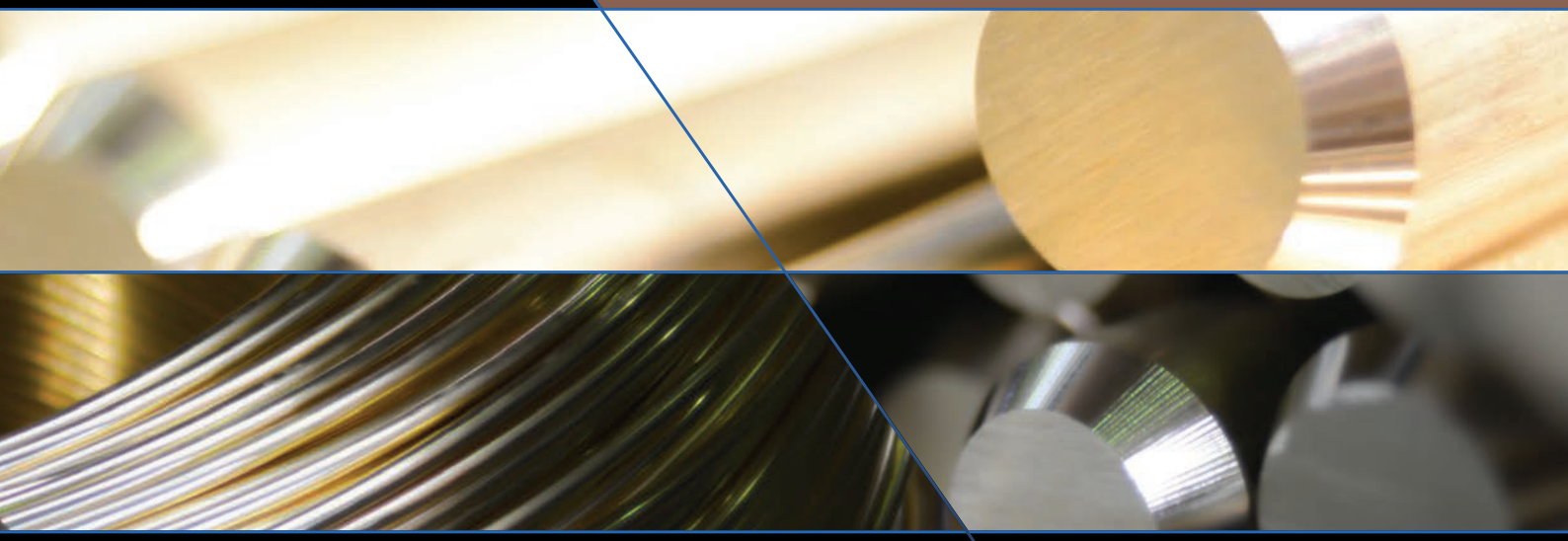
HALCOR

Evolving Beyond Copper

BRASS AND COPPER ALLOYS EXTRUDED PRODUCTS



HALCOR
Evolving Beyond Copper

COPPER & ALLOYS
EXTRUSION DIVISION:
ElvalHalcor

Member of **Copper Alliance**

Halcor is the largest producer of copper tubes in Europe, implementing long term investments that provide dynamic markets with a wide range of sustainable products and innovative solutions. With more than 80 years of metal processing experience and know-how, Halcor, the copper & alloys extrusion division of ElvalHalcor SA, is a trustful business partner to industrial companies that build equipment and parts, as well as, to wholesalers that distribute products to meet global demands. A dynamic network of owned commercial subsidiaries around Europe and supportive technical services enables Halcor to bring expert solutions to the industry with agility and reliability. Committed to constantly investing in sustainable development, Halcor strategically focuses on R&D&I creating solutions for low carbon and recyclable products, for applications such as energy-efficient equipment, renewable energy sources and electric vehicles, contributing to the global transition to a green economy.

High quality in production is achieved through strict controls applied throughout the production process. With a consistent quality focus, Halcor implements an ISO 9001:2015 Certified Quality Management System and leverages high technologies and expert staff.

TÜV HELLAS
TÜV AUSTRIA
THE COPPER MARK

INDEX

• BRASS & COPPER ALLOYS APPLICATIONS

Building Installation & Construction

Due to high resistance and machinability, copper alloy products are the optimized choice for building and housing installation. Our long experience in production of brass products can serve a wide range of requirements.

- **Copper Alloy Rods**
  Plumbing systems (taps, valves and fittings)
  Drinking water applications
- **Copper Alloy Tubes**
  Bathroom accessories
  Architectural applications

Automotive

Car and bus engines require components produced by durable materials such as high tensile brass.

- **Copper Alloy Wires**
  Automotive connectors
- **Copper Alloy Rods**
  Journal bearings in turbochargers
  Valve guides in internal combustion engines
- **Copper Alloy Tubes**
  Piston pin bore bushings
  Gear box refrigeration circuit

Electrical & Electronics

Copper alloys' relatively high conductivity, combined with corrosion resistance, makes them an ideal choice for the manufacture of electrical and electronic components.

