



Designation: B 776 – 91 (Reapproved 1995)

AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Hafnium and Hafnium Alloy Strip, Sheet, and Plate¹

This standard is issued under the fixed designation B 776; 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 two grades of hafnium strip, sheet, and plate, one specifically for nuclear applications (Grade R1) and one for commercial applications for alloying (Grade R3).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 8 Test Methods for Tension Testing of Metallic Materials²

E 21 Test Methods for Elevated Temperature Tension Tests of Metallic Materials²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *lot*—a lot shall consist of all material of the same mill thickness, shape, and condition produced from the same ingot by the same reduction schedule and the same final heat-treating conditions.

4. Classification

4.1 The strip, sheet, or plate is to be furnished in one of the two grades shown in Table 1.

5. Ordering Information

5.1 Purchase orders for material under this specification shall include the following information as required to adequately describe the desired material:

5.1.1 Quantity (weight or number of pieces),

TABLE 1 Chemical Requirements

Elements	Composition, weight	
	Grade R1	Grade R3
Aluminum	0.010	0.050
Carbon	0.015	0.025
Chromium	0.010	0.050
Copper	0.010	...
Hydrogen	0.0025	0.0050
Iron	0.050†	0.0750
Molybdenum	0.0020	...
Nickel	0.0050	...
Niobium	0.010	...
Nitrogen	0.010	0.015
Oxygen	0.040	0.130
Silicon	0.010	0.050
Tantalum	0.020	...
Tin	0.0050	...
Titanium	0.010	0.050
Tungsten	0.0150	0.0150
Uranium	0.0010	...
Vanadium	0.0050	...
Zirconium	^A	^A
Hafnium	balance	balance

^AZirconium shall be reported. Acceptable levels shall be established by mutual agreement between purchaser and producer.

† Editorially corrected.

5.1.2 Number of material,

5.1.3 Form (strip, sheet, plate),

5.1.4 Metallurgical condition (6.2),

5.1.5 Finish (Section 11),

5.1.6 Applicable dimensions (thickness, width, and length),

5.1.7 Grade (Table 1), and

5.1.8 ASTM designation and year of issue.

NOTE 1—A typical ordering description is as follows: twenty-eight pieces hafnium plate, annealed; mechanically descaled and pickled; 0.158 in. by 6.000 in. thick by 18-in. long lengths; Grade R1; ASTM B776— ____.

5.2 In addition to the data specified in 5.1, the following options and points of agreement between the manufacturer and the purchaser shall be specified on the purchase order if required:

5.2.1 Mechanical test temperature (see 8.1),

5.2.2 Tolerances (Section 10),

5.2.3 Workmanship standards (Section 11),

5.2.4 Special or alternate tests (Sections 8 and 14),

5.2.5 Inspection (Section 16),

5.2.6 Corrosion testing (Section 9),

5.2.7 Zirconium analysis requirements (Table 1), and

5.2.8 The isotopic hafnium composition and its analysis, if required, shall be mutually agreed upon by the purchaser and producer.

¹ This specification is under the jurisdiction of ASTM Committee B-10 on Reactive and Refractory Metals and Alloys and is the direct responsibility of Subcommittee B10.02 on Zirconium and Hafnium.

Current edition approved July 26, 1991. Published November 1991. Originally published as B 776 – 87. Last previous edition B 776 – 90.

² Annual Book of ASTM Standards, Vol 03.01.

³ Annual Book of ASTM Standards, Vol 14.02.