



# Standard Specification for Aluminum for Use in Iron and Steel Manufacture<sup>1</sup>

This standard is issued under the fixed designation B37; 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 aluminum and aluminum alloys in the form of ingots, bars, rods, cones, nuggets or shot, designated as shown in [Table 1](#), for use in the manufacture of iron and steel.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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:<sup>2</sup>

[B275 Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought](#)

[B660 Practices for Packaging/Packing of Aluminum and Magnesium Products](#)

[B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products](#)

[D3951 Practice for Commercial Packaging](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys](#)

[E607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point to Plane Technique Nitrogen Atmosphere \(Withdrawn 2011\)<sup>3</sup>](#)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.01 on Aluminum Alloy Ingots and Castings.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

[E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis](#)

[E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry](#)

2.2 *Other Standards:*<sup>4</sup>

[CEN EN 14242 Aluminum and Aluminum Alloys – Chemical Analysis – Inductively Coupled Plasma Optical Emission Spectral Analysis](#)

## 3. Terminology

3.1 *Definitions*—Refer to Terminology [B881](#) for definitions of product terms used in this specification.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *bar*—a form of aluminum deoxidizing product with a rectangular cross section, similar to the appearance of a brick.

3.2.2 *cone*—a form of aluminum deoxidizing product with a round flat base and a pointed end.

3.2.3 *deox*—a common or commercial term used in place of aluminum deoxidizing product.

3.2.4 *nugget*—a form of aluminum deoxidizing product with a non-uniform (lump) shape.

3.2.5 *shot*—a form of aluminum deoxidizing product with a spheroid appearance of a pellet.

## 4. Ordering Information

4.1 Orders for material under this specification shall include the following:

4.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable),

4.1.2 Grade of material (see [Table 1](#)),

4.1.3 Form of material (ingot, bar, rod, cone, nugget or shot),

4.1.4 Any required dimensional or weight limitations for the material, and

4.1.5 The quantity in either pieces or pounds (kilograms).

4.2 Additionally, orders for material to this specification shall include the following information when required by the purchaser:

<sup>4</sup> Available from European Committee for Standardization, Central Secretariat (CEN), rue de Stassart 36, B1050 Brussels, Belgium., [www.CEN.eu/eseach](http://www.CEN.eu/eseach).

**TABLE 1 Chemical Limits**

NOTE 1—Analysis shall be made only for copper, zinc, magnesium, silicon, and iron unless the determination of additional elements is required by the contract or order, or the presence of other elements in substantial concentration is indicated during the course of the analysis. In the latter case, the amount of these other elements shall be determined, reported, and the total of copper, zinc, magnesium, silicon, iron, and “other elements” shall not exceed the specified amount prescribed in the last column of the table. Unless otherwise specified in the contract or order, 0.2 % or more of any “other element” shall constitute a “substantial concentration” and require that element to be reported.

NOTE 2—The following applies to all specified limits in this table: For purposes of determining conformance to these limits, an observed value or a calculated value obtained from analysis shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the specified limit in accordance with the rounding-off method of Practice E29.

Grade	Composition, %				
	Aluminum, min, by Difference	Copper, max	Zinc, max	Magnesium, max	Total of All Impurities, max
990A	99.0	0.2	0.2	0.2	1.0
980A	98.0	0.2	0.2	0.5	2.0
950A	95.0	1.5	1.5	1.0	5.0
920A	92.0	4.0	1.5	1.0	8.0
900A	90.0	4.5	3.0	2.0	10.0
850A	85.0	5.0	5.5	2.5	15.0

4.2.1 Special packaging (see Section 7),

4.2.2 Whether Practices B660 applies and, if so, the levels of preservation, packaging and packing required (see 7.4),

4.2.3 Whether Practice D3951 applies (see 7.4),

4.2.4 If inspection is required at manufacturer’s plant (see Section 8),

4.2.5 Whether certificate of conformance is required (see 6.3 and 10.1), and

4.2.6 Whether a certified chemical analysis is required (see 6.3 and 6.3.1).

## 5. Quality Assurance

5.1 Unless otherwise specified in the contract or purchase order, the producer shall be responsible for the performance of all inspections and test requirements specified herein. Unless disapproved by the purchaser, the producer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to confirm that the material conforms to prescribed requirements.

5.2 All testing shall be performed in accordance to applicable ASTM test methods.

5.3 The material covered by this specification shall be free of dross, slag, and other harmful contamination.

### 5.4 Shot:

5.4.1 Hollow shells shall not exceed 10 % by count in a minimum sample of 340 shot. The surface of material in shot form shall be free from a heavy oxidized coating.

5.4.2 The bulk density of shot shall not be less than 90 lb/ft<sup>3</sup>.

## 6. Chemical Composition

6.1 *Limits*—The average analysis of each lot of material shall conform to the chemical composition limits specified in Table 1. Conformance shall be determined by the producer by taking samples in accordance with E716 at the time ingots, bars, rods, cones, nuggets or shot are poured. The average analysis shall be determined from the analytical results of all samples taken from that cast. If the producer has determined the chemical composition of the material during casting, sampling and analysis of the finished product shall not be required.

