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Solid metals. Fine solutions.

Wrought copper-aluminium alloy **C63000** alloy 1563

C63000 according to ASTM belongs to the group of high-strength aluminium multi-components bronzes. The material has a high corrosion resistance with high strength properties at the same time. It is similar to the material CW307G according to EN 12420, ZOLLERN brand EBz.

ZOLLERN brand	C63000
Norm::	ASTM B 150 and 171

// Composition (weight by per cent in %)

Cu	Al	Fe	Mn	Ni
Rest	8.5 – 11.0	3.0 – 5.0	max. 1.0	4.0 – 6.0

Pb	Si	Sn	Zn	Other
max. 0.05	max. 0.2	max. 0.1	max. 0.4	max. 0.2

// Strength properties at room temperature

	(minimum values)		
[1] ASTM B 150, condition M10, O20 [2] ASTM B 171, condition M10, O20	$R_{p0.5}$ N/mm²	R_m N/mm²	A_5 %
[1] Forgings up to 100 mm thickness	295	585	10
[1] Forgings over 100 mm thickness	275	550	12
[2] Forgings up to 50 mm thickness	250	620	10
[2] Forgings over 50 to 90 mm thickness	230	585	10
[2] Forgings 90 to 150 mm thickness	205	550	10
	$R_{p0.5}$ KSI	R_m KSI	A_5 %
[1] Forgings up to 4" thickness	42.5	85	10
[1] Forgings over 4" thickness	40	80	12
[2] Forgings up to 2" thickness	36	90	10
[2] Forgings over 2" to 3.5" thick	33	85	10
[2] Forgings 3.5" to 5 Thickness	30	80	10

Higher values on request

// Physical properties

Density at 20 °C	7.6 kg/dm³
Melting temperature/range	1060 – 1075 °C
Coefficient of linear expansion	
from - 200° to 20°C	15 x 10^{-6} °C^{-1}
from 20° to 100°C	15 x 10^{-6} °C^{-1}
from 20° to 300°C	17 x 10^{-6} °C^{-1}
Specific heat at 20°C	0.452 J/g x °C
Thermal conductivity at 20°C	0.63 W/cm x°C
Electr. conductivity at 20°C	4 - 6 MS/m 7 - 10% IACS
Electr. resistance at 20°C	0.167 - 0.25 Ω mm²/m
Temperature coefficient of the Electr. resistance (0 - 100°C)	0.0005 °C^{-1}
Permeability	< 1.9
Young's modulus	117 KN/mm²

// Dynamic strength values at room temperature (reference values)

Rotational bending fatigue strength R_{bw} at 20 x 10^6 load cycles	290 N/mm²
Notched impact energy (ISO - V/KV)	20 joules

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Areas of application

C63000 is a high-strength material with a high load capacity and high corrosion resistance to Cl-containing water, neutral and acidic aqueous media. It has good resistance to scaling, erosion and cavitation. Use as

- Condenser plates and components in chemical apparatus engineering, also for low temperature applications.
- Highly loaded bearings and worm wheels for sliding speeds < 1 m/s.
- Surface pressures up to approx. 20 KN/cm² are permissible under suitable conditions, e.g. for toggle lever bearings, sliding rails, wear strips and wedge gibs in machine and mould making.
- Moulds and mould inserts in injection moulding enable shorter cycle times due to the good thermal conductivity.
- Rotor and winding caps in electrical engineering.
- Pressure-tight high-pressure fittings for hydraulics and pneumatics.
- Screws, bolts and drive shafts for pumps are in use, as are sealing strip supports in paper machines.

Machinability

Carbide tools are needed for turning and milling and sharp tools are needed for drilling and thread cutting. This results in a machinability that is better than that of austenitic stainless steel. Shorter rolling and flowing chips are formed. Cutting and die-sinking is easily possible, and the surface can also be structured decoratively by etching.

Relaxation annealing	650 – 720°C
Soft annealing	800 - 850°C with subsequent furnace cooling down to 650°C, then air cooling
Soft soldering	not recommendable
Brazing	poor, fluxes containing fluoride and chloride of type F - SH1 and silver solders are advantageous
Welding	good, both TIG, MIG and manual electrode welding is possible, filler metal e.g. CuAl9Ni4Fe2Mn2 = CF310G or S-CuAl8Ni2
Surface treatment	polishing, chemical structuring and galvanic treatments are possible. Undercoating is advisable for electroplated coatings

ZOLLERN GmbH & Co. KG

Hitzkofer Strasse 1
72517 Sigmaringendorf-
Laucherthal
Germany
T +49 7571 70-984
F +49 7571 70-82984
zgm@zollern.com
www.zollern.com