- **Copper Alloy Wires**
  Machined pin & socket contacts
  Spring-loaded contacts (pogo pins)
  Active Optical Cables

Industrial Applications

Due to wear resistance and strength, copper alloy products play a fundamental role in Industrial Machinery and Equipment.

- **Copper Alloy Wires**
  EDM applications
  Industrial fasteners
  Lock pins
- **Copper Alloy Rods**
  Worm gears
  Industrial fittings
  Bearings and bushings

Marine & Naval

Special copper alloy products thanks to significant corrosion resistance and considerably improved machinability are indispensable in marine and naval market.

- **Copper Alloy Rods**
  Shipbuilding parts
  Decorative fittings

Aquaculture

Natural metallurgical and biological properties of copper alloys make them an ideal choice for use in marine aquaculture.

- **Copper Alloy Mesh**
  Aquaculture cages
  Copper alloy mesh for marine aquaculture enclosures
  Copper alloy mesh for fish traps

Copper Alloys List

Leaded Nickel Silver

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
-		Cu	Zn	Pb	Sn	Fe	Mn	Ni	AL	Si	As	Others total
Number	Symbol											
CW407J	CuNi12Zn38Mn5Pb2	42-45	Rem.	1-2,5	0,2	0,3	4,5-6	11-13	-	-	-	0,2

Lead-Free Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	AL	Si	As	Others total
Number	Symbol											
CW507L	CuZn36	63,5-65,5	Rem.	0,05	0,1	0,05	-	0,3	0,02	-	-	0,1
CW508L	CuZn37	62,0-64,0	Rem.	0,1	0,1	0,1	-	0,3	0,05	-	-	0,1
CW724R	CuZn21Si3P	75,0-77,0	Rem.	0,1	0,3	0,3	0,05	0,2	0,05	2,7-3,5	-	0,2

Low-Lead Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	AL	Si	As	Others total
Number	Symbol											
CW509L	CuZn40	59,0-61,5	Rem.	0,2	0,2	0,2	-	0,3	0,05	-	-	0,2
CW510L	CuZn42	57,0-59,0	Rem.	0,2	0,3	0,3	-	0,3	0,05	-	-	0,2
CW511L	CuZn38As	61,5-63,5	Rem.	0,2	0,1	0,1	-	0,3	0,05	-	0,02-0,15	0,2

Leaded Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	AL	Si	As	Others total
Number	Symbol											
CW600N	CuZn35Pb1	62,5-64,0	Rem.	0,8-1,6	0,1	0,1	-	0,3	0,05	-	-	0,1
CW601N	CuZn35Pb2	62,0-63,5	Rem.	1,6-2,5	0,1	0,1	-	0,3	0,05	-	-	0,1
CW602N	CuZn36Pb2As	61,0-63,0	Rem.	1,7-2,8	0,1	0,1	0,1	0,3	0,05	-	0,02-0,15	0,2
CW603N	CuZn36Pb3	60,0-62,0	Rem.	2,5-3,5	0,2	0,3	-	0,3	0,05	-	-	0,2
CW606N	CuZn37Pb2	61,0-62,0	Rem.	1,6-2,5	0,2	0,2	-	0,3	0,05	-	-	0,2
CW608N	CuZn38Pb2	60,0-61,0	Rem.	1,6-2,5	0,2	0,2	-	0,3	0,05	-	-	0,2
CW612N	CuZn39Pb2	59,0-60,0	Rem.	1,6-2,5	0,3	0,3	-	0,3	0,05	-	-	0,2
CW614N	CuZn39Pb3	57,0-59,0	Rem.	2,5-3,5	0,3	0,3	-	0,3	0,05	-	-	0,2
CW617N	CuZn40Pb2	57,0-59,0	Rem.	1,6-2,5	0,3	0,3	-	0,3	0,05	-	-	0,2

Dezincification-Resistant (DZR) Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	AL	Si	As	Others total
Number	Symbol											
CW602N	CuZn36Pb2As	61-63	Rem.	1,7-2,8	0,1	0,1	0,1	0,3	0,05	-	0,02-0,15	0,2
CW511L	CuZn38As	61,5-63,5	Rem.	0,2	0,1	0,1	-	0,3	0,05	-	0,02-0,15	0,2
CW625N	CuZn35Pb1.5AlAs	62-64	Rem.	1,2-1,6	0,3	0,3	0,1	0,2	0,5-0,7	-	0,02-0,15	0,2
CW626N	CuZn33Pb1.5AlAs	64-66	Rem.	1,2-1,7	0,3	0,3	0,1	0,2	0,8-1,0	-	0,02-0,15	0,2

