SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York, N. Y. 10017

# AEROSPACE MATERIAL SPECIFICATIONS

AMS 5383

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Revised

## ALLOY CASTINGS, INVESTMENT, CORROSION AND HEAT RESISTANT
Nickel Base - 19Cr - 3.0Mo - 5.1(Cb + Ta) - 0.90Ti - 0.60Al
Vacuum Melted, Vacuum Cast



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

2. APPLICATION: Primarily for structural parts requiring strength up to 1300 F (704 C) and oxidation resistance up to 1800 F (982 C).

3. COMPOSITION: Castings shall conform to the following:

| | min | max |
|---|---|---|
| Carbon | -- | 0.10 |
| Manganese | -- | 0.35 |
| Silicon | -- | 0.35 |
| Phosphorus | -- | 0.015 |
| Sulfur | -- | 0.015 |
| Chromium | 17.00 | 21.00 |
| Nickel | 50.00 | 55.00 |
| Molybdenum | 2.80 | 3.30 |
| Columbium + Tantalum | 4.75 | 5.50 |
| Titanium | 0.65 | 1.15 |
| Aluminum | 0.40 | 0.80 |
| Titanium + Aluminum | -- | 1.75 |
| Cobalt | -- | 1.00 |
| Boron | -- | 0.006 |
| Copper | -- | 0.30 |
| Iron | remainder | |

4. CONDITION: Homogenization and solution heat treated, unless otherwise specified.

5. TECHNICAL REQUIREMENTS:

5.1 Casting: Castings shall be produced from master heat metal remelted and poured under vacuum without loss of vacuum between melting and pouring. A master heat is metal of a single furnace charge melted and cast into ingot under vacuum. Gates, sprues, risers, and rejected castings shall be used only in preparation of master heats; they shall not be remelted directly for pouring of castings.

5.2 Test Specimens:

5.2.1 Separately Cast 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, 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. Center gating may be used but, if specimens are so gated, the gate shall be completely removed before testing. If the metal for castings is given any treatment such as fluxing or cooling and reheating, metal for the specimens shall be so treated. If grain refining techniques are used for castings, similar techniques shall be used for producing test specimens.





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5.2.2 Specimens Machined from Castings: When agreed upon by purchaser and vendor, tensile test specimens may be machined from castings selected at random from the shipment. Size and locations of specimens and mechanical properties required shall be as shown on the drawing or as agreed upon by purchaser and vendor.

5.3 Heat Treatment: Castings and test specimens shall be heat treated as follows; the test specimens shall be heat treated with, or in the same manner as, the castings they represent.

5.3.1 Homogenization Heat Treatment: Heat in a suitable protective atmosphere to 2000 F ± 25 (1093.3 C ± 14), hold at heat for 1 - 2 hr, and cool as required to below 90 F (32 C).

5.3.2 Solution Heat Treatment: Heat in a suitable protective atmosphere within the range of 1750 - 1800 F (954.4 - 982.2 C), hold at the selected temperature within ±25 F (±14 C) for 1 hr, and cool at a rate equivalent to air cool or faster.

5.4 Hardness: Shall be not higher than Rockwell C 25 or equivalent.

5.5 Properties after Precipitation Heat Treatment: Tensile test specimens produced in accordance with 5.2.1, heat treated as in 5.3, and then precipitation heat treated by heating to 1325 F ± 15 (718.3 C ± 8.3), holding at heat for 8 hr, furnace cooling to 1150 F ± 15 (621.1 C ± 8.3), holding at 1150 F ± 15 (621.1 C ± 8.3), for a total precipitation time of 18 hr, and cooling at a rate equivalent to air cool or faster, shall conform to the following requirements:

5.5.1 Room Temperature Tensile Properties:

| | |
|---|---|
| Tensile Strength, psi | 125,000 min |
| Yield Strength at 0.2% Offset, psi | 110,000 min |
| Elongation, % in 1 in. or 4D | 5 min |
| Reduction of Area, % | 10 min |

5.5.2 Hardness: Shall be Rockwell C 34 - 44 or equivalent.

5.5.3 Stress Rupture Test at 1300 F (704.4 C): Test specimens maintained at 1300 F ± 3 (704.4 C ± 1.7) while an axial load of 65,000 psi is applied continuously shall not rupture in less than 23 hours. The test shall be continued until the specimen ruptures. Elongation after rupture, measured at room temperature, shall be not less than 3% in 4D.

5.5.3.1 The test of 5.5.3 may be conducted at a stress higher than 65,000 psi but stress shall not be changed while test is in process, unless otherwise permitted. Time to rupture and elongation requirements shall be as specified in 5.5.3.

6. QUALITY:

6.1 Castings shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections 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.

6.2 When castings are broken for fracture test, the fracture shall have uniform color and be substantially free from oxides and other defects.

6.3 Radiographic and other quality standards shall be as agreed upon by purchaser and vendor.

6.4 Unless otherwise specified, castings shall be produced under radiographic control. This shall consist of radiographic examination of castings until proper foundry technique, which will produce castings free from harmful internal imperfections, is established for each part number, and of production castings as necessary to ensure maintenance of satisfactory quality.