



# Standard Specification for Fine Aluminum–1 % Silicon Wire for Semiconductor Lead- Bonding<sup>1</sup>

This standard is issued under the fixed designation F 487; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Keywords were added editorially in June 1995.

## 1. Scope

1.1 This specification covers aluminum–1 % silicon alloy wire for internal connections in semiconductor devices and is limited to wire of diameter up to and including 0.0020 in. (0.051 mm). For diameters larger than 0.0020 in. (0.051 mm), the specifications are to be agreed upon between the purchaser and the supplier.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

## 2. Referenced Documents

### 2.1 ASTM Standards:

F 16 Test Methods for Measuring Diameter or Thickness of Wire and Ribbon for Electronic Devices and Lamps<sup>2</sup>

F 72 Specification for Gold Wire for Semiconductor Lead Bonding<sup>2</sup>

F 205 Test Method for Measuring Diameter of Fine Wire by Weighing<sup>2</sup>

F 219 Test Methods of Testing Fine Round and Flat Wire for Electron Devices and Lamps<sup>2</sup>

F 584 Practice for Visual Inspection of Semiconductor Lead Bonding Wire<sup>2</sup>

### 2.2 Military Standard:

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes<sup>3</sup>

## 3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

3.1.1 Quantity,

3.1.2 Size (see Section 5),

3.1.3 Breaking load and elongation (see Section 4),

3.1.4 Packaging and marking (see Section 11), and

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<sup>2</sup> Annual Book of ASTM Standards, Vol 10.04.

<sup>3</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

3.1.5 Special requirements, such as for certificate of compliance (see Section 10).

## 4. Physical Requirements

4.1 Elongation and breaking-load ranges for the wire shall be specified by the purchaser. The maximum ranges of these mechanical properties are listed in Table 1.

4.2 Mechanical property requirements in ranges smaller than those listed in Table 1 may be specified upon agreement between the purchaser and the supplier.

NOTE 1—The nature of aluminum–1 % silicon alloy is such that the mechanical properties of both as-drawn and annealed wires overlap considerably. It is also possible to alter the properties of hard wire by varying the manufacturing parameters and procedures. For these reasons, no distinction is made between the two types of wire in this specification.

## 5. Dimensions, Weights, and Permissible Variations

5.1 Wire size shall be expressed in terms of wire diameter in decimal fractions of an inch (or millimetre) or in weight per unit length. Tolerances for various size ranges are specified in Table 2.

5.2 When wire size is expressed in terms of weight, the following values shall be used:

5.2.1 Density of Aluminum–1 % Silicon—2.7 g/cm<sup>3</sup>.

5.2.2 Weight of a 200-mm Length of Wire 0.0254 mm in Diameter—0.274 mg.

## 6. Surface Finish

6.1 The wire surface shall be clean and free of finger oils, lubricant residues, stains, and particulate matter.

6.2 Mechanical damage to the wire surface, such as nicks, scratches, and kinks, shall be held to a minimum.

6.3 The inspection shall be carried out under conditions prescribed in Practice F 584 unless some other inspection method is agreed upon between the purchaser and the supplier. The nature and extent of defects permitted to be present on the surface of the wire shall be agreed upon between the purchaser and the supplier.

## 7. Chemical Requirements

7.1 The alloy composition shall be 1.00 ± 0.15 % silicon, and between 98.84 and 99.15 % aluminum. All other elements are considered impurities.