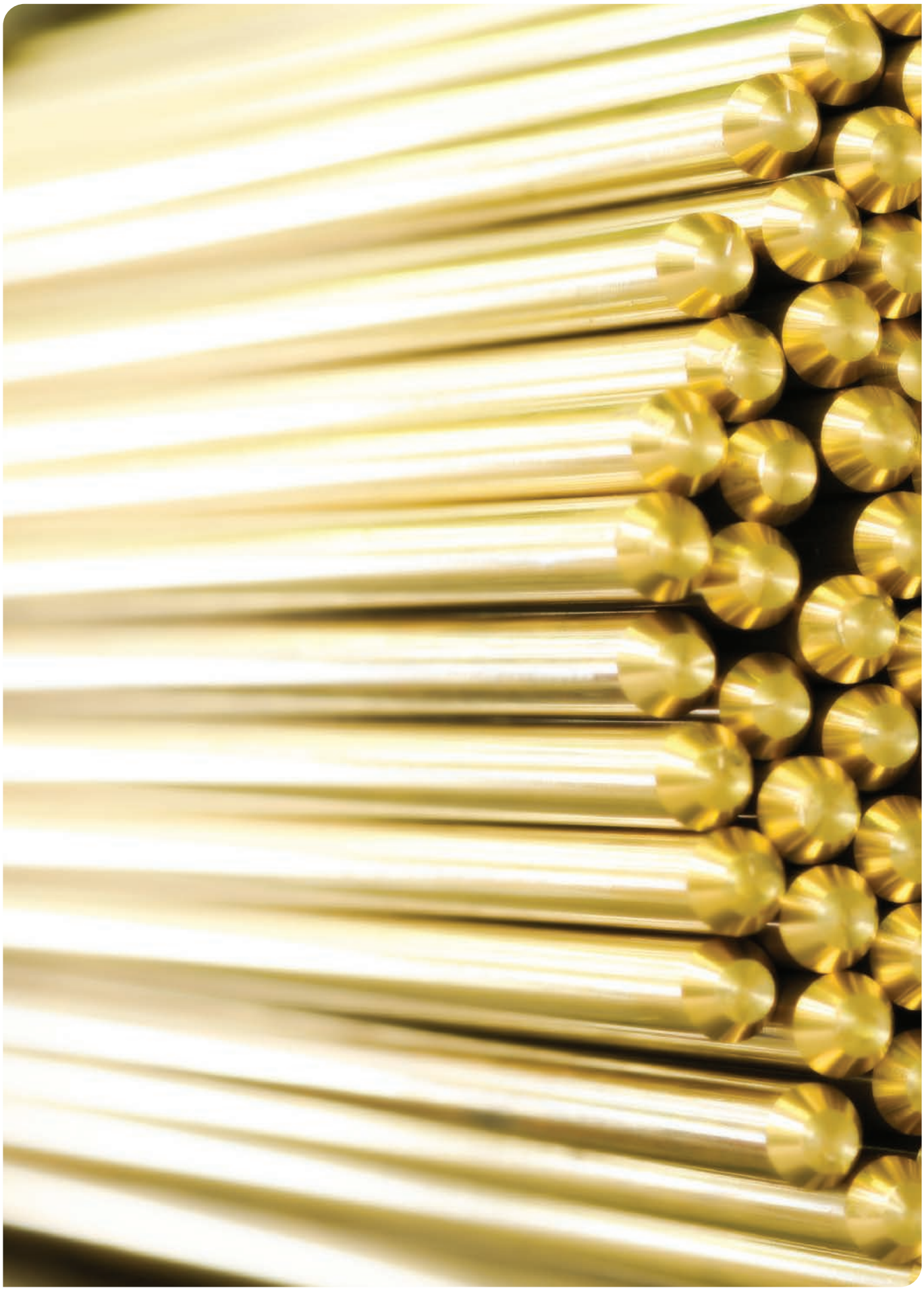
High Tensile Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	Al	Si	As	Others total
Number	Symbol											
CW708R	CuZn31Si1	66-70	Rem.	0,8	-	0,4	-	0,5	-	0,7-1,3	-	0,5
CW710R	CuZn35Ni3Mn2AlPb	58-60	Rem.	0,2-0,8	0,5	0,5	1,5-2,5	2,0-3,0	0,3-1,3	0,1	-	0,1
CW713R	CuZn37Mn3Al2PbSi	57-59	Rem.	0,2-0,8	0,4	1	1,5-3	1	1,3-2,3	0,3-1,3	-	0,1
CW721R	CuZn40Mn1Pb1AlFeSn	57-59	Rem.	0,8-1,6	0,2-1	0,2-1,2	0,8-1,8	0,3	0,3-1,3	-	-	0,3
CW722R	CuZn40Mn1Pb1FeSn	56,5-58,5	Rem.	0,8-1,6	0,2-1	0,2-1,2	0,8-1,8	0,3	0,1	-	-	0,3

Naval Brass

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
-		Cu	Zn	Pb	Sn	Fe	Mn	Ni	Al	Si	As	Others total
Number	Symbol											
CW711R	CuZn36Pb2Sn1	59,5-61,5	Rem.	1,3-2,2	0,5-1	0,1	-	0,3	-	-	-	0,2

MATERIAL DESIGNATION		CHEMICAL COMPOSITION %										
European Norms		Cu	Zn	Pb	Sn	Fe	Mn	Ni	Al	Si	As	Others total
Number	Symbol											
CW712R	CuZn36Sn1Pb	61-63	Rem.	0,2-0,6	1,0-1,5	0,1	-	0,2	-	-	-	0,2
CW719R	CuZn39Sn1	59-61	Rem.	0,2	0,5-1	0,1	-	0,2	-	-	-	0,2



• SOLID RODS

Copper Alloys Division produces extruded and drawn solid brass and copper alloy rods in round, hexagonal, square shape and other sections for free machining and hot forging applications. Solid Rods are available in a wide variety of copper alloys and in full compliance with European and International Norms.