6.2 *Methods of Analysis*—The determination of chemical composition shall be made in accordance with E607, E716, E1251), and E34 or CEN EN 14242 (ICP method).

6.3 When an actual chemical analysis or a certificate of conformance is required with a shipment, it shall be called for in the contract or purchase order.

6.3.1 When lots are mixed, the certified chemical composition of a composite lot shall be the weighted average of the certified chemical compositions from each lot that is contained in the composite lot.

6.4 *Lot Definition*—A lot shall be defined as follows:

6.4.1 A “lot” in a batch process shall consist of that product produced in a continuous cast from one furnace or ladle. Once the furnace or ladle has been alloyed and casting starts, no hardeners, liquid or solid material shall be added to the furnace or ladle.

6.4.2 A “lot” in a continuous process shall consist of that product produced during a continuous cast from one furnace during a period of up to 24 hours. Additions of hardeners, liquid or solid material are added to the furnace during the casting of product.

6.4.3 Any manufacturing change in the furnace, casting equipment or continuity of operation, which potentially affects the product characteristics defined by this specification shall be considered as the start of a new lot.

6.5 When samples are taken at the time the molten metal is made into shot, rod, bar, nuggets, cones or ingot, at least one sample shall be taken from each source of molten metal.

6.6 *Sampling Frequency*—The frequency of samples taken for determination of chemical composition shall be as follows:

6.6.1 In a batch production process, samples shall be taken periodically throughout the production of each lot. Each sample shall be representative of approximately equal volumes of the material. The frequency of sampling shall be not less than one sample for every 20 % of the volume of the furnace or ladle from which the material is being poured with a minimum of three samples per lot.

6.6.2 In a continuous production process, samples shall be taken periodically throughout the production of each lot. Each sample shall be representative of approximately equal volumes of the material. The frequency of sampling shall be not less than one sample for every 20 % of the volume of the furnace or ladle from which the material is being poured with a minimum of five samples per lot.

6.6.3 In either the batch or continuous production process the maximum elapsed time between determinations shall not exceed 8 hours.

6.7 *Sampling of Finished Product*—If it becomes necessary to analyze finished product for conformance to chemical composition limits, the method used to sample product for the determination of chemical composition shall be by agreement between the producer and the purchaser.

6.7.1 The number of samples taken for determination of chemical composition shall be as follows:

6.7.1.1 When the metal is shipped in carload lots of the same grade and cast, not less than five samples shall be taken at random from the carload for sampling. If the shipment is in less than carload lots or in mixed grades, one sample shall be taken for each 6000 lb (2700 kg) or fraction thereof.

6.8 Analysis shall be performed in accordance with **E716**, **E607**, **E1251**, **E34**, or CEN EN 14242 (ICP method).

6.9 Other methods of analysis or in the case of a dispute the method of analysis shall be agreed upon by the producer and the purchaser.

## 7. Packaging, Marking, and Shipping

7.1 The material shall be packaged in such a manner as to prevent damage in ordinary handling and transportation. The type of packaging and gross weight of individual containers shall be left to the discretion of the producer unless otherwise agreed upon. Packaging methods and containers shall be so selected as to permit maximum utility of mechanical equipment in unloading and subsequent handling. Each package or container shall contain only one size and one grade of material when packed for shipment unless otherwise agreed upon between the purchaser and producer.

7.2 Each package or container shall be marked with the purchase order number, quantity, specification number, grade, gross and net weights, and the name of the producer.

7.3 Packages or containers shall be such as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery.

7.4 When specified in the contract or purchase order, material shall be preserved, packaged and packed in accordance with the requirements of Practices **B660**. The applicable levels shall be as specified in the contract or order. Marking for shipment of such material shall be in accordance with Practice **D3951**.

## 8. Source Inspection

8.1 If the purchaser elects to make an inspection of production or the material at the manufacturer's works, it shall be so stated in the contract or purchase order.

8.2 If the purchaser elects to have inspection made at the producer's facilities, the manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification and/or the requirements of the contract. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

## 9. Rejection and Rehearing

9.1 Any ingots, bars, rods, cones, nuggets or shot that at the time of receipt does not conform to the requirements of this specification may be rejected, and shall be replaced by the producer.

9.2 In the case of dissatisfaction regarding rejections based on quality or chemical composition requirements as specified in Sections **5** and **6**, respectively, the manufacturer may make claim for a rehearing as a basis of arbitration within 15 calendar days after receipt by the producer of the rejection notification.

## 10. Certification

10.1 The manufacturer shall, on request, furnish to the purchaser a certificate stating that each lot has been sampled, tested, and inspected in accordance with this specification, and has met the requirements of Sections **5**, **6.1**, and **6.3.1**.

## 11. Keywords

11.1 aluminum; deox; deoxidizing; iron manufacture; steel manufacture

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