 density units and step wedge comparison films.

6. Materials

6.1 *Films*—Films used for radiographic testing of semiconductors and electronic components must be very fine grain. The grain must be fine enough to permit resolution of discontinuities that are 0.025 mm.

6.2 *Non-Film Techniques, When Specified*—The use of non-film techniques is permitted if agreed upon between purchaser and supplier and the equipment is capable of producing results of equal quality when compared with film

¹ This test method is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.01 on Radiographic Practice and Penetrators.

Current edition approved Dec. 10, 1995. Published February 1996. Originally published as E 1161 – 87. Last previous edition E 1161 – 92.

² *Annual Book of ASTM Standards*, Vol 03.03.

³ Available from the American Society for Nondestructive Testing, 1711 Arlington Plaza, P.O. Box 28518, Columbus, OH 43228.

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