

Cobalt Alloy, High Temperature Brazing Filler Metal
50Co - 8.0Si - 19Cr - 17Ni - 4.0W - 0.80B
2050 to 2100 °F (1121 to 1149 °C) Solidus-Liquidus Range
(Composition similar to UNS R30040)

1. SCOPE:

1.1 Form:

This specification covers a cobalt alloy in the form of wire, rod, strip, foil, and powder and a viscous mixture (paste) of the powder in a suitable binder.

1.2 Application:

This filler metal has been used typically for joining cobalt alloys requiring corrosion and oxidation resistant joints with good strength at elevated temperatures, but usage is not limited to such applications.

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 cancelled 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 or www.astm.org.

ASTM B 214	Sieve Analysis of Granular Metal Powders
ASTM D 638	Tensile Properties of Plastics
ASTM D 638M	Tensile Properties of Plastics (Metric)
ASTM E 354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

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3. TECHNICAL REQUIREMENTS:

3.1 Composition:

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	0.35	0.45
Silicon	7.50	8.50
Phosphorus	--	0.02
Sulfur	--	0.02
Chromium	18.00	20.00
Nickel	16.00	18.00
Tungsten	3.50	4.50
Boron	0.70	0.90
Iron	--	1.00
Titanium	--	0.05
Aluminum	--	0.05
Zirconium	--	0.05
Selenium	--	0.005 (50 ppm)
Other Elements, total (3.1.1)	--	0.15
Cobalt	remainder	

3.1.1 Determination not required for routine acceptance.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Wire, Strip, and Foil: Powder bonded in a suitable binder.

3.2.2 Rod: As cast, with fins and projections removed.

3.2.3 Powder: As fabricated.

3.2.4 Paste: Shall consist of 84 to 90% by weight powder in a suitable binder and, unless otherwise ordered, shall not contain flux.

3.3 Properties:

Filler metal shall conform to the following requirements:

3.3.1 Wire, Strip, and Foil:

3.3.1.1 Burn-Off of Binder: The binder used for bonding powder to form wire, strip, and foil shall burn off, leaving no adherent residue, when the product is heated to 1000 °F (538 °C) or higher.

3.3.1.2 Tensile Strength: Shall be not lower than 360 psi (2482 kPa), determined in accordance with ASTM D 638 or ASTM D 638M, Speed B.

3.3.1.3 Metallic Content: The ratio of volume of powder to volume of plastic binder shall be the largest possible consistent with the requirements of 3.3.1.1 and 3.3.1.2.

3.3.2 Rod and Powder: When specified, properties shall be as agreed upon by purchaser and vendor.

3.3.3 Paste:

3.3.3.1 Paste shall have a shelf life of not less than six months; not more than thorough mixing shall be required to restore paste for use during that time.

3.3.3.2 Paste, without flux, shall leave no adherent residue when heated in a protective atmosphere to a temperature higher than 1000 °F (538 °C).

3.4 Quality:

The product, as received by purchaser, shall be uniform in color, quality, and condition and free from foreign materials and from imperfections detrimental to its working qualities. Rod and powder shall have a metallic luster. Wire, strip, and foil shall be clean, sound, smooth, and free from ragged edges, splitting, damaged ends, and other imperfections detrimental to usage of the products.

3.5 Sizes and Tolerances:

The product shall be supplied in the following standard sizes and to the tolerances shown:

3.5.1 Wire:

3.5.1.1 Nominal Diameters: Shall be as shown in Table 2.

TABLE 2 - Standard Diameter Sizes

Inch	Millimeters
0.031	0.79
0.062	1.57
0.125	3.18
0.188	4.78

3.5.1.2 Diameter Tolerances: Shall be ± 0.004 inch (± 0.10 mm).

3.5.2 Rod:

3.5.2.1 Nominal Diameters: Shall be as ordered.

3.5.2.2 Diameter Tolerances: Shall be as shown in Table 3.

TABLE 3 - Diameter Tolerance

Diameter Inch	Diameter Millimeters	Tolerance, % of Diameter
0.031	0.79	± 20
0.062	1.57	± 15
0.125	3.18	± 10
0.188	4.78	± 10

3.5.2.3 Concentricity: When long lengths are supplied as welded composites of cast lengths, the diameters of the adjacent sections shall be concentric within ± 0.031 inch (± 0.79 mm).

3.5.3 Strip and Foil: When specified, tolerances shall be as agreed upon by purchaser and vendor.

3.5.4 Powder:

3.5.4.1 Mesh Designation: Shall be 140.

3.5.4.2 Powder shall be supplied in accordance with the limits on particle size distribution shown in Table 4, unless some other distribution is specified. Tests shall be in accordance with ASTM B 214.

TABLE 4 - Particle Size Distribution

Mesh Designation	U.S. Standard Sieve
140F	On a No. 100 sieve - 0.5% max
	On a No. 140 sieve - 10% max
	Through a No. 325 sieve - 55% max

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product 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 technical requirements, other than shelf life of paste (3.3.3.1), are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Shelf life of paste (3.3.3.1) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with the following:

4.3.1 Composition: One sample shall be taken from each furnace charge except that powder produced from consecutive furnace charges and collected together, without teardown of the atomizing equipment, shall constitute a batch, from which one or more samples shall be taken.

4.3.2 Properties Except Shelf Life of Paste: One sample from each lot.

4.3.2.1 A lot shall be all product, other than powder or paste, which has been tested and found to conform to Table 1, in the same temper and size, and presented for vendor's inspection at one time.

4.3.2.2 A lot of powder shall be a uniform blend of powder produced from one or more furnace charges, except as modified by 4.3.1, each meeting the requirements of Table 1 and presented for vendor's inspection at one time.

4.3.2.3 A lot of paste shall be that paste produced from a single lot of powder, combined with binder from the same manufacturing batch, and presented for vendor's inspection at one time

4.4 Reports:

The vendor of the product shall furnish with each shipment a report showing the composition of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number or numbers, AMS 4783F, form, size, and quantity.

4.5 Resampling and Retesting:

Not applicable.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 Shall be as agreed upon by purchaser and vendor.