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# Standard Specification for Pure Aluminum (Unalloyed) Source Material for Electronic Thin Film Applications<sup>1</sup>

This standard is issued under the fixed designation F1513; 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.

## 1. Scope

1.1 This specification covers pure aluminum metal (unalloyed) for use in evaporation sources and sputtering targets. This material is intended as a raw material for electronic applications. The material is used as-supplied in some cases (for example, as *e*-beam evaporation sources). In other instances it may be remelted, alloyed, cast and processed by the purchaser to make finished products (for example, sputtering targets).

1.2 This specification sets purity grade levels, physical attributes, analytical methods, and packaging.

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

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

D1971 Practices for Digestion of Water Samples for Determination of Metals by Flame Atomic Absorption, Graphite Furnace Atomic Absorption, Plasma Emission Spectroscopy, or Plasma Mass Spectrometry

## 3. Terminology

3.1 *material lot*—material melted and cast from one crucible charge.

## 4. Classification

4.1 Grades of aluminum are defined in Table 1. Impurity contents are reported in parts per million by weight (wt ppm).

4.2 Purity and total metallic impurity levels are based upon elements listed in Table 2.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.17 on Sputter Metallization.

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<sup>2</sup> 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.

TABLE 1 Aluminum Grades

Grade	Purity, %	Maximum Metallic Impurity Content (by weight), ppm
6N	99.9999	1
5N5	99.9995	5
5N	99.999	10

## 5. Ordering Information

5.1 Orders for pure aluminum source material shall include the following:

5.1.1 Grade (4.1),

5.1.2 Configuration (8.1 and 8.2),

5.1.3 Whether or not certification is required (12.1), and

5.1.4 Whether or not a sample representative of the finished product is required to be provided by the supplier to the purchaser.

## 6. Impurities

6.1 The minimum suite of metallic impurity elements to be analyzed is defined in Table 2. Acceptable analysis methods and detection limits are specified in Section 11. Elements not detected will be counted and reported as present at the detection limit. Additional elements may be analyzed and reported, as agreed upon between the supplier and the purchaser, but these shall not be counted in defining the grade designation.

6.2 Nonmetallic elements to be analyzed and reported are C, H, O, N, and S.

6.3 Acceptable limits and analytical techniques for particular elements in critical applications shall be as agreed upon between the supplier and the purchaser.

TABLE 2 Minimum Suite of Metallic Elements to be Analyzed

Antimony	Gold	Silver
Arsenic	Iron	Sodium
Beryllium	Lithium	Thorium
Boron	Magnesium	Tin
Calcium	Manganese	Titanium
Cerium	Nickel	Uranium
Cesium	Phosphorus	Vanadium
Chromium	Potassium	Zinc
Copper	Silicon	Zirconium