SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS5797 | REV. D

Issued 1952-11
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Superseding AMS5797C

Cobalt Alloy, Corrosion and Heat-Resistant, Covered Welding Electrodes
51.5Co - 20Cr - 10Ni - 15W
(Composition similar to UNS W73605)

RATIONALE

AMS5797D has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat-resistant cobalt alloy in the form of covered welding electrodes.

1.2 Application:

These electrodes have been used typically for shielded-metal-arc welding of parts fabricated from material of similar composition, particularly when the weld zone is required to have corrosion and heat resistance comparable to that of the parent metal, but usage is not limited to such applications.

1.3 Classification:

The electrodes covered by this specification are classified as follows:

Type A - DC
Type B - DC - AC
Type C - DC
Type D - DC - AC

1.3.1 When DC is specified, reverse polarity (electrode positive) is required.

1.3.2 If a type is not specified, Type A shall be supplied.

1.3.3 Lime-type coverings are required for Types A and C electrodes.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS5797D

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

2.2 AWS Publications:

Available from American Welding Society, Inc., 550 NW LeJeune Road, Miami, FL 33126.

AWS A5.4 Stainless Steel Electrodes for Shielded Metal Arc Welding

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Weld metal deposited from electrodes 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	--	0.15
Manganese	0.50	2.00
Silicon	--	1.00
Phosphorus	--	0.03
Sulfur	--	0.03
Chromium	19.00	21.00
Nickel	9.00	11.00
Tungsten	14.00	16.00
Iron	--	3.00
Cobalt	remainder	

3.1.1 Weld Pads for Chemical Analysis: The referee procedure for making pads of weld metal and removing samples for chemical analysis shall be AWS A5.4.

3.2 Properties:

Electrodes shall conform to the following requirements:

3.2.1 Weldability: Electrodes shall demonstrate good weldability, shall flow smoothly and evenly under the conditions specified in 1.3, and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

3.2.2 Burn-Off: The covering shall be consumed uniformly all around and shall not burn back from the core wire under proper welding conditions. Heating of the electrodes during welding shall not cause injurious blistering of the covering within the ranges of current values recommended by the manufacturer.

3.2.3 Grip Portion and Arc Ends: A portion of the electrode 0.75 to 1.25 inches (19.0 to 31.8mm) long on end-grip rods and 1.5 to 2.0 inches (38 to 51 mm) long on center-grip rods shall be bare to permit good electrical contact with the electrode holder. The arc end of the electrodes shall be sufficiently bare to permit easy striking of the arc but the length of this bare section, measured from the end of the electrode to the point where the full cross-section of the covering begins, shall not exceed the diameter of the bare wire and in no case shall it exceed 1/8 inch (3.2mm).

3.2.4 Cleaning: Slag produced during welding shall be readily removable with hand tools.

3.3 Quality:

3.3.1 Core Wire: Shall be uniform in quality and condition, cylindrical, sound, and free from foreign materials and from imperfections detrimental to weld quality.

3.3.2 Covering: Shall be uniform in quality, tightly adherent, and free from abnormal scabs, blisters, pockmarks, bruises, and other surface defects and shall withstand normal handling without damage. It shall not be harmfully hygroscopic and shall not adversely affect weld quality.

3.4 Standard Sizes:

Diameters and lengths shown in Table 2 are standard.

TABLE 2A - Standard Diameters and Lengths, Inch/Pound Units

Nominal Diameter of Core Wire Inch	Length Inches
1/16, 5/64	9 and 18
3/32	9, 10, 12, and 18
1/8, 5/32, 3/16, 1/4	14

TABLE 2B - Standard Diameters and Lengths, SI Units

Nominal Diameter of Core Wire Millimeters	Length Millimeters
1.6, 2.0	229 and 457
2.4	229, 254, 305, and 457
3.2, 4.0, 4.8, 6.4	356

3.4.1 End-grip electrodes shall be supplied in all lengths except 18 inches (457mm) where center-grip electrodes are required.

3.5 Tolerances:

Shall be as follows:

3.5.1 Electrodes shall not vary in length more than ±1/4inch (±6.4 mm) from the length ordered.

3.5.2 Electrode core wire shall not vary in diameter more than ±0.002inch (±0.05mm) from the size ordered.

3.5.3 Overall diameter of the covered electrodes shall not vary more than 4% from that of the sample approved as in 4.4.1.

3.5.4 Covering shall be concentric with the core wire to the extent that the maximum core-plus-one-covering dimension shall not exceed the minimum core-plus-one-covering dimension by more than 5% of the minimum core-plus-one-covering dimension.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of electrodes 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 electrodes conform to specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), grip portion and arc ends (3.2.3), standard sizes (3.4), and tolerances (3.5) are acceptance tests and shall be performed to represent each control number of electrodes.

4.2.2 Periodic Tests: Weldability (3.2.1), burn-off (3.2.2), and cleaning (3.2.4) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the first-article shipment of electrodes to a purchaser, when a change in material and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing:

Shall be as agreed upon by purchaser and vendor; a control number shall be a designation indicating batch processing and core wire heat number.

4.4 Approval:

4.4.1 Sample electrodes shall be approved by purchaser before electrodes for production use are supplied, unless such approval be waived by purchaser.

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

4.5 Reports:

The vendor of electrodes shall furnish with each shipment a report stating that the electrodes conform to the technical requirements. This report shall include the purchase order number, AMS 5797D, control number, size, and quantity. When requested by purchaser, the vendor shall also include in the report the composition of the deposited weld metal for each heat.

4.6 Resampling and Retesting:

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

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 Individual Electrodes:

5.1.1.1 One or more legible imprints of AMS 5797 shall be applied to the electrode covering as near as practical to the grip end of the core wire and within 2-1/2 inches (63.5 mm) of the grip end. In the case of center-grip electrodes, the imprint shall be applied to the electrode covering as above and upon both sides of the center-grip (bare core wire) area.