



## Designation: B652/B652M – 10 (Reapproved 2018)

# Standard Specification for Niobium-Hafnium Alloy Ingots<sup>1</sup>

This standard is issued under the fixed designation B652/B652M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers hafnium alloyed niobium ingots prepared by vacuum- or plasma- arc melting or electron-beam furnace melting, or a combination of these methods, to produce consolidated metal for processing to various mill shapes.

1.2 The material covered by this specification is Grade R04295, niobium-base alloy containing approximately 10 % hafnium and 1 % titanium.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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:*<sup>2</sup>

**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**E2626 Guide for Spectrometric Analysis of Reactive and Refractory Metals** (Withdrawn 2017)<sup>3</sup>

## 3. Terminology

3.1 *Lot Definitions:*

<sup>1</sup> 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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<sup>2</sup> 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.

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

3.1.1 *ingot, n*—a quantity of metal cast into a shape suitable for subsequent processing to various mill products.

## 4. Ordering Information

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

4.1.1 General alloy description (see 1.2) and ASTM designation and year of issue,

4.1.2 Quantity in weight or pieces,

4.1.3 Size: diameter and length,

4.1.4 Chemistry (Section 6),

4.1.5 Quality and finish (see 8.2, 8.4, and 8.6),

4.1.6 Certifications and Reports (Section 14),

4.1.7 Packaging (Section 16), and

4.1.8 Disposition of rejected material (Section 12).

## 5. Materials and Manufacture

5.1 The ingot metal for this material may be vacuum- or plasma-arc melted, electron-beam melted, or a combination of these methods.

## 6. Chemical Composition

6.1 The material shall conform to the requirements as to chemical composition prescribed in Table 1. Analysis for elements, not listed in Table 1 and not normally expected in niobium hafnium alloy, shall not be required unless specified at time of purchase. Guide E2626 may be used as a guide for chemical analysis techniques.

## 7. Permissible Variations in Quantity

7.1 For orders requiring up to 100 lb [45 kg] of ingots, the manufacturer may overship up to a maximum of 20 %. For orders up to 1000 lb [450 kg], the manufacturer may overship up to a maximum of 10 %. The permissible overshipment shall be negotiated for orders larger than 1000 lb [450 kg].

## 8. Workmanship, Finish, and Appearance

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

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

8.3 In the conditioned ingot, no abrupt changes in diameter or local depressions that will impair subsequent fabrication will