

(R) Tungsten Alloy Shapes, Sintered, High Density

1. SCOPE:

1.1 Form:

This specification covers two types of tungsten alloy in the form of sintered shapes.

1.2 Application:

This material has been used typically for parts, such as counterbalance weights or projectiles, requiring maximum weight per unit volume, but usage is not limited to such applications.

1.3 Classification:

Products covered by this specification are classified as follows:

Type 1 - tungsten with nickel and copper

Type 2 - tungsten with iron and nickel

1.3.1 Unless a specific type is ordered, either type may be supplied.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order form a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright 2000 Society of Automotive Engineers, Inc.
All rights reserved.

Printed in U.S.A.

QUESTIONS REGARDING THIS DOCUMENT:
TO PLACE A DOCUMENT ORDER:

(724) 772-7161
(724) 776-4970

FAX: (724) 776-0243
FAX: (724) 776-0790

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19248-2959.

ASTM B 311 Density of Cemented Carbides

ASTM E 8 Tension Testing of Metallic Materials

ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

3.1.1 Type 1: Shall be nominally 90% tungsten with the balance being primarily an alloy of nickel and copper.

3.1.2 Type 2: Shall be nominally 90% tungsten with the balance being primarily an alloy of nickel, iron, and other elements as required.

3.2 Condition:

As produced, unless machined surfaces are specified by purchaser.

3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Tensile Properties: Specimens cut from shapes 2 inches (50 mm) and under in section thickness shall conform to the requirements of Table 1 (See 8.2) determined in accordance with ASTM E 8:

TABLE 1 - Minimum, Mechanical Properties

Type	Property	Value
1	Ultimate Tensile Strength	94 ksi (645 MPa)
	Yield Strength at 0.2% offset	70 ksi (485 MPa)
	Elongation in 4D	1%
2	Ultimate Tensile Strength	110 ksi (755 MPa)
	Yield Strength at 0.2% offset	75 ksi (515 MPa)
	Elongation in 4D	2%

3.3.1.1 In those cases where shape sizes are inadequate to extract tensile specimens, such specimens may be extracted from a bar or shape produced from material from the same materials and processed along with the shapes.

3.3.2 Hardness: Shall be 20 to 32 HRC, determined in accordance with ASTM E 18.

3.3.3 Density: Shall be 16.7 to 17.2 g/cm³, determined in accordance with ASTM B 311, except that shapes of large section or weighing more than 2500 g may have density as low as 16.5 g/cm³.

3.3.4 Microstructure: Shall be a uniform distribution of tungsten particles in a metallic matrix, and homogeneous, when examined at 200X magnification.

3.4 Quality:

Shapes, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from cracks, loose particles and other imperfections detrimental to usage of the shapes.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of shapes shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: All requirements are acceptance tests and shall be performed on each lot.

4.3 Sampling:

Shall be in accordance with the following. A lot shall be all sintered shapes formed from one blend of powder and thermally processed in a single batch.

4.3.1 Tensile properties, hardness, density and microstructure shall be taken from one part per lot. Where the part is of such a size or shape as to prevent extraction of a tensile specimen, a test block or a tensile test specimen, formed from the same blend of powder and thermally processed with the lot may be used.

4.4 Approval:

4.4.1 Sample sintered shapes from new or reworked master patterns shall be approved by purchaser before shapes for production use are supplied, unless such approval be waived by purchaser.

4.4.2 Vendor shall use ingredients, processing techniques, and methods of inspection on production sintered shapes which are essentially the same as those used on the approved sample shapes. If necessary to make any change in ingredients, processing techniques, or methods of inspection, vendor shall submit for reapproval a statement of the proposed changes in materials, processing, or both and, when requested, sample shapes. Production shapes made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.4.3 For material procured in off-the-shelf bar or briquette forms, approval is not required.

4.5 Reports:

4.5.1 The vendor of shapes shall furnish with each shipment a report showing the results of tests on each lot in the shipment to determine conformance to the acceptance test requirements and stating that the material conforms to the other technical requirements. This report shall include the purchase order number, AMS 7725C, lot number, type (1 or 2), form, size or part number, and quantity.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the shapes may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the shapes represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Individual pieces shall have attached a durable tag marked with the purchase order number, AMS 7725C, type, and nominal size or part number or shall be boxed and the box marked with the same information.

5.2 Packaging:

The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT:

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS:

Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES:

8.1 A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this specification. An (R) symbol to the left of the document title indicates a complete revision of the specification, including technical revisions. Change bars and (R) are not used in original publications, nor in specifications that contain editorial changes only.