



Standard Practices for Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis¹

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1. Scope

1.1 These practices describe the sampling of aluminum and aluminum-base alloys to obtain a chill-cast disk suitable for quantitative optical emission spectrochemical analysis. The disk in the region to be excited is representative of the melt or product and gives a repeatability of results which approaches that of the reference materials used.

1.2 These practices describe procedures for representative sampling of molten metal, from fabricated or cast products which can be melted, and from other forms which cannot be melted.

1.3 *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 precautionary statements are given in 5.1 and 6.2.

2. Referenced Documents

2.1 ASTM Standards:

E 101 Test Method for Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique²

E 227 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique²

E 401 Practice for Bonding Thin Spectrochemical Samples and Standards to a Greater Mass of Material³

E 607 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere³

E 1251 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge³

3. Summary of Practices

3.1 Molten metal representative of the furnace melt is poured into a specified mold to produce a chill-cast disk. The disk is machined to a specified depth that represents the average composition and produces an acceptable surface for excitation.

3.2 Fabricated, cast, or wrought products are remelted and cast into molds, briquetted and remelted, bonded to more massive material, or excited directly without remelting.

3.3 Special practices are included for the sampling and analysis of aluminum-silicon alloys, containing greater than 14 % silicon.

4. Significance and Use

4.1 These practices, used in conjunction with the following appropriate quantitative optical emission spectrochemical methods, Test Methods E 101, E 227, E 607, and E 1251, are suitable for use in manufacturing control, material or product acceptance, and research and development.

5. Apparatus

5.1 *Ladle*, capable of holding a minimum of 250 g (8.8 oz) of molten metal, with a handle of sufficient length to reach into a furnace, trough, or crucible. The ladle should be lightly coated with a tightly adhering ladle wash that will not contaminate the sample (Note 1).

NOTE 1—**Caution:** Traces of moisture in the coating may cause dangerous spattering.

NOTE 2—A suitable ladle wash may be prepared as follows: Mix 255 g (9 oz) of fine whiting (CaCO_3) with 3.8 L (1 gal) of water and boil for 20 min. Add 127 g (4.5 oz) of sodium silicate solution (40 to 42°Bé) and boil for 30 min. Stir well before using.⁴

5.2 *Sample Molds*, capable of producing homogenous chill-cast disks having smooth surfaces, free of surface pockets and porosity. These castings should have a spectrochemical response similar to the reference materials used in preparing the analytical curves and must have a repeatability from excitation-to-excitation of no more than 2 % relative on major elements.

¹ These practices 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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² *Annual Book of ASTM Standards*, Vol 03.05.

³ *Annual Book of ASTM Standards*, Vol 03.06.

⁴ Other proprietary ladle washes such as Dycote, available from Foseco, Inc., P. O. Box 8728, Cleveland, OH 44135; and Zirconite, available from Titanium Alloy Mfg. Co., 111 Broadway, New York, NY 10006, have been found suitable for this purpose.