Production Range

DIA	AF	AF	PROCESS	LENGTH
DIA= 2-70	AF= 5-60	AF= 5-50	Cold Drawn	1,5-5 meters
DIA= 71-105	Max. 65	Upon request	Extruded	1,5-5 meters

Values in mm

Cold drawn solid rods are produced according to EN 12164. Extruded solid rods are produced according to EN 12165. Comprehensive range of imperial sizes available.

Brass rods are produced with standard tolerances Class A according to European Norms, but can also be supplied with tolerances Class B upon request.

Standard Lengths

1,5m-5m, other lengths upon request

Alloys

CW617N, CW614N, CW602N, CW713R, CW724R, CW603N, CW710R, CW625N, CW711R, CW712R
Other alloys upon request

Temper

- Round Rods are delivered half hard. Other tempers upon request.
- Hexagonal and square rods are delivered thermally stress relieved. Other tempers upon request.

Packaging

Bundles and wooden cases

Chamfering

From 4,8mm up to 65mm

Tolerances on diameter of round forging stock (EN 12165)

Dimensions in millimetres

Nominal Diameter		Tolerances	
over	up to and including	Class A	Class B
10[a]	18	±0,25	±0,14
18	30	±0,30	±0,17
30	50	±0,60	±0,20
50	80	±0,70	±0,37
80	120	±2	-

[a] Including 10

Tolerances on diameter of round rod (inlcuding deviation from circular form) (EN 12164)

Dimensions in millimetres

Nominal Diameter		Tolerance Class A
over	up to and including	
2[a]	3	0 -0,04
3	6	0 -0,05
6	10	0 -0,06
10	18	0 -0,07
18	30	0 -0,08
30	50	0 -0,16
50	80	0 -0,19

[a] Including 2

Tolerances on width across-flats of hexagonal and square rod (EN 12164)

Dimensions in millimetres

Nominal width across-flats		Tolerances
over	up to and including	
2[a]	3	0 -0,06
3	6	0 -0,08
6	10	0 -0,09
10	18	0 -0,11
18	30	0 -0,13
30	50	0 -0,16
50	60	0 -0,19

[a] Including 2

• HOLLOW RODS

Copper Alloys Division produces hollow rods in various outer diameters and wall thicknesses and shapes both external and internal for free machining applications. Brass Hollow Rods are available in a wide variety of alloys and in full compliance with European and International Norms.

Production Range

Round External Shape			Hexagonal External Shape			Round Internal Shape		Hexagonal Internal Shape		Wall Thickness (mm)	
Cold Drawn		Extruded	Cold Drawn		Extruded						
External diameter (mm)			Width across-flats (mm)			Internal diameter (mm)		Internal width across-flats (mm)			
Min.	Max.	Max.	Min.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
15	70	90	17	55	60	8	60	8	50	3	21

Other sizes upon request.

Hollow Rods are produced according to EN 12168.

Alloys

CW617N, CW614N, CW626N
Other alloys upon request

Temper

Hollow rods are delivered thermally stress relieved.

Packaging

Bundles

Chamfering

From 15 mm up to 65 mm

Tolerances on external diameter or width across-flats (EN 12168)

Dimensions in millimetres

Nominal external diameter or width across-flats		Tolerance Class C
over	up to and including	
12[a]	18	0 -0,11
18	30	0 -0,13
30	50	0 -0,16
50	80	0 -0,30

[a] Including 12

NOTE 1: For hollow rod of circular external shape, the above tolerances include any deviations from circular form.
NOTE 2: Products supplied will normally be drawn finish.

Tolerances on diameter of the bore (EN 12168)

Dimensions in millimetres

Nominal bore diameter		Tolerance on bore diameter Class A
over	up to and including	
8[a]	10	±0,29
10	18	±0,35
18	30	±0,42
30	50	±0,80
50	70	±0,95

[a] Including 8

Tolerances on eccentricity For Hollow Rods (EN 12168)

Nominal wall thickness WT (mm)	Maximum Eccentricity %
2<WT≤3	10
WT>3	8

% Eccentricity=(WTmax. - WTmin.)/(WTmax. - WTmin.) x 100
where WTmax., WTmin. the maximum and the minimum wall thickness

• LEAD-FREE & LOW-LEAD PRODUCTS

Environmental requirements and health concerns about the use of lead in copper alloys have grown the interest for decreasing the amount of lead in circulation.

