AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
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ALLOY CASTINGS, PRECISION INVESTMENT, CORROSION AND HEAT RESISTANT
Cobalt Base - 25Cr - 5W

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

2. APPLICATION: Primarily for small parts, such as turbine blades or buckets, requiring high strength up to 1500 F and oxidation resistance up to 2000 F.

3. COMPOSITION: Castings shall conform to the following:

Carbon	0.35 - 0.45
Manganese	1.00 max
Silicon	1.00 max
Chromium	23.00 - 27.00
Nickel	0.50 - 3.00
Molybdenum	1.00 max
Tungsten	4.00 - 6.00
Iron	2.00 max
Cobalt	Remainder

4. CASTING:

4.1 Castings shall be poured either from remelted master heat metal or directly from a master heat. A master heat is previously refined metal of a single furnace charge, except when produced in the form of shot. A master heat in the form ø of shot shall be the uniformly blended product of one or more furnace charges, with total weight not exceeding 7000 lb. Gates, sprues, risers and rejected castings shall only be used in preparation of master heats; they shall not be remelted directly, without refining, for pouring of castings.

4.2 Temperature of Metal for Pouring: The temperature of the metal for pouring of ø castings shall be held within ± 50 F of that agreed upon by purchaser and vendor.

4.3 Temperature of Molds: The temperature of the mold cavities at time of receiving ø metal from the furnace or ladle shall be held within ± 50 F of that agreed upon by purchaser and vendor.

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5. TEST SPECIMENS:

5.1 Tensile Test Specimens: Unless otherwise specified, tensile test specimens shall be cast to represent each master heat of metal in castings and, when requested, shall be supplied with the castings. The specimens shall be of standard proportions with 0.25 in. diameter at the reduced parallel section and shall be cast to size in molds made of the same refractory and heated to the same temperature as the molds for castings, and shall be cooled at approximately the same rate as the castings. If the metal for castings is given any treatment such as fluxing or cooling and reheating, metal for the specimens shall be so treated and during such treatment be heated to the same maximum temperature and held for approximately the same length of time as the molten metal for castings. The temperature of the metal during pouring of the specimens shall not be lower than the temperature of the metal during pouring of the castings.

5.2 Bend Test Specimens: Three specimens at least 0.090 in. in diameter or thickness and approximately 2 in. in length shall be cast in each mold along with each cast part or parts.

6. CONDITION: As cast, unless otherwise specified.

7. TECHNICAL REQUIREMENTS:

7.1 Hardness:

7.1.1 Castings as cast shall have hardness not higher than Rockwell C 34.

7.1.2 Castings and specimens after being heated at 1475 F ± 10 for 50 hr and cooled to room temperature shall have hardness not higher than Rockwell C 45.

7.2 Tensile Properties: Tensile test specimens produced in accordance with 5.1, heated to 1500 F ± 10, held at 1500 F ± 10 for 30 min. before testing, and tested at 1500 F ± 10 at a rate of 0.045-0.062 in. per min. shall conform to the following requirements:

Tensile Strength, psi	50,000 min
Elongation, % in 1 in.	10 min

7.3 Bending: At least two of the specimens cast in each mold in accordance with 5.2 shall withstand, without cracking, bending at room temperature through an angle of 30 degrees around a 0.5 in. diameter. If more than one specimen from a mold fails to pass this test, the disposition of the castings from that mold may be determined by applying a similar test to an actual casting or apecimens cut from castings, gates or runners. Such specimens shall be not less than 0.090 in. in diameter or thickness. Failure of any such additional specimens will be cause for rejection of the castings.

8. QUALITY:

8.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts. Castings shall have smooth surfaces and shall be well cleaned. Unless otherwise specified, metallic shot or grit shall not be used for final cleaning.