AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AMS 4640C

Issued 6-13-40
Revised 11-1-52

ALUMINUM BRONZE
81.5Cu - 10.3Al - 5Ni - 2.8Fe

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

2. FORM: Rods, bars, shapes, heavy wall tubes, forgings, and forging stock.

3. APPLICATION: Primarily for parts requiring abrasion resistance, good ductility, and good retention of hardness at moderate temperatures.

4. COMPOSITION:

Copper	78.0 min
Aluminum	9.7 - 10.9
Nickel	4.5 - 5.5
Iron	2.0 - 3.5
Manganese	1.5 max
Zinc	0.30 max
Tin	0.20 max
Total Named Elements	99.8 min

5. CONDITION:

5.1 Rods, Bars, Shapes and Tubes: Hot or cold finished, reheated to not lower than Ø 1100 F and cooled in air.

5.2 Forgings: Quenched from a temperature not lower than 1600 F, reheated to not lower than 1100 F and cooled in air.

5.3 Forging Stock: As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Tensile Properties:

6.1.1 Rounds, Hexagons and Octagons:

Nominal Diameter or Distance Between Parallel Sides Inches Ø	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E=17,500,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 4D, min
1.0 and under	110,000	70,000	0.0120	10
Over 1.0 to 2.0, incl	110,000	62,000	0.0111	10
Over 2.0 to 3.0, incl	105,000	55,000	0.0103	10
Over 3.0 to 5.0, incl	100,000	50,000	0.0097	10

6.1.2 Flats, Squares, Shapes and Tubes:

Nominal Thickness or OD Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 17,500,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 4D, min
1.0 and under	100,000	52,000	0.0099	10
Over 1.0 to 3.0, incl	95,000	50,000	0.0097	10
Over 3.0	90,000	48,000	0.0095	10

6.1.3 Tensile test specimens from rods, bars and shapes over 1.5 in. in diameter or distance between parallel sides shall have their axes located approximately midway between center and surface. Tensile test specimens from tubes shall have their axes located at approximately the midwall.

6.2 Hardness: Material shall have hardness as follows, or equivalent hardness by other methods; requirements apply from surface to center of material, to determinations made using 3000 kg load:

6.2.1 Rounds, Hexagons and Octagons:

Nominal Diameter or Distance Between Parallel Sides Inches	Hardness, Brinell
2.0 and under	201-248
Over 2.0 to 5.0, incl	187-241

6.2.2 Flats, Squares, Shapes and Tubes:

Nominal Thickness or OD Inches	Hardness, Brinell
3.0 and under	187-241
Over 3.0	183-241

6.2.3 Forgings: Brinell 201-248.

6.3 Fracture Test: When material is broken for fracture test, the fracture shall be fine grained. Material shall be sufficiently ductile to show some bending before rupture.

7. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts.

8. TOLERANCES: Unless otherwise specified, tolerances shall conform to the latest issue of AMS 2221 as applicable. Diameter, thickness and width tolerances shall be as specified below:

8.1 Rounds, Hexagons and Octagons: Table I, Refractory.

8.2 Squares: Table IV.