



Designation: B 494/B 494M – 01

## Standard Specification for Primary Zirconium<sup>1</sup>

This standard is issued under the fixed designation B 494/B 494M; 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 primary zirconium metal commonly designated as sponge or chunklets, but may also take other forms. This specification does not include crystal bar zirconium.

1.2 Unless a single unit is used, for example corrosion mass gain in  $\text{mg}/\text{dm}^2$ , the values stated in either inch-pound or SI units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore each system must be used independently of the other. SI values cannot be mixed with inch-pound values.

1.3 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 and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

2.1 *ASTM Standards:*

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>2</sup>

### 3. Terminology

3.1 *Lot Definitions:*

3.1.1 *castings*—a lot shall consist of all castings produced from the same pour.

3.1.2 *ingot*—no definition required.

3.1.3 *rounds, flats, tubes, and wrought powder metallurgical products (single definition, common to nuclear and non-nuclear standards)*—a lot shall consist of a material of the same size, shape, condition, and finish produced from the same ingot or powder blend by the same reduction schedule and the same heat treatment parameters. 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 final batch anneal.

3.1.4 *sponge*—a lot shall consist of a single blend produced at one time.

3.1.5 *weld fittings*—definition is to be mutually agreed upon between manufacturer and the purchaser.

### 4. Classification

4.1 Primary zirconium is furnished in two grades:

4.1.1 *Grade R60702*—Unalloyed zirconium.

4.1.2 *Grade R60703*—Unalloyed zirconium for metallurgical alloying.

### 5. Ordering Information

5.1 Orders for material under this specification shall include the following information:

5.1.1 Quantity (weight),

5.1.2 Name of material (zirconium sponge or chunklet),

5.1.3 Grade number (see 3.1.1),

5.1.4 Method of manufacture (Section 6),

5.1.5 ASTM designation and year of issue,

5.1.6 Additions to the specification and supplementary requirements, if required,

5.1.7 Mutually agreed upon marking requirements for the containers, and

5.1.8 Oxygen limits, when needed.

NOTE 1—A typical ordering description is as follows: 3000 lb (2000kg) zirconium sponge, ASTM B 494, dated \_\_, Grade R60703.

### 6. Materials and Manufacture

6.1 Zirconium metal is usually prepared by reduction of zirconium tetrachloride, and it gets its physical characteristics from the processes involved in production. These characteristics may be expected to vary greatly with manufacturing methods. This specification, however, is not limited to metal prepared by reduction of tetrachloride or to material of any specific physical form.

6.2 Only virgin zirconium metal, in identified, uniform, well-mixed blends, shall be supplied under this specification.

### 7. Chemical Composition

7.1 The material shall conform to the requirements as to chemical composition prescribed in Table 1.

7.2 When requested by the purchaser, a check analysis shall be performed for any elements listed in Table 1.

7.2.1 The manufacturer's analysis shall be considered as

<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 B10.02 on Zirconium and Hafnium.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.02.