

PRODUCT
CATALOG
Strips & Sheets

24

Uba
lebronze alloys



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History of the Group

About Lebronze alloys

Lebronze alloys is a world leader in the **development** and **fully integrated production** of **high-performance copper and nickel alloys**.

Thanks to a multidisciplinary know-how, the Group provides **innovative solutions to all major industries** such as Aeronautics, Electronics, Space, Automotive, Energy, among others.

Our 6 production facilities and 750 employees manage a **unique range of metal processing technologies**: continuous and semi-continuous casting, extrusion, hot and cold rolling, drawing, open-die forging, hot stamping, closed-die forging, cold forming, machining, non-destructive testing, etc.

The Group's commitment is to find appropriate and **optimized solutions for every sector's requirements while optimizing the environmental impact of our products**.

High performance copper and nickel alloys

Fully integrated production process

Optimized environmental impact of our products

KEY FIGURES

- 6 production sites
- 3 service centers
- 750 employees
- 200 + alloys produced
- 288 M€ turnover

2006

The DUMONT family, some private investors as well as some key managers, take over "Le Bronze Industriel", a company founded in France in 1934 specializing in copper alloys production. This change of ownerships, with Michel DUMONT as active Chairman, marked a new period of strategic growth for the company.

2012-2016

Period of massive external growth for the company. Several major acquisitions are made such as Inoforges, Swissmetal Lüdenscheid and CLAL. These acquisitions consolidated our metallurgical expertise through a sharing of experience.

2016

Le Bronze Industriel officially becomes Lebronze alloys. It has been 10 years since the buyout and the Group has now tripled its sales.

2020

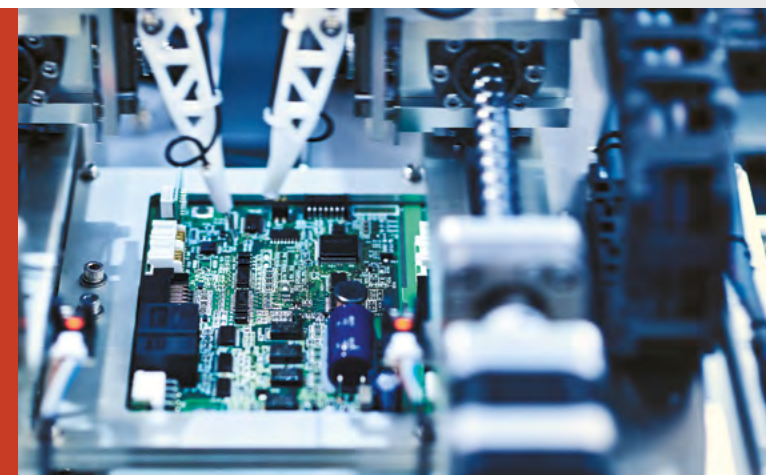
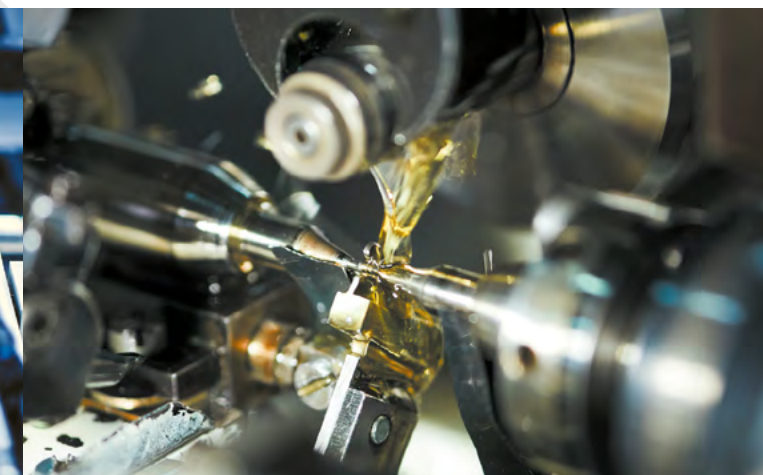
Opening of our first service center in Europe at Aldridge (UK). This service center joins an already well-established network of distributor partners around the globe and enables us to provide a greater responsiveness to our customers' needs.

2022

Marks the end of a 2-years industrial repositioning allowing the Group to focus on high added value materials.

2023

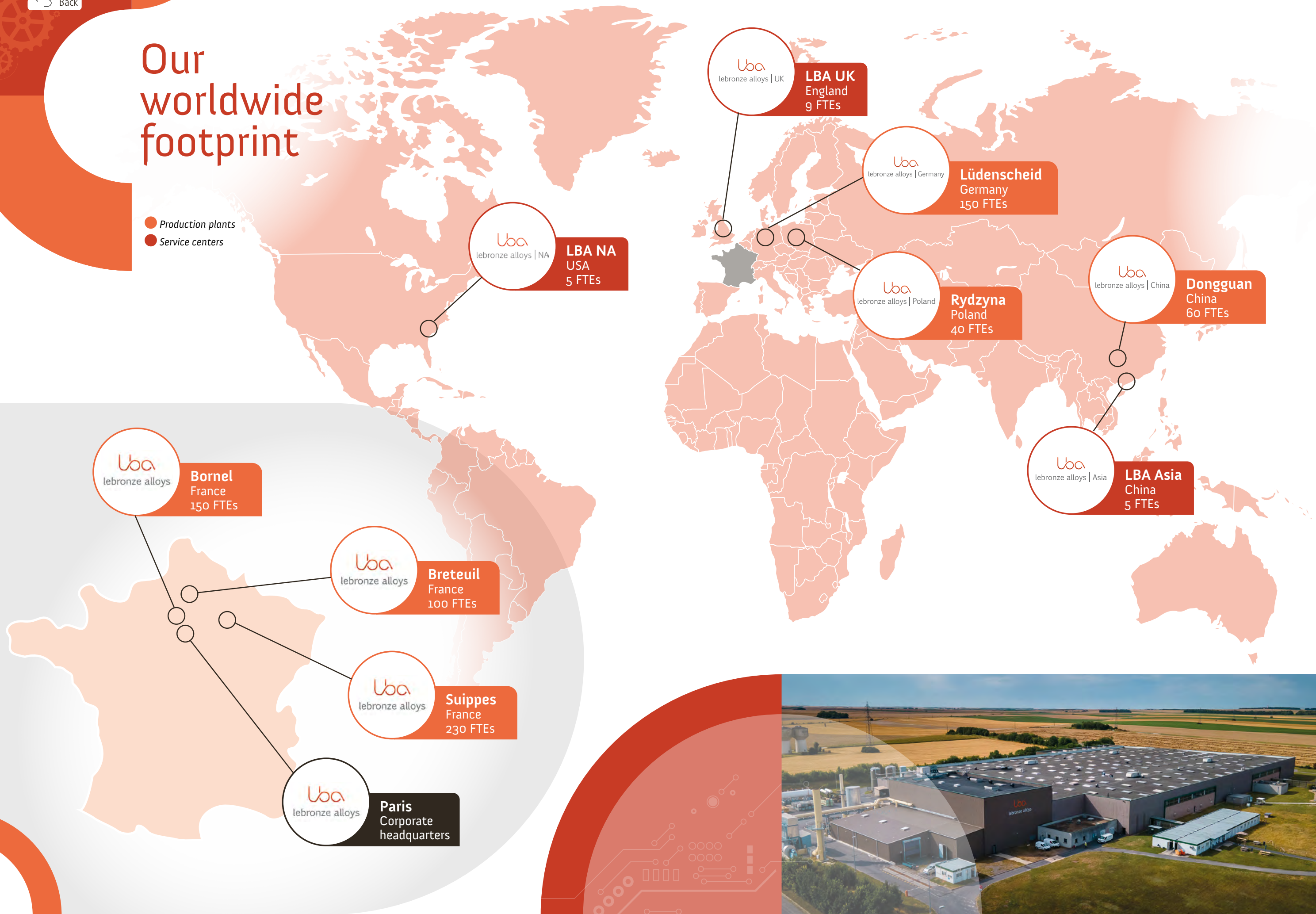
The Group counts over 750 employees, 6 production sites and 3 service centers around the world and generates 288 M€ of sales.



[Back](#)

Our worldwide footprint

- Production plants
- Service centers



[← Back](#)

Product range at a glance

Lebronze alloys offers **more than 200 copper-based and nickel-based alloys** with unique properties which meet the most complex requirements. We supply these alloys in different forms :



Billets



Bars



Hollow bars



Strips



Sheets



Rods



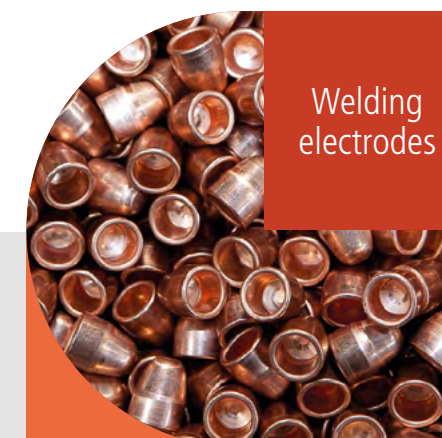
Wires



Standard & complex profiles



Plates



Welding electrodes



Marine tubes & fitting



Machined blanks and parts

A fully integrated production process

One of the Group's major strengths relies in its **fully integrated production process**, from smelting to machining and recycling.

This particularity guarantees a traceability, optimization and strict control of the final properties of our materials so they can suit to the most stringent requirements.

Melting & Casting

- Continuous wire casting
- Continuous bar casting
- Semi-continuous casting

Hot forming

- Extrusion
- Hot rolling
- Free forging
- Hot stamping

Cold forming

- Cold rolling
- Drawing straightening
- Cold stamping
- Heat treatments

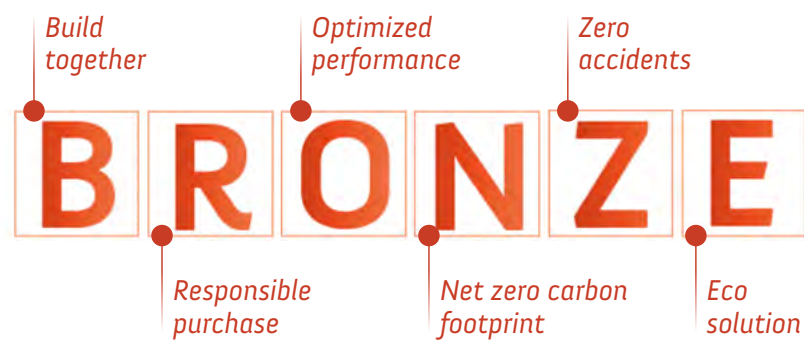
Finishing

- Machining
- Servicing
- Scrap recovery

Our sustainable development policy

To ensure the sustainability of our business, it is essential to strike the **right balance between economic performance, social impact and environmental impact.**

This balance within the Group is structured around our **6 "Bronze" pillars.** Each pillar is broken down into actions and indicators that enable us to be part of a dynamic of continuous progress and sustainability.



Build together: this pillar covers social initiatives that have a positive impact on gender, sex and age equality, as well as projects that improve the well-being of our teams at work.

Responsible purchase: purchases represent more than 50% of Group sales. It is therefore essential that we implement a responsible purchasing policy and tighten up our requirements of our suppliers.

Optimised performance: the Company's economic, industrial and environmental performance is a key factor in meeting the expectations of our relevant stakeholders.

Net zero carbon footprint: taking into account the major challenge of decarbonation, we have decided to make this a specific pillar and to build a path that meets the transformation of the Climate Act and the Paris Agreement.

Zero accidents: our processes require constant vigilance. We are taking action to anticipate and reduce the risk of accidents as far as possible.

Eco solution: by working in collaboration with our customers and bringing innovations to the market, we are contributing to a more sustainable approach by improving the life cycle of products.

Quality

Lebronze alloys develops for all its activities a formally recognized quality management system which allow to:

- guarantee the traceability of our products, from raw material to the product delivered
- certify our products properties
- control our delivery times

Our state-of-the-art quality checks equipment include:

- **Metallurgical tests** such as traction, resilience, hardness, bending and others
- **Non destructive tests** such as Magnetic Particle Inspection (MPI), ultrasonic contact testing, liquid penetrant Inspection and others
- **Metrology, geometry and surface tests** such as surface metrology, global DEA, profile projectors and others



Our certifications

All our certificates can be consulted on our website

Aerospace certifications



Certified site: Suippes



Heat treating



Certified service center:
Lebronze alloys UK

General certifications



Certified sites: Bornel, Breteuil, Lüdenscheld, Suippes, Rydzyna.



Certified sites: Breteuil, Suippes, Rydzyna.



Certified sites: Lüdenscheld and Suippes.

CuMn alloys

Current sensing alloys

Precision and stability

Our Group offers a wide range of **current sensing alloys** composed of copper, manganese and nickel. These alloys are widely used for the **precision and the stability** of their electrical resistivity in various environment. Main applications are in electronics as **precision resistors** and **electric shunts** amongst others.

Our wide range of current sensing alloys makes us one of the **major actors on this market** and allows us to meet the **challenging requirements of a large portfolio of customers**.

