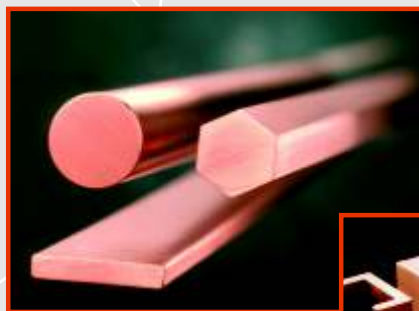


CERTEC®

COPPER BARS
COPPER SECTIONS

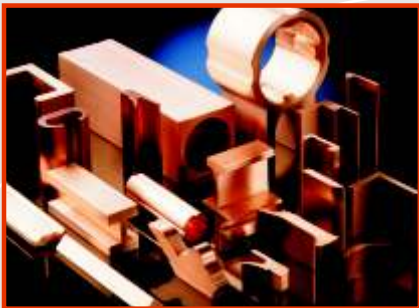


CERTEC®

Copper Bars and Copper Sections



Our bars and profiles carry the CERTEC® trademark as a symbol of outstanding technical quality and are used in electrical engineering and other industrial applications.



CERTEC® - Copper Bars and Copper Sections of High-Tech Quality:

Our production program covers a large range of bars and sections. We are able to meet the demands for high technical specification and quality by carefully planned production, CAD/CAM controlled tool manufacture, state of the art production facilities and test installations as well as by our well-trained and dedicated staff.

Stringent inspections during the entire manufacturing process up to product shipment ensure a constant high quality level of these products.

In order to be able to supply the required quality it is important that requirements and applications are clearly defined this being an important precondition for a goal-oriented cooperation with our customers.

Materials, physical-technical properties, technical delivery conditions, temper

Due to our extensive range of copper grades, we are in a position to produce the most suitable material for a multitude of applications.

The following survey shows the range of copper grades and compares corresponding international and national standards with each other. The summary shows a comparison with former (superseded) national standards.

International and national standards

Company standard	EN	ISO	ASTM	ÖNORM ¹⁾	DIN ¹⁾	BS ¹⁾	UNI ¹⁾	NF ¹⁾	
CU1*	1976 : 1998 Cu-OFE CW 009 A	431 - 1981 Cu-OFE	Cu-OFE C 10100	-	-	6017 : 1981 Cu-OFE	-	A51 - 050 Cu-c2	Pure copper grades
CU2 CU3**	1976 : 1998 Cu-OF CW 008 A	431 - 1981 Cu-OF	OF C 10200	M 3401 Cu-OF	M 1787 OF-Cu 2.0040	6017 : 1981 Cu-OF	5649 Parte 1a Cu-OF	A51 - 050 Cu-c1	
CU50	1976 : 1998 Cu-ETP CW 004 A	431 - 1981 Cu-ETP	ETP C 11000	M 3401 Cu-E (E-Cu)	1787 E-Cu 58 2.0065	6017 : 1981 Cu-ETP	5649 Parte 1a Cu-ETP	A51 - 050 Cu-a1	
PCU2	1976 : 1998 Cu-PHC CW 020 A	431 - 1981 Cu-PHC	OF XLP C 10300	M 3401 Cu-SE	1787 SE-Cu 2.0070	-	5649 Parte 1a Cu-HCP	-	Phosphorus copper grades
PCU3	1976 : 1998 Cu-HCP CW 021 A	431 - 1981 Cu-HCP	OF XLP C 10300	M 3401 Cu-SE	1787 SE-Cu 2.0070	-	5649 Parte 1a Cu-HCP	-	
PCU4	1976 : 1998 Cu-DLP CW 023 A	431 - 1981 Cu-DLP	OFLP C 10800	M 3401 Cu-DLP	1787 SW-Cu 2.0076	-	5649 Parte 1a Cu-DLP	A51 - 050 Cu-b2	
AGCU2	1976 : 1998 CuAg0,10(OF) CW 019 A	431 - 1981 Cu-Ag (OF)	OFS C10700	M 3403 CuAg 0,1	17666 CuAg 0,1 2.1203	6017 : 1981 CuAg-OF-4	5649 Parte 2a CuAg 0,1 (OF)	-	Phosphorus-free types of copper containing silver (oxygen-free)
AGCU3	-	431 - 1981 Cu-Ag (OF)	-	-	-	6017 : 1981 CuAg-5	-	-	
AGCU100	1976 : 1998 CuAg0,04 CW 011 A	431 - 1981 Cu-Ag	STP C11300	M 3403 CuAg 0,03	-	6017 : 1981 CuAg-2	-	-	Silver bearing copper grades without Phosphor
AGCU101	1976 : 1998 CuAg0,10 CW 013 A	431 - 1981 Cu-Ag	STP C11600	M 3403 CuAg 0,1	17666 CuAg 0,1 2.1203	6017 : 1981 CuAg-4	-	-	
AGCU50	similar 1976 : 1998 CuAg0,04P CW 014 A	431 - 1981 Cu-Ag(P)	-	-	-	-	-	-	Silver bearing copper grades with Phosphor
AGCU51	1976 : 1998 CuAg0,10P CW 016 A	431 - 1981 Cu-Ag(P)	-	M 3403 CuAg 0,1 P	17666 CuAg 0,1 P 2.1191	-	5649 Parte 2a CuAg 0,1 (P)	-	

