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Standard Specification for Pig Tin¹

This standard is issued under the fixed designation B339; 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 Department of Defense.

1. Scope

1.1 This specification covers refined tin in pig form recovered and cast from primary and secondary tin-bearing materials. One grade of tin metal is specified and is designated by the grade letter shown in Table 1.

1.2 The percent values of tin contained are to be regarded as the standard.

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 Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

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

E46 Test Methods for Chemical Analysis of Lead- and Tin-Base Solder³

E51 Method for Spectrographic Analysis of Tin Alloys by the Powder Technique⁰

E57 Methods for Chemical Analysis of White Metal Bearing Alloys

E88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *pig, n*—an oblong or square mass of metal that has been cast while still molten into a mold that gives the metal its particular shape.

4. Ordering Information

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

4.1.1 ASTM designation and year of issue,

4.1.2 Quantity in weight, metric tons or kilograms,

4.1.3 Shape and size,

4.1.4 Method of manufacturing (Section 5),

4.1.5 Chemistry (Section 6),

4.1.6 Product marking (Section 16), and

4.1.7 Packaging (Section 17).

5. Materials and Manufacture

5.1 The refined tin shall be produced from primary, secondary, or a combination of tin-bearing materials to obtain the requirements of this specification.

5.2 The refined metal for Grade A or B tin may be manufactured by fire refining, vacuum refining, electrolytic or electrowinning

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.02 on Refined Lead, Tin, Antimony, and Their Alloys.

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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.

³ Withdrawn. the last approved version of this historical standard is referenced on www.astm.org.

TABLE 1 Chemical Composition and Impurity Contents

| Element | Composition, - wt% | | | |
|-------------------------------|--------------------|-----------|---|------------------|
| | Grade "A" | Grade "B" | Grade "A" for the Manufacture of Tinplate | Ultra Pure Grade |
| Tin, min | 99.85 | | 99.85 | 99.95 |
| Tin, min | 99.85 | 99.85 | 99.85 | 99.95 |
| Antimony, max | 0.04 | | 0.04 | 0.005 |
| Antimony, max | 0.04 | 0.015 | 0.04 | 0.005 |
| Arsenic, max | 0.05 | | 0.05 | 0.005 |
| Arsenic, max | 0.05 | 0.05 | 0.05 | 0.005 |
| Bismuth, max | 0.030 | | 0.030 | 0.015 |
| Bismuth, max | 0.030 | 0.030 | 0.030 | 0.015 |
| Cadmium, max | 0.001 | | 0.001 | 0.001 |
| Cadmium, max | 0.001 | 0.001 | 0.001 | 0.001 |
| Copper, max | 0.04 | | 0.04 | 0.005 |
| Copper, max | 0.04 | 0.04 | 0.04 | 0.005 |
| Iron, max | 0.010 | | 0.010 | 0.010 |
| Iron, max | 0.010 | 0.010 | 0.010 | 0.010 |
| Lead, max | 0.05 | | 0.010 | 0.001 |
| Lead, max | 0.05 | 0.5 | 0.010 | 0.001 |
| Ni + Co, max | 0.01 | | 0.01 | 0.010 |
| Ni + Co, max | 0.01 | 0.01 | 0.01 | 0.010 |
| Sulfur, max | 0.01 | | 0.01 | 0.010 |
| Sulfur, max | 0.01 | 0.01 | 0.01 | 0.010 |
| Zinc, max | 0.005 | | 0.005 | 0.005 |
| Zinc, max | 0.005 | 0.005 | 0.005 | 0.005 |
| Silver, max | 0.01 | | 0.01 | 0.010 |
| Silver, max | 0.01 | 0.01 | 0.01 | 0.010 |
| Other impurities ^A | | | 0.010 | 0.010 |

^A Maximum per impurity not listed above.

refining methods, or a combination of these methods.

6. Chemical Composition

6.1 The tin shall conform to the requirements as to chemical composition prescribed in Table 1.

7. Methods of Chemical Analysis

7.1 An analysis of each lot shall be made by the supplier. The analysis shall be made from representative test samples obtained from the lot during pouring or from the final pig product. The chemical composition determined shall conform to the requirements of Table 1.

7.2 If a product analysis is desired by the purchaser, it shall be made in the purchaser's laboratory or elsewhere. Such analysis may be made by various methods including, but not limited to, wet chemical or spectrographic techniques.

8. Lot

8.1 All tin of Grade A or B produced and cast at one time shall constitute a lot for chemical analysis. Each pig of the lot shall bear a single identifying number that can be related to the manufacturing lot. This lot number can be cast, metal die stamped, or marked legibly upon each pig.

9. Workmanship, Finish and Appearance

9.1 The manufacturer shall use care to have each lot of tin material as uniform in quality as possible.

9.2 The pigs shall be clean and reasonably free of adhering foreign material.

10. Sampling for Chemical Analysis

10.1 Care must be taken to ensure that the sample selected for testing is representative of the material. The method of sampling for chemical analysis shall be agreed upon mutually between the supplier and the purchaser and shall consist of one of the following methods:

10.1.1 Test samples taken from the lot during casting or

10.1.2 Test samples taken from the final solidified cast pig product.

10.2 *Sampling From the Lot During Casting*—The supplier may obtain representative chill cast samples from the lot of molten metal during casting. The shape of the cast sample shall be agreed upon by all parties concerned. The molten metal shall be mechanically stirred and dip samples taken. If the material is produced in a pot or kettle, the material shall be drossed, stirred, and dip samples taken. If the facility does not allow for dip sampling, the samples shall be taken at the beginning, at the middle, and at the end of the pour. The sampling ladle must be clean and heated and the molten metal cast into chilled molds which produce