ALUMINUM BRONZES

These are alloys of copper and aluminum with additions of iron, nickel, or manganese, forming a family of hard, tough bronzes with a high yield strength and excellent resistance to tensile stress, wear, and fatigue. They absorb severe vibrations and impacts, preventing rebound forces on the shaft. They exhibit outstanding resistance to corrosion caused by seawater, even under highly turbulent flow and with abrasive elements in suspension (superior to all other copper-based alloys), as well as good resistance to hard water, hydrochloric acid, sulfuric acid, hydrofluoric acid, chlorides, neutral salt solutions, brines, non-oxidizing mineral acids, and some organic acids.

These alloys operate at higher temperatures than any other group of copper-based cast alloys. They have good weldability (arc, gas, TIG, MIG, but not with tin), especially with steel, a property leveraged in mixed steel/aluminum bronze constructions, where each metal fulfills a specific role.

The mechanical properties of these alloys change dramatically with very small alterations in chemical composition, making it essential to maintain strict control over alloying elements and impurities during the melting process. Likewise, it is necessary for the Nickel content to be higher than that of Iron; this improves the alloy's overall corrosion resistance by helping to eliminate harmful phases in the microstructure.

ALLOY: VA - 955 = UNS C95500 = SAE 701 C

The addition of Ni and Mn to its composition creates a highly rigid and tough bronze with excellent mechanical properties, good sliding qualities, and outstanding resistance to corrosion and cavitation, both at low and high temperatures, as well as during intermittent operation. It replaces carbon steels in parts subjected to high specific pressures, impacts, bending, and alternating compressions in the presence of severe corrosion.

As a bushing and sliding plate, it withstands very high loads at low speeds, requiring reliable and clean lubrication. It demands hard shafts (550 - 600 HB), fine finishes on the shaft/support, precise alignments, and loose tolerances.

Chemical Composition:

%Cu	% Fe	%Ni	%Mn	%Al
78 min.	3 - 5	3 - 5,5	3,5 max.	10 - 11,5

Mechanical and Physical Properties:

	W/HT	WHT
• **Tensile Strength,** *Kg/mm²*	63,3 - 84,4	77,5 - 87,2
• **Yield Strength,** *Kg/mm²*	28,1 - 47,8	42,2 - 56,2
• **Elongation,** *%*	20 - 7	12 - 5
• **Hardness,** *HB (10 mm / 500 Kg)*	175 - 200	215 - 260
• **Thermal Conductivity,** *W / m °C (20 °C)*	41,9	
• **Coefficient of thermal Expansion,** *10^{-6} / °C (20 - 300 °C)*	16,2	
• **Electrical Conductivity,** *% IACS (20 °C)*	8	
• **Operating Temperature,** *°C*	-232 - 398	
• **Operating Load or Pressure,** *Kg/mm²*	5,1 - 7,1 (very high)	

Technical manufacturing standards:

- Chemical Composition and Mechanical Properties: UNS C 95500 = SAE 701 C = DIN 1714 CuAl10Ni5Fe4
- Centrifugal Casting : ASTM B271 / 271M
- Sand Mold Casting : ASTM B148 / SAE J462
- Continuous Casting : ASTM B505 / 505M

Main Uses and Application:

Crowns, gears, large-sized pinion nuts for elevators and high-demand power transmission equipment ● Bushings, guides for pistons, and steam and high-pressure hydraulic valves ● Pumps, valves, and parts for sewage, wastewater, and end-stage fluids ● Cages for large ball bearings ● Dies for deep-drawing and injection molds.

✱ ***Referential Specifications for Chemical Composition, Mechanical, and Physical Properties based on the Unified Numbering System (UNS-C) of the Copper Development Association (CDA) for cast and forged copper alloys; subject to written confirmation by VULCANO METALS***

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