* CU1 the oxygen and manganese content differs slightly from the limit values for C10100 in accordance with ASTM

** CU3 does not correspond completely to the material C10200 according to ASTM

¹⁾ withdrawn, national Standards

Copper Bars and Copper Sections

■ Pure copper grades

Company standard EN	CU1 CW009A	CU2 CW008A	CU3 CW008A	CU50 CW004A
Copper content	≥ 99,99 %	Cu+Ag ≥ 99,98 %	Cu+Ag ≥ 99,96 %	Cu+Ag ≥ 99,90 %
Oxygen content	≤ 8 ppm	≤ 10 ppm	no oxides when enlarged 200fold	max. 0,04 %
Electrical conductivity	≥ 101 % IACS * ≥ 58,6 m/Ω·mm ^{2**}	≥ 100% IACS* ≥ 58,0 m/Ω·mm ^{2**}	≥ 100 % IACS * ≥ 58,0 m/Ω·mm ^{2**}	≥ 100 % IACS * ≥ 58,0 m/Ω·mm ^{2**}
Other characteristics	P ≤ 3 ppm Formation of tight compounds with glass. Resistant to hydrogen embrittlement. No release of volatile matter into the vacuum.	High electrical conductivity. Resistant to hydrogen embrittlement.	High electrical conductivity. Resistant to hydrogen embrittlement.	High electrical conductivity.
Field of uses	High-vacuum engineering; high- performance transmission cables; microelectronics; travelling-wave magnetrons and electronic tubes	Vacuum engineering; electronics; anodes; electrical instruments in the presence of reducing gases; switch- gears and switching devices	Electronics; switchgear device construction; general use in electrical engineering	Switchgear device construction; general use in electrical engineering, if no requirements on the resistance to hydrogen embrittlement

* Conversion IACS to m/Ω · mm²

100 % IACS corresponds to a conductivity of 58.0 m/Ω · mm²

** The specification of electrical conductivity relates to the annealed condition

Phosphorous copper grades

Company standard EN	PCU2 CW020A	PCU3 CW021A	PCU4 CW023A
Copper content Cu + Ag + P	≥ 99,98 %	≥ 99,98 %	≥ 99,90 %
Phosphorus content	10 - 30 ppm	20 - 50 ppm	50 - 130 ppm
Electrical conductivity	≥ 100 % IACS**	≥ 98,28 % IACS**	90,5-96,9 % IACS**
Other characteristics	Resistant to hydrogen embrittlement. Good weldability and solderability.	Resistant to hydrogen embrittlement. In comparison with PCU2 improved weldability and solderability.	Resistant to hydrogen embrittlement. Very good weldability and solderability.
Field of uses	Electrical engineering, electronics, collector segments, cladding materials	Applications in electrical engineering for squarewave generators and switchgear devices	Apparatus engineering