In addition, the increasing importance of green economy and sustainable production has provided the driving force for the development of low-lead and lead-free copper alloys. Copper Alloys Division produces a number of low-lead and lead-free high performance copper alloy products meeting the increasingly stringent legislation and market requirements. Our product portfolio satisfies the ELV and RoHS regulations and meets the E.U. drinking water requirements. Our products can be used for drinking water applications, electrical and electronic parts, automotive components as well as in several other manufacturing sectors for machining and hot forging processes.

Standard Lengths

3m – 5m, other lengths upon request

Temper

- Round Rods are delivered half hard. Other tempers upon request.
- Hexagonal and square rods are delivered thermally stress relieved. Other tempers upon request.
- Hollow rods are delivered thermally stress relieved.

Packaging

Bundles and wooden cases

Chamfering

Solid Rods: From 4,8mm up to 65mm

Hollow Rods: From 15mm up to 65mm

Production Range
Extruded – Cold Drawn Rods

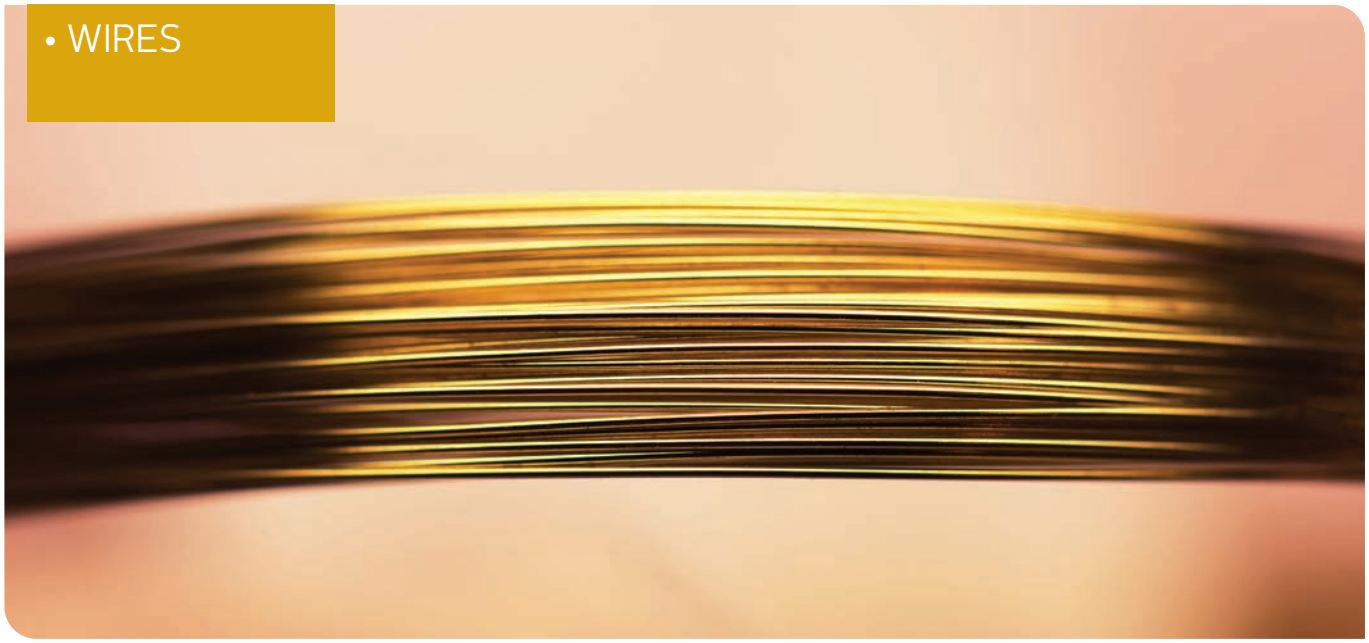
PRODUCTION CAPABILITY				
EN designation	Solid Rods			Hollow Rods
				
CW510L CuZn42	5mm-70mm	5mm-55mm	5mm-50mm	Upon Request
CW511L CuZn38As	5mm-70mm	5mm-55mm	5mm-50mm	Upon Request
CW724R CuZn21Si3P	5mm-90mm	10mm-41mm	-	Upon Request

Extruded solid rods are produced according to EN 12165.
Cold drawn solid rods are produced according to EN 12164, and the following CW510L and CW511L products are NSF certified:

- Solid Round Rods (5-70mm)
- Solid Hexagonal/Square Rods (5-50mm)

NSF
Certified to NSF/ANSI/CAN 372

• WIRES



Copper Alloys Division produces wires in various sizes and delivery forms covering applications' requirements.
Wires are available in a wide variety of brass and copper alloys and in full compliance with European and International Norms.

