

Data Sheet

GENERAL DESCRIPTION
– SUBJECT TO CHANGES OR DEVIATIONS

Copper Nickel Silicon Chrome – Luvata NK203

Alloy description

CuNiSiCr alloy is a very high strength Beryllium free precipitation hardening alloy with medium high electrical and thermal conductivity.

Mechanical and electrical properties of CuNiSiCr copper are obtained through thermomechanical treatment which typically consists of following steps: solution annealing followed by rapid quenching to water bath, cold working, aging at 400-450°C and cold working to final dimensions. The final metallographical structure of CuNiSiCr consists of finely dispersed Ni₂Si and Cr precipitates which develop during the aging treatment. Aging treatment is therefore essential to obtain high mechanical properties and sufficient electrical conductivity.

Typical applications:

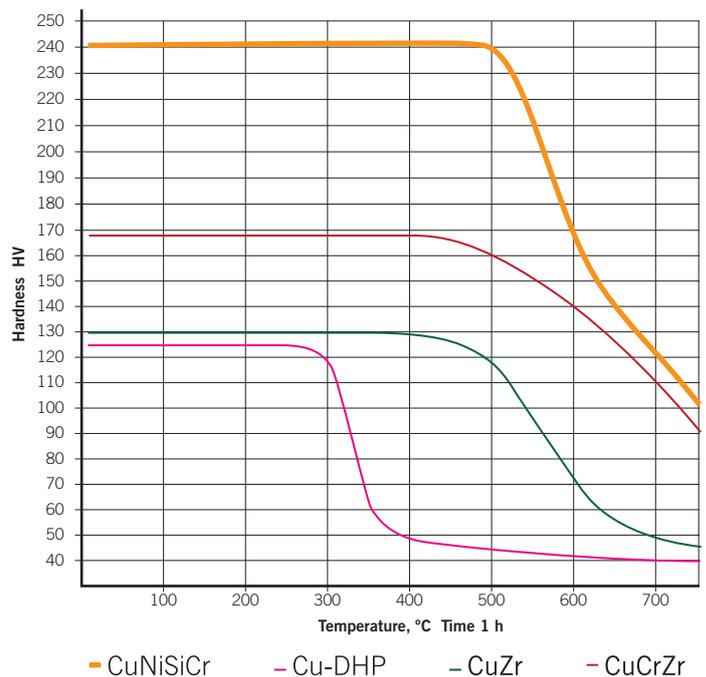
- Spot welding adaptor shanks
- Generator rotor wedge profiles
- Casting dies for non-ferrous metals
- Other applications where high strength material properties are needed

Products / shapes:

Round rods and solid profiles in age-hardened temper.

Softening behaviour – resistance against softening:

Room temperature hardness is presented in the following figure as a function of annealing temperature. Material at hard or aged temper.



Chemical composition and corresponding standards:

Luvata Pori Oy alloy	Composition* %	EN – CEN/TS 13388:2008	ASTM / USA
NK203	Ni 1.8 – 3.0 % Si 0.4 – 0.8 % Cr 0.1 – 0.8 %	CW 111C	CDA 18000

*Fe 0.15% max

Physical properties:

Density kg/dm ³	Coefficient of linear expansion 1/K	Specific heat J/(kg x K)	Melting temperature °C
8.8	0.0000175	380	1020 – 1040

Mechanical properties – round rods:

Hardness HV	220 – 250 HV
Tensile strength	650 – 800 N/mm ²
0,2% yield strength	600 – 750 N/mm ²
Elongation	9 – 15 %

Electrical and thermal properties – typical values:

Electrical conductivity	vol	% IACS *	38 – 42
	mass	%IACS	38 – 42
	MS/m		22 – 24
Electrical resistivity	vol	Ω mm ² /m	0.041 – 0.045
	mass	Ω g/m ²	0.37 – 0.41
Thermal conductivity (20 °C)	W / Km		220

* % IACS = International Annealed Copper Standard. The % IACS values are calculated as percentages of the standard value for annealed high conductivity copper as laid down by the International Electrotechnical Commission.

Joining and machining:

Machinability rating (free cutting brass = 100)	Soldering	Brazing	TIG	MIG	EBW
20	Good	Good	NOT Recommended	NOT Recommended	NOT Recommended

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