Silver bearing phosphorous copper grades ¹⁾

Company standard	EN Material-number	Cu + Ag %	Ag %	Other elements %	Specific conductivity % IACS**	Resistance to hydrogen embrittlement
AGCU100	CW011A	≥ 99,90	0,03 - 0,05	≤ 0,0300	≥ 100	containing oxygen
AGCU101	CW013A	≥ 99,90	0,08 - 0,12	≤ 0,0300	≥ 100	containing oxygen
AGCU2	CW019A	≥ 99,98	0,09 - 0,12	≤ 0,0065	≥ 100	close bend
AGCU3	Special quality	≥ 99,98	0,18 - 0,21	≤ 0,0065	≥ 98,3	close bend

** The specification of electrical conductivity relates to the annealed condition

¹⁾ The tables show the types usually used, and other types of copper containing silver, and with or without phosphorus, as required

Silver bearing phosphorous copper grades ¹⁾

Standard	EN Material number	Cu+AG+P [%]	AG [%]	P [%]	other Elements [%]	specific conductivity [% IACS]**	Resistance to hydrogen embrittlement ISO 2626
AGCU50	similar CW014A	> 99,97	0,02-0,05	0,0010-0,0070	< 0,03	> 98,3	close bend
AGCU51	CW016A	> 99,97	0,09-0,12	0,0010-0,0070	< 0,03	> 98,3	close bend

** The specification of electrical conductivity relates to the annealed condition

1) The tables show the types usually used, and other types of copper containing silver, and with or without phosphorus, as required

Temper / Mechanical properties

The table below shows a summary of conditions defined in EN 13601. Deviations from the limits given, which are defined in other national or international standards, can usually still be manufactured in most cases (based on appropriate feasibility tests conducted by us).

EN 13600 Copper and copper alloys	- Seamless copper tubes for electrical engineering
EN 13601 Copper and copper alloys	- Copper bars and wires for general use in electrical engineering
EN 13604 Copper and copper alloys	- Products from high-conductivity copper for electron tubes, semiconductor components and for vacuum engineering applications
EN 13605 Copper and copper alloys	- Sections and profiled wires for electrical engineering

Temper designation	Temper designation EN 13601	Diameter or width across flats (mm)	Thickness (mm)	Tensile strength R _m [MPa]	0,2 % Proof stress R _{p0,2} [MPa]	Elongation A (%)	Brinell hardness HBW 2,5/62,5
extruded	-	25 - 250	> 3,5	without specified strength values			
drawn	D	2 - 80	up to 40	without specified strength values			
soft	R200	2 - 80	up to 40	200	max. 120	min. 35	35 - 65
	H035	2 - 80	up to 40	200	max. 120	min. 35	35 - 65
halfhard	R250	2 - 10	up to 10	min. 250	min. 200	min. 12	
	R250	10 - 30	-	min. 250	min. 180	min. 15	
	R230	30 - 80	10 - 40	min. 230	min. 160	min. 18	
	H065	up to 80	up to 40				65 - 90
hard	R300	2 - 20	up to 10	min. 300	min. 260	min. 8	
	R280	20 - 40	10 - 20	min. 280	min. 240	min. 10	
	R260	40 - 80	20 - 40	min. 260	min. 220	min. 12	
	H085	2 - 40	up to 20				85 - 110
	H075	40 - 80	20 - 40				75 - 100
extra hard	R350	up to 10	up to 5	min. 350	min. 320	min. 5	
	H100	up to 10	up to 5				min. 100

The extruded condition is not included in the EN 13600 series.