Production Range

Round: min. 0.8mm max. 10mm
Wires are produced according to EN 12166

Alloys

CW507L, C508L, CW509L, CW407J, CW608N, CW614N, CW617N, CW510L, CW601N, CW603N, CW612N
other alloys upon request

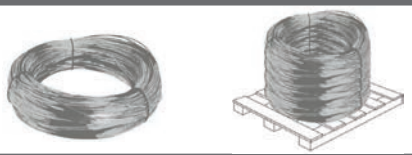
Temper

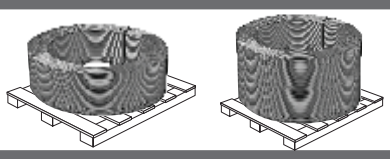
Hard, Half Hard, Soft

Packaging

Free coils (with or without cardboard drum)
Pack coiling, spooled (With or without cardboard drum)
Steel drum
Tubular carriers
Bulk coils in octagon carton boxes

PACKAGING					
COILS					
WIRE DIAMETER (mm)	INTERNAL (mm)	EXTERNAL (mm)	WEIGHT (kg)		
1.75≤ ○ < 8.0 8.0 ≤ ○ ≤ 14.0	400 / 500 400 / 500	700 / 800 ≈1 000	30 -90 40 -120		
LARGE COILS					
WIRE DIAMETER (mm)	INTERNAL (mm)	EXTERNAL (mm)	HEIGHT (mm)	WEIGHT (kg)	
3.0 ≤ ○ ≤ 8.0 8.0 < ○ ≤ 14.0	400 / 500 600 / 700	800 / 1000 970 / 1000 / 1050	200 / 300 / 450 / 500 200 / 300 / 450 / 550	500 / 1000 / 1500 500 / 1000 / 1500	
SPOOLS					
WIRE DIAMETER (mm)	INTERNAL (mm)	EXTERNAL (mm)	WIDTH (mm)	WEIGHT (kg)	
3.0 ≤ ○ ≤ 14.0	625	1000	520	1000 / 1500	





Other packages subject to prior agreement.

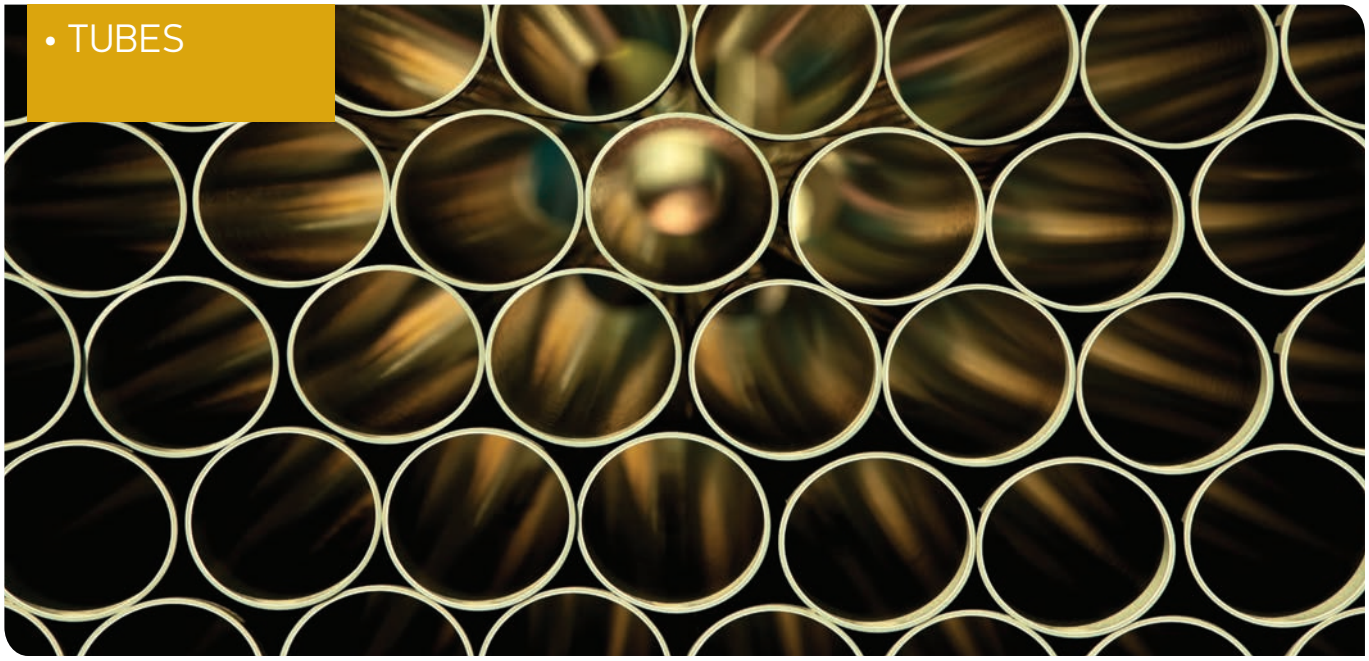
Form of Supply

DIMENSIONS		
ALLOY	PACKAGING	● (mm)
CW507L	coils	0,80 < D < 6,00
	large coils	3,50 < D < 6,00
CW508L	coils	0,80 < D < 6,00
	large coils	3,50 < D < 6,00
CW509L	coils	0,80 < D < 6,00
	large coils	3,50 < D < 6,00
CW601N	coils	2,30 < D < 6,00
	large coils	3,50 < D < 6,00
CW603N	coils	2,30 < D < 6,00
	large coils	3,50 < D < 6,00
CW612N	coils	2,30 < D < 6,00
	large coils	3,50 < D < 6,00
CW614N	coils	2,30 < D < 6,00
	large coils	3,50 < D < 6,00
CW617N	coils	2,30 < D < 6,00
	large coils	3,50 < D < 6,00

