

# Data Sheet

GENERAL DESCRIPTION  
– SUBJECT TO CHANGES OR DEVIATIONS

## Oxygen-free Silver Bearing Copper – Luvata Special Products Alloy HK003, HK015

### Alloy description

Luvata Special Products HK silver bearing oxygen-free copper is a high purity copper that is immune against hydrogen embrittlement. It is used in applications where high electrical and thermal conductivity are essential. Small amount of alloyed silver increase the softening temperature of pure copper and the mechanical properties at elevated temperature are higher than in pure copper. It can be joined with all welding and brazing methods and it is suitable for manufacturing processes requiring extreme deformability.

### Typical applications:

- Commutators
- Generator rotor and stator windings
- Applications where creep properties and higher softening temperature than in OF-OK® are needed
- Other applications where high electrical and thermal conductivity are needed

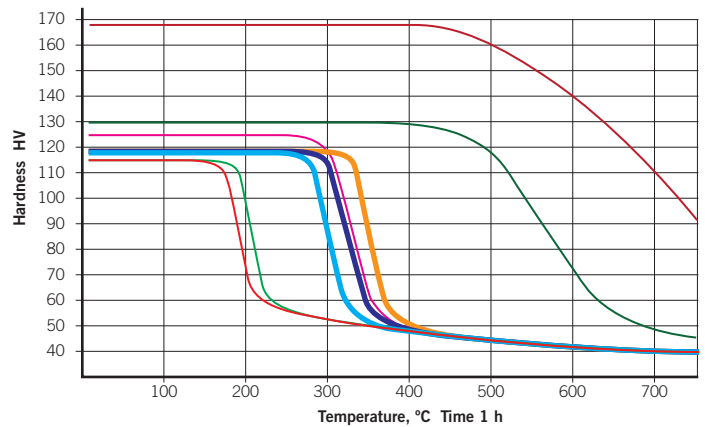
### Products / shapes:

Profile tubes, round tubes, round rods, wire and strip coils, rectangular bars and solid profiles. Corresponding EN-norms for different products are as follows:

- EN 13600 – Copper and copper alloys.  
Seamless copper tubes for electrical purposes.
- EN 13601 – Copper and copper alloys.  
Copper rod, bar and wire for general electrical purposes.
- EN 13605 – Copper and copper alloys.  
Copper profiles and profiled wire for electrical purposes.

### 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.



– Cu-ETP    – CuAg0,05(OF)    – Cu-DHP    – Cu-Zr  
– Cu-OF    – CuAg0,1(OF)    – CuAg0,2(OF)    – CuCrZr

**Chemical composition and corresponding standards:**

Luvata Pori Oy alloy	Composition* Ag –content %	EN – CEN/TS 13388:2008	ASTM / USA
HK003	0,03 – 0,05 %	CuAg0,04 (OF) / CW017A	CDA C104 OFS
HK015	0,085 – 0,12 %	CuAg0,10 (OF) / CW019A	CDA C107 OFS

\* Other elements max %: Bi 0,0005, others total 0,0065

**Physical properties:**

Density kg/dm <sup>3</sup>	Coefficient of linear expansion 1/K	Specific heat J/(kg x K)	Melting temperature °C
8,94	0,0000177	385	1083

**Mechanical properties – typical values:**

	Soft temper	Half-hard temper	Hard temper
Hardness HV	35 – 65 HV	70 – 95 HV	85 – 115 HV
Tensile strength	200 – 220 N/mm <sup>2</sup>	250 – 350 N/mm <sup>2</sup>	260 – 400 N/mm <sup>2</sup>
0,2% yield strength	35 – 65 N/mm <sup>2</sup>	180 – 280 N/mm <sup>2</sup>	220 – 380 N/mm <sup>2</sup>
Elongation	min. 40 %	min. 12 %	min. 5 %

**Electrical and thermal properties – typical values:**

			HK003	HK015
Electrical conductivity	vol	% IACS *	min 99,5	min 99,5
	mass	%IACS	min 98,9	min 98,9
	MS/m		min 57,7	min 57,7
Electrical resistivity	vol	Ω mm <sup>2</sup> /m	max 0,0173	max 0,0173
	mass	Ω g/m <sup>2</sup>	max 0,1549	max 0,1549
Thermal conductivity (20 °C)	W / Km		388	388

\* % 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	Excellent	Excellent	Good	Good	Good

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