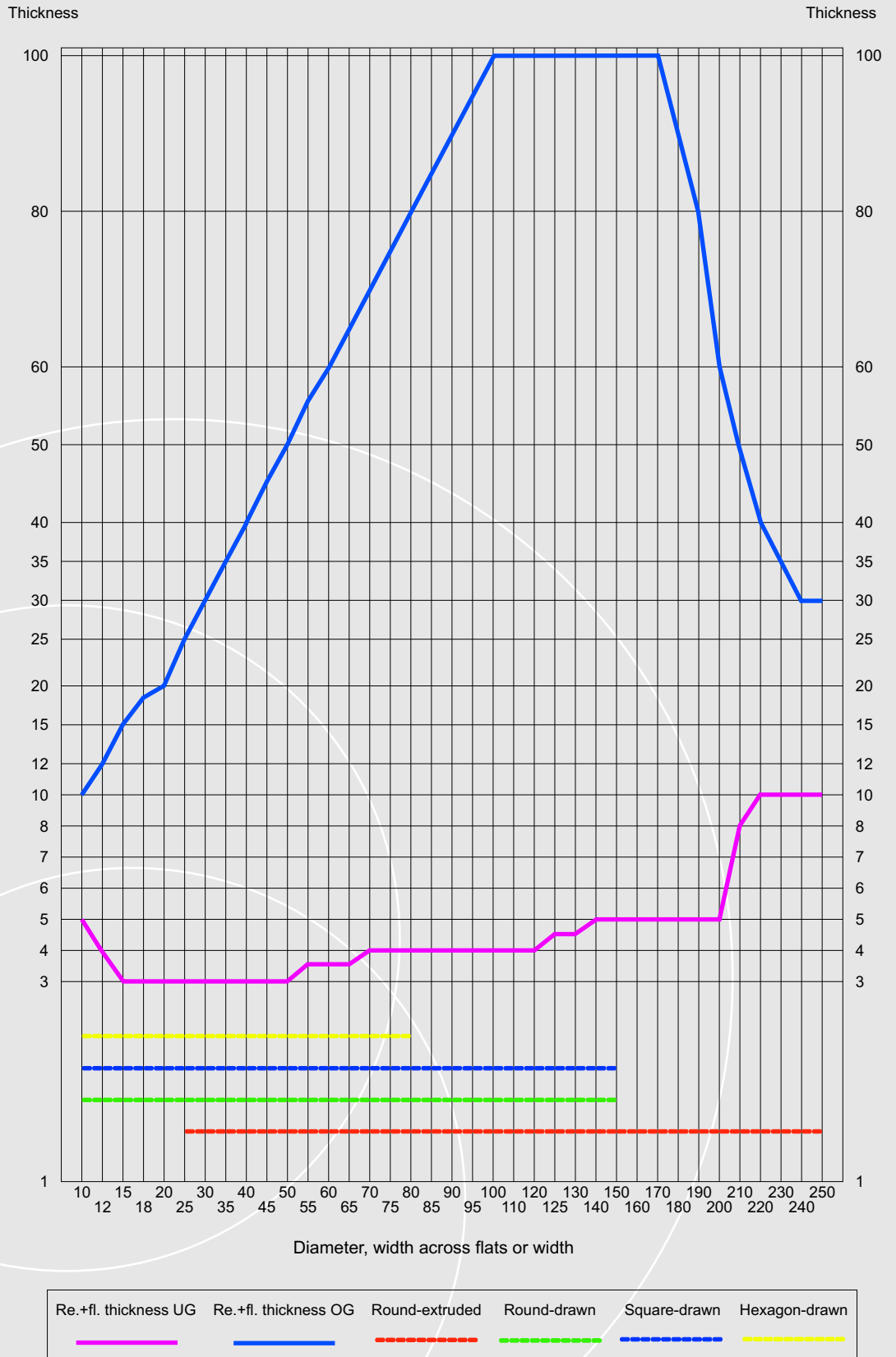
Only the limits for R_m, R_{p0,2} and A apply to condition descriptions with R.

Only the Brinell hardness limits apply to condition descriptions with H.

Electrical conductivity depends on the material and the solidity condition.

The limits differ slightly from the limits according to DIN 40 500ff for individual parameters.

