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Standard Specification for Aluminum for Use in Iron and Steel Manufacture¹

This standard is issued under the fixed designation B 37; 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.

¹ 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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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 the standard. The values given in parentheses are mathematical conversions to SI units, which 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:

~~EB 29660 Practices for Using Significant Digits in Test Data to Determine Conformance with Specification Packaging/Packing of Aluminum and Magnesium Products²~~

~~E 34 Test Methods for Chemical Analysis of~~

~~B 881 Terminology Relating to Aluminum and Aluminum-Base Alloys Magnesium-Alloy Products²~~

~~D 3951 Practice for Commercial Packaging³~~

~~E 5529 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition³~~

~~E 101 Test Method for Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique Using Significant Digits in Test Data to Determine Conformance with Specifications⁴~~

~~E 22734 Test Methods for Optical Emission Spectrometric Chemical Analysis of Aluminum and Aluminum-Base Alloys by the Point-to-Plane Technique³~~

~~E 607 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere⁵~~

~~E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition⁵~~

~~E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition⁵~~

~~E 607 Test Method for Atomic Emission Spectrometric Analysis Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere⁵~~

~~E 716 Practices for Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis⁵~~

~~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 Discharge⁵~~

3. Ordering Information

3.1 ~~Orders~~ Terminology

3.1 Definitions—Refer to Terminology B 881 for ~~material under~~ 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 following:

² Annual Book of ASTM Standards, Vol T4.02: 02.02.

³ Annual Book of ASTM Standards, Vol 03.05: 15.09.

⁴ Discontinued. See 1995 Annual

⁴ Annual Book of ASTM Standards, Vol 03.05: 14.02.

⁵ Annual Book of ASTM Standards, Vol 03.065.

- ~~3.1.1 This specification designation (which includes the number, the year, and the revision letter, if applicable);~~
- ~~3.1.2 Grade appearance of material (see Table 1);~~
- ~~3.1.3 Form a brick.~~
- ~~3.2.2 cone—a form of material (ingot, rod aluminum deoxidizing product with a round flat base and a pointed end.~~
- ~~3.2.3 deox—a common or shot);~~
- ~~3.1.4 Dimensional limitations for material;~~
- ~~3.1.5 The quantity commercial term used in either pieces or pounds;~~
- ~~3.2 Additionally, orders for material to this specification shall include the following information when required by the purchaser:~~
 - ~~3.2.1 Special packaging (see Section 6);~~
 - ~~3.2.2 If inspection is required at manufacturers plant (see Section 7), 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.~~

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 and the total of copper, zinc, magnesium, silicon and 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 % of any “other element” shall constitute a “substantial concentration.”

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 E 29.

Grade	Composition, %				
	Alumi-num, min, by difference	Copper, max	Zinc, max	Magne-sium, max	Total of All Impu-rities, 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. Quality

- 4.1 The 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:
 - 4.2.1 Special packaging (see Section 7);
 - 4.2.2 Whether Practices B 660 applies and, if so, the levels of preservation, packaging and packing required (see 7.4);
 - 4.2.3 Whether Practice D 3951 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, 6.9, and 6.10).

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 commercially uniform performed in quality, in freedom from accordance to applicable ASTM test methods.

5.3 The material covered by this specification shall be free of dross, slag, hollow shells, 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/ft³.

56. Chemical Composition

56.1 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 analyzing producer's analysis of samples from each cast, with the average analysis determined from the analytical results of all samples taken for that cast (see 6.9). Analytical samples from each cast shall be taken at the time the ingots, bars, rods, cones, nuggets or shot are produced or samples may be taken from the finished product. If the producer has determined the chemical composition of the material during the course of manufacture, he shall not be required to sample sampling and analyze the finished product.

5.2 Number analysis of Samples—The number of samples taken for determination of chemical composition shall be as follows:

5.2.1 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 finished product shall be taken for each 6000 lb (2 700 kg) or fraction thereof.

5.2.2 A sample shall consist of an ingot or section of rod in the case of material in these forms. In the case of material in shot form, a sample shall consist of a thin chill-cast bar approximately ¼ in. (6 mm) in thickness made by melting a small representative lot of the shot. An acceptable alternate sample configuration is described in Practices E 716.

5.2.3 When samples are taken at the time the molten metal is made into shot, rod, or ingot, at least one sample shall not be taken from each source of molten metal.

5.3 Methods of Sampling—Samples for determination of chemical composition shall be taken in accordance with one of the following methods:

5.3.1 Samples for chemical analysis shall be taken by drilling, sawing, milling, turning, or clipping a representative piece or pieces to obtain a prepared sample of not less than 75 g. Sampling shall be in accordance with Practice E 55.

