Austral Wright Metals
at the cutting edge

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Austral Bronze Crane Copper Limited
ACN 008 466 840

PRODUCT DATA SHEET

Engraving Brass Alloy 356

Copper Alloys

UNS C35600

Also known as Extra high leaded brass

Composition, AS2738.2 - 1984, Compositions & designations

Copper		Lead		Iron	Zinc
Min	Max	Min	Max	Max	
59.0	64.5	2.0	3.0	0.10	Remainder

Equivalent Alloy Specifications

Specification	Designation
UNS	C35600
ISO	CuZn39Pb2
BSI	-
JIS	C 3560

ASTM Product Specifications

Specification	Title
B16	Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines
B121	Leaded Brass Plate, Sheet, Strip, and Rolled Bar
B453	Copper-Zinc-Lead Alloy (Leaded-Brass) Rod

Mechanical Properties

ASTM B121 Leaded Brass Plate, Sheet, Strip, and Rolled Bar

	Units	Annealed (Soft)	Hard	Quarter hard	Half hard	Extra hard
		O3	H	¼H	½H	EH
Tensile Strength minimum	MPa	310*	470 – 540	340 – 405	380 – 450	545 – 615
Hardness maximum	HRB	85	76 – 84	40 – 65	57 – 74	83 – 89

Notes: *1. Properties marked * are typical, for information only*
2. Annealed and hard tempers are available from stock. Other tempers available for sufficient quantity on request.

Available Forms Austral Wright Metals can supply this alloy as plate, sheet and bar.

General Description Engraving brass is traditionally used for machine engraved name plates due to its combination of high strength and free machining characteristics. It is an alpha / beta brass with a duplex structure which renders it unsuitable for acid etched work, for which the single phase brasses such as C26000 (70/30 brass) are preferable.

C35600 weathers to the warm brown bronze tone which is desirable for name plates.

C37000 is also available, with lower (0.9–1.4%) lead content. It has excellent free cutting properties, but machinability is only 70% of C35600.

Typical applications are engraved name plates and plaques, appliance trim, clock components, builders hardware, gear meters, free machining sheet and plate.

PHYSICAL PROPERTIES

Property	Metric Units	Imperial Units
Melting Point (Liquidus)	905^{0}C	1660^{0}F
Melting Point (Solidus)	885^{0}C	1630^{0}F
Density	8.50 gm/cm^3 @ 20^{0}C	0.307 lb/in^3 @ 68^{0}F
Specific Gravity	8.50	8.50
Coefficient of Thermal Expansion	20.5 x 10^{-6}/^{0}K (20 - 300^{0}C)	11.4 x 10^{-5}/^{0}F (68 - 572^{0}F)
Thermal Conductivity	115 W/m.^{0}K @ 20^{0}C	67 BTU/ft^3/ft/hr/^{0}F @ 68^{0}F
Thermal Capacity (Specific Heat)	380 J/kg.^{0}K @ 20^{0}C	0.09 BTU/lb/^{0}F @ 68^{0}F
Electrical Resistivity (Annealed)	6.6 microhm.cm @ 20^{0}C	38.4 ohms (circ mil/ft) @ 68^{0}F
Electrical Conductivity (Annealed)	0.152 microhm^{-1}.cm^{-1} @ 20^{0}C	26% IACS
Modulus of Elasticity (tension)	97 GPa @ 20^{0}C	14.0 x 10^6 psi @ 68^{0}F
Modulus of Rigidity (torsion)	37 GPa @ 20^{0}C	5.3 x 10^6 psi @ 68^{0}F
Poisson's Ratio	0.32	0.32

FABRICATING PROPERTIES

Cold Working Capacity	Poor
Hot Working Capacity	Fair
Hot Working Temperature	700 - 800^{0}C
Annealing Temperature	425 - 600^{0}C
Stress Relieving Temperature	250 - 300^{0}C
Machinability Rating	100% of free cutting brass (C36000)
Polishing/Electroplating Finish	Good

JOINING PROPERTIES

Soldering	Excellent
Brazing	Good
Oxy-Acetylene Welding	Not recommended
Gas Shielded Arc Welding (GTAW/TIG, GMAW/MIG)	Not recommended
Coated Metal Arc Welding (Manual electrodes)	Not recommended
Resistance Welding	Not recommended

Corrosion Resistance

C35600 has good corrosion resistance to weathering and fair resistance to many waters. There is some risk of failure by dezincification.

C35600 should not be used in contact with ammonia, ammonia compounds or amines, as it may suffer stress corrosion cracking. It is more susceptible to stress corrosion and dezincification than the single phase high copper brasses, but these are seldom a serious problem in atmospheric conditions.

Please consult Austral Wright Metals for advice on your specific application.

Phase Diagram & Mechanical Properties of the Brasses