Designation: B777 – 15

Standard Specification for Tungsten Base, High-Density Metal[1]

This standard is issued under the fixed designation B777; 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 the requirements for four classes of machinable, high-density tungsten base metal produced by consolidating metal powder mixtures, the composition of which is mainly tungsten. This material specification may be used for bare parts or for parts that may be coated with other materials for protection against corrosion and abrasion.

1.2 This specification describes physical, mechanical, and microstructural testing of a material lot based on the use of test coupons, not actual parts. Sintered properties typically vary both with part size and sampling location within a given part. Results obtained from coupon testing may therefore differ from the properties of a specific location in a larger part.

1.3 *Intended Use*—Parts made from this material are intended for uses such as weights or counter-balances in static or dynamic balancing, high-speed rotating inertia members, radiation shielding, hypervelocity impact, and vibration-damping applications. In selecting the appropriate alloy for a given application, it is important to note that as the tungsten content of the alloy is increased, stiffness, radiation attenuation, and density increase with an accompanying decrease in attainable ductility.

1.4 *Special Applications*—For particular applications, properties or requirements other than those specified in Sections 5, 6, and 7 of this specification may be important. These alloys may contain elements which make them weakly ferromagnetic. Where freedom from magnetic response is required, this should be specified in the purchase order. Class 4 is not available in a non-magnetic grade. For purposes of this specification, non-magnetic material is defined as material having a maximum magnetic permeability of 1.05 (see Test Method A342). Also for special applications involving large sections, methods for determining internal quality, such as mechanical testing of specimens excised from these larger sections or suitable nondestructive tests may be applied. If such part property data are required, an additional part-specific test program shall be specified in the purchase order.

1.5 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.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A342 Test Methods for Permeability of Weakly Magnetic Materials

B311 Test Method for Density of Powder Metallurgy (PM) Materials Containing Less Than Two Percent Porosity

D3951 Practice for Commercial Packaging

E3 Guide for Preparation of Metallographic Specimens

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E407 Practice for Microetching Metals and Alloys

2.2 *Federal Standard:*

Fed. Std. No. 151 Metals, Test Methods[3]

3. Classification

3.1 The tungsten base metal shall be of the following classes (see Table 1 and Table 2), as specified (see 4.1).

4. Ordering Information

4.1 Orders for tungsten base, high-density metal should specify the following:

4.1.1 Title, designation, and year of issue of this specification,

4.1.2 Class, (see 3.1),

4.1.3 Quantity,

4.1.4 Levels of preservation and packing (see 9.1),

4.1.5 Special markings, if required (see 9.2),

4.1.6 Method of hardness testing, if different from Rockwell "C" (see Table 1),

[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 B10.04 on Molybdenum and Tungsten.

Current edition approved Dec. 1, 2015. Published December 2015. Originally approved in 1987. Last previous edition approved in 2013 as B777 – 07 (2013). DOI: 10.1520/B0777-15.

[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] Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, http://quicksearch.dla.mil.