5.3.2 Sampling for spectrochemical analysis shall be in accordance with Practices E 716. Samples for other methods of analysis shall be suitable for the form of material being analyzed and the type of analytical method used.

5.4 required.

6.2 Methods of Analysis—The determination of chemical composition shall be made in accordance with suitable chemical (Test Methods E 34), or spectrochemical (Test Methods E 101, E 227, E 607 and E 1251) methods. Other methods may be used only when no published ASTM method is available. In case methods.

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

6.4 Lot Definition—A lot shall be agreed upon by 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 producer furnace or ladle has been alloyed and purchaser:

6. Packaging, Marking, and Shipping

6.1 The casting starts, no hardeners, liquid or solid material shall be packaged added to the furnace or ladle.

6.4.2 A "lot" in such a continuous process shall consist of that product produced during a continuous cast from one furnace during a period of up to prevent damage in ordinary handling and transportation. The type 24 h. Additions of packaging and gross weight 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 effects the product characteristics defined by this specification shall be left to considered as the discretion start of a new lot.

6.5 When samples are taken at the producer unless otherwise agreed upon. Packaging methods and containers 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 to permit maximum utility follows:

6.6.1 In a batch production process, samples shall be taken periodically throughout the production of mechanical equipment in unloading and subsequent handling. each lot. Each package or container sample shall contain only be representative of approximately equal volumes of the material. The frequency of sampling shall be not less than one-size and one-grade 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 shipment unless otherwise agreed upon between every 20 % of the purchaser and producer.

6.2 Each package volume of the furnace or ladle from which the material is being poured with a minimum of five samples per lot.

6.7 Sampling of Finished Product—The number of samples taken for determination of chemical composition shall be marked with as follows:

6.7.1 When the purchase order number, quantity, specification number, grade, gross metal is shipped in carload lots of the same grade and net weights, and cast, not less than five samples shall be taken at random from the name of carload for sampling. If the producer:

6.3 Packages shipment is in less than carload lots or containers in mixed grades, one sample shall be such taken for each 6000 lb (2700 kg) or fraction thereof.

6.8 Sample Preparation—Samples shall be taken and prepared as follows:

6.8.1 A sample shall consist of an ingot, bar or section of rod and in the case of material in shot, cone or nugget form, a sample shall consist of a sufficient material to make a representative sample.

6.8.2 Sampling for spectrochemical analysis shall be in accordance with Practices E 716. Samples for other methods of analysis shall be suitable for the form of material being analyzed and the type of analytical method used.

6.8.3 Samples for chemical analysis shall be taken by common drilling, sawing, milling, turning, or clipping a piece or pieces to obtain a representative prepared sample of not less than 75 g. Sampling shall be in accordance with Practice E 55 for rod and Practice E 88 for all other forms.

6.9 The certified chemical composition of a lot shall be the average of the analytical results from testing of all samples taken for safe transportation at that lot.

6.10 When lots are mixed, the lowest rate to certified chemical composition of a composite lot shall be the point weighted average of delivery; the certified chemical compositions from each lot that is contained in the composite lot.

7. Inspection

7.1 If the purchaser desires 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 material at discretion of the producer's works where the material is made, it 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 contract purchaser and producer.

7.2 Each package or container shall be marked with the purchase order:

7.2 If 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 have inspection made ensure acceptance by common or other carriers for safe transportation at the producer's works, the manufacturer shall afford the inspector representing the purchaser all reasonable facilities lowest rate to satisfy him that the point of delivery.

7.4 When specified in the contract or purchase order, material is being furnished shall be preserved, packaged and packed in accordance with this specification. All tests and inspection the requirements of Practices B 660. The applicable levels shall be so conducted as not to interfere unnecessarily with specified in the contract or order. Marking for shipment of the works, such material shall be in accordance with Practice D 3951.

8. Rejection

8.1 Material that does not conform to Source Inspection

8.1 If the requirements purchaser elects to make an inspection of this specification may be rejected, and if rejected, production or the material at the manufacturer's works, it shall be replaced by so stated in the producer. The full weight of 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 returned so conducted as not to interfere unnecessarily with the producer 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 ~~4 and 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, 6.9, and 6.10.

11. Keywords

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

SUMMARY OF CHANGES

Committee B07 has identified the location of selected changes to this standard since the last issue (B 37-96 (2001)) that may impact the use of this standard. (Approved April 10, 2003).

(I) Rewrite of standard.

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