AEROSPACE
MATERIAL SPECIFICATIONS
SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 7727

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Revised

ALLOY BARS AND FORGINGS, LOW EXPANSION, GLASS SEALING
53Fe - 29Ni - 17Co

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

2. APPLICATION: Primarily for electronic elements to be sealed to hard glasses during assembly of electronic components.

3. COMPOSITION: Shall be a metallic alloy containing approximately 53% iron, 29% nickel, and 17% cobalt with impurities not exceeding the following limits:

Carbon	0.06
Manganese	0.50
Silicon	0.20

3.1 The following impurities shall not exceed the limits shown, but analysis is not required for routine acceptance:

Titanium	0.10
Aluminum	0.10
Magnesium	0.10
Zirconium	0.10
Ti + Al + Mg + Zr	0.20

4. CONDITION OR FINISH: Unless otherwise specified, material shall be supplied as follows:

4.1 Bars: Centerless ground.

4.2 Forgings: As ordered.

5. TECHNICAL REQUIREMENTS: When ASTM methods are specified for determining conformance to the following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

5.1 Thermal Expansion: The average linear coefficient of thermal expansion, when determined in accordance with ASTM B95, shall conform to the following:

Temperature Range, Degrees	Average Linear Coefficient of Thermal Expansion In. per In. per Deg Cent
30 C (86 F) to 400 C (752 F)	4.60 to 5.20 x 10^{-6}
30 C (86 F) to 450 C (842 F)	5.10 to 5.50 x 10^{-6}

5.1.1 Prior to testing, the specimen shall be annealed in a hydrogen atmosphere for 1 hr at 900 C (1652 F), followed by 15 min. at 1100 C (2012 F). Between the 900 C and 1100 C heat treatment periods, the specimen may be cooled to room temperature. The specimen shall be cooled from 1100 C to 200 C (2012 F to 392 F) in the hydrogen atmosphere at a rate not faster than 5 C (9 F) per minute.

5.2 Temperature of Transformation: The temperature of transformation from gamma to alpha phase, as determined by means of expansion measurements or metallographic examination, shall be not higher than -78.5 C (-109.3 F). For material whose smallest dimension is over 0.875 in. some localized transformation acceptable to the purchaser may be tolerated. Prior to testing, the specimen shall be annealed as in 5.1.1.

5.3 Tensile Properties: Material shall be capable of meeting the following requirements:

Tensile Strength, psi	70,000 min
Yield Strength at 0.2% Offset or at 0.0056 in. in 2 in. Extension Under Load (E = 19,500,000), psi	55,000 min
Elongation, % in 2 in or 4D	30 min

6. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections, consistent with the type of material involved, detrimental to fabrication or to performance of parts.

7. TOLERANCES: Unless otherwise specified, tolerances shall conform to the following:

7.1 Diameter of Centerless Ground Bars:

Nominal Diameter, Inches	Tolerance, Inch Plus and Minus
0.030 to 0.055 incl	0.0005
Over 0.055 to 0.125 incl	0.001
Over 0.125 to 0.500 incl	0.0015
Over 0.500 to 1.000 incl	0.002
Over 1.000 to 1.625 incl	0.0025
Over 1.625 to 1.750 incl	0.003
Over 1.750 to 2.000 incl	0.004
Over 2.000 to 4.000 incl	0.005

8. REPORTS:

8.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests to determine conformance to the requirements of this specification for each test lot in the shipment. This report shall include the purchase order number, test lot number, material specification number, size, and quantity from each test lot.