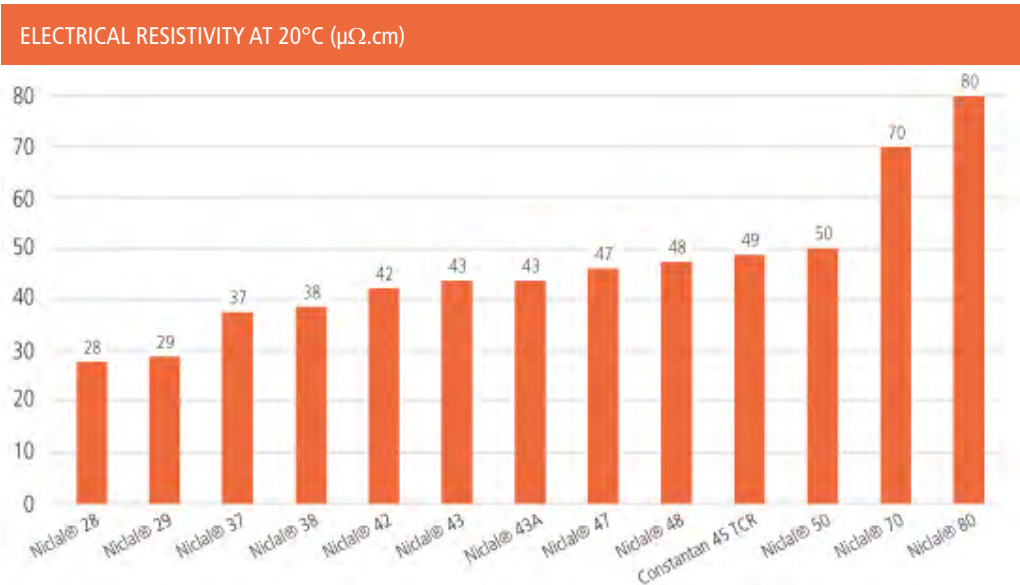
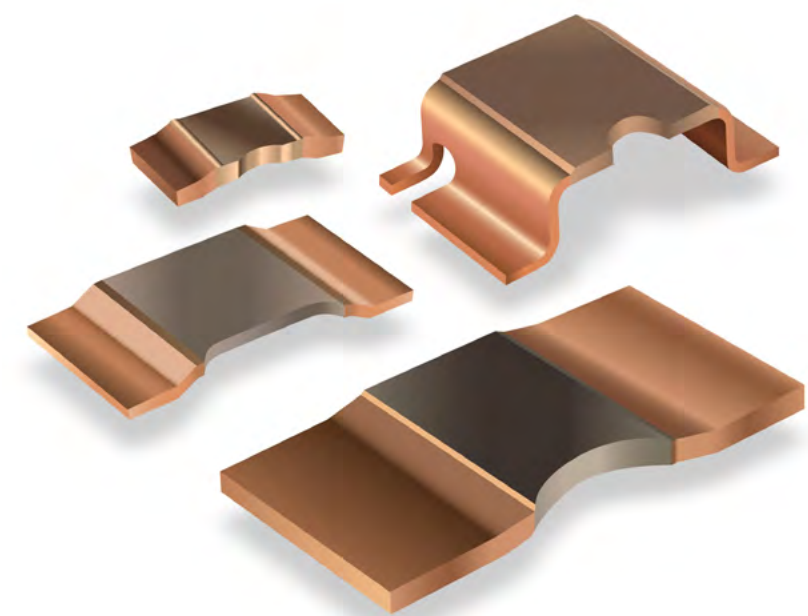
We provide these products mainly as strips to be processed into relatively complex components.

PRODUCT PORTFOLIO	
Alloy	ISO
Nical® 28	CuMn ₆ Sn ₂
Nical® 29	CuMn ₇ Sn ₂
Nical® 37	CuMn ₁₀ Ni ₄
Nical® 38	CuMn ₁₀ Ni ₄
Nical® 42	CuMn ₁₁ Ni ₄
Nical® 43	CuMn ₁₂ Ni ₄
Nical® 43A	CuMn ₁₂ Ni ₂
Nical® 47	CuMn ₁₄ Ni ₂
Nical® 48	CuMn ₁₃ Ni ₄
Constantan 45 TCR	CuNi ₄₄ Mn ₁ Fe
Nical® 50*	Proprietary
Nical® 70*	Proprietary
Nical® 80*	Proprietary

*For those alloys, technical data is on demand

STANDARD CAPABILITY			
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

- Our CuMn current sensing alloys are :
- RoHS and REACH compliant
 - Mainly produced from recycled raw materials



Markets and applications

Electronics



- Precision resistors
- Electrical shunts in electricity meters
- Electrical shunts in DC ammeters

E-Mobility



- Electrical shunts for battery management



Niclal® 28

CuMn₆Sn₂

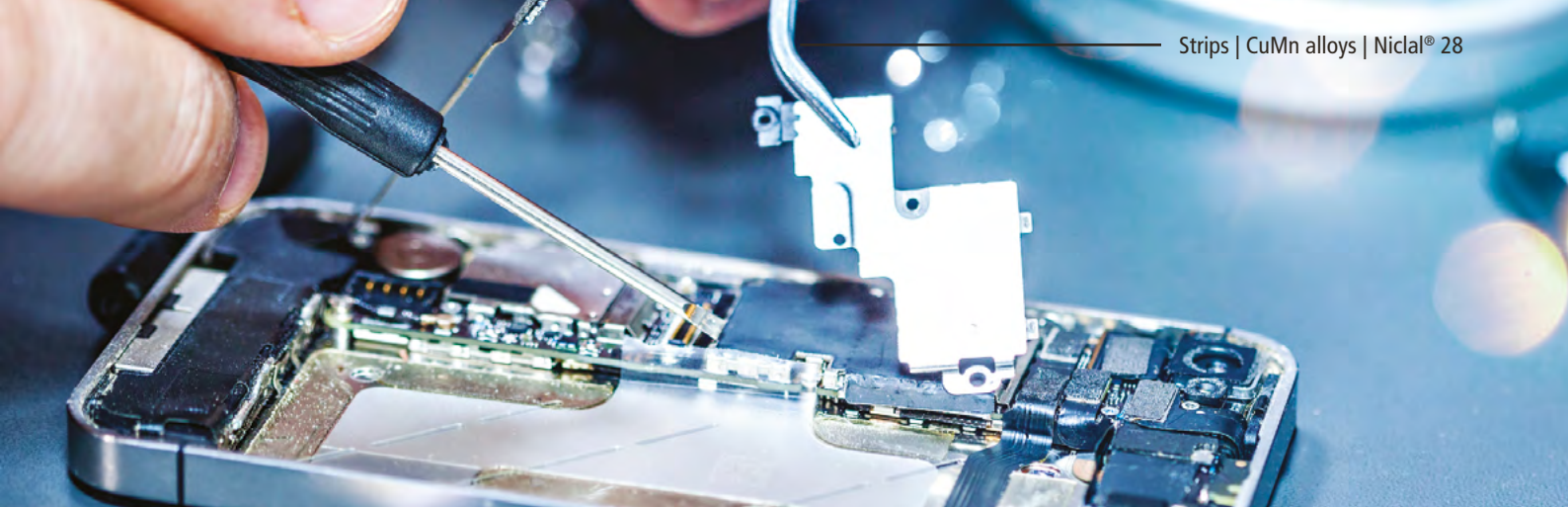
Cu
copper

Mn
manganese

Sn
tin

Back

Niclal® 28 is a Copper-Manganese-Tin (CuMn₆Sn₂) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 28 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₆ Sn ₂	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Sn
Balance	6.5%	2.1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.5 g/cm³
Thermal conductivity	34 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	860 °C
Electrical properties	
Electrical resistivity at 20 °C	28 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 25 ppm/°C 0 ± 25 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	0 ± 0.6 μV/°C
Long-term stability (after 4000 hours at 100 °C)	ΔR < 0.2%

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
OSK (skin pass)	≤ 380	≤ 450	≥ 25 %	≤ 150
¼ hard H14	≥ 500	≥ 650	≤ 5%	≤ 220

TYPICAL APPLICATIONS

- Precision resistors
- Electrical shunts in electricity meters
- Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

- Cold forming
- Welding
- Soldering
- Stamping

STANDARD CAPABILITY

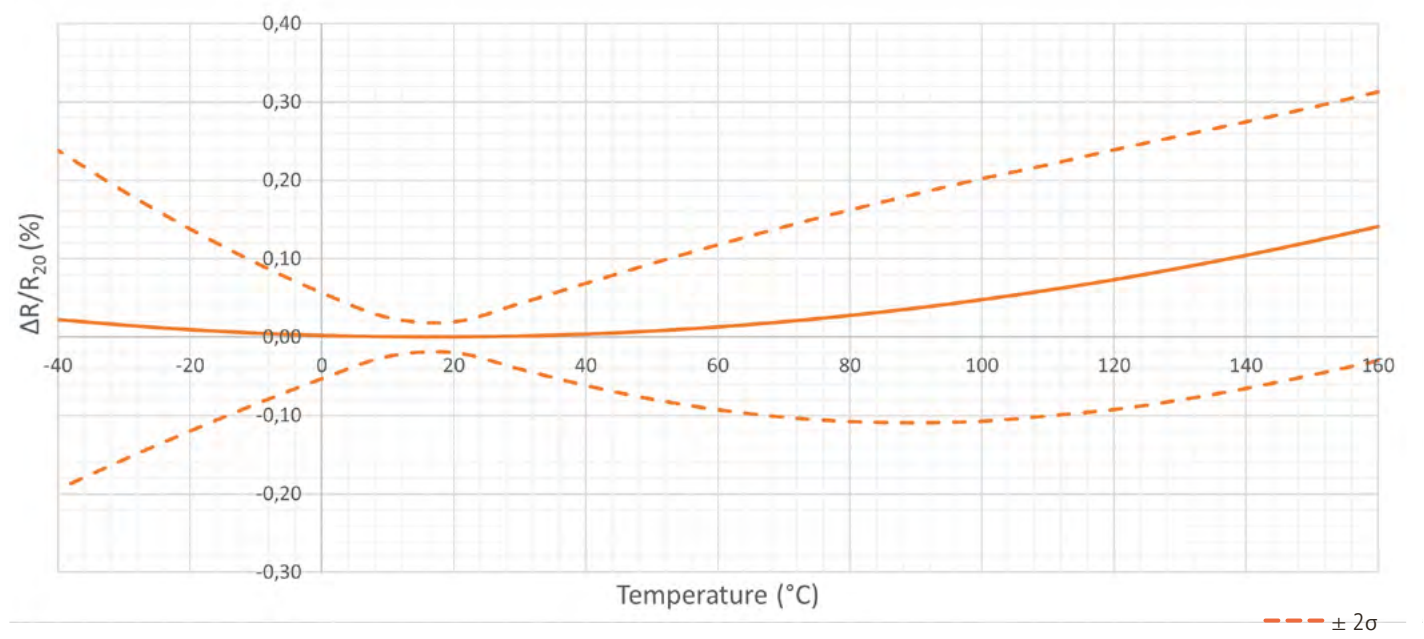
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

