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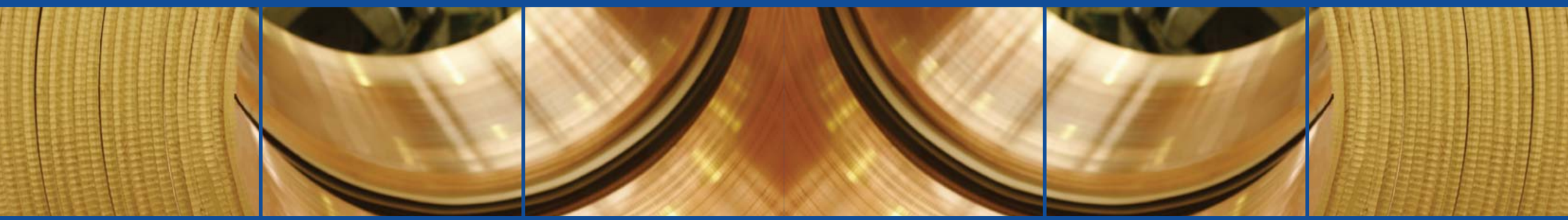

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OUR BRASS IS THE BETTER BRONZE

Sofia Med is a producer of a wide range of rolled and extruded copper and copper alloy products such as sheets, strips, plates, circles, disks, bare and plated copper bus bars, rods, profiles, components, fabricated parts and wire that are used in a wide variety of building and industrial applications.

Sofia Med is part of the ElvalHalcor Hellenic Copper and Aluminium industry S.A., a leading global manufacturer of aluminium and copper rolled and extrusion products.

Sofia Med is situated in Sofia, Bulgaria, on a 250 000 m^2 area and has three production units: Foundry, Rolling and Extrusion.

With more than 80 years of manufacturing experience and significant investments, **Sofia Med** has evolved into a competitive modern European company with customers globally.

Sofia Med operates under strict quality, environmental, as well as health and safety management systems, in compliance with ISO 9001:2015, IATF 16949:2016, ISO 14001:2015, OHSAS 18001:2017, ISO 50001:2011, as well as follows the guidelines of ISO 26000:2010 for social responsibility.

The wide product range of **Sofia Med** meets the requirements of the Unified European standards (EN), as well as BS, DIN, ASTM, JIS standards, or any other specific customer request.

Comparison of SM688 (CuZn23Al3Co) with CuSn6 (C5191) and CuSn8 (C5210)

Within the last couple of years the consideration of designer of connectors has changed completely. As it was in the 90s and in the first decade of this century only important to create alloys with great high performance with very good relaxation behavior and high tensile strength with relatively middle class electrical conductivity.

Sofia Med takes in consideration for all connectors needed between 600-750 N/mm² a high class brass for reasonable price against a phosphor bronze.

COMPARISON OF SAME TEMPERCLASS WITH BRONZE AND SM688 IN THE TEMPER 600

UNS		C51910	C52100	C68800
JIS		C5191	C5210	C6880
DIN name		CuSn6	CuSn8	CuZn23Al3Co
Sofia Med				SM688
Tensile strength in N/mm²		580-660	600-690	600-700
0,2% yield strength in N/mm²		>530	>540	>510
Vickers hardness HV (indication value only)		180-210	190-220	175-210
Elongation A50%		>7	>8	>13 ⬆
Electrical conductivity in IACS		13	12	17 ⬆
Bendability 90°				
0.10 ≤ s ≤ 0.25 mm	Transverse	0 x s	0 x s	0 x s
	Parallel	0 x s	1 x s	0 x s ⬆
0.25 ≤ s ≤ 0.50 mm	Transverse	0 x s	1 x s	0 x s ⬆
	Parallel	0 x s	2 x s	0 x s ⬆

COMPARISON OF SAME TEMPERCLASS WITH BRONZE AND SM688 IN THE TEMPER 660

UNS		C51910	C52100	C68800
JIS		C5191	C5210	C6880
DIN name		CuSn6	CuSn8	CuZn23Al3Co
Sofia Med				SM688
Tensile strength in N/mm²		640-730	660-750	660-750
0,2% yield strength in N/mm²		>600	>620	>580
Vickers hardness HV (indication value only)		200-230	210-240	210-240
Elongation A50%		>4	>6	>8 ⬆
Electrical conductivity in IACS		13	12	17 ⬆
Bendability 90°				
0.10 ≤ s ≤ 0.25 mm	Transverse	0 x s	0.5 x s	0 x s
	Parallel	2 x s	1.5 x s	0 x s ⬆
0.25 ≤ s ≤ 0.50 mm	Transverse	1 x s	1 x s	0 x s ⬆
	Parallel	3 x s	3 x s	1 x s ⬆

GENERAL PROPERTIES

ALLOY CHARACTERISTICS

SM688 is very favorable for electrical connectors and useful to replace the C5191 (CuSn6) and C5210 (CuSn8). The cold forming properties are more than good, the bending properties in good way and bad way are at least on the same level as C5191 (CuSn6) or even better, especially in the temper class of 600-700 N/mm². The electrical conductivity is 2-3% IACS higher than C5191 (CuSn6). Strip can be produced from 0.080 – 5 mm, even in sheets and circles it is available. Applications are connectors, switches, carriers, contact springs, relays and many electronic applications. The strips can be delivered with tempered qualities on request. The material is in line with the U.S. EPAand meets the OEKO-TEX standard regarding the Pb and Cd.

MECHANICAL PROPERTIES

TEMPER CONDITIONS		0	H01	H02	H04	H06
		HV150-180	HV175-210	HV190-220	HV210-240	HV230-260
Tensile strength in N/mm²		540-600	600-700	660-750	740-830	820-910
0,2% yield strength in N/mm² min		430	510	580	660	780
Vickers hardness HV		150-180	175-210	190-220	210-240	230-260
Elongation $A_{L50\%}$		>30	>13	>8	>3	>2
Electrical conductivity in % IACS		17	17	17	16	16
Bendability						
0.10 ≤ s ≤ 0.25 mm	Transverse	0 x s	0 x s	0 x s	1 x s	3 x s
	Parallel	0 x s	0 x s	0 x s	1.5 x s	10 x s
0.25 ≤ s ≤ 0.50 mm	Transverse	0 x s	0 x s	0 x s	2 x s	-
	Parallel	0 x s	0 x s	1 x s	2 x s	-

PHYSICAL PROPERTIES

Thermal expansion coefficient 20 ... 300°C	18.2	10^{-6}/K
Density	8.2	g/cm³
Thermal conductivity	78	W(m•K)
Modulus of elasticity (1 GPa = 1 kN/mm²) cold formed	115 Gpa = kN/mm²	
Electrical conductivity soft	10	MS/m

MATERIAL DESIGNATION

DIN EN Symbol	CuZn23Al3Co
UNS	C68800
JIS	C6880

CHEMICAL COMPOSITION

Cu	Balance
Zn	23%
Al	3%
Co	0,4%
Fe	<0,05
Ni	<0,1
Others	<0,105

This information was given with the best knowledge, but cannot guarantee any characteristics we describe listed above. The contract terms of Sofia Med agreed with any individual customer and our general conditions of sales describe the liability of these conditions. In any case do we reserve the right by technical development or any other reason to modify this sheet according to our needs. This data sheet is part of a technical modification service done case by case.