Dimensions in millimetres

Nominal diameter		Tolerance
over	up to and including	Class D
0,5	1,0	$^{0}_{-0,03}$
1,0	2,0	$^{0}_{-0,04}$
2,0	4,0	$^{0}_{-0,04}$
4,0	6,0	$^{0}_{-0,05}$
6,0	10,0	$^{0}_{-0,06}$

• TUBES



Copper Alloys Division produces tubes in a wide range of sizes, mainly used in residential construction, transportation and industrial applications.
Brass Tubes are produced in full compliance with European and International Norms.

Alloys

CW508L, CW511L
Other alloys upon request

Temper

Hard, Half Hard, Soft. Tubes are delivered stress relieved upon customer's request.

Packaging

Bundles and wooden cases

Production Range

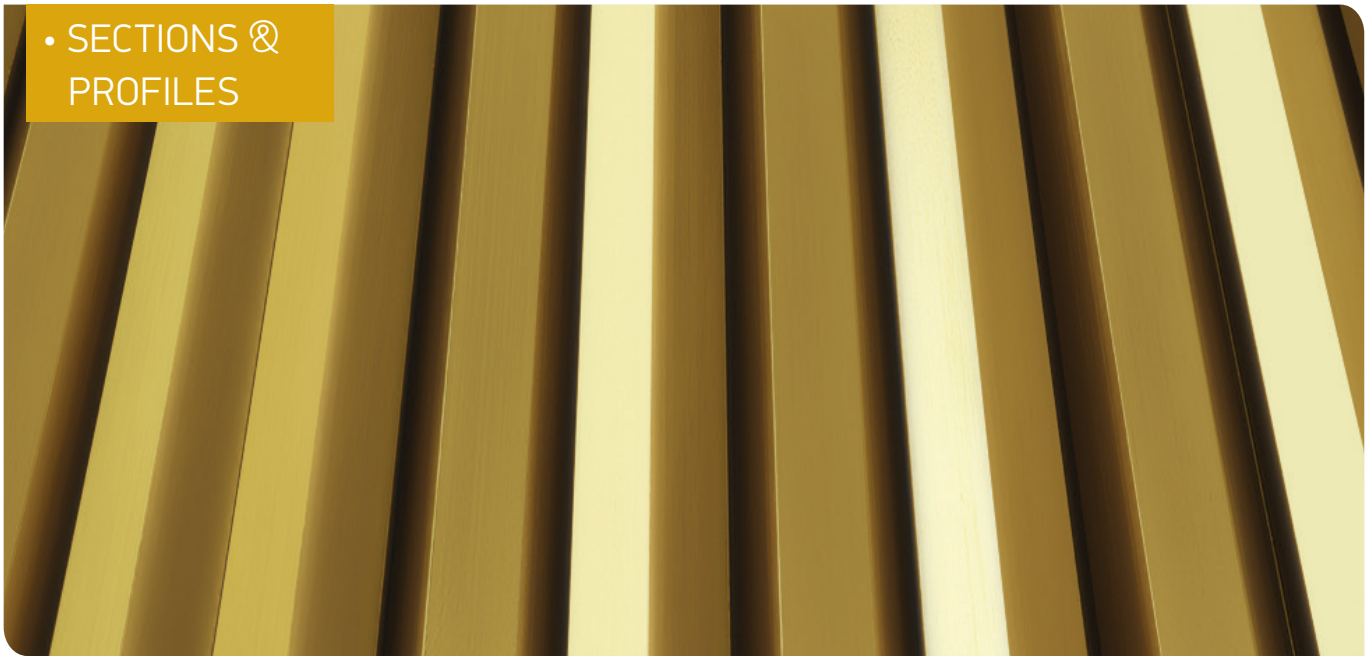
Dimensions in millimetres

Thickness		Nominal Diameter	
Min.	Max.	Min.	Max.
0,40	5,00	4,75	95,00

Material		Material Condition	Wall Thickness t (mm)	Tensile Strength R_m (N/mm²)	0,2% proof strength $R_{p0,2}$ (N/mm²)		Elongation A %
Symbol	Number						
CuZn37	CW508L	M	max.	min.	min.	max.	min.
		R300	20	300	-	220	45
		R370	10	370	200	-	25
		R440	5	440	320	-	10

CW511L (CuZn38As) upon request

• SECTIONS & PROFILES



Applications

Architectural and deco rational applications such us lock profiles, brass furniture's and in the manufacturing of mechanical and electrical fittings.

Process

Drawn or Extruded

Alloys

CuZn44Pb3, CuZn39Pb3,
Other alloys upon request.