Production range bars



Range of sections

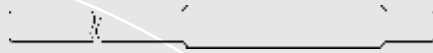
Cross section / sizes

Solid and hollow sections (open and closed) with cross sections between 150 und 5,000 mm² defined by a circumscribed circle of max. 200 mm and a web thickness of min. 3 mm.

Examples for section drawings

Flat- and Rotor wedges

e.g. from CU2 (C10200), extruded



U-Section

e.g. from CU1 (Cu-OFE), hard drawn



L-Section

e.g. from CU50 (Cu-ETP), hard drawn



Hollow section

e. g. from PCU3 (Cu-HCP), drawn, soft annealed



Double hollow section

e. g. from AGCU51 (CuAg0,1P), hard drawn



Alloy sections on request!

Production programme

Rectangular, flat, round, square and hexagon bars

- in straight lengths
- temper according to applicable standard

Rectangular, flat, round and square bars

- from standard size stock in lengths of 4 - 4.2 m
- other lengths on request

Special Sections

- in straight lengths
- lengths on request

Packaging

Round bars and sections

- in bundles of 500 kg
- bound at 3 points with steel or plastic strip or packing in wooden cases
- according to customer's requirements



Rectangular, flat, square and hexagon bars

- in bundles between wood laths or partially
- wrapped with recyclable PVC



Special types of packaging can also be produced based on customer requirements.

CERTEC®

Copper Bars and Copper Sections

■ One of the worldwide state of the art production sites

buntmetall amstetten, part of the AUSTRIA BUNTMETALL Group, was founded in 1904 by Georg Adam Scheid. Copper and copper alloy semi-finished and finished parts have been produced in Amstetten since then.

They are processed into tubes, rods, wires, profiles and ready-to-build finished products according to customer requirements.

Over 6,500 to CERTEC® copper bars and profiles for the electrical industry are manufactured each year on our state of the art copper production lines.



ÖNORM EN ISO 9001 - ÖNORM EN ISO 14001 - OHSAS 18001

HIGH STANDARDS

■ Quality, environment and safety at work

The management promotes a flexible customer and market orientated company philosophy, which takes into consideration the environment and safety at work.

This is reflected in the level of importance placed on further investment in our state-of-the art production and testing facilities, where particular care is taken to preserve resources and to prevent emissions, whilst also taking into account safety-related concerns.

Our dedicated employees are required to take part in ongoing instructions and further training. Our continuous commitment to our customers, to the environment and the safety of our staff means that we put the high standard of production to the test every day, and guarantee high-quality products for every area of application.

The certification of our integrated management system according to EN ISO 9001, EN ISO 14001 and OHSAS 18001 attests to these exacting requirements.



■ Supplier to most industrial sectors

buntmetall amstetten is the main raw material supplier for electrical engineering throughout the copper sector.

The rods are primarily used in switchgears, transformers, generator construction, high vacuum technology and hot pressed parts.

The applications for profiles ranges from distributor rails to switchgear cabinets, clamps, breakers, commutators, inductive heating and foundry equipment, electromagnets and rotor bars.

Special industrial product applications require special market support.

Subsidiaries are the “on-site partners” for our customers both in the domestic market and abroad. buntmetall amstetten is well known for his high level of technical expertise.

Intensive consultancy together with a wide range of stock and an excellent delivery service has been the guarantee of our success for many years.

■ Our staff are the determining factor in our company

The motivation and flexibility of our staff ensures the success of our enterprise. A great number of today's employees were trained in our company.

buntmetall amstetten has maintained a company training centre for apprentices since 1954.

BMA is proud to be able to count many renowned European industrial companies among its customer's (summary):

- ABB Group
- Alstom
- CERN
- Schneider,
- Siemens
- VA-Tech, ...





buntmetall amstetten GmbH
Fabrikstraße 4, A - 3300 Amstetten

Tel. +43 (0) 74 72 / 606 - 0
Fax +43 (0) 74 72 / 616 04
E-Mail: office@buntmetall.at
<http://www.buntmetall.at>

A company of the Wieland-group