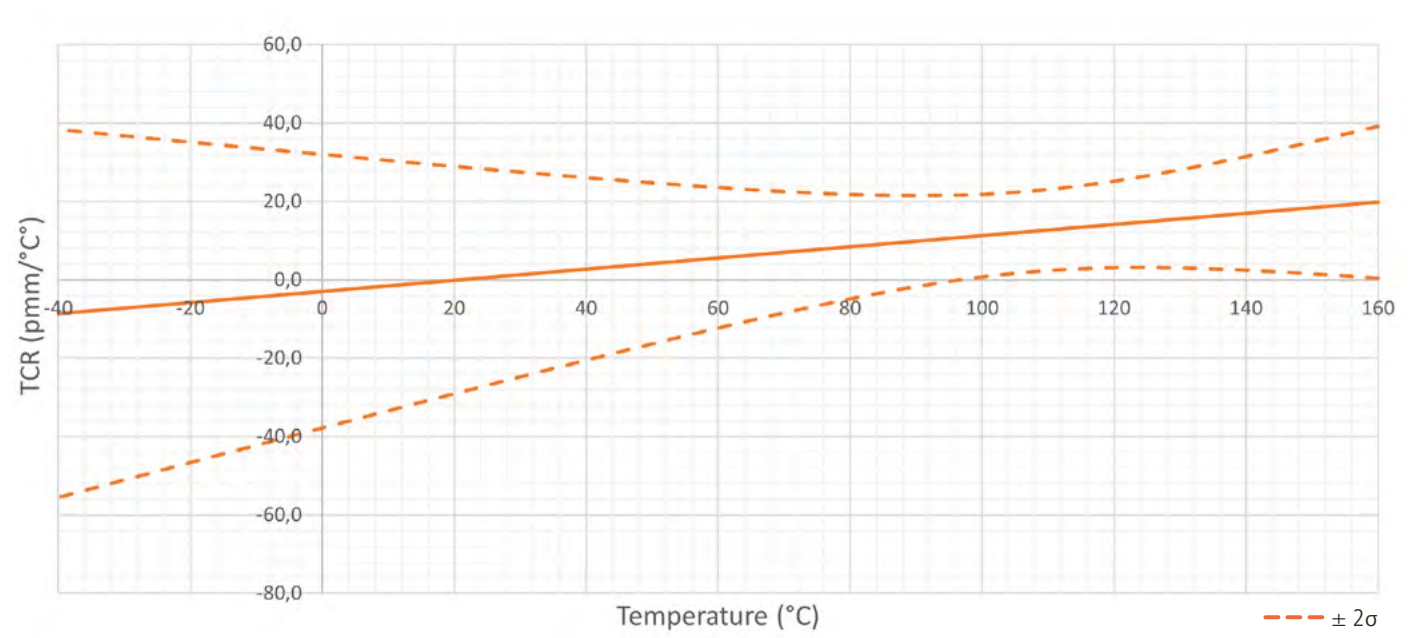
OTHER AVAILABLE FORMS

On demand

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE



Disclaimer : Data for information only, non-contractual



Niclal® 29

CuMn₇Sn₂

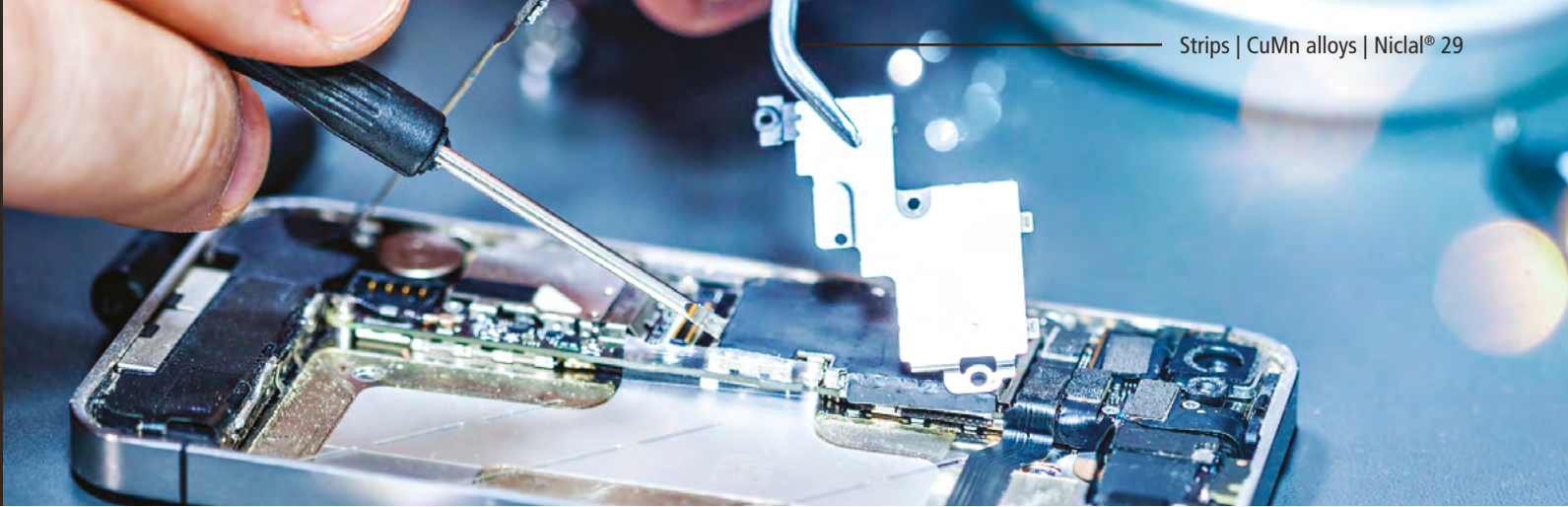
Cu
copper

Mn
manganese

Sn
tin

Back

Niclal® 29 is a Copper-Manganese-Tin (CuMn₇Sn₂) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 29 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₇ Sn ₂	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Sn
Balance	7%	2.3%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.5 g/cm³
Thermal conductivity	34 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	860 °C
Electrical properties	
Electrical resistivity at 20 °C	29 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 20 ppm/°C 0 ± 20 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	0 ± 0.7 μV/°C
Long-term stability (after 4000 hours at 100 °C)	ΔR < 0.2%

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≥ 250	≤ 400	≥ 40 %	≤ 90
¼ hard H14	≥ 535	≤ 700	≤ 5%	≤ 200

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

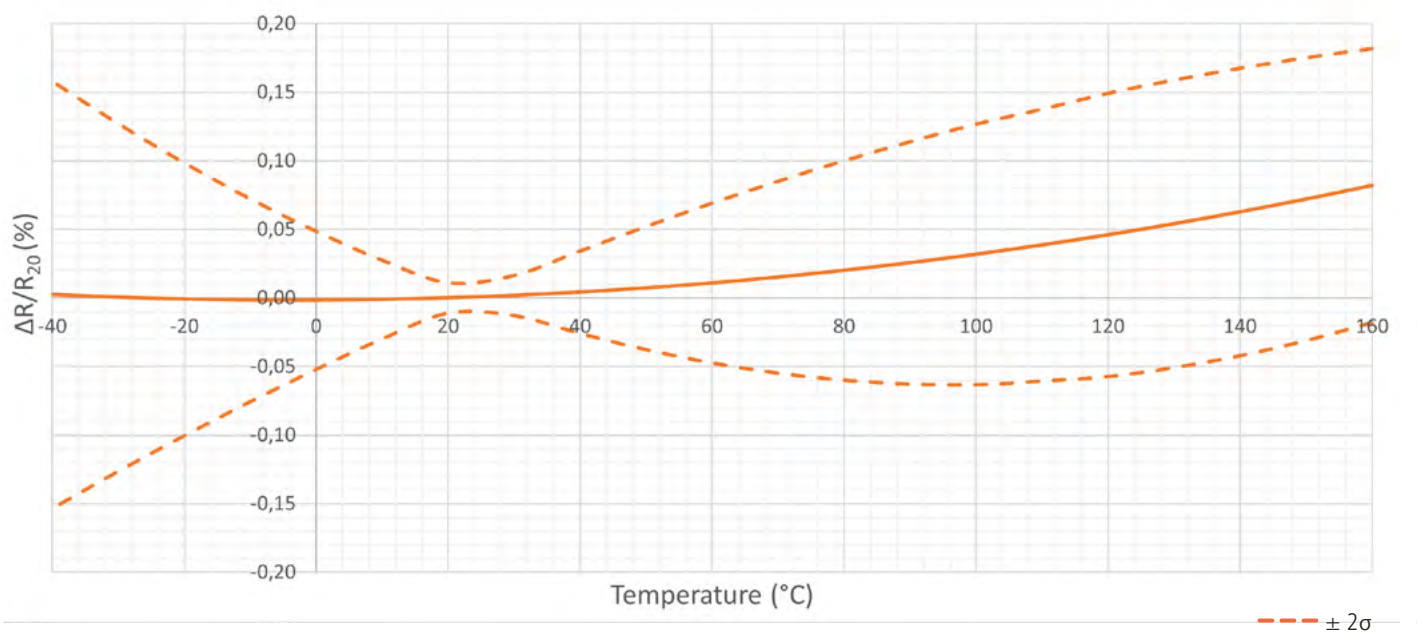
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

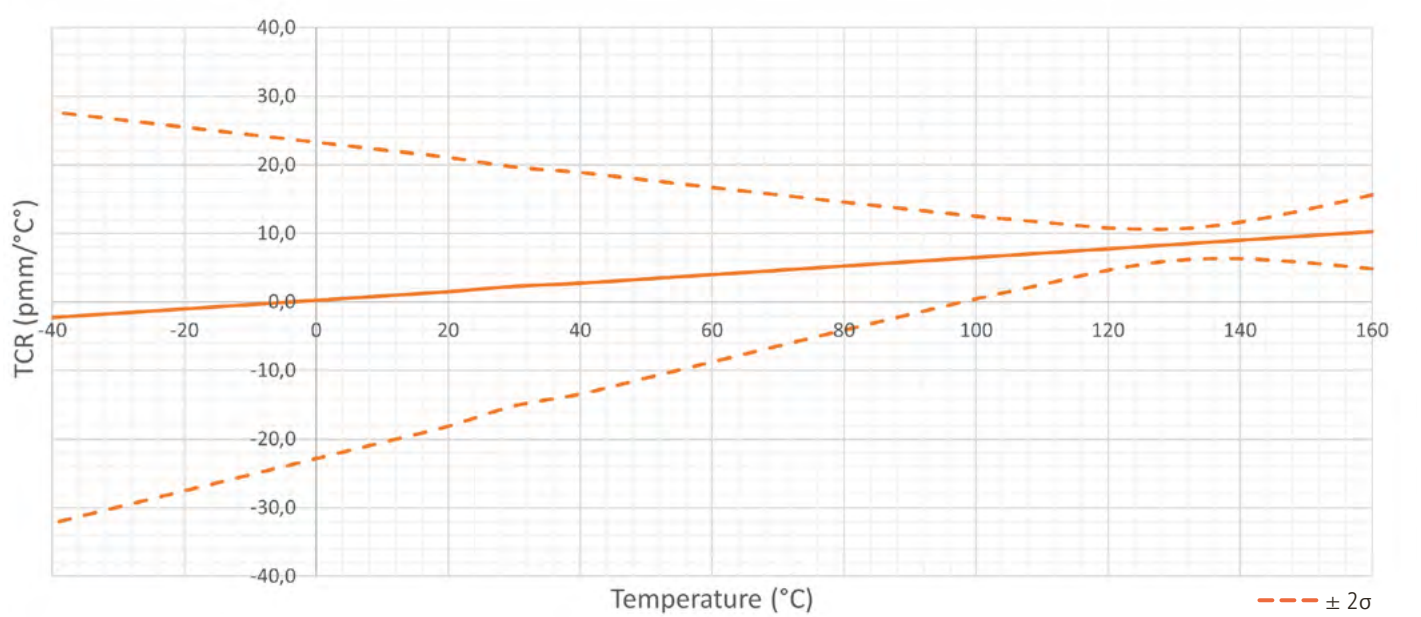
OTHER AVAILABLE FORMS

On demand

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE



Disclaimer : Data for information only, non-contractual



Niclal® 37

CuMn₁₀Ni₄

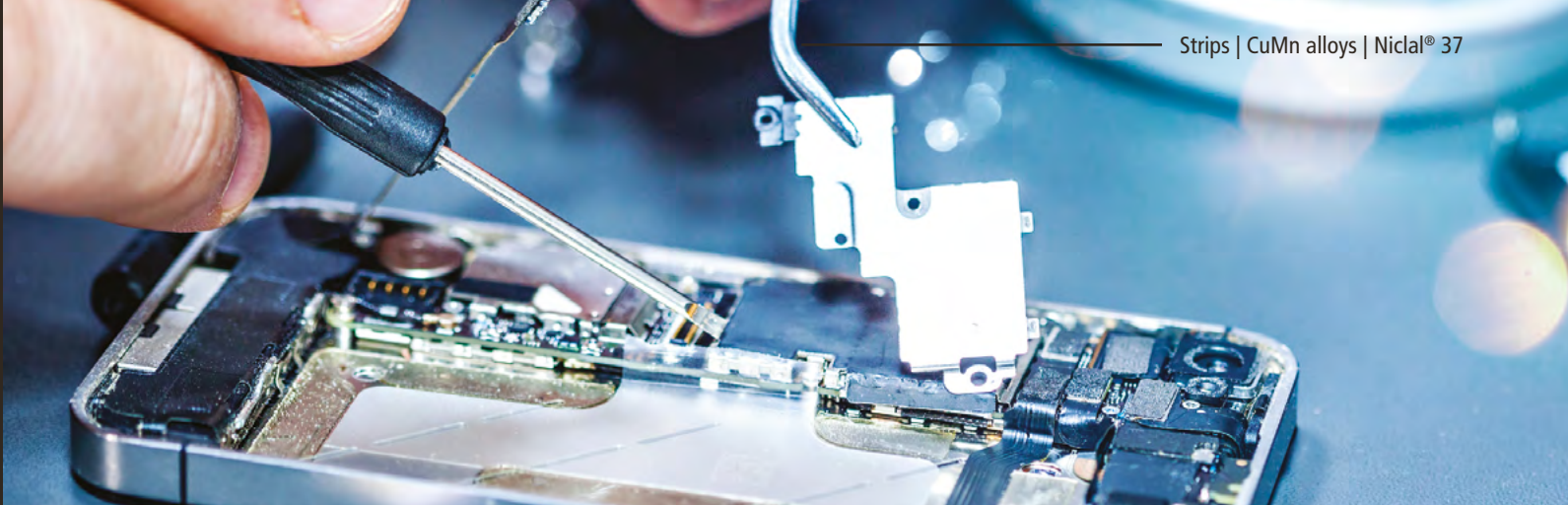
Cu
copper

Mn
manganese

Ni
nickel

← Back

Niclal® 37 is a Copper-Manganese-Nickel (CuMn₁₀Ni₄) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 37 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₀ Ni ₄	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	10%	4%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	950 °C
Electrical properties	
Electrical resistivity at 20°C	37 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 20 ppm/°C 0 ± 25 ppm/°C
Thermo EMF against Copper between 15 and 25°C	0 ± 1.7 μV/°C
Long-term stability (after 4000 hours at 100°C)	0 ± 0.1 %

