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Standard Specification for Tantalum and Tantalum Alloy Ingots¹

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1. Scope

1.1 This specification covers unalloyed and alloyed tantalum ingots prepared by vacuum-arc melting, electron-beam melting, or powder-metallurgy consolidation to produce consolidated metal for processing to various mill shapes.

1.2 The materials covered by this specification are:

1.2.1 R05200, unalloyed tantalum, electron-beam furnace or vacuum-arc melt, or both,

1.2.2 R05400, unalloyed tantalum, powder-metallurgy consolidation,

1.2.3 R05255, tantalum alloy, 90 % tantalum 10 % tungsten, electron-beam furnace or vacuum-arc melt, or both,

1.2.4 R05252, tantalum alloy, 97.5 % tantalum 2.5 % tungsten, electron-beam furnace or vacuum-arc melt, or both, and,

1.2.5 R05240 tantalum alloy, 60 % tantalum 40 % columbium, electron-beam furnace or vacuum-arc melt, or both.

2. Referenced Documents

2.1 *ASTM Standards*:²

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

3. Ordering Information

3.1 Orders for material under this specification shall include the following information as applicable:

3.1.1 Type (see 1.2),

3.1.2 Quantity in weight or pieces,

3.1.3 Size, diameter, and length,

3.1.4 Method of manufacture (Section 4),

3.1.5 ASTM designation, and

3.1.6 Additions to the specification and supplementary requirements if required.

¹ This specification is under the jurisdiction of ASTM Committee B10 on Reactive and Refractory Metals and Alloys and is the direct responsibility of Subcommittee B10.03 on Niobium and Tantalum.

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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.

4. Materials and Manufacture

4.1 The ingot metal for Type R05200 (unalloyed tantalum), for Type R05255 (90 % tantalum 10 % tungsten alloy), Type R05252 (97.5 % tantalum 2.5 % tungsten), and Type R05240 (60 % tantalum 40 % columbium) may be vacuum-arc melted, electron-beam furnace melted, or a combination of these two methods. The metal for Type R05400 is defined as powder-metallurgy consolidation unalloyed tantalum.

5. Chemical Composition

5.1 The material shall conform to the requirements for chemical composition in accordance with Table 1.

5.1.1 Analysis for elements not listed in Table 1 and not normally expected in tantalum shall not be required unless specified at time of purchase.

5.2 In the event of dispute over conformity of the material to this specification, upon agreement between the purchaser and the seller as to procedure, representative samples of the material may be submitted to a referee for analysis.

6. Permissible Variation

6.1 *Quantity*—The permissible overshipment shall be negotiated between the purchaser and the manufacturer.

7. Workmanship, Finish, and Appearance

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

7.2 When specified, the ingots shall be conditioned on the surface to standards agreed upon between the manufacturer and the purchaser.

7.3 In the conditioned ingot, no abrupt change in diameter or local depressions that will impair subsequent fabrication will be permitted. The difference between maximum and minimum radius of the conditioned ingot shall not exceed 20 % of the maximum radius.

7.4 Each ingot shall be tested for soundness by nondestructive test methods, such as dye penetrant and ultrasonic tests. Methods and acceptance standards shall be as mutually agreed upon between the purchaser and the manufacturer.

7.5 Defects in the ingots that exceed the acceptance standards shall be removed by cropping or surface conditioning, whichever is appropriate. The manufacturer shall be permitted