

Designation	DIN	EN Nr.	UNS (ASTM)	AISI	LMSA
Cu-ETP	-	-	C11000	-	B100

Chemical composition

Cu	Bi	O	Pb	Others
99.90 min	0.0005 max	0.04 max	0.03 max	0.03 max

Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precisely than the composition indicated.

Main technical properties and features

Cu-ETP (Electrolytic Tough-Pitch) is a pure copper. This copper is characterized by a minimal amount of 99.90 % copper and a minimal electrical conductivity of 100 % IACS (International Annealed Copper Standard). During the course of fusion and melting, a few hundred ppm of oxygen are introduced, which give the copper particular properties. The presence of copper oxide Cu₂O, combined with other impurities, reduces the negative effect on the thermal and electric conductivity. This grade of copper is most frequently used in the electrotechnical applications. The presence of oxygen makes the Cu-ETP inappropriate for operations requiring heating temperatures which exceed 300 °C in a reducing atmosphere containing hydrogen. In fact hydrogen, which diffuses quickly at high temperature will reduce the Cu₂O oxides by producing totally insoluble H₂O in the copper. If such a thermal treatment is necessary, the use of copper grades without oxygen, such as a Cu-OF or Cu-OFE, are critical, as they can be thermally treated in a reduced atmosphere. Cu-ETP can easily be brazed; however, welding with inert gas or lasers are difficult. Its galvanizability as well as its tinning by immersion is excellent and it presents an exceptional ability to cold deformation. Due to its oxide layer having a solid adherence, it also presents a high resistance to oxidation in certain polluted atmospheres, to water, and to water vapor and neutral saline solutions. In contrast, its resistance to corrosion in an oxidizing environment, in the presence of hydrous ammonia or seawater is insufficient.

Typical uses

Cu-ETP is primarily used in the electronic industry to produce stamped and folded parts. This alloy is also used in the superconductor industry, as a heat dissipater, as lead frames, in coaxial cables and in underwater fiber optic cables. In vacuum applications, Cu-OF or Cu-OFE are more appropriate as anodes, waveguides, joints, etc.

Typical manufacturing range

	Thickness (mm)	Width (mm)	Length (mm)
Rolled products Strip in coils ^[1]	0.010 - 2.000	1.5 - 200.0	-
Strip as sheets ^[1]	0.010 - 1.500	10.0 - 200.0	100 - 3000

^[1] Not all our production possibilities are presented here. Other dimensions or product forms available upon request. Some combinations of thicknesses and widths are not possible.

Mechanical properties of strips

Temper	R _{p0.2} (N/mm ²)	R _m (N/mm ²)	A _{50mm} (%)	Hardness HV
R200 H45	140 max.	200 - 260	33 min.	45 - 65
R240 H65	180 min.	240 - 300	8 min.	65 - 95
R240 H90	250 min.	290 - 360	4 min.	90 - 110
R360 H110	320 min.	360 min.	-	110 min.

Physical properties

Modulus of elasticity	kN/mm ²	127
Poisson ratio		0.34
Density	g/cm ³	8.94
Melting point	°C	1084
Linear dilatation coefficient	10 ⁻⁶ ./ °C	17.7 from 0 to 300°C
Thermal conductivity at 20°C	W/m °K	394
Electrical resistivity	μΩcm	1.72
Electrical conductivity	MS/m	58
Electrical conductivity	% IACS	100
Specific heat at 20°C	J/(kg. K)	386
Magnetic properties		Non magnetic

Tolerances (strip and foil)

Thickness	Thickness (mm)		EN Standard		Lamineries MATTHEY		
	≥	<	10140 Precision	10258 Precision	LMSA Standard	LMSA Precision	LMSA Extreme
	-	0.025	-	-	-	-	± 0.001
	0.025	0.050	-	-	± 0.003	± 0.002	± 0.0015
	0.050	0.065	-	± 0.003	± 0.003	± 0.0025	± 0.002
	0.065	0.100	-	± 0.004	± 0.004	± 0.0035	± 0.003
	0.100	0.125	± 0.005	± 0.006	± 0.005	± 0.004	± 0.003
	0.125	0.150	± 0.005	± 0.006	± 0.005	± 0.005	± 0.004
	0.150	0.250	± 0.010	± 0.008	± 0.008	± 0.006	± 0.004
	0.250	0.300	± 0.010	± 0.009	± 0.009	± 0.007	± 0.005
	0.300	0.400	± 0.010	± 0.010	± 0.010	± 0.007	± 0.005
	0.400	0.500	± 0.015	± 0.012	± 0.012	± 0.008	± 0.006
	0.500	0.600	± 0.015	± 0.014	± 0.014	± 0.010	± 0.007
	0.600	0.800	± 0.015	± 0.015	± 0.015	± 0.010	± 0.007
	0.800	1.000	± 0.015	± 0.018	± 0.018	± 0.012	± 0.009
	1.000	1.200	± 0.020	± 0.020	± 0.020	± 0.015	± 0.012
	1.200	1.250	± 0.020	± 0.020	± 0.020	± 0.015	± 0.012
	1.250	1.500	± 0.020	± 0.020	± 0.020	± 0.015	± 0.014
Width	Our width tolerances "Standard" is +0.2, -0.0 (or ± 0.1 mm upon request). They are available for slit widths < 125 mm and thicknesses < 1.00 mm. Special tolerances upon request.						
Camber	Width (mm)		Camber max. (mm/m)				
	>	≤	LMSA Standard		LMSA Extreme		
			≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 0.5 mm	
	3	6	12	-	6	-	
	6	10	8	10	4	5	
	10	20	4	6	2	3	
	20	250	2	3	1	1.5	
Surface	Special surface qualities upon request						
Flatness	Special requirement on the longitudinal or transversal flatness upon request						

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