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≥ 200	≤ 400	≥ 40 %	≤ 90

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

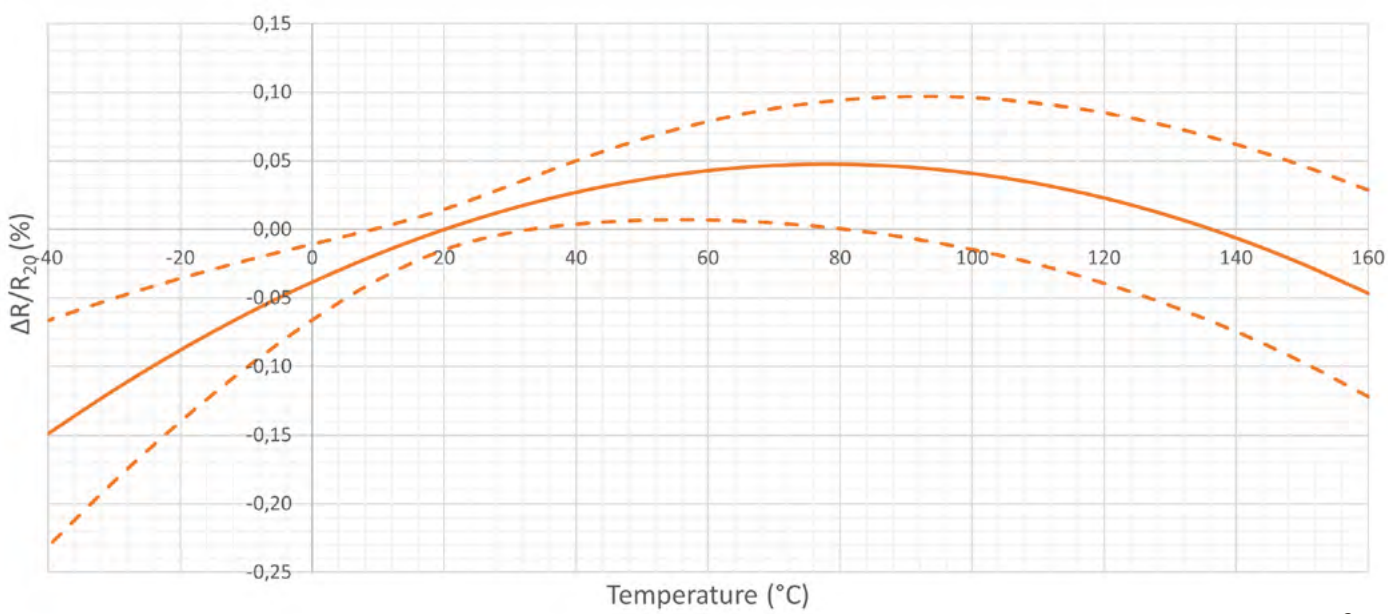
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

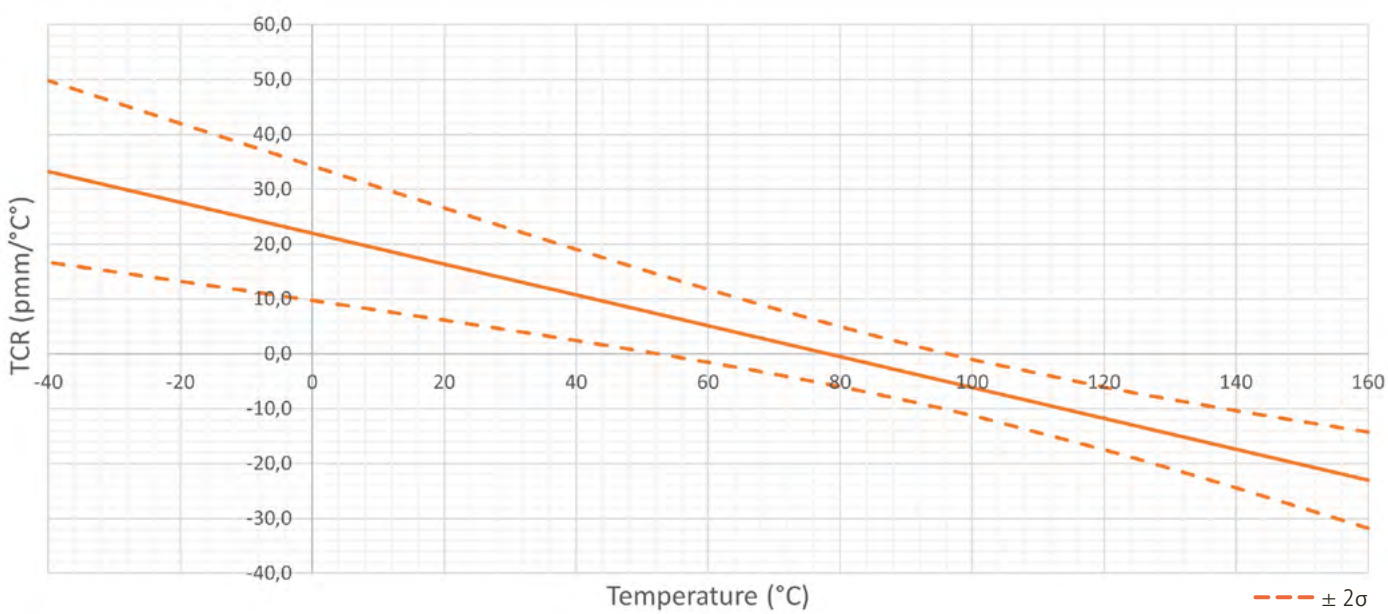
OTHER AVAILABLE FORMS

Wire

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE



Disclaimer : Data for information only, non-contractual



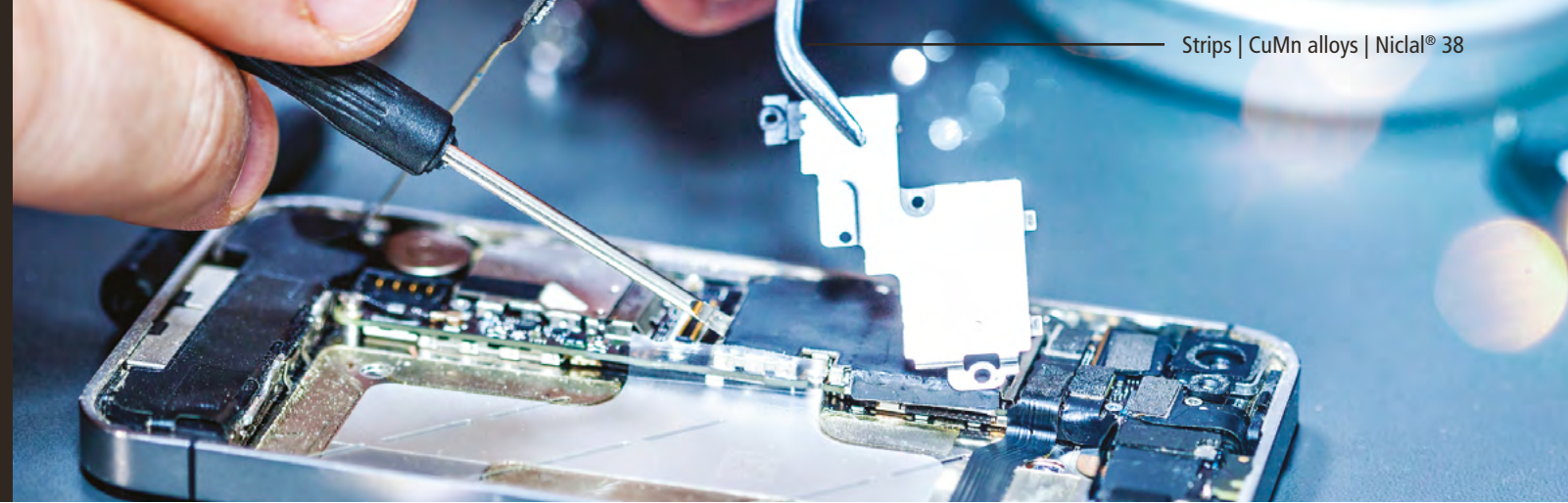
Niclal® 38

CuMn₁₀Ni₄



← Back

Niclal® 38 is a Copper-Manganese-Nickel (CuMn₁₀Ni₄) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 38 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₀ Ni ₄	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	10%	4%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	950 °C
Electrical properties	
Electrical resistivity at 20°C	38 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 15 ppm/°C 0 ± 20 ppm/°C
Thermo EMF against Copper between 15 and 25°C	0 ± 1.7 μV/°C
Long-term stability (after 4000 hours at 100°C)	0 ± 0.25%

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≥ 150	≤ 400	NA	≤ 110
¼ hard H11	Upon request			≤ 130
½ hard H12				≤ 160

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

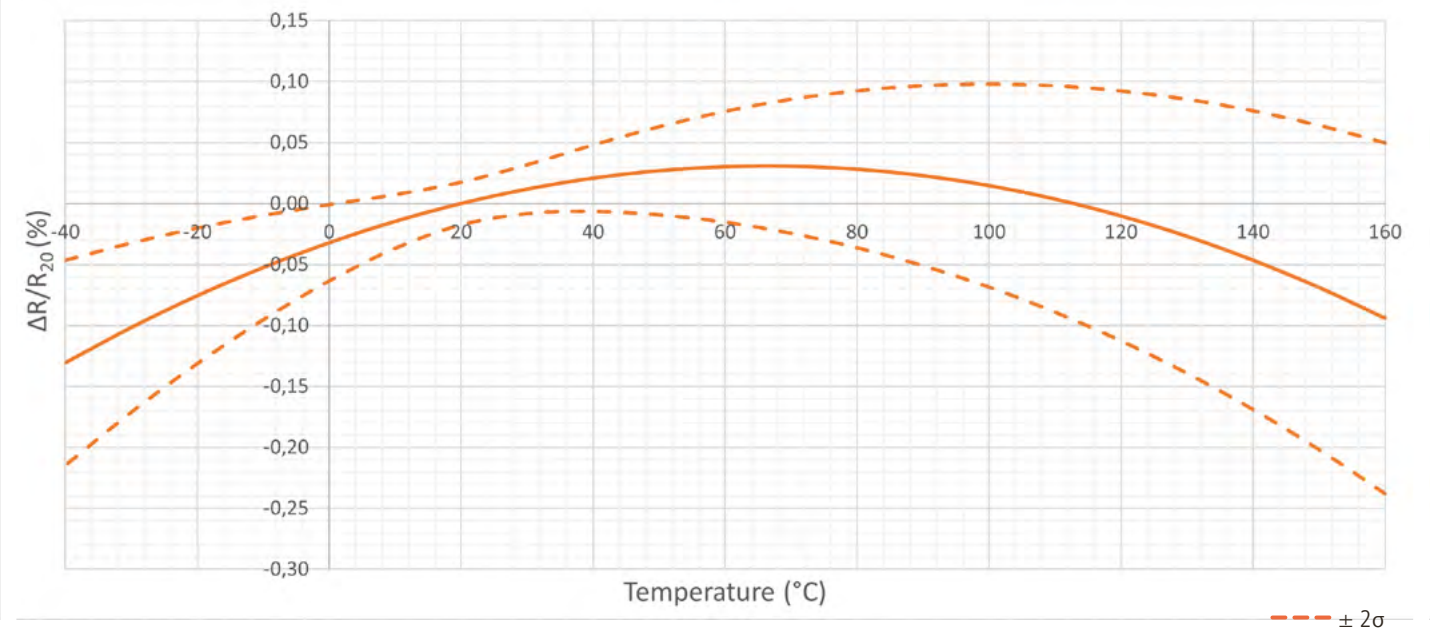
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

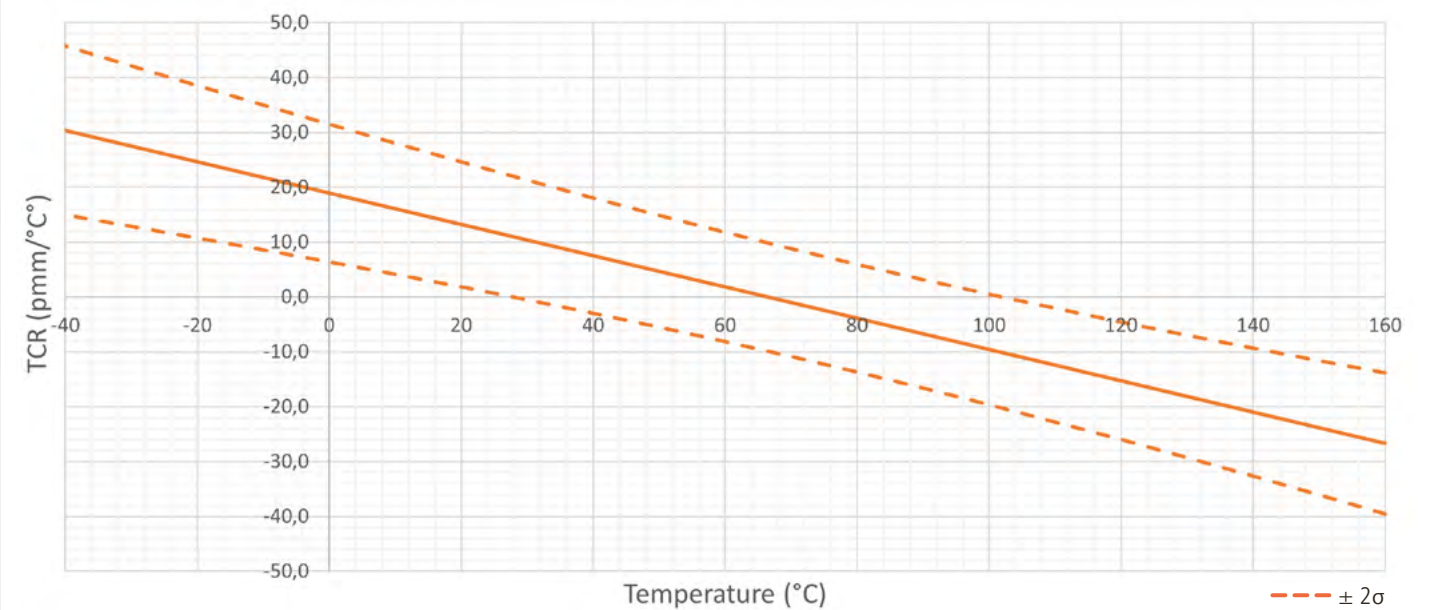
OTHER AVAILABLE FORMS

Wire

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE



Disclaimer : Data for information only, non-contractual



Niclal® 42

CuMn₁₁Ni₄

29	01.54%	25	14.01%	28	16.01%
Cu		Mn		Ni	
copper		manganese		nickel	

↩ Back

Niclal® 42 is a Copper-Manganese-Nickel (CuMn₁₁Ni₄) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 42 μΩ.cm and good transformation ability (stamping, welding etc...).

MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₁ Ni ₄	NA	NA

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	11%	4%

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	940 °C
Electrical properties	
Electrical resistivity at 20 °C	42 μΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

OTHER AVAILABLE FORMS

Wire

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 150	≤ 420	≥ 35 %	≤ 110
¼ hard H11	Upon request			≤ 140
½ hard H12				≤ 160
¾ hard H14	≤ 600	≤ 620	≤ 5 %	≤ 200

Disclaimer : Data for information only, non-contractual

We also produce copper alloys bars and hollow bars.

To know more, visit:
www.lebronze-alloys.com



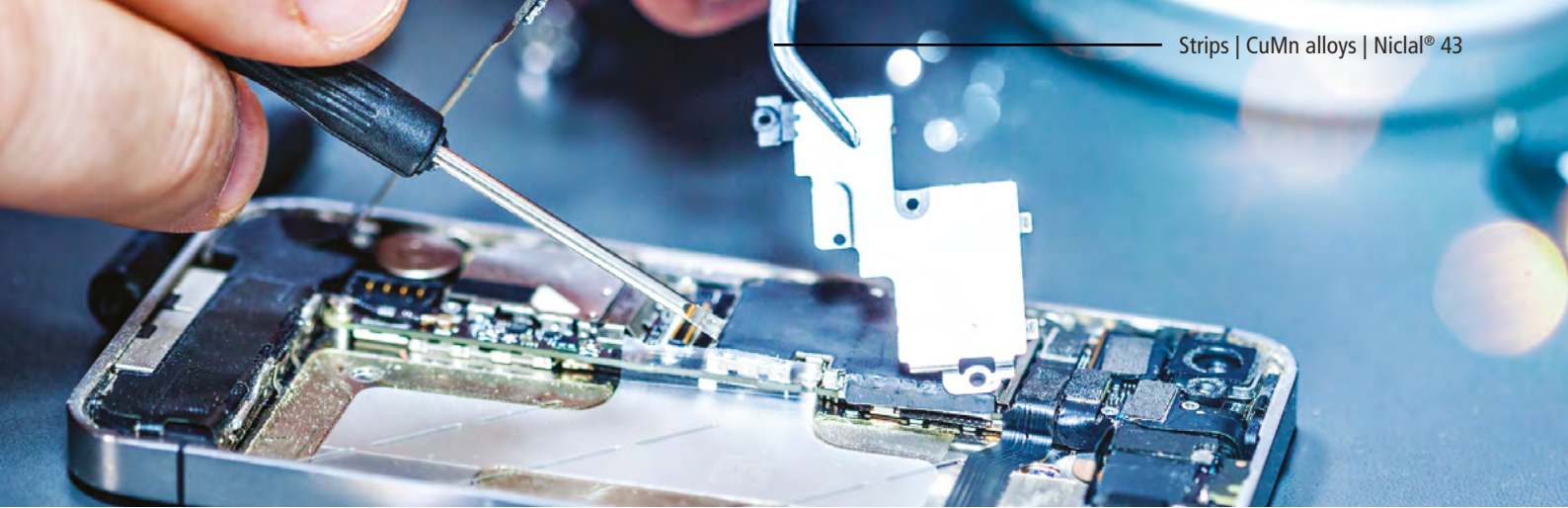
Niclal® 43

CuMn₁₂Ni₄



← Back

Niclal® 43 is a Copper-Manganese-Nickel (CuMn₁₂Ni₄) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 43 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₂ Ni ₄	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	12%	4%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	940 °C
Electrical properties	
Electrical resistivity at 20 °C	43 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 20 ppm/°C 0 ± 25 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	0 ± 1.2 μV/°C
Long-term stability (after 4000 hours at 100 °C)	ΔR < 0,2 %

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
OSK (skin pass)	≥ 170	≤ 440	≥ 30 %	≤ 120
¾ hard H13	≤ 600	≤ 600	≤ 5 %	≤ 200
¼ hard H14	≥ 570	≤ 710	≤ 5 %	≤ 210

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

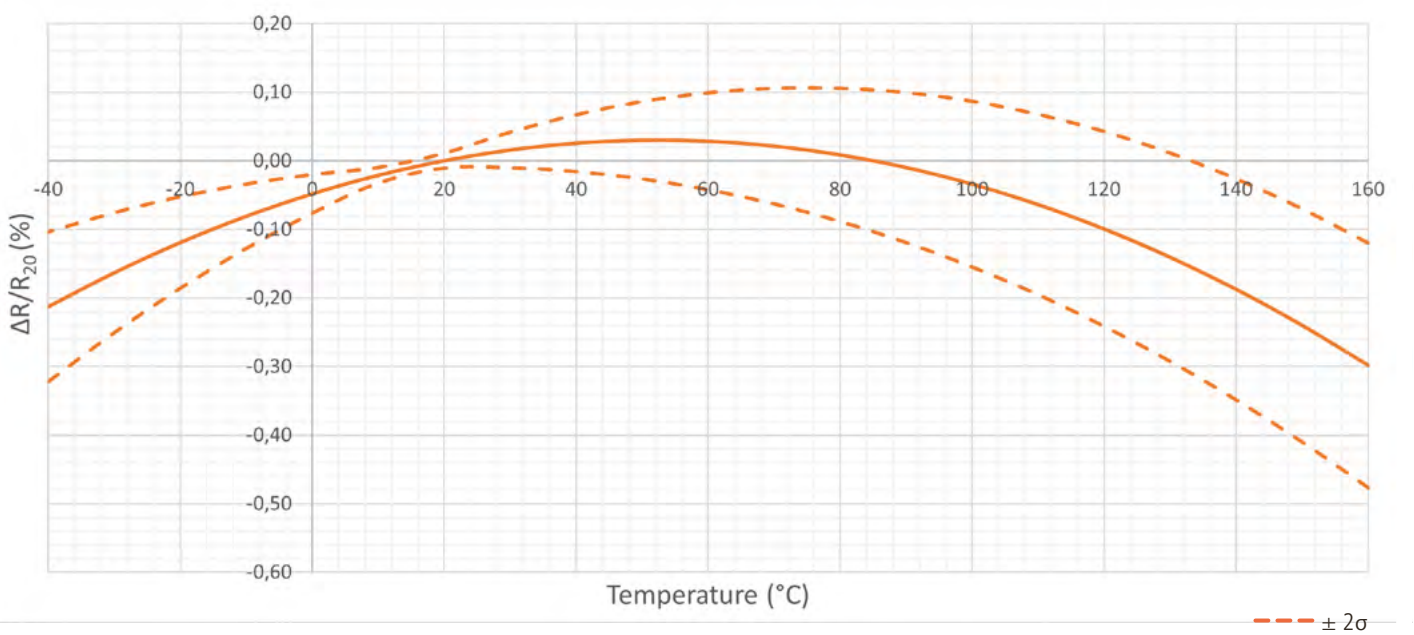
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheet	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

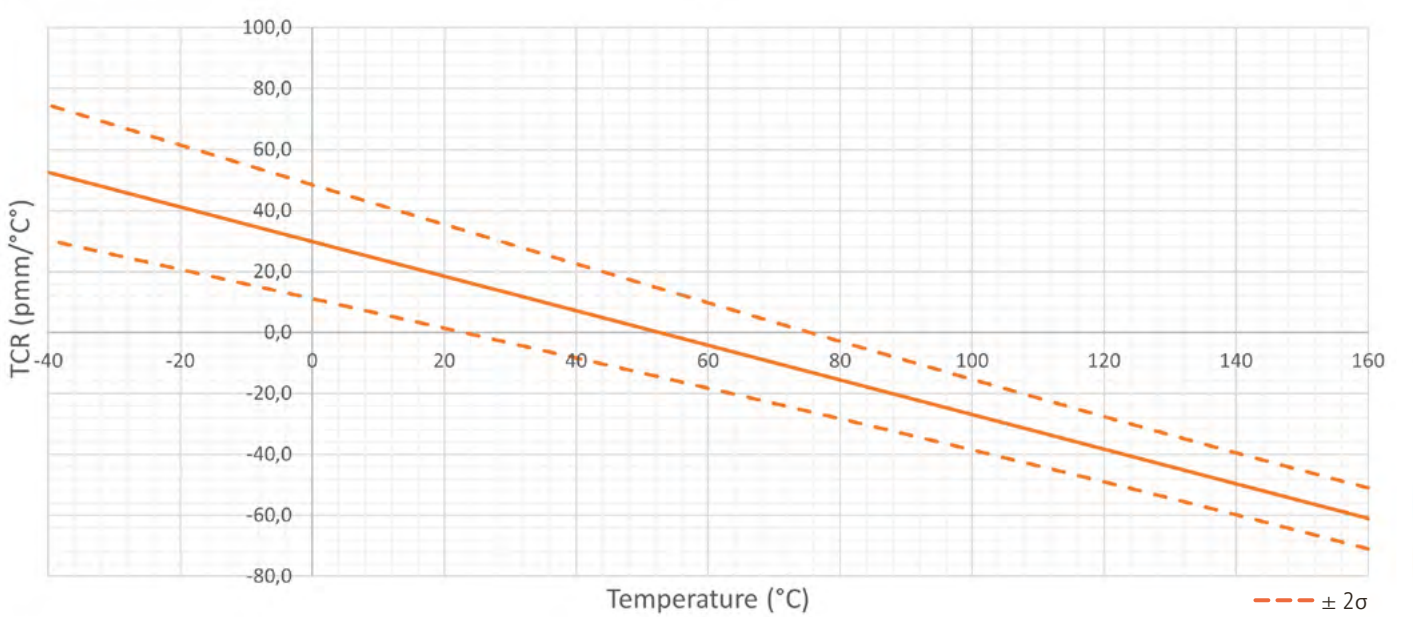
OTHER AVAILABLE FORMS

Wire

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE

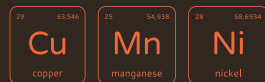


Disclaimer : Data for information only, non-contractual



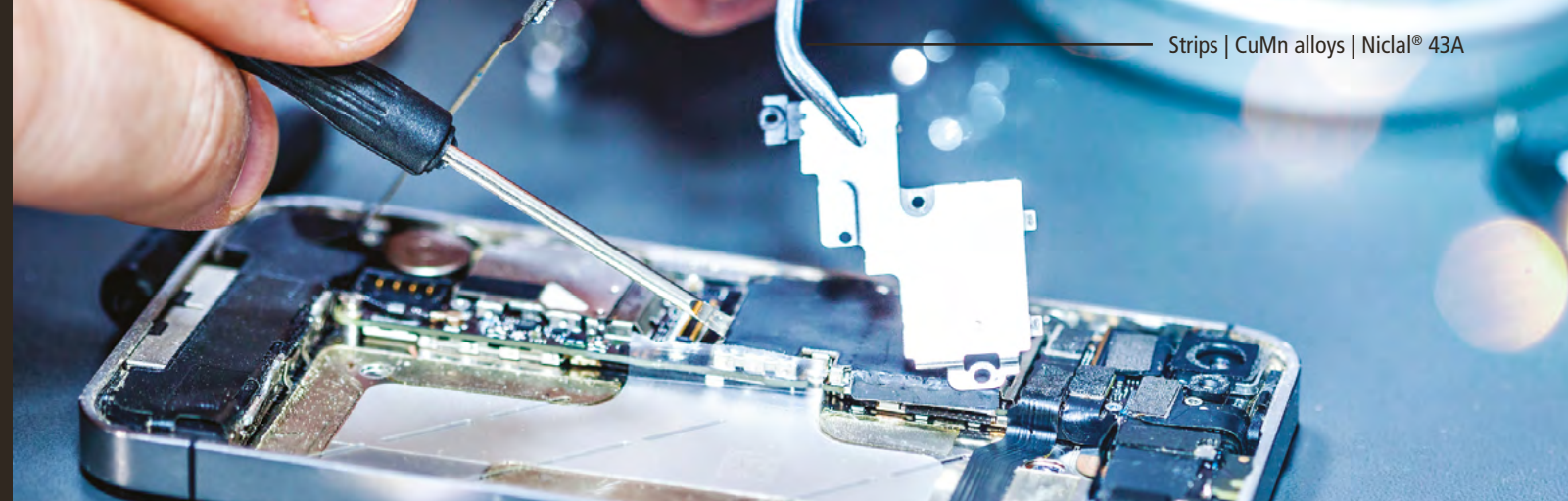
Niclal® 43A

CuMn₁₂Ni₂



← Back

Niclal® 43A is a Copper-Manganese-Nickel (CuMn₁₂Ni₂) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 43 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₂ Ni ₂	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	12%	2%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	940 °C
Electrical properties	
Electrical resistivity at 20 °C	43 μΩ.cm
Temperature coefficient of electrical resistance: -between -40 and 160 °C -between 20 and 60 °C	0 ± 15 ppm/°C 0 ± 20 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	0 ± 0.3 μV/°C
Long-term stability (after 4000 hours at 100 °C)	ΔR < 0,25 %

