

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard



AMS 5791A

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Superseding AMS 5791

Cobalt Alloy, Powder, Plasma Spray 56.5Co - 25.5Cr - 10.5Ni - 7.5W

1. SCOPE:

1.1 Form:

This specification covers a cobalt alloy in the form of powder.

1.2 Application:

Primarily for producing plasma spray coatings to provide surfaces resistant to wear, corrosion, and abrasion.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The applicable issue of referenced publications shall be the issue in effect on the date of the purchase order.

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 16428-2959.

ASTM B 214 Sieve Analysis of Granular Metal Powders

ASTM C 117 Material Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing

ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

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3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Powder shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	0.45	0.55
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.04
Sulfur	--	0.04
Chromium	24.50	26.50
Nickel	9.50	11.50
Tungsten	7.00	8.00
Iron	--	2.00
Cobalt	remainder	

3.2 Condition:

Powder shall be oxide reduced by heating within the range 955 to 1010 °C (1751 to 1850 °F) in vacuum or dry hydrogen atmosphere for 2 to 4 hours. This requirement shall be waived if powder is produced by atomizing in an inert atmosphere.

3.3 Properties:

Powder shall conform to the following requirements:

- 3.3.1 Particle Size Determination: Powder shall be supplied with the particle size distribution shown in Table 2. Sieve analysis shall be conducted in accordance with ASTM B 214 or ASTM C 117; the method of testing used shall be reported.

TABLE 2 - Particle Size Determination

U.S. Standard Sieve	Minimum % by weight
Passing through No. 170 (90 μ m)	100
Passing through No. 200 (75 μ m)	95
Retained on No. 325 (45 μ m)	90

3.3.2 Flowability: Powder shall be visually examined for free flowing through a suitable powder feeder and spray gun. The powder stream shall allow the flow to be consistent and without excessive pulsation.

3.3.3 Plasma Spraying: Powder shall produce acceptable plasma spray coatings; standards for acceptance and method of test shall be as agreed upon by purchaser and vendor.

3.4 Quality:

Powder, as received by purchaser, shall be thoroughly blended, uniform in color and quality, dry, and free from foreign materials and from imperfections detrimental to its spraying qualities.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

4.2 Classification of Tests:

Tests for all technical requirements are acceptance tests and preproduction tests and shall be performed prior to or on the initial shipment of powder to a purchaser, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

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

4.3 Sampling and Testing:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient powder shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all powder produced in a single production run from the same batch of raw materials under the same fixed conditions and presented for vendor's inspection at one time.

4.3.1.2 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.5 shall state that such plan was used.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample powder shall be approved by purchaser before powder for production use is supplied, unless such approval be waived by purchaser. Results of tests on production powder shall be essentially equivalent to those on the approved sample powder.

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

4.5 Reports:

The vendor of powder shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the powder conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 5791A, vendor's powder designation, and quantity.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the powder 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 powder represented. Results of all tests shall be reported.