



**COPPER ALLOYS**  
**BY GINDRE**  
**TECHNICAL DATAS**

# **WE HAVE BEEN TRANSFORMING COPPER INTO POWER FOR TWO CENTURIES...**

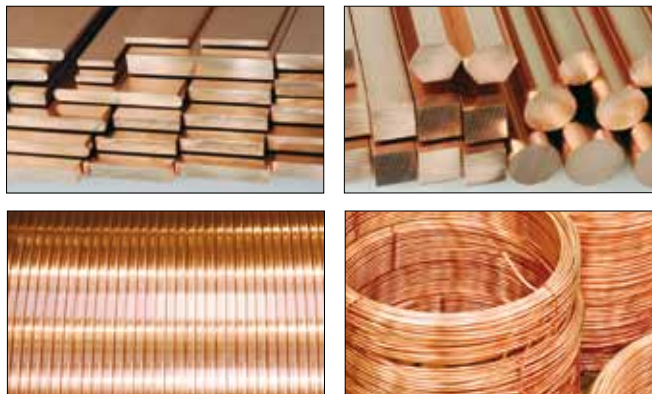
Recent decades have seen the Group, a family business at the start, rise into the foremost rank of world suppliers to the electricity industry. The production units make bars, profiles and copper wire, keeping in step with the technological evolution in extrusion, drawing and industrial engineering, to achieve our present capacity and production quality, meeting the most demanding standards.

At the same time, the company has logically extended its expertise to design and manufacture based on its semi-finished products using increasingly sophisticated components.

This total industrial process, relying on highly customer-orientated distribution logistics, is today established in ten countries through subsidiaries and partners and more than 600 people.

Nowdays Gindre is part of ALPIN AG, mainly involved in the mining industry.

This brings a complete mangement of the Value Chain.



# **TODAY, THE WORLDWIDE COPPER SPECIALIST EXPANDS ITS RANGE OF ALLOYS**

**Recently Gindre-Duchavany moves forward  
in order to enlarge his products range.  
Gindre are pleased to announce that it is extending  
its range of products  
in the form of additional copper based alloys.  
Gindre have combined its existing technical expertise in copper  
production with investment  
to be able to offer the following new alloys in its range.**

**Markets Gindre is developing further with such alloys include  
Motors, Generators, Welding, Connectors,  
high speed machining applications etc...  
and these alloys have been developed to meet  
or exceed those market standard requirements.  
The following data sheets are an introduction to these alloys  
and are a guide to our abilities.**

**We welcome the opportunity for existing and new customers  
to inquire on these new products accordingly.**



# OUR CURRENT RANGE

CuA1 / CuETP / CW004A / C11000
CuC1 / CuOF / CW008A / C10200
CuC2 / CuOFE / CW009A / C10100
CuC4 / CuPHC / CW020A / C10300
CuAg5 / CuAg / CW016A / C10700
CuAg6 / CuAg / CW013A / C11600
CuB / CuDXP / CW025A / C12220
CuB1 / CuDHP / CW024A / C12200

# THE NEW RANGE

<b>CuZn5 / CW500L / C21000</b>	<b>page 5</b>
<b>CuZn10 / CW501L / C22000</b>	<b>page 5</b>
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**BRASS ALLOYS**

**COPPER ALLOYS**



## LA5 (CW500L) Brass Gilding 95%

**Typical use**  
ELECTRICAL : Rotor bars, AC Motors, Connectors  
INDUSTRIAL : Small arm ammunition shells and caps  
OTHER : Coins, Medals

Material designation			Standard tempers ASTM B927 M				
Reference material :	C21000	(ASTM B36 / B95)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW500L	(EN 12163)					
	CuZn5	(ISO 1634-1)					
	CZ 125	(BS2870)					
	L96	(GOST 15527)					
	H96	(GB5232)					
	210	(AS 2738-2)					
			O60 (Annealed)	205	70	-	25%
			H01 (1/4 hard)	235	95	24 - 52	17%
			H02 (1/2 hard)	275	160	44 - 60	9%
			H04 (full hard)	330	255	60 - 67	7%

Chemical composition									
Element	Cu	Zn	Pb	Fe	Al	Ni	Sn	Other	
Min (%)	94	Rest							
Max (%)	96		0,05	0,05	0,02	0,3	0,1	0,1	

Characteristics		
Electrical conductivity :	56% IACS 32,5 MS/m	<b>Recommended fabrication technique :</b> Blanking Coining, Drawing, Stamping, Soldering, Brazing, Cold & Hot Working
Melting temperature :	1049°C - 1066°C	
Density :	8,86 @ 20°C	<b>Acceptable fabrication technique :</b> Oxyacetylene Welding, Gas shielded Arc Welding
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	
		<b>Machinability rating : 20</b>

