



Standard Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys¹

This standard is issued under the fixed designation E34; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

^{ε1} NOTE—Editorial changes were made throughout in August 2012.

1. Scope

1.1 These test methods cover the chemical analysis of aluminum and aluminum-base alloys having compositions within the following limits:

Beryllium, ppm	0.3 to 100
Bismuth, %	0.02 to 1.0
Boron, %	0.005 to 0.060
Cadmium, %	0.001 to 0.50
Chromium, %	0.01 to 1.0
Copper, %	0.01 to 20.0
Gallium, %	0.001 to 0.05
Iron, %	0.01 to 3.0
Lead, %	0.01 to 1.0
Lithium, %	0.001 to 4.0
Magnesium, %	0.002 to 12.0
Manganese, %	0.005 to 2.0
Nickel, %	0.01 to 4.0
Silicon, %	0.05 to 20.0
Tin, %	0.03 to 1.0
Titanium, %	0.002 to 0.30
Vanadium, %	0.002 to 0.16
Zinc, %	0.003 to 12.0
Zirconium, %	0.01 to 0.30

1.2 The analytical procedures appear in the following sections:

Procedure	Sections
Beryllium:	
Beryllium by Argon Plasma Optical Emission Spectroscopy	283 to 292
Beryllium by the Morin (Fluorometric) Test Method	^{1e}
Bismuth:	
Bismuth by the Thiourea (Photometric) Method	^{1a}
Bismuth and Lead by the Atomic Absorption Test Method	188 to 198
Boron:	

Procedure	Sections
Boron by the Carmine (Photometric) Test Method	^{1e}
Cadmium:	
Cadmium by the Atomic Absorption Test Method	167 to 177
Chromium:	
Chromium by the Diphenylcarbazide (Photometric) Test Method	^{1e}
Chromium by the Persulfate Oxidation (Titrimetric) Test Method	^{1b}
Chromium by the Atomic Absorption Test Method	199 to 209
Copper:	
Copper and Lead by the Electrolytic (Gravimetric) Test Method	^{1c}
Copper and Zinc by the Atomic Absorption Spectrometry Test Method	210 to 220
Copper by the Electrolytic (Gravimetric) Test Method	303 to 311
Copper by the Neocuproine (Photometric) Test Method	^{1a}
Gallium:	
Gallium by the Ion Exchange-Atomic Absorption Test Method	312 to 323
Iron:	
Iron by the 1,10-Phenanthroline (Photometric) Method	73 to 81
Iron and Manganese by the Atomic Absorption Spectrometry Method	221 to 231
Lead:	
Copper and Lead by the Electrolytic (Gravimetric) Test Method	^{1c}
Bismuth and Lead by the Atomic Absorption Spectrometry Test Method	188 to 198
Lithium:	
Lithium by the Atomic Absorption Test Method	324 to 334
Magnesium:	
Magnesium by the Pyrophosphate (Gravimetric) Method	^{1b}
Magnesium by the Ethylenediamine Tetraacetate (Titrimetric) Test Method	^{1e}
Magnesium by the Atomic Absorption Spectrometry Test Method	232 to 242
Manganese:	
Iron and Manganese by the Atomic Absorption Spectrometry Test Method	221 to 231
Manganese by the Periodate (Photometric) Test Method	293 to 302
Nickel:	
Nickel by the Dimethylglyoxime (Photometric) Test Method	^{1a}
Nickel by the Dimethylglyoxime (Gravimetric) Test Method	^{1b}
Nickel by the Atomic Absorption Spectrometry Test Method	243 to 253
Silicon:	

¹ These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.04 on Aluminum and Magnesium.

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^{1a} Discontinued as of Feb. 25, 1983.

^{1b} Discontinued as of May 29, 1981.

^{1c} Discontinued as of Oct. 25, 1985.

^{1d} Discontinued as of March 25, 1983.

^{1e} Discontinued as of July 1, 2011.

Silicon by the Molybdisilic Acid (Photometric) Test Method	1 ^e
Silicon by the Sodium Hydroxide-Perchloric Acid (Gravimetric) Method	1 ^e
Tin:	
Tin by the Iodate (Titrimetric) Test Method	1 ^e
Titanium:	
Titanium by the Chromotropic Acid (Photometric) Test Method	141 to 150
Titanium by the Diantiprylmethane Photometric Test Method	254 to 263
Vanadium:	
Vanadium by an Extraction-Photometric Test Method using <i>N</i> -Benzoyl- <i>N</i> -Phenylhydroxylamine	264 to 273
Zinc:	
Zinc by the Ammonium Mercuric Thiocyanate or the Zinc Oxide (Gravimetric) Test Method	1 ^b
Zinc by the Ethylenediamine Tetraacetate (Titrimetric) Test Method	1 ^d
Copper and Zinc by the Atomic Absorption Spectrometry Test Method	210 to 220
Zinc by the Ion Exchange-EDTA Titrimetric Test Method	274 to 282
Zirconium:	
Zirconium by the Arsenazo III (Photometric) Method	178 to 187

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard does not purport to address all of the safety problems, 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.* Specific hazard statements are given throughout these test methods.

2. Referenced Documents

2.1 ASTM Standards:²

- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials
- E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition
- E60 Practice for Analysis of Metals, Ores, and Related Materials by Spectrophotometry
- E88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition
- E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials
- E173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals (Withdrawn 1998)³
- E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis
- E1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry (Withdrawn 2004)³

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 The last approved version of this historical standard is referenced on www.astm.org.

- E1479 Practice for Describing and Specifying Inductively-Coupled Plasma Atomic Emission Spectrometers
- E1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology E135.

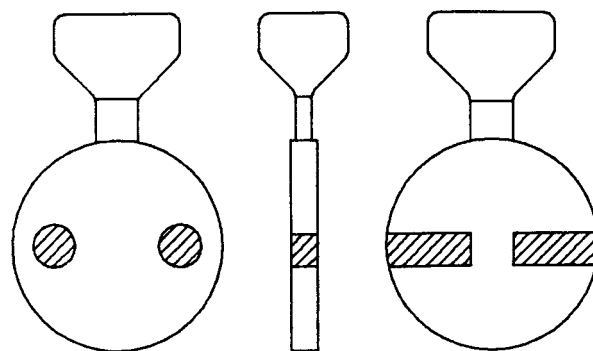
4. Significance and Use

4.1 These test methods for the chemical analysis of metals and alloys are primarily intended to test such materials for compliance with compositional specifications. It is assumed that all who use these test methods will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory.

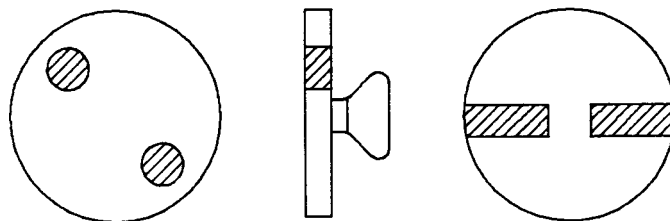
5. Apparatus, Reagents, and Photometric Practice

5.1 Apparatus and reagents required for each determination are listed in separate sections preceding the procedure.

5.2 Photometric practice prescribed in these test methods shall conform to Practice E60.



Type A Mold



Type B Mold

NOTE 1—Shaded areas are suitable for sampling.

FIG. 1 Type A and Type B Disks