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
OSK (skin pass)	≥ 170	≤ 440	≥ 30 %	≤ 120
¾ hard H13	≤ 600	≤ 600	≤ 5 %	≤ 200
¼ hard H14	≥ 570	≤ 710	≤ 5 %	≤ 210

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

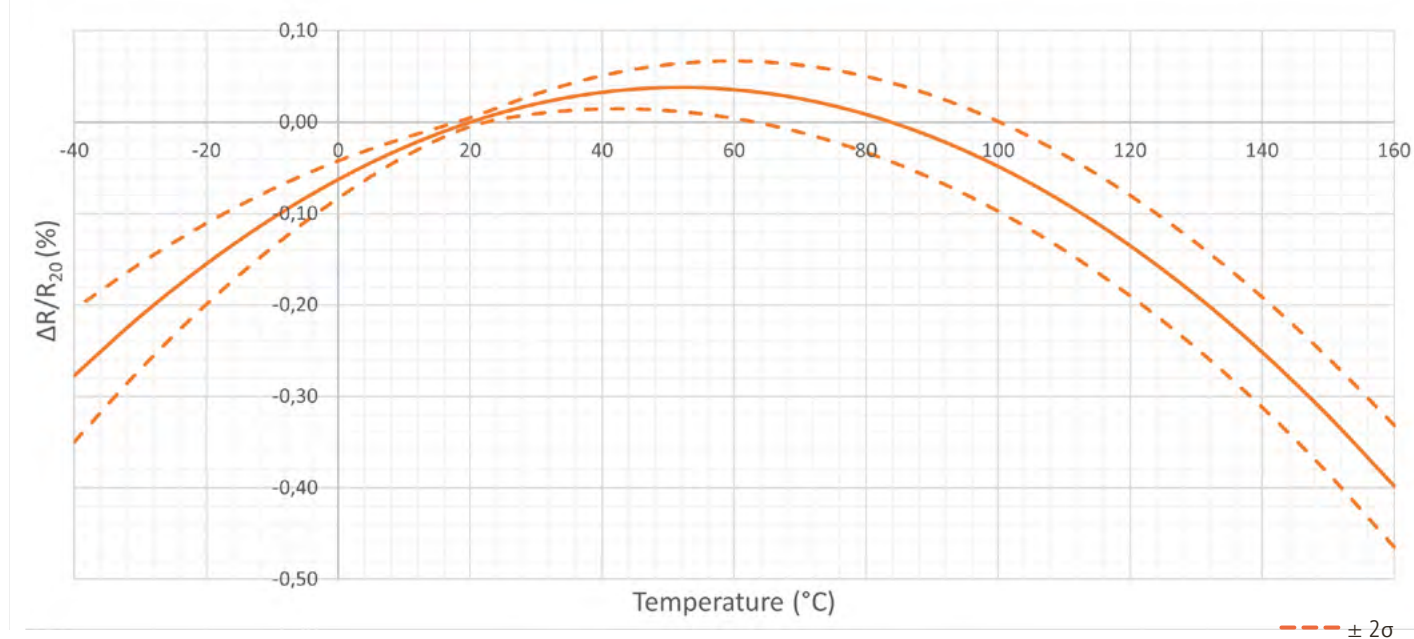
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheet	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

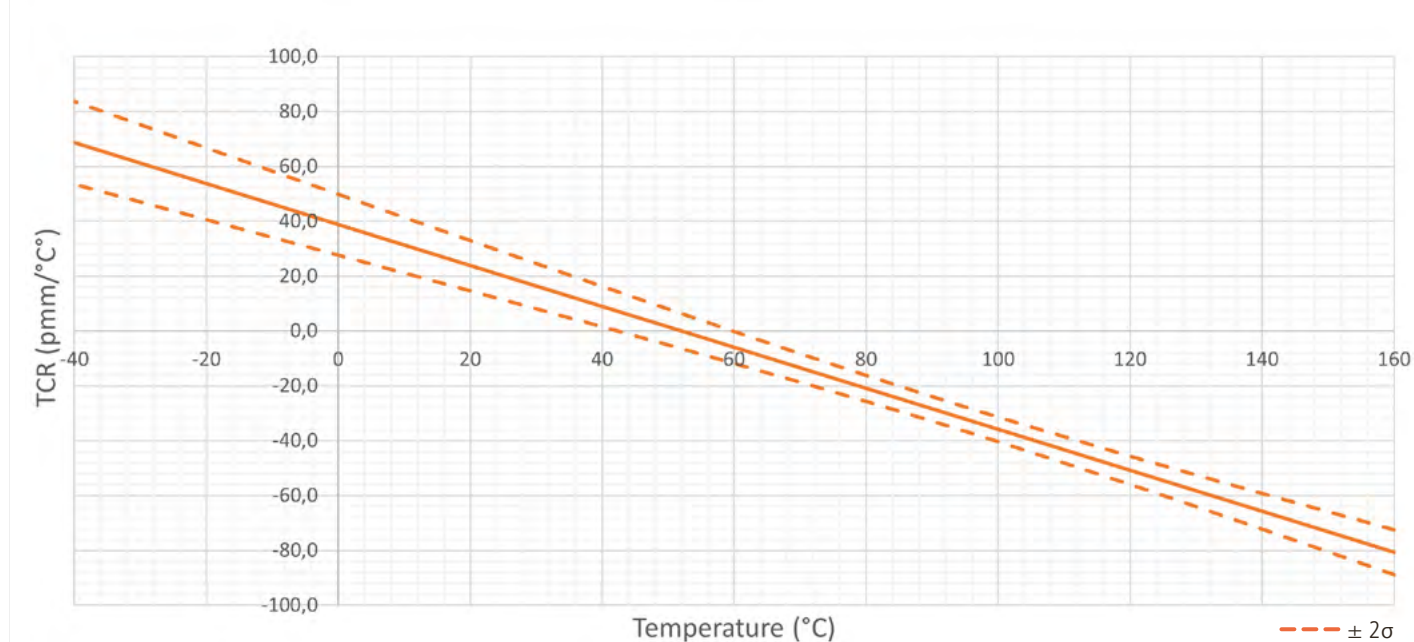
OTHER AVAILABLE FORMS

Wire

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE



Disclaimer : Data for information only, non-contractual



Niclal® 47

CuMn₁₄Ni₂

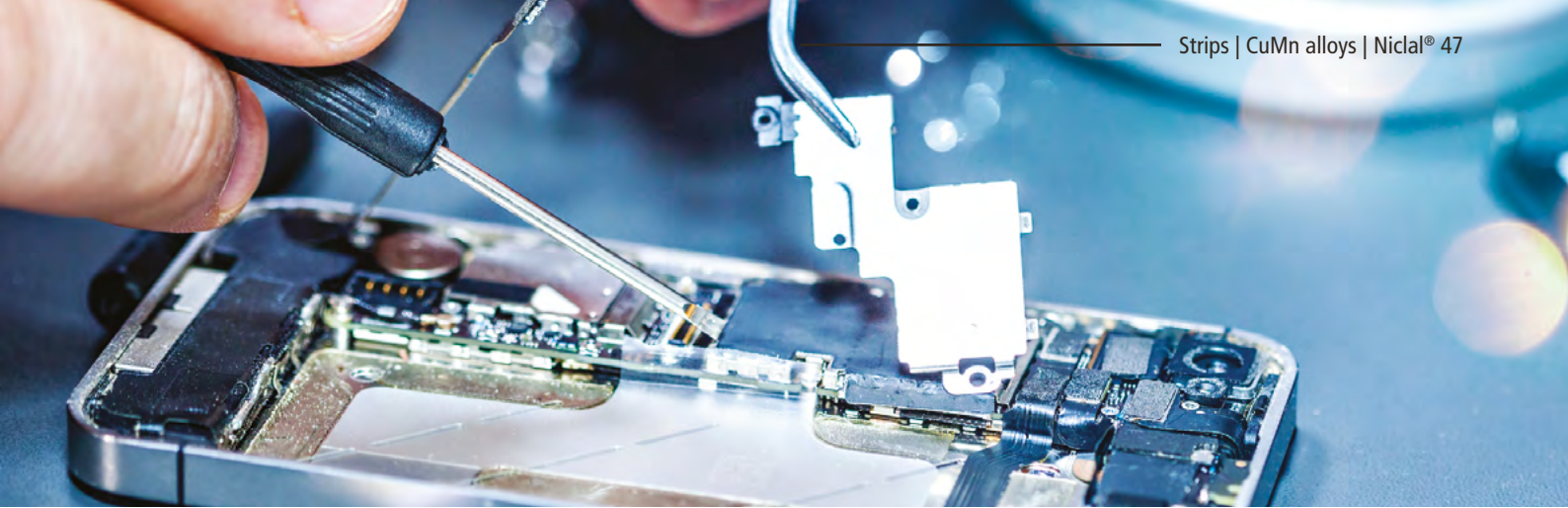
Cu
copper

Mn
manganese

Ni
nickel

Back

Niclal® 47 is a Copper-Manganese-Nickel (CuMn₁₄Ni₂) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 47 μΩ.cm and good transformation ability (stamping, welding etc...).



MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₄ Ni ₂	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	14%	2%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	930 °C
Electrical properties	
Electrical resistivity at 20 °C	47 μΩ.cm
Temperature coefficient of electrical resistance: - between - 40 and 160 °C - between 20 and 60 °C	0 ± 20 ppm/°C 0 ± 20 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	0 ± 0.3 μV/°C
Long-term stability (after 4000 hours at 100 °C)	0 ± 0.35 %

TYPICAL APPLICATIONS

Precision resistors
Electrical shunts in electricity meters
Electrical shunts in DC ammeters

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Welding
Soldering
Stamping

STANDARD CAPABILITY

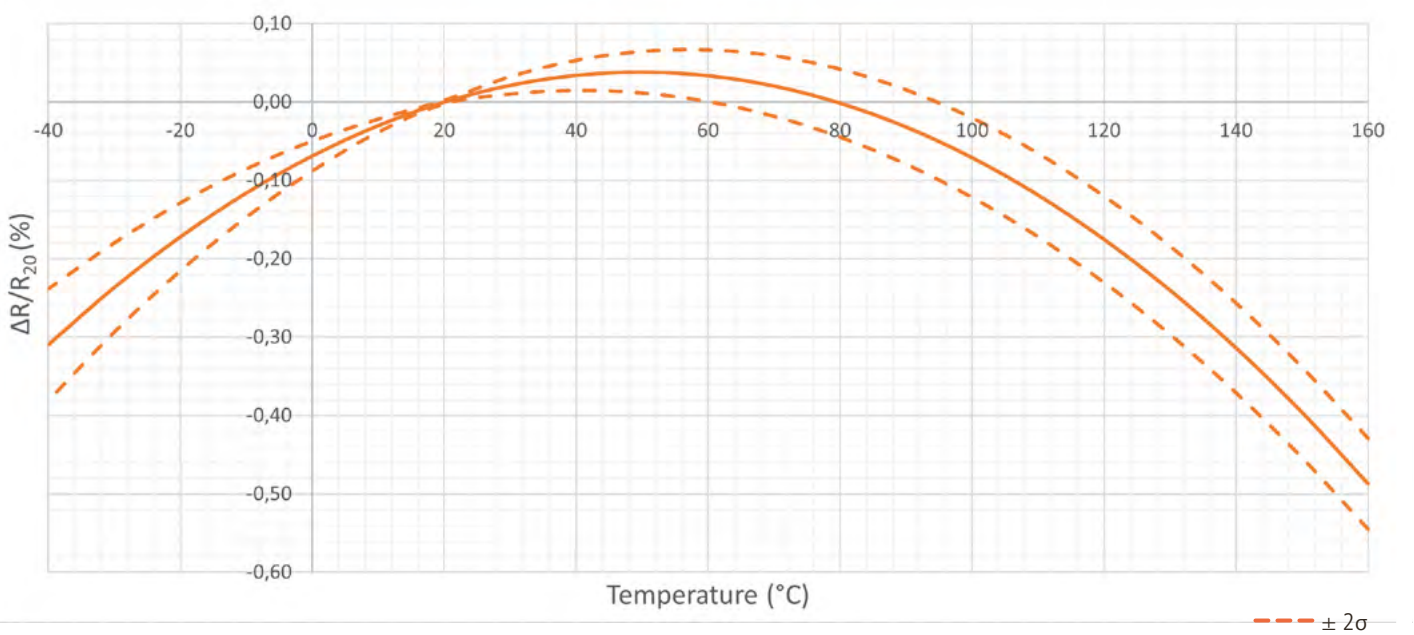
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