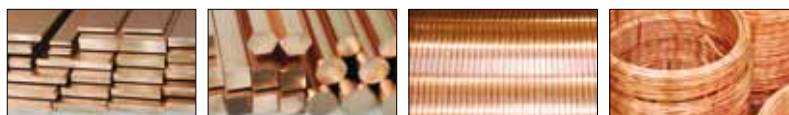
## LA10 (CW501L) Brass Commercial Bronze, 90%

**Typical use**  
ELECTRICAL : Rotor bars, AC Motors, Connectors, wave guide  
INDUSTRIAL : Small arm ammunition shells, screws, rivets  
OTHER : Marine Hardware, chain links, weather stripping

Material designation			Standard tempers ASTM B927 M				
Reference material :	C22000	(ASTM B927)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW501L	(EN 12163)					
	CuZn10	(ISO 1634-1)					
	CZ 101	(BS2873)					
	L90	(GOST 15527)					
	H90	(GB5232)					
	220	(AS 2738-2)					
			O60 (Annealed)	220	70	-	25%
			H01 (1/4 hard)	255	115	-	17%
			H02 (1/2 hard)	310	185	-	10%
			H04 (full hard)	380	255	-	7%

Chemical composition									
Element	Cu	Zn	Pb	Fe	Al	Ni	Sn	Other	
Min (%)	89	Rest							
Max (%)	91		0,05	0,05	0,02	0,3	0,1	0,1	

Characteristics		
Electrical conductivity :	44% IACS 25,5 MS/m	<b>Recommended fabrication technique :</b> Blanking Coining, Drawing, Stamping, Soldering,
Melting temperature :	1021°C - 1043°C	
Density :	8,8 @ 20°C	<b>Acceptable fabrication technique :</b> Oxyacetylene Welding, Gas shielded Arc Welding
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	
		<b>Machinability rating : 20</b>



## LA15 (CW502L) Red Brass, 85%

**Typical use**  
**ELECTRICAL** : Rotor bars, AC Motors, Connectors, Power sockets  
**INDUSTRIAL** : Condenser tubes, Heat exchangers, pump linings  
**OTHER** : Marine Hardware, chain links, weather stripping

Material designation			Standard tempers ASTM B927 M				
Reference material :	C23000	(ASTM B36 / B927)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW502L	(EN 12163)					
	CuZn15	(ISO 1634-1)					
	CZ 102	(BS2873)					
	L95	(GOST 15527)					
	H95	(GB5232)					
	230	(AS 2738-2)					
<b>O60 (Annealed)</b>	240	70	-	25%			
<b>H01 (1/4 hard)</b>	290	115	-	17%			
<b>H02 (1/2 hard)</b>	310	185	-	10%			
<b>H04 (full hard)</b>	415	255	-	7%			

Chemical composition									
Element	Cu	Zn	Pb	Fe	Al	Ni	Sn	Other	
Min (%)	84	Rest							
Max (%)	86		0,05	0,05	0,02	0,3	0,1	0,1	

Characteristics			
Electrical conductivity :	37% IACS 21,5 MS/m	<b>Recommended fabrication technique :</b> Blanking Coining, Drawing, Stamping, Soldering	
Melting temperature :	988°C - 1027°C	<b>Acceptable fabrication technique :</b> Spot Welding, Oxyacetylene Welding, Gas shielded Arc Welding	
Density :	8,75 @ 20°C		
Young's Modulus :	117 GPa		
Shear Modulus :	44 GPa	<b>Machinability rating : 30</b>	

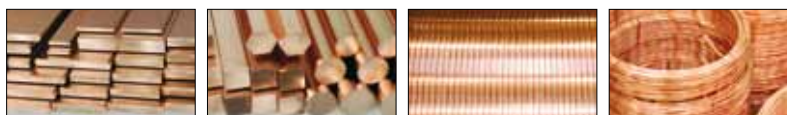
## LA20 (CW503L) Low Brass, 80%

**Typical use**  
**ELECTRICAL** : Rotor bars, AC Motors, Connectors, Battery caps  
**INDUSTRIAL** : Pump linings, hose connectors  
**OTHER** : Marine Hardware, weather stripping

