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Solid metals. Fine solutions.

Wrought copper-aluminium alloy **EBz** alloy. 1560

EBz 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. Higher strength values can be achieved by quenching and tempering.

ZOLLERN brand	EBz
EN designation	CuAl10Ni5Fe4
EN material no:	CW307G

EN 12420, 12163, 12167 (12165)
AD 2000 »pressure vessel« AD W 6/2
EN 1653 »Plates, circular blanks«
(EN 1652 »rolled sheets ...«)

// National designations / ISO

DIN	CuAl10Ni5Fe4
DIN / WL	2.0966 2.1104
ISO	≈ CuAl10Fe5Ni5
USA	≈ C63000
GB	≈ CA 104
F	U - A10N

≈ (substantial coherence)

// 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] EN 12420:1999 [2] EN 12163:2016 min. 250 Kg [3] EN 12167:2016 min. 250 Kg	$R_{p0.2}$ N/mm²	R_m N/mm²	A_5 %	HB
[1] Forged pieces and diepressed parts up to 80 mm thickness	360	720	12	175
[1] Forgings over 80 mm thickness	330	700	15	170
[2] Rods, drawn H 170 up to 35 mm Ø or SW H 200	320 400	680 740	10 8	170 200
[3] Profiles, drawn H 170 up to 35 mm thickness H 200	320 400	680 740	10 8	170 200

AD W 6/2, EN 1653, AMS4640H, DEF Stan 02-833, NFL 14706, BS2B23, ASTM B150 on request

// Strength properties at elevated temperatures (reference values)

Temperature	°C	20	200	300	400	500
0.2% limit	$R_{p0.2}$ N/mm²	400	380	350	260	100
Tensile strength	R_m N/mm²	760	670	630	420	170
Elongation	A_5 %	19	12	10	32	58

// 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 electrical 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

EBz 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. Used 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 of up to approx. 20 KN/cm² are permissible under suitable conditions, e.g. with

- toggle lever bearings
- Sliding strips
- Wear and wedge gibs in machine and mould construction

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 as well as 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