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Designation: B1002 – 16 (Reapproved 2020)

Standard Specification for Refined Indium[1]

This standard is issued under the fixed designation B1002; 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. Scope

1.1 This specification covers refined indium as ingot in six grades as follows:

1.1.1 *Grade 99.9*—Indium having a purity of 99.90 %, also known as 3N grade,

1.1.2 *Grade 99.99*—Indium having a purity of 99.99 %, also known as 4N grade,

1.1.3 *Grade 99.995*—Indium having a purity of 99.995 %, also known as 4N5 grade,

1.1.4 *Grade 99.999*—Indium having a purity of 99.999 %, also known as 5N grade,

1.1.5 *Grade 99.9999*—Indium having a purity of 99.9999 %, also known as 6N grade, and

1.1.6 *Grade 99.99995*—Indium having a purity of 99.99995 %, also known as 6N5 grade.

1.2 Indium metal from ingot can be fabricated into shot, spheres, wire, sheet, foil, tubing, and other customized fabrications with purities up to and including Grade 99.999. Grades 99.9999 and 99.99995 are available in ingot form only.

1.3 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.

1.4 *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 become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. Manufacture

3.1 The material may be produced by any refining process that yields a product capable of meeting the chemical requirements of this specification. The purchaser, upon request, shall be informed of the refining process used.

4. Chemical Requirements

4.1 The material should conform to the requirements for chemical composition as prescribed in Table 1.

4.2 Analysis shall be made using the manufacturer's standard methods. In the event of disagreement as to the chemical composition of the metal, methods of chemical analysis for reference purposes shall be determined by a mutually acceptable laboratory.

5. Sampling

5.1 The value of this material is such that special attention must be paid to sampling procedures. The purchaser and manufacturer shall agree upon sampling procedures used.

5.2 *Lot Size*—Sampling lots shall consist of the following:

5.2.1 *Ingot*—A single refining lot and

5.2.2 *Other Fabricated Forms*—A single refining lot.

6. Rejection and Rehearing

6.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

6.2 *Investigation of Claims*—In a question of chemical composition, a new sample shall be drawn by representatives of both parties in accordance with Section 5. The properly mixed and quartered sample shall be separated into three parts,

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[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.

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TABLE 1 Indium Grades

Grade	Classification	Total Allowed Maximum Impurities of all Elements
99.9 % purity, also known as 3N grade	Lower grade indium	0.1 % or 1000 ppm
99.99 % purity, also known as 4N grade	Commercial indium	0.01 % or 100 ppm
99.995 % purity, also known as 4N5 grade	High purity commercial indium	0.005 % or 50 ppm
99.999 % purity, also known as 5N grade	Reduced impurity indium	0.001 % or 10 ppm
99.9999 % purity, also known as 6N grade	High purity indium	0.0001 % or 1 ppm
99.99995 % purity, also known as 6N5 grade	Ultra high purity indium	0.00005 % or 0.5 ppm

each of which shall be placed in a sealed package, one for the manufacturer, one for the purchaser, and one for an umpire, if necessary.

6.3 In the event of disagreement between the manufacturer and the purchaser on the conformance of the metal to the requirements of this specification by the purchaser, the umpire sample is to be submitted to a mutually acceptable laboratory for analysis. The results of the referee's analysis shall be used in determining conformance of the metal to this specification.

7. Product Marking

7.1 The material container shall be identified legibly by a label or tag with the following information: indium (In), grade, lot number, and weight to the nearest 0.001 troy oz (0.03 g).

8. Available Purity Grades

8.1 The grades of indium are specified by the maximum total metallic impurities as listed in Table 1.

9. Keywords

9.1 indium; ingot; refined indium

APPENDIX

(Nonmandatory Information)

X1. CHEMICAL REQUIREMENTS FOR EACH GRADE OF INDIUM

TABLE X1.1 Chemical Requirements

Element[A]	Composition %					
	3N Grade 99.9 % Purity	4N Grade 99.99 % Purity	4N5 Grade 99.995 % Purity	5N Grade 99.999 % Purity	6N Grade 99.9999 % Purity	6N5 Grade 99.99995 % Purity
Bismuth, max	0.01	0.001	0.0005	0.0002	0.00001	0.000010
Cadmium, max	0.01	0.001	0.0005	0.0002	0.00001	0.000010
Copper, max	0.01	0.001	0.0005	0.0002	0.00001	0.000010
Iron, max	0.01	0.001	0.0005	0.0002	0.00002	0.000015
Nickel, max	0.01	0.002	0.0005	0.0002	0.00002	0.000015
Lead, max	0.02	0.004	0.001	0.0005	0.00002	0.000018
Tin, max	0.02	0.004	0.001	0.0005	0.00003	0.000010
Thallium, max	0.005	0.002	0.001	0.0005	0.00003	0.000009

[A] Impurities other than those listed above may be included by special agreement between purchaser and manufacturer.

X1.1 The chemical requirements for each grade of indium are specified in Table X1.1.

X1.1.1 The following applies to all specified limits in this table: For purposes of determining conformance with this specification, an observed value obtained from analysis shall be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of Practice E29.

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