Material designation			Standard tempers ASTM B927 M				
Reference material :	C24000	(ASTM B36 / B927)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW503L	(EN 12163)					
	CuZn20	(ISO 1634-1)					
	CZ 103	(BS2870)					
	L80	(GOST 15527)					
	H80	(GB5232)					
	240	(AS 2738-2)					
<b>O60 (Annealed)</b>	275	70	-	30%			
<b>H01 (1/4 hard)</b>	310	140	-	20%			
<b>H02 (1/2 hard)</b>	330	205	-	13%			
<b>H04 (full hard)</b>	450	275	-	10%			

Chemical composition									
Element	Cu	Zn	Pb	Fe	Al	Ni	Sn	Other	
Min (%)	79	Rest							
Max (%)	81		0,05	0,05	0,02	0,3	0,1	0,1	

Characteristics			
Electrical conductivity :	32% IACS 18,6 MS/m	<b>Recommended fabrication technique :</b> Blanking Coining, Drawing, Stamping, Soldering, Brazing, Cold Working	
Melting temperature :	965°C - 998°C	<b>Acceptable fabrication technique :</b> Oxyacetylene Welding, Gas shielded Arc Welding	
Density :	8,67 @ 20°C		
Young's Modulus :	110 GPa		
Shear Modulus :	44 GPa	<b>Machinability rating : 30</b>	



## LA37 (CW508L) Yellow Brass, 63%

**Typical use**  
 ELECTRICAL : Rotor bars, AC Motors,  
 INDUSTRIAL : Pump linings, hose connectors  
 OTHER : Connectors, screws and nuts, machined parts

Material designation			Standard tempers ASTM B927 M				
Reference material :	C27400	(ASTM B927 / B135)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW508L	(EN 12163)					
	CuZn37	(ISO 1637 / 246-1)					
	CZ 108	(BS2870)					
	L63	(GOST 15527)					
	H62	(GB5232)					
	274	(AS 2738-2)					
			<b>O60 (Annealed)</b>	275	70	-	30%
			<b>H01 (1/4 hard)</b>	310	140	-	20%
			<b>H02 (1/2 hard)</b>	330	205	-	13%
			<b>H04 (full hard)</b>	450	275	-	10%

Chemical composition									
Element	Cu	Zn	Pb	Fe	Al	Ni	Sn	Other	
Min (%)	62	Rest							
Max (%)	64		0,09	0,05	0,05	0,3	0,1	0,1	

Characteristics		
Electrical conductivity :	27% IACS 15,6 MS/m	<b>Recommended fabrication technique :</b> Blanking Coining, Drawing, Stamping, Soldering, Brazing, Roll threading, Spinning
Melting temperature :	915°C	<b>Acceptable fabrication technique :</b> Oxyacetylene Welding, Gas shielded Arc Welding
Density :	8,44 @ 20°C	
Young's Modulus :	103 GPa	
Shear Modulus :	37 GPa	<b>Machinability rating :</b> 35



## Low SB (CW115C) Low Silicon Bronze B

**Typical use**  
**ELECTRICAL :** Rotor bars, Conduit, Pole Line Hardware, Motors,  
**INDUSTRIAL :** Shafting, bushings, bearing plates, heat exchanger  
**OTHER :** Bolts, Clamps, Hinges, Cap screws, Machine

Material designation		
Reference material :	C65100	(ASTM B96)
Comparable materials :	CW115C	(EN 12166)
	CuSi1Mn	(ISO)
	CuSi1	

Standard tempers ASTM B927 M				
Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
<b>O60 (Annealed)</b>	275	85	RF50	30%
<b>H02 (1/2 hard)</b>	380	140	RB 65-90	12%

Chemical composition										
Element	Cu	Zn	Pb	Fe	Mn	Si	P	Al	Other	
Min (%)	Rest					0,8				
Max (%)		1,5	0,05	0,8	0,7	2,0	0,02	0,02	0,5	

Characteristics		
Electrical conductivity :	13% IACS 7,5 MS/m	Fatigue strength 10 <sup>8</sup> cycles (full hard rod) : 170MPa
Melting temperature :	1032°C-1060°C	Recommended fabrication technique : Soldering, Brazing, Spot Weld, Butt Weld, Cold & Hot Working
Density :	8,75 @ 20°C	Acceptable fabrication technique : Seam Weld, Oxyacetylene Welding
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	Machinability rating : 30

## High SB (CW116C) High Silicon Bronze A

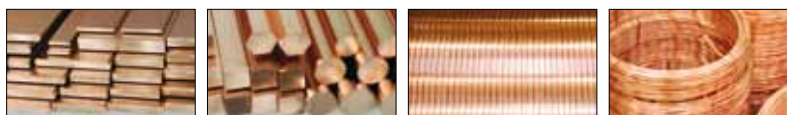
**Typical use**  
**ELECTRICAL :** Rotor bars, Conduit, Pole Line Hardware, Motor,  
**INDUSTRIAL :** Shafting, bushings, bearing plates, heat exchanger  
**OTHER :** Bolts, Clamps, Hinges, Cap & machine screws.