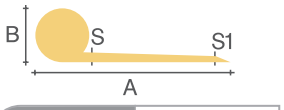
Packing

Generally in 5m lengths packed in wooden cases.
Shorter lengths subject to agreepent.

Production Range

Some of the commonly produced sections are shown on this page. Also according to customer drawing or sample, subject to agreement.

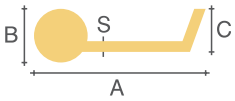
HINGE (mm)



A	30 - 58
B	8 - 16
S	1,8 - 3
S 1	1,8 - 3

A	32 - 117
B	10 - 19
S	2 - 6

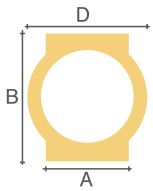
A	22,7 - 69
B	5,5 - 15
S	2 - 3



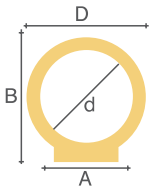
A	101 - 81
B	19
C	33
S	6 - 5,5

MANIFOLD (HOLLOW SECTION) (mm)

	1" (B1)	1" (E1)	1" (E2)	Y" (K1)
D	38,0	37,5	37,5	32,0
B	46,0	40,0	40,0	34,0
A	25,0	26,0	26,0	26,0
d	29,0	29,0	30,0	23,5

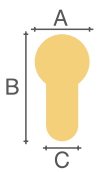


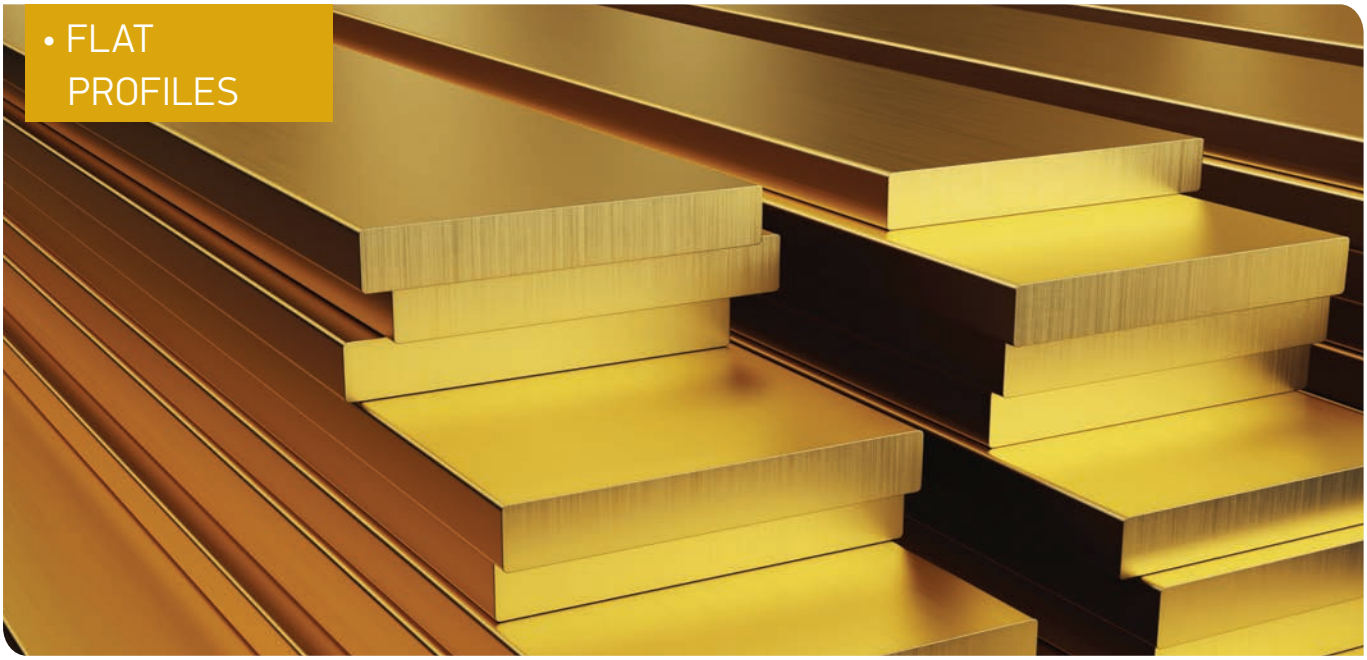
	1 0" (M1)
D	48,0
B	48,0
A	26,0
d	37,0



LOCK PROFILE (mm)

	PR 20	PR 20A
A	17,0	16,9
B	32,8	33,0
C	10,0	9,9





BRASS FLATS

Applications

Mostly in components production and for architectural applications.

Alloys

CuZn44Pb3, CuZn39Pb3, CuZn39Pb2

Temper

Hard or soft (annealed)

Packing

In straight lengths of 3m in wooden cases of 500Kg each. Other lengths subject to agreement.

Production Range

Dimensions in millimetres

Thickness	3	4	5	6	8	10	12	15	20
Min. width	40	30	6	8	10	12	20	20	25
Max. width		50	60	60	100	100	80	80	60

11/2024

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Evolving Beyond Copper

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