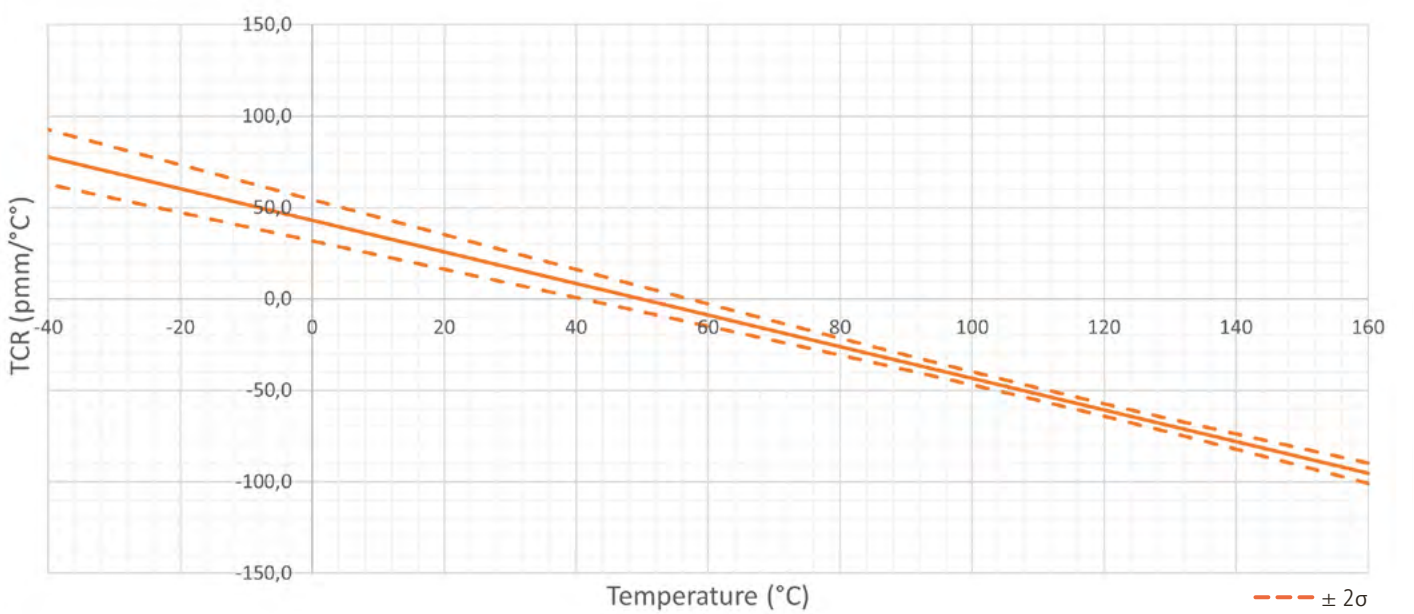
OTHER AVAILABLE FORMS

Wire

RESISTANCE CHANGE VS TEMPERATURE



TCR CHANGE VS TEMPERATURE





Niclal® 48
CuMn₁₃Ni₄



← Back

Niclal® 48 is a Copper-Manganese-Nickel (CuMn₁₃Ni₄) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 48 μΩ.cm and good transformation ability (stamping, welding etc...).

MATERIAL DESIGNATION

ISO	UNS	Others
CuMn ₁₃ Ni ₄	NA	NA

CHEMICAL COMPOSITION

Cu	Mn	Ni
Balance	13%	4%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	18 x 10 ⁻⁶ /°C
Melting point	930 °C
Electrical properties	
Electrical resistivity at 20 °C	48 μΩ.cm

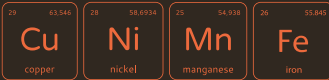
MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
¼ hard H14	≥ 610	≥ 625	≤ 3 %	≤ 200

Disclaimer : Data for information only, non-contractual



Constantan 45 TCR
CuNi₄₄Mn₁Fe



← Back

Constantan 45 TCR is a Copper-Nickel-Manganese (CuNi₄₄Mn₁Fe) alloy designed and produced by Lebronze alloys. It exhibits high thermal stability of electrical resistance centered around 49 μΩ.cm and good transformation ability (stamping, welding etc...).

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₄₄ Mn ₁ Fe	NA	DIN 17764 n°2.0842

CHEMICAL COMPOSITION

Cu	Ni	Mn	Fe
Balance	44%	1%	0.4%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	25 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.5 x 10 ⁻⁶ /°C
Electrical properties	
Electrical resistivity at 20 °C	50 μΩ.cm
Temperature coefficient of electrical resistance between 20 and 105°C	0 ± 40 ppm/°C
Thermo EMF against Copper between 15 and 25 °C	- 40 μV/°C

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2 % (MPa)	Tensile Strength (MPa)	Hardness (HV)	Elongation (%)
Annealed	≥ 150	≤ 450	≥ 40 %	≤ 110
OSK (skin pass)	≥ 230	≤ 410	≤ 25 %	≤ 130
½ hard H12	≥ 500	≤ 560	≤ 15 %	≤ 190
¾ hard H14	≥ 620	≤ 675	≤ 5 %	≤ 210
Spring H15	Upon request		≤ 3 %	≤ 240

Disclaimer : Data for information only, non-contractual

CuNiSn alloys

Spinodal alloys

High strength and hardness

Our Group offers a wide range of **spinodal alloys** composed of copper, nickel and tin. These alloys are widely used for their **high yield strength and their hardness**. These alloys have various applications such as **spectacle components, automotive bushings, electronic EMI shielding and miniature connectors**.

Our wide range of spinodal alloys makes us one of the **major actors on this market** and allows us to meet the **challenging requirements of a large portfolio of customers**.

We provide these products mainly as strips, rods and wires to be processed into relatively complex components.

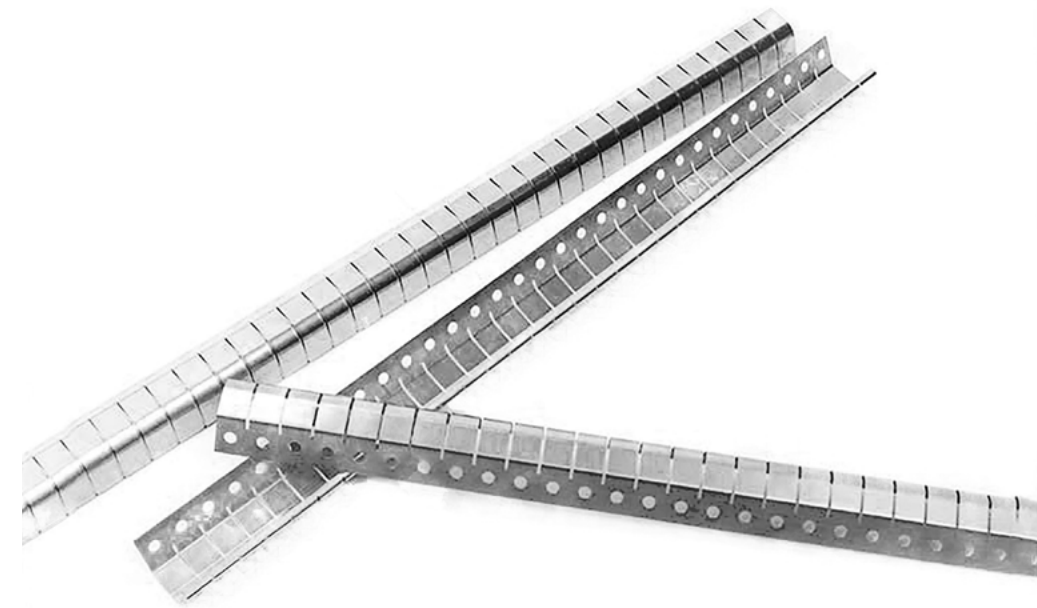
PRODUCT PORTFOLIO

Alloy	ISO	UNS
Hardiall®	CuNi ₁₅ Sn ₈	C72900
Niclafor® 1000	CuNi ₉ Sn ₆	C72700
Declafor 1015	CuNi _{7.5} Sn ₅ Te	C72670
Nical® 725	CuNi ₉ Sn ₂	NA

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 to 3.5 mm	3 to 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our Spinodal alloys are :

- Ideal substitutes to copper-beryllium and leaded copper-beryllium alloys
- RoHS and REACH compliant
- Mainly produced from recycled raw materials



Markets and applications

Electronics



- Connectors
- Relays
- Fingerstock
- EMI shielding

Automotive



- Bushings

Luxury

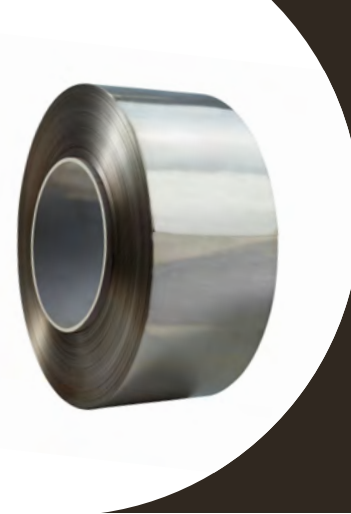


- Eyewear components
- Watch industries micro-components



Our copper and nickel alloys strips
can be slitted on demand.

To know more, visit:
www.lebronze-alloys.com



Hardiall® CuNi₁₅Sn₈ | C72900

<div>Cu</div> <div>copper</div>	<div>Ni</div> <div>nickel</div>	<div>Sn</div> <div>tin</div>
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↶ Back

Hardiall® is a wrought spinodally hardened copper alloy designed for high strength applications where toughness is required. It is non-magnetic and resists mechanical wear, galling, stress relaxation, corrosion and erosion. Hardiall® is a direct replacement to beryllium copper and leaded beryllium copper.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₅ Sn ₈	C72900	NA

CHEMICAL COMPOSITION

Cu	Ni	Sn
Balance	15%	8%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Coefficient of thermal expansion from 20 to 200 °C	16.4 x 10 ⁻⁶ /°C
Modulus of elasticity	140 GPa
Melting point	1300 °C
Electrical properties	
Thermal conductivity at 20°C	38 W/m.°C
Electrical conductivity at 20°C	7.5 % IACS

TYPICAL APPLICATIONS

Connectors
Springs
Electrical Contacts
Power Sockets
VCM springs
Belleville Washers
Snap Springs

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Surface coating
Soldering
Brazing
Machining
Stamping

KEY FEATURES

Non-magnetic
Mechanical wear resistance
Galling resistance
Stress relaxation resistance
Corrosion and erosion resistance
High hardness

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

OTHER AVAILABLE FORMS

Wire
Rods

Bars
Machined parts

Disclaimer : Data for information only, non-contractual



Niclafor® 1000

CuNi₉Sn₆ | C72700

Cu
copper

Ni
nickel

Sn
tin

↩ Back

Niclafor® 1000 is a range of Copper-Nickel-Tin (CuNi₉Sn₆) alloys designed and produced by Lebronze alloys. It exhibits very high mechanical properties, excellent fatigue resistance and low friction. Niclafor® can substitute to Beryllium copper for various applications.



MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₉ Sn ₆	C72700	ASTM B740

CHEMICAL COMPOSITION

Cu	Ni	Sn
Balance	9%	6%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C	8.9 g/cm³	
Thermal conductivity at 20°C	53.6 W/m.°C	
Coefficient of thermal expansion from 20 to 200 °C	17.25 x 10 ⁻⁶ /°C	
Modulus of elasticity	120 GPa	
Modulus of torsion	50 GPa	
Melting point	970 °C	
Electrical properties		
Electrical conductivity	Solution annealed	≈ 9 %IACS
	Heat treated	≥ 12 %IACS

TYPICAL APPLICATIONS

- Connectors, Relays, fingerstock gaskets for EMI shielding
- Test probes
- Automotive bushings
- Telecom and mobile phones components
- Spectacles components
- Domestic appliance components
- Micro-components for watch industry

COMPATIBLE DOWNSTREAM PROCESS

- Cold forming
- Surface coating
- Soldering
- Brazing
- Machining
- Stamping

KEY FEATURES

- Dimensional stability to heat treatment
- Strictly non-magnetic
- Non-sparking
- Corrosion resistance
- Good stress relaxation resistance
- Good friction properties
- High formability

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)	90° Bending*	
					Longitudinal (Bad way)	Transverse (Good way)
Solution annealed						
TB	≤ 300	≤ 460	≥ 30	≤ 140	0.2 x t	0.2 x t
Solution annealed and cold rolled						
TD1	≥ 300	460 - 560	≥ 15	140 - 180	0.2 x t	0.2 x t
TD2	≥ 400	540 - 640	≥ 10	160 - 200	0.2 x t	0.2 x t
TD3	≥ 550	620 - 720	≥ 3	200 - 240	0.5 x t	0.5 x t
TD4	≥ 600	700 - 820	≈ 1	220 - 260	2 x t	1 x t
TDX	≥ 650	≥ 780	≈ 1	≤ 320	10 x t	2 x t
Solution annealed and precipitation heat treated						
TF	≥ 510	740 - 860	≥ 10	230 - 270	0.5 x t	0.5 x t
Solution annealed, cold rolled and precipitation heat treated						
TH1	≥ 650	850 - 950	≥ 8	270 - 310	0.5 x t	0.5 x t
TH2	≥ 720	880 - 980	≥ 8	290 - 320	1 x t	1 x t
TH3	≥ 800	950 - 1050	≥ 4	310 - 340	1 x t	1 x t
TH4	≥ 900	1000 - 1100	≈ 3	320 - 360	2 x t	2 x t
THX	≥ 950	≥ 1050	≈ 1	≤ 390	NA	NA

*90° bending across and in the rolling direction. According to DIN 5011 dated 25/10/85 Figures represent min bending radius

OTHER AVAILABLE FORMS

- Wire
- Rods
- Bars



Declafor 1015

CuNi_{7.5}Sn₅Te | C72670

<div>Cu</div> <div>copper</div>	<div>Ni</div> <div>nickel</div>	<div>Sn</div> <div>tin</div>	<div>Te</div> <div>tellurium</div>
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↩ Back

Declafor1015 is a Copper-Nickel-Tin (CuNi_{7.5}Sn₅Te) alloy designed and produced by Lebronze alloys. It exhibits very high mechanical properties, excellent fatigue resistance and low friction.