Material designation		
Reference material :	C65500	(ASTM B96)
Comparable materials :	CW116C	(EN 12163)
	CuSi3Mn1	(ISO 1637)

Standard tempers ASTM B96 M				
Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
<b>M (Annealed)</b>	410	135	40	70%
<b>H01 (1/4 hard)</b>	490	260	77	47%
<b>H02 (1/2 hard)</b>	555	300	80	20%
<b>H04 (full hard)</b>	685	350	87	8-17%

Chemical composition											
Element	Cu	Zn	Pb	Fe	Mn	Si	P	Al	Ni	Sn	Other
Min (%)	Rest				0,7	2,8					
Max (%)		0,4	0,05	0,2	1,3	3,2	0,05	0,05	0,6	0,4	0,5

Characteristics		
Electrical conductivity :	7% IACS 4 MS/m	Fatigue strength 10 <sup>8</sup> cycles (full hard rod) : 200MPa
Melting temperature :	971°C-1027°C	Recommended fabrication technique : Brazing, Spot Weld, Butt Weld, Seam Weld, Cold & Hot Working
Density :	8,53 @ 20°C	Acceptable fabrication technique : Soldering, Oxyacetylene Welding
Young's Modulus :	103 GPa	
Shear Modulus :	39 GPa	Machinability rating : 30





<b>CC (CW105C) Chromium Copper</b>	<b>Typical use</b> ELECTRICAL : Connectors, Switches Contacts, Motors, INDUSTRIAL : Heat Sinks, Electrode Holder Jaws, Welding consumable : wheels, tips, rods.
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Material designation			Standard tempers EN 12167				
Reference material :	C18200		Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min
Comparable materials :	CW105C	(EN 12166)	R200	200	60	-	30%
	CuCr1		R360	360	250	-	15%
	BrH1	(GOST 18175)	R420	420	350	-	8%

Chemical composition							
Element	Cu	Pb	Fe	Si	Cr	Other	
Min (%)	Rest				0,6		
Max (%)		0,05	0,08	0,1	1,2	0,2	

Characteristics		
Electrical conductivity : (can be adjusted by heat treatment)	80% IACS 46,4 MS/m	Acceptable fabrication technique : Soldering, Brazing, Gas Shielded Arc Welding, Cold & Hot Working
Melting temperature :	1070°C - 1075°C	Machinability rating : 20
Density :	8,89 @ 20°C	
Young's Modulus :	117 GPa	
Shear Modulus :	50 GPa	

<b>CCZ (CW106C) Copper Chromium Zirconium</b>	<b>Typical use</b> ELECTRICAL : Rotor bars, Motor, welding electrode supports and extensions, INDUSTRIAL : Welding consumable : wheels, tips, rods
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Material designation			Standard tempers -EN 12163				
Reference material :	CW106C (EN 12420 - EN 12163)		Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Brinell	Elongation % min
Comparable materials :	C18150		R370	370	250	140	16%
	CuCr1Zr (ISO 1336 - ISO 1637)		R430	430	350	155	10%
	CC 102 (BS 2872 - BS 2874)		R470	470	420	165	8%

Chemical composition							
Element	Cu	Fe	Si	Cr	Zr	Other	
Min (%)	Rest			0,5	0,05		
Max (%)		0,08	0,1	1,2	0,25	0,2	

Characteristics		
Electrical conductivity : (can be adjusted by heat treatment)	76 % IACS 44 MS/m	Excellent mechanical properties even at high temperatures, maximum service temperature : 380°C
Melting temperature :	1070°C-1080°C	Acceptable fabrication technique : Soldering, Brazing, Cold & Hot Working
Density :	8,89 @ 20°C	
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	



**CNSC (C18000)**  
**CuNi2SiCr**  
**Copper Nickel Silicon Chromium**

**Typical use**  
 ELECTRICAL : Rotor bars,  
 INDUSTRIAL : Resistance welding electrodes, welding rod  
 OTHER : Bolts, Clamps, Hinges, Cap Screws, Fasteners, Nuts

Material designation	
Reference material :	C18000
Comparable materials :	CuNi2SiCr

Standard tempers				
Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Rockwell B	Elongation % min

Chemical composition									
Element	Cu	Pb	Fe	Mn	Si	Ni	Cr	Other	
Min (%)	Rest				0,4	1,8	0,1		
Max (%)		0,02	0,15	0,1	0,8	2,5	0,8	0,3	

