

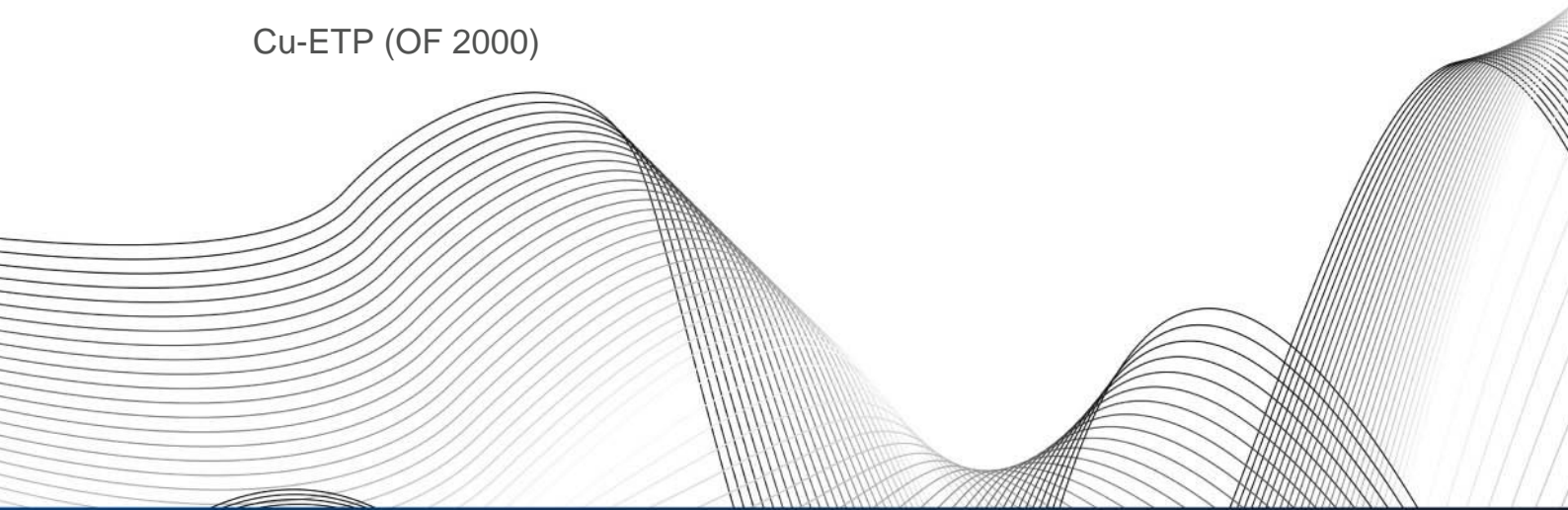


OTTO FUCHS
Dülken GmbH & Co. KG



Copper and Copper Alloys

Cu-ETP (OF 2000)





	Cu	As	Co	Cr	Others
min.	99.9	-	-	-	-
max.	-	0.0005	0.040	0.005	0.03

- 1) Including Ag to a maximum of 0.015 %
- 2) Maximum of oxygen content of 0.06 % permitted if agreed between customer and manufacturer

Applications

Cu-ETP is used in applications with demand for high electric conductivity (electricity, electronics).

Examples of application:

bus bars
pins
circuit breaker
terminals

Physical properties

At room temperature

Density	8.9	g/cm ³
Electrical conductivity	57	MS/m
	98	% I.A.C.S
Heat conductivity	394	W/(m*K)
Heat capacity	386	J/(kg*K)
Coefficient of thermal expansion	17.7	10 ⁻⁶ /K
Young's modulus	110	GPa
Melting point	1083	°C

Microstructures

Cu-ETP provides a homogeneous microstructure of α -Phase. Oxygen (in solution up to a maximum of 0.09 %) is in a compound of Cu(I)-oxide.



Consignment and measurements

Strength conditions

Product/spec.	Condition	Yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	Elongation at break A [%]	Brinell- Hardness HBW 2.5/62.5
13600/13601/ 13605/ extruded profiles	D	**	**	**	**
Forgings	M	**	**	**	**
13600	R200	≤120	200-250	≥40	/
13601/13605		≤120	≥200	≥35	/
13601	R230	≥160	≥230	≥18	/
13605 (2)	R240	≥160	≥240	≥15	/
13600	R250	≥150	250-300	≥15	/
13601 (1)		≥180 res. 200	≥250	≥15 res. 12	/
13601	R260	≥220	≥260	≥12	/
13601	R280	≥240	≥280	≥10	/
13605 (2)		≥240	≥280	≥8	/
13600	R290	≥250	290-360	≥6	/
13601	R300	≥260	≥300	≥8	/
13601	R350	≥320	≥350	≥5	/
13600	R360	≥320	≥360	(3)	/
13600	H035	/	/	/	35-60
13601/13605		/	/	/	35-65
Forgings	H045	/	/	/	≥45
13600	H065	/	/	/	60-90
13601		/	/	/	65-90
13605		/	/	/	65-95
13601	H075	/	/	/	75-100
13605 (2)	H080	/	/	/	80-115
13601	H085	/	/	/	85-110
13600	H090	/	/	/	85-105
13600	H100	/	/	/	≥95
13601		/	/	/	≥100

DIN EN 13600:
Seamless tubes, electrical
engineering

DIN EN 13601:
Bars, electrical engineering

DIN EN 13605:
Profiles, electrical engineering

Condition M = without specified mechanical properties – as manufactured

Condition D = cold drawn, without specified mechanical properties

** Without specified mechanical properties

/ No requirements in standard or not applicable

(1) Values for yield strength/elongation at break defined dependent on dimension

(2) To be agreed with customer

() The numbers are not requirements of the standard - they are for information only

Specified dimensions for bars and profiles

Round and rectangular bars as well as profiles can be delivered up to 180 mm in extruded and up to 130 mm in cold drawn condition. Pre-material for forging and forgings is dependent upon each individual case.

Specified dimensions for seamless tubes

Dimensions for seamless tubes are available on request.



Other consignments

Rods in other strength and hardness conditions and dimensions, and tubes are available on request.

Processing		Heat treatment	
Shaping		Soft annealing	250-500°C
Machinability (CuZn39Pb3=100%)	poor (20)	Stress relieving	150-200°C
Cold working	very good	Special notes and remarks	
Hot working	good		
Hot working temperature	750-950°C	Good persistence in natural atmosphere, drinking and industrial water, aqueous and alkaline solutions (with exception of Solutions of cyanides, halogenides and Ammonium), pure steam, non oxidising acids (so far as no Oxygen in solution) and neutral solutions of salts.	
Connecting		No persistence in oxidising acids, liquid ammonia, halogen gas, hydrogen sulphide and sea water.	
Resistance welding	poor	When tempering, welding or brazing in hydrogen bearing atmosphere there is a risk of hydrogen embrittlement.	
Shielded welding	poor		
Brazing	good		
Soldering	very good		
Surface treatment			
Mechanical polishing	good		
Electrolytic polishing	very good		
Galvanisation	very good		
Tin coating	very good		



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