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Wrought copper-aluminium alloy **EBh** alloy 1570

EBh 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. By specific heat treatment, a yield strength and tensile strength of approx. 600 and 900 N/mm² can be achieved for short forgings, see EBh-W97.

ZOLLERN brand	EBh
EN designation	CuAl11Fe6Ni6
EN material no:	CW308G

EN 12420:1999 Forgings

// National designations / ISO

DIN	CuAl11Ni6Fe5
DIN	2.0978
ISO	≈ CuAl10Fe5Ni5
USA	≈ C63000
GB	≈ CA 104
F	≈ U - A11N

≈ (substantial coherence)

// Composition (weight by per cent in %)

Cu	Al	Fe	Mn	Ni
Rest	10.5 – 12.5	5.0 – 7.0	max. 1.5	5.0 – 7.0

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	$R_{p0.2}$ N/mm²	R_m N/mm²	A_5 %	HB
[1] Forgings and die-pressed parts	410	740	4	200

The material VB has higher strength values than EBh.
It also corresponds to CW308G.
VB is preferred for wall thicknesses of 100 mm and more.

// Strength properties at elevated temperatures (reference values)

Temperature	°C	20	200	300	400	500
0.2% limit	$R_{p0.2}$ N/mm²	500	460	440	260	145
Tensile strength	R_m N/mm²	850	750	650	350	170
Elongation	A_5 %	13	11	7	37	43

// 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	0.38 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	< 1.6
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)	10 joules

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Areas of application

EBh 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. 25 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

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