Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 7730C
Superseding AMS 7730B
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DEPLETED URANIUM CASTINGS

1. SCOPE:

1.1 Form: This specification covers depleted uranium in the form of castings.

1.2 Application: Primarily for use as cast aircraft counterweights where it is desirable to produce compound contours without machining and where space limitations require the use of a high-density material. Applications in oxidizing atmospheres necessitate a protective coating.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2360 - Room Temperature Tensile Properties of Castings
AMS 2645 - Fluorescent Penetrant Inspection
AMS 2646 - Contrast Dye Penetrant Inspection

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E8 - Tension Testing of Metallic Materials

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by methods agreed upon by purchaser and vendor.

	min	max
Uranium	99.00	-
Carbon	-	0.07

3.2 Condition: As cast and cadmium plated.

3.3 Casting: Melting and casting shall be performed in vacuum unless melting and casting under inert atmosphere are permitted by purchaser. Molds shall be made of graphite or insoluble refractory material unless special casting techniques are used to prevent contamination with foreign materials. Extreme care shall be exercised to avoid contact of the molten metal with more soluble refractories such as those containing silica.

3.4 Test Specimens: Tensile test specimens shall be cast to represent each heat of metal in castings, shall be cast in molds made of the same mold material as used for the castings, heated to the same temperature as the molds for the castings, and shall be cooled at approximately the same rate as the castings. The specimens shall be of standard proportions in accordance with ASTM E8 with 0.250 in. (6.35 mm) diameter at the reduced parallel gage section and shall be cast to size or machined from actual castings or from separately-cast coupons of adequate size to yield such specimens.

3.5 Plating: Cleaning and plating shall be accomplished on all parts such that a continuous, smooth, pore-free, crack-free, adherent, plated finish is produced. Plating shall consist of a sulfamate ø nickel deposit applied to a thickness of 0.001 - 0.003 in. (0.03 - 0.08 mm) followed by a deposit of cadmium applied to a thickness of 0.001 - 0.003 in. (0.03 - 0.08 mm) with supplementary chomate treatment. All sharp edges and corners shall be broken prior to plating.

3.6 Properties: Castings and representative test specimens produced in accordance with 3.4 shall conform to the following requirements:

3.6.1 Separately-Cast Specimens:

3.6.1.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	70,000 psi (483 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (241 MPa)
Elongation in 4D, min	6%

3.6.2 Castings:

3.6.2.1 Tensile Properties: When specified on the drawing or when agreed upon by purchaser and vendor, tensile test specimens conforming to ASTM E8 shall be machined from castings selected at random from each lot. Property requirements for such specimens shall be as specified ø on the drawing or as agreed upon by purchaser and vendor and may be defined as specified in AMS 2360.

3.6.2.2 Density: Shall be not lower than 0.673 lb per cu in. (18.63 Mg/m^3), unless otherwise specified.

3.6.2.3 Radiation Emission: The radiation emission of the casting, at the surface of the casting, shall be not greater than 220 mR (56.8 μC/kg) per hr, beta plus gamma. After cadmium plating, the radiation emission shall be not greater than 210 mR (54.2 μC/kg) per hour.

3.6.2.3.1 The radiation emission values of 3.6.2.3 are valid only if measured with a beta-gamma survey meter having a scale of 0 - 250 mR (0 - 64.5 μC/kg) per hr with a full scale accuracy of ±10%. If any other instrument is used, conversion shall be required.

3.7 Quality:

3.7.1 Castings:

3.7.1.1 Castings, as received by purchaser, shall be uniform in quality and condition, sound, and free ø from foreign materials and from internal and external imperfections detrimental to usage of the castings.

Ø 3.7.1.1.1 Castings shall have smooth surfaces and shall be well cleaned.

3.7.1.2 Repair of minor imperfections by inert-gas-shielded fusion welding is permitted unless otherwise specified; the repair shall not be detrimental to fabrication or to performance of parts and shall be free from cracks, porosity, and other harmful imperfections, determined by fluorescent penetrant inspection in accordance with AMS 2645 or contrast dye penetrant inspection in accordance with AMS 2646.

3.7.1.3 Surface imperfections may be removed with suitable grinders or other tools but the blending of imperfections shall not result in dimensions outside the drawing limits.

3.7.2 Plating: Shall be smooth, fine grained, adherent to all surfaces of the finished part, and free from cracks, blisters, pits, nodules, and other defects.

3.7.2.1 All plated parts shall be fluorescent penetrant inspected in accordance with AMS 2645 or contrast
Ø dye penetrant inspected in accordance with AMS 2646 to ensure the absence of porosity and cracks in the finished plating.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of castings shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the castings conform to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this
Ø specification are classified as acceptance tests and as preproduction tests and shall be performed on each lot of castings.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction
Ø test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following; a lot shall be all castings of the same configuration from the same heat of molten metal:

4.3.1 Composition: One casting from each lot.

4.3.2 Tensile Properties:

4.3.2.1 One tensile test specimen in accordance with 3.4 from each lot.

4.3.2.2 One or more castings from each lot when properties of specimens machined from castings are required. Size, location, and number of specimens machined from castings shall be as specified
Ø on the drawing or as agreed upon by purchaser and vendor. When size, location, and number of specimens are not specified, not less than two tensile test specimens, one from the thickest section and one from the thinnest section, shall be cut from a casting or castings from each lot.

4.3.3 Density and Radiation Emission: One casting from each lot.

4.3.4 Statistical Sampling: Testing for tensile properties of each lot may be waived by the purchaser upon vendor's demonstration of a statistical sampling plan which will ensure that the tensile properties of 3.6.1.1 and 3.6.2.1 will be met.

4.4 Approval:

4.4.1 Sample castings from new or reworked patterns and the casting procedure shall be approved by purchaser before castings for production use are supplied, unless such approval be waived.

4.4.2 Vendor shall establish for production of sample castings of each part number parameters for the control factors of processing which will produce acceptable castings; these shall constitute the approved casting procedure and shall be used for producing production castings. If necessary to make any change in parameters for the control factors of processing, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample castings, test specimens, or both. Production castings incorporating the revised operations shall not be shipped prior to receipt of reapproval.

4.4.2.1 Control factors for producing castings include, but are not limited to, the following:

Type of furnace and its capacity
Size of furnace charge
Furnace atmosphere
Fluxing or deoxidation procedure
Mold refractory formulation
Mold back-up material
Gating practices
Mold preheating and pouring temperatures
(variations of ±25°F (±15°C) from established limits are acceptable)
Solidification and cooling procedures
Cleaning operations
Cadmium plating procedures
Methods of routine inspection

4.4.2.1.1 Any of the above control factors of processing for which parameters are considered proprietary by the vendor may be assigned a code designation. Each variation in such parameters shall be assigned a modified code designation.

4.5 Reports: The vendor of castings shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, heat number and/or code symbol, material specification number and its revision letter, part number, and quantity from each lot.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the castings 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 castings represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Each casting shall, before plating, be impression stamped "CAUTION - RADIOACTIVE MATERIAL - DEPLETED URANIUM" in such a manner as to ensure legibility after plating. In addition, each part shall be identified as to part number and lot number, unless otherwise specified. Methods of applying characters shall be as agreed upon by purchaser and vendor. Methods of marking shall have no deleterious effects on the castings or their performance.

5.2 Packaging:

5.2.1 Castings 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 castings to ensure carrier acceptance and safe delivery. Each container shall contain only parts of the same configuration, condition, and pattern. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.