Designation: B391 – 18

Standard Specification for Niobium and Niobium Alloy Ingots[1]

This standard is issued under the fixed designation B391; 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 unalloyed and alloyed niobium ingots prepared by vacuum- or plasma-arc melting or electron-beam melting to produce consolidated metal for processing to various mill shapes.

1.2 The materials covered by this specification are:

1.2.1 *R04200-Type 1*—Reactor grade unalloyed niobium,

1.2.2 *R04210-Type 2*—Commercial grade unalloyed niobium,

1.2.3 *R04251-Type 3*—Reactor grade niobium alloy containing 1 % zirconium, and

1.2.4 *R04261-Type 4*—Commercial grade niobium alloy containing 1 % zirconium.

1.3 Unless a single unit is used, 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 *The following precautionary caveat pertains only to the test method portions of this specification: 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, 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

E2626 Guide for Spectrometric Analysis of Reactive and Refractory Metals (Withdrawn 2017)[3]

3. Ordering Information

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

3.1.1 ASTM standard number and year of issue,

3.1.2 Type (see 1.2),

3.1.3 Quantity in weight or pieces,

3.1.4 Size, diameter and length,

3.1.5 Chemistry (see 5.2),

3.1.6 Permissible overshipment (see 6.1),

3.1.7 Quality and finish (see 7.2 and 7.6),

3.1.8 Sampling (Section 8)

3.1.9 Packaging (Section 15), and

3.1.10 Required reports (Section 13).

4. Materials and Manufacture

4.1 The ingot metal for all four types may be vacuum or plasma arc melted, vacuum electron-beam melted, or any combination of these three methods.

5. Chemical Requirements

5.1 The finished ingot shall conform to the requirements for chemical composition as prescribed in Table 1.

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

[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.