



Standard Specification for Niobium-Hafnium Alloy Foil, Sheet, Strip, and Plate¹

This standard is issued under the fixed designation B654/B654M; 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 hafnium alloyed niobium foil, sheet, strip, and plate.

1.2 The material covered by this specification is 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 *The following safety hazards caveat pertains only to the test methods portion, Section 14, of this specification: This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard 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

B652/B652M Specification for Niobium-Hafnium Alloy Ingots

E8 Test Methods for Tension Testing of Metallic Materials

E21 Test Methods for Elevated Temperature Tension Tests of Metallic Materials

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

E2626 Guide for Spectrometric Analysis of Reactive and Refractory Metals

3. Terminology

3.1 *Definitions:*

¹ This specification is under the jurisdiction of 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.

3.1.1 *foil, n*—a flat product less than 6 in. [150 mm] wide and less than 0.005 in. [0.13 mm] in thickness.

3.1.2 *lot, n*—a lot is defined as that material produced from one ingot and heat-treated at the same conditions. Unless otherwise agreed between manufacturer and purchaser, a lot shall be limited to the product of an 8 h period for final continuous anneal or to a single furnace load for a final batch anneal

3.1.3 *plate, n*—a flat product 6 in. [150 mm] or more in width and more than 0.187 in. [4.8 mm] in thickness.

3.1.4 *sheet, n*—a flat product 6 in. [150 mm] or more in width and from 0.005 in. [0.13 mm] to 0.187 in. [4.8 mm] in thickness.

3.1.5 *strip, n*—a flat product, may be supplied in coil, less than 6 in. [150 mm] wide and from 0.005 in. [0.13 mm] to 0.187 in. [4.8 mm] in thickness.

4. Ordering Information

4.1 Orders for material under this specification should 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 or thickness, width, and length, as applicable,

4.1.4 Chemical Composition (Section 6),

4.1.5 Temper (Section 7),

4.1.6 Mechanical test temperature and limits (Sections 8 and 14),

4.1.7 Permissible dimensional tolerances and weight or quantity variations (see 9.3),

4.1.8 Quality and finish (see 10.2),

4.1.9 Sampling (see 13.2),

4.1.10 Inspection Witnessing (see 15.2),

4.1.11 Certification Requirements (Section 18), and

4.1.12 Packaging (Section 20).

5. Materials and Manufacture

5.1 Materials covered by this specification shall be made from ingots in accordance with Specification **B652/B652M**.