Characteristics		
Electrical conductivity : <small>(can be adjusted by heat treatment )</small>	40 % IACS 23 MS/m	<b>Recommended fabrication technique :</b> Soldering, Brazing, Cold & Hot Working
Melting temperature :	1040°C	
Density :	8,81 @ 20°C	<b>Acceptable fabrication technique :</b> Machining, Oxyacetylene Welding, Resistance welding
Young's Modulus :	130 GPa	
		<b>Machinability rating : 30</b>

**CNS (CW111C)**  
**Copper Nickel Silicon**

**Typical use**  
 ELECTRICAL : Rotor bars,  
 INDUSTRIAL : Resistance Welding Electrodes, welding Rod  
 OTHER : Bolts, Clamps, Hinges, Cap Screws, Fasteners, Nuts

Material designation	
Reference material :	C64700 (ASTM B 411)
Comparable materials :	CW111C (EN 12163) CuNi2Si (ISO 1187)

Standard tempers -ASTM B 301 M				
Precipitation hardened	Min. tensile strength MPa	Min yield strength MPa	Hardness Brinell	Elongation % min
Rod 2,4-38mm	620	515	ind. 190	8%
Square 5-25mm	620	515	ind. 175	8%
Rect 5-38x5-65	550	485	ind. 145	8%

Chemical composition									
Element	Cu	Zn	Pb	Fe	Mn	Si	Ni	Other	
Min (%)	Rest					0,4	1,6		
Max (%)		0,5	0,02	0,1	0,1	0,8	2,2	0,3	

Characteristics		
Electrical conductivity : <small>(can be adjusted by heat treatment )</small>	44 % IACS 25,5 MS/m	<b>Recommended fabrication technique :</b> Soldering, Brazing, Cold & Hot Working
Melting temperature :	1060°C-1095°C	
Density :	8,88 @ 20°C	<b>Acceptable fabrication technique :</b> Machining, Oxyacetylene Welding, Resistance welding
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	<b>Machinability rating : 30</b>



<b>CS (CW114C) Copper Sulphur</b>	<b>Typical use</b> ELECTRICAL : Connectors, Motor & Switchs components, INDUSTRIAL : Screws, Welding Torch Tips, Furnace Brazed Articles
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Material designation		Standard tempers -ASTBM B 301 M				
Reference material :	C14700 (ASTM B 124)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Brinell	Elongation % min
Comparable materials :	CW114C (EN 12167) CuS CuSP	H02 Ø6.5-32mm	260	205	-	8%
		H02 Ø>32-76mm	260	205	-	12%
		H04 Ø6.5-32mm	305	260	-	4%
		H04 Ø>32-76mm	275	240	-	8%

Chemical composition					
Element	Cu+Ag	P	S	Other	
Min (%)	Rest	0,003	0,2		
Max (%)		0,005	0,5	0,1	

Characteristics		
Electrical conductivity : (can be adjusted by heat treatment )	95 % IACS 55 MS/m	Recommended fabrication technique : Soldering, Brazing, Hot Working
Melting temperature :	1067°C-1076°C	Acceptable fabrication technique : Butt Weld, Cold Working
Density :	8,94 @ 20°C	Machinability rating : 85
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	

<b>CT (CW118C) Copper Tellurium</b>	<b>Typical use</b> ELECTRICAL : Connectors, Motor & Switchs parts, Transistor Bases, INDUSTRIAL : Screws, Tips, Furnace Brazed Articles
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Material designation		Standard tempers -ASTBM B 301 M				
Reference material :	C14500 (ASTM B 301)	Temper	Min. tensile strength MPa	Min yield strength MPa	Hardness Brinell	Elongation % min
Comparable materials :	CW118C (EN 12164) CuTeP CuTe	H02 Ø6.5-32mm	260	205	-	8%
		H02 Ø>32-76mm	260	205	-	12%
		H04 Ø6.5-32mm	305	260	-	4%
		H04 Ø>32-76mm	275	240	-	8%

Chemical composition					
Element	Cu+Ag	P	Te	Other	
Min (%)	Rest	0,004	0,4		
Max (%)		0,012	0,7	0,1	

Characteristics		
Electrical conductivity : (can be adjusted by heat treatment )	86 % IACS 50 MS/m	Recommended fabrication technique : Soldering
Melting temperature :	1051°C-1080°C	Acceptable fabrication technique : Brazing, Cold & Hot Working
Density :	8,94 @ 20°C	Machinability rating : 85
Young's Modulus :	117 GPa	
Shear Modulus :	44 GPa	





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