



Designation: B413 – 97a (Reapproved 2017)

Standard Specification for Refined Silver¹

This standard is issued under the fixed designation B413; 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 silver cast bar² form in three grades as follows:

1.1.1 *Grade 99.90* (UNS P07020)—Silver having a minimum fineness of 999.0 commonly referred to as “commercial bar” or “bullion.”

1.1.2 *Grade 99.95* (UNS P07015)—Silver having a minimum fineness of 999.5.

1.1.3 *Grade 99.99* (UNS P07010)—A premium grade having a minimum fineness of 999.9.

1.2 The values stated in inch-pound units are to be regarded as 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 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 and health practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *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:*³

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

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.05 on Precious Metals and Electrical Contact Materials.

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² Other forms of unfabricated silver of commerce are not to be excluded under this specification.

³ 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.

[E378 Test Method for Spectrographic Analysis of Silver by the Powder Technique](#) (Withdrawn 2004)⁴

3. Materials and Manufacture

3.1 The silver shall be produced by any process that yields a product capable of meeting the requirements of this specification.

3.2 The bars shall be of a quality generally acceptable to the trade.

3.3 The manufacturer shall use care to have each shipment of as uniform quality as possible.

4. Chemical Composition

4.1 The refined silver shall conform to the chemical composition prescribed in [Table 1](#).

5. Lots

5.1 A single melt shall constitute a lot for sampling.

6. Method of Analysis

6.1 The composition of the bars or samples shall be determined by any destructive or nondestructive method agreed upon between the manufacturer and the purchaser. Unless otherwise specifically agreed, chemical methods will be used for analysis. The chemical composition of the materials set forth in this specification shall be determined, in case of disagreement, in accordance with Test Method [E378](#). The selection of methods for the determination of elements not covered by that test method shall be a matter of agreement between the manufacturer and the purchaser.

7. Sampling

7.1 The value of this material is such that special attention must be paid to sampling procedures. If the purchaser and the manufacturer agree that samples most representative of the assay value of a melt are required, the samples should be taken from the silver melt as it is ready for pouring into molds. The samples should consist of shot or cast pins.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

TABLE 1 Chemical Requirements

NOTE 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.

Element ^{A,B}	Composition, %		
	Grade 99.90 (UNS P07020)	Grade 99.95 (UNS P07015)	Grade 99.99 (UNS P07010)
Silver, min	99.90	99.95	99.99
Silver and copper, min	99.95	...	...
Bismuth, max	0.001	0.001	0.0005
Copper, max	0.08	0.04	0.010
Iron, max	0.002	0.002	0.001
Lead, max	0.025	0.015	0.001
Palladium, max	...	...	0.001
Selenium, max	...	...	0.0005
Tellurium, max	...	...	0.0005

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

^B In this specification, it is to be noted that while oxygen is neither specified nor determined analytically, it is known to be present in the refined silver. When calculating the purity of refined silver by difference, oxygen will be considered as silver.

7.2 On agreement between manufacturer and purchaser, an alternative sampling procedure may be used.

7.3 The amount of sample taken shall be sufficient to supply three portions for analysis; the mass of each portion shall be sufficient to permit the determination of its composition as set forth in Table 1.

7.4 After mixing thoroughly, the sample shall be divided into three parts, each placed in a package and sealed, one for the manufacturer, one for the purchaser, and one for the umpire.

8. Product Marking

8.1 A brand shall be cast or otherwise legibly marked upon each bar, by which the manufacturer can be identified. The bar

shall be marked with the minimum fineness together with the melt number, bar number, and weight to the nearest 0.1 oz troy.

9. Claims

9.1 Claims to be considered shall be made to the manufacturer in writing within 30 days of receipt of the material at the purchaser’s plant, and the results of the tests made by the purchaser shall accompany such claims. The manufacturer shall be given 1 week from the date of receipt of the complaint to investigate his records, and shall then agree either to satisfy the claim or to submit samples to an umpire. No claim shall be considered unless a portion of the original silver bars can be shown to the representative of the manufacturer.

9.2 Where the silver satisfies the requirements of this specification, it shall not be condemned for defects in the products in which it is used.

10. Investigation of Claims

10.1 In a question of chemical composition, a new sample shall be drawn by representatives of both parties in accordance with Section 7. The properly mixed and quartered sample shall be separated into three parts, 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. The manufacturer and the purchaser shall each make an analysis, and if the results do not establish or dismiss the claim to the satisfaction of both parties, the third sample shall be submitted to a mutually agreeable umpire, who shall determine the question of fact, and whose determination shall be final.

11. Settlement of Claims

11.1 The expenses of the manufacturer’s representative and of the umpire shall be paid by the loser or divided in proportion to the concession made in case of compromise. In the case of rejection being established, the damages shall be limited to the payment of freight both ways by the producer for substitution of an equivalent weight of silver conforming to this specification.

APPENDIX

(Nonmandatory Information)

X1. SAMPLING

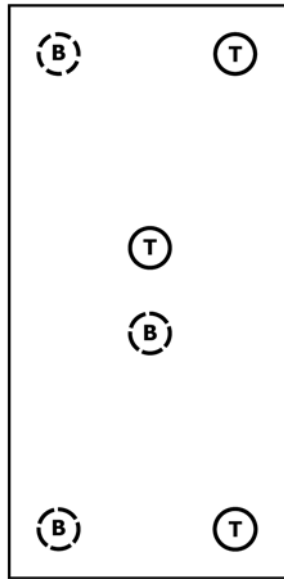
X1.1 When sampling is to be done on bars, the sampling preferably shall be by drilling. This shall be done by a procedure that will avoid errors due to segregation of impurities within the bars and also will avoid surface contamination.

X1.2 *Drilling Procedure*—At least one bar of each melt shall be sampled. The bar or bars to be drilled shall be thoroughly brushed with a stiff fiber brush having bristles which are set in a nonmetallic holder.

X1.3 *Single Bar*—The bar shall be drilled at least six times with a 0.635 cm high-speed drill in a pattern similar to that shown in Fig. X1.1. Three holes shall be drilled half way

through the top face of the bar for the hole positions marked “T.” The bar shall be turned end over end and three holes drilled through the bottom face for the positions marked “B.” The bar shall be drilled while on a clear surface of a material such as polyethylene sheeting or a lint-free paper.

X1.4 *Several Bars From Same Melt*—The same precautions and procedure as that outlined for single bars shall be followed, except that the drillings representing the different orientation of the bar will be made on six different bars. For example, when six bars are sampled, the sampling positions corresponding to those in Fig. X1.1 are used except that only one hole will be



T in circle—Hole position in top of bar.
B in broken circle—Hole position in bottom of bar.

FIG. X1.1 Sample Drilling Template

drilled in each bar corresponding to one of the six positions.

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