Declafor1015 can substitute to Titanium-copper and Beryllium-copper for various applications.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi _{7.5} Sn ₅ Te	C72670	NA

CHEMICAL COMPOSITION

Cu	Ni	Sn	Other (incl. Te)
Balance	7.5%	5%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C	8.9 g/cm³	
Thermal conductivity at 20°C	55 W/m.°C	
Coefficient of thermal expansion from 20 to 200 °C	17.2 x 10 ⁻⁶ /°C	
Modulus of elasticity	115 GPa	
Melting point	960°C	
Electrical properties		
Electrical conductivity at 20°C	Solution annealed	≤ 9 % IACS
	Heat treated	≥ 13 % IACS

TYPICAL APPLICATIONS

Electrical spring contacts and test probes
Micro-components for watch industry
Coaxial connectors

COMPATIBLE DOWNSTREAM PROCESS

Machining
Plating

KEY FEATURES

Dimensional stability to heat treatment
Strictly non-magnetic
Non-sparking
Corrosion resistance
Good stress relaxation resistance
Good friction properties
Good machinability

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

OTHER AVAILABLE FORMS

Wire
Rods

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
TB	≤ 370	410 - 460	≥ 30	≤ 140
TH3	≤ 870	900	≥ 7	≥ 280

Disclaimer : Data for information only, non-contractual

We also produce copper and nickel alloys wires and precision rods.

To know more, visit:
www.lebronze-alloys.com



Niclal® 725

CuNi₉Sn₂

Cu
copper

Ni
nickel

Sn
tin

↩ Back

Niclal® 725 is a range of Copper-Nickel-Tin (CuNi₉Sn₂) alloys designed and produced by Lebronze alloys. It exhibits high mechanical properties, a good compromise between elasticity and conductivity , excellent fatigue resistance and low friction.



MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₉ Sn ₂	NA	CW351H

CHEMICAL COMPOSITION

Cu	Ni	Sn
Balance	9%	2%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity at 20°C	48 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.2 x 10 ⁻⁶ /°C
Modulus of elasticity	138 GPa
Melting point	1060 °C
Heat capacity	377 J/(kg.°C)
Electrical properties	
Electrical conductivity at 20°C	11 % IACS

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

- Connectors
- Sensors
- Household appliances parts
- Mechatronics and automation components

COMPATIBLE DOWNSTREAM PROCESS

- Deep-drawing
- Slitting
- Bending

KEY FEATURES

- Elasticity
- Good compromise between elasticity and conductivity
- Good corrosion resistance
- Good friction properties

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)	90° Bending* Transverse (good way)
Solution annealed					
Annealed	< 250	< 400	> 35	< 100	0 x t
Cold rolled					
¼ hard H11	> 300	380 - 450	> 15	125 - 150	0.3 x t
½ hard H12	> 400	470 - 530	> 4	145 - 165	0.4 x t
¾ hard H13	> 460	500 - 580	> 1	165 - 185	1 x t
¾ hard H14	> 550	580 - 650	0	185 - 215	1 x t
Spring H15	> 600	> 650	0	> 200	2 x t
Cold rolled and stress relieved					
H31	> 230	390 - 450	> 25	110 - 130	NA
H32	> 320	460 - 530	> 15	145 - 170	0.5 x t
H33	> 450	550 - 630	> 10	170 - 190	0.5 x t
H34	> 500	620 - 680	> 8	180 - 210	0.5 x t
H35	> 600	> 650	> 8	> 195	0.5 x t

*90° bending across the rolling direction. According to DIN 5011 dated 25/10/85 Figures represent min bending radius

OTHER AVAILABLE FORMS

- Wire
- Rods

Disclaimer : Data for information only, non-contractual

ARCAP® alloys

Corrosion resistance and anti-magnetism

ARCAP® is a **proprietary range of alloys** characterized by **excellent corrosion resistance, absolute non-magnetism and optimized transformation properties** (machining, drilling, forming, deep-drawing...)

In rolled format, our portfolio is composed of three alloys :

- ARCAP® AP1 and AP1C characterized by **high and formability properties**
- ARCAP® AP4 characterized by **high corrosion resistance even at high temperature**

ARCAP® alloys do not need any coatings allowing downstream production steps minimization and better corrosion and friction properties especially compared to stainless steels.

These properties make of ARCAP® an ideal alloy for **complex components in harsh environment**.

PRODUCT PORTFOLIO		
Alloy	ISO	UNS
ARCAP® AP1C	Cu ₅₆ Ni ₂₅ Zn ₁₉	C79360
ARCAP® AP1	Cu ₆₄ Ni ₂₅ Zn ₁₁	NA
ARCAP® AP4	Cu ₅₅ Ni ₄₄ Mn ₁	NA

STANDARD CAPABILITY			
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

**Dimensions outside this range on request*



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

- Our ARCAP alloys are :
- RoHS and REACH compliant
 - Mainly produced from recycled raw materials



Markets and applications

Electronics



- Electronic casings

Luxury



- Watch micro-components



ARCAP® AP1C

Cu₅₆Ni₂₅Zn₁₉

Cu
copper

Ni
nickel

Zn
zinc

← Back

ARCAP® AP1C is a Copper-Nickel-Zinc (Cu₅₆Ni₂₅Zn₁₉) alloy designed and produced by Lebronze alloys. This lead-free alloy exhibits high mechanical properties, excellent corrosion resistance, absolute non-magnetism, a good formability (cold forming, deep drawing, crimping and stamping) and a fair machinability.



MATERIAL DESIGNATION

ISO	UNS	Others
Cu ₅₆ Ni ₂₅ Zn ₁₉	C79360	NA

CHEMICAL COMPOSITION

Cu	Ni	Zn
56%	25%	Balance

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity at 20°C	22 W/m.°C
Thermal conductivity at 200°C	25 W/m.°C
Coefficient of thermal expansion from 20 to 300 °C	16 x 10 ⁻⁶ /°C
Modulus of elasticity	163 - 170 GPa
Melting range	1150 - 1170 °C
Optical reflection coefficient (Ag=100%)	70%
Magnetism (OERSTED)	10 ⁻⁶
Electrical properties	
Electrical conductivity	4.3 - 4.9 %IACS

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

- Watch microcomponents
- Aerospace instruments shielding
- Optic fiber connectors

COMPATIBLE DOWNSTREAM PROCESS

- Cold forming
- Deep drawing
- Brazing
- Soldering
- Electrical seam-resistance welding
- TIG welding

KEY FEATURES

- Bluish white color
- Stringent amagnetism
- Corrosion resistance
- Dimensional stability
- Machinability

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 300	≤ 450	≥ 30	≤ 130
¼ hard H11	> 300	450 - 550	≥ 15	130 - 165
½ hard H12	> 400	450 - 550	≥ 5	160 - 190
¾ hard H13	> 500	520 - 600	≈1	180 - 210
¾ hard H14	≥ 550	≥ 580	≈1	200 - 230
Stress relieve H15	≥ 700	≥ 730	NA	≥ 220
Stress relieve H31	≤ 300	480 - 580	≥ 15	145 - 180
Stress relieve H32	≥ 400	520 - 620	≥ 8	170 - 200
Stress relieve H33	≥ 590	630 - 730	≥ 3	210 - 240
Stress relieve H34	≥ 690	705 - 815	≥ 1	235 - 265
Stress relieve H35	≥ 750	≥ 760	NA	245

BENDING PROPERTIES

Temper	90° Bending*		180° Bending*	
	Transverse (Good way)	Longitudinal (Bad way)	Transverse (Good way)	Longitudinal (Bad way)
Annealed	0*t	0*t	0*t	0*t
¼ hard H11	0*t	0*t	0*t	0*t
½ hard H12	1*t	1*t	1*t	1*t
¾ hard H13	1.5*t	2.5*t	1.5*t	2.5*t
¾ hard H14	2*t	3*t	2*t	3*t
H15	2*t	3*t	3*t	4*t
Stress relieve H31	0*t	0*t	0*t	0*t
Stress relieve H32	0.5*t	0.5*t	0.5*t	0.5*t
Stress relieve H33	1.5*t	1.5*t	2*t	2*t
Stress relieve H34	2*t	2.5*t	3*t	3*t
Stress relieve H35	2*t	3*t	4*t	4*t

*Bending across and in the rolling direction. According to DIN 5011 dated 25/10/85 Figures represent min bending radius

OTHER AVAILABLE FORMS

- Wire
- Rods

Disclaimer : Data for information only, non-contractual



ARCAP® AP1

Cu₆₄Ni₂₅Zn₁₁

Cu
copper

Ni
nickel

Zn
zinc

← Back

ARCAP® AP1 is a Copper-Nickel-Zinc (Cu₆₄Ni₂₅Zn₁₁) alloy designed and produced by Lebronze alloys. This lead-free alloy exhibits high mechanical properties, excellent corrosion resistance, absolute non-magnetism, a good formability (cold forming, deep drawing, crimping and stamping) and a fair machinability.

MATERIAL DESIGNATION

ISO	UNS	Others
Cu ₆₄ Ni ₂₅ Zn ₁₁	NA	NA

CHEMICAL COMPOSITION

Cu	Ni	Zn
64%	25%	Balance

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity at 20°C	22 W/m.°C
Thermal conductivity at 200°C	25 W/m.°C
Coefficient of thermal expansion from 20 to 300 °C	16 x 10 ⁻⁶ /°C
Modulus of elasticity	163 - 170 GPa
Melting range	1150 - 1170 °C
Optical reflection coefficient (Ag=100%)	70%
Magnetism (OERSTED)	10 ⁻⁶
Electrical properties	
Electrical conductivity	4.3-4.9 %IACS

TYPICAL APPLICATIONS

Watch microcomponents
Aerospace instruments shielding
Optic fiber connectors

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Deep drawing
Brazing
Soldering
Electrical seam-resistance welding
TIG welding

KEY FEATURES

Bluish white color
Stringent amagnetism
Corrosion resistance
Dimensional stability
Machinability

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 300	≤ 420	≥ 30	≤ 120
¼ hard H11	> 300	370 - 470	≥ 20	120 - 150
½ hard H12	> 370	450 - 550	≥ 10	150 - 170
¾ hard H13	> 470	520 - 600	≈3	165 - 185
4/4 hard H14	≥ 530	≥ 580	≈1	180 - 210

BENDING PROPERTIES

Temper	90° Bending*		180° Bending*	
	Transverse (Good way)	Longitudinal (Bad way)	Transverse (Good way)	Longitudinal (Bad way)
Annealed	0*t	0*t	0*t	0*t
¼ hard H11	0*t	0*t	0*t	0*t
½ hard H12	1*t	1*t	1*t	1*t
¾ hard H13	1*t	2*t	2*t	2*t
4/4 hard H14	2*t	3*t	3*t	4*t

*bending across and in the rolling direction. According to DIN 5011 dated 25/10/85 Figures represent min bending radius

OTHER AVAILABLE FORMS

Wire
Rods



ARCAP® AP4

Cu₅₅Ni₄₄Mn₁



↩ Back

ARCAP® AP4 is a Copper-Nickel (Cu₅₅Ni₄₄Mn₁) alloy designed and produced by Lebronze alloys. It exhibits high mechanical properties, excellent corrosion resistance, high elasticity and fair machinability.



MATERIAL DESIGNATION

ISO	UNS	Others
Cu ₅₅ Ni ₄₄ Mn ₁	NA	DIN 17471 2.0842

CHEMICAL COMPOSITION

Cu	Ni	Mn
Balance	44%	1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity at 20°C	22.5 W/m.°C
Thermal conductivity at 200°C	23 W/m.°C
Coefficient of thermal expansion from 20 to 300 °C	16 x 10 ⁻⁶ /°C
Modulus of elasticity	145 GPa
Melting range	1225 - 1285 °C
Optical reflection coefficient (Ag=100%)	70%
Magnetism (OERSTED)	10 ⁻⁶
Electrical properties	
Electrical conductivity	3.5 %IACS

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Watch microcomponents
Aerospace instruments shielding
Optic fiber connectors

COMPATIBLE DOWNSTREAM PROCESS

Hot working
Deep drawing
Brazing
Soldering
Electrical seam-resistance welding
TIG welding

KEY FEATURES

Remarkable corrosion resistance at high temperature
High mechanical properties
Good Marine corrosion resistance

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 300	≤ 500	≥ 30	≤ 140
¼ hard H11	> 300	470 - 600	≥ 15	140 - 180
½ hard H12	> 450	450 - 550	≥ 1	150 - 170
Spring H15	≤ 670	≥ 580	NA	180 - 210

BENDING PROPERTIES

Temper	90° Bending*		180° Bending*	
	Transverse (Good way)	Longitudinal (Bad way)	Transverse (Good way)	Longitudinal (Bad way)
Annealed	0*t	0*t	0*t	0*t
¼ hard H11	0*t	0*t	0*t	0*t
½ hard H12	1*t	1*t	1*t	1*t
Spring H15	1*t	2*t	1*t	2*t

*bending across and in the rolling direction. According to DIN 5011 dated 25/10/85 Figures represent min bending radius

OTHER AVAILABLE FORMS

Wire
Rods

CuNi alloys

Resistance alloys

Precision of electrical properties

Our Group offers a wide range of copper-nickel alloys **used for resistance applications**. These alloys are characterized by **highly precise electrical properties** and used as **heating elements** for various applications (ex: mineral insulated cables, household appliances, electrical devices), **bimetallic contacts** or coinage that **require controlled resistivity**. Our wide range of CuNi alloys makes us one of the **major actors on this market** and allows us to meet the challenging requirements of a large portfolio of customers.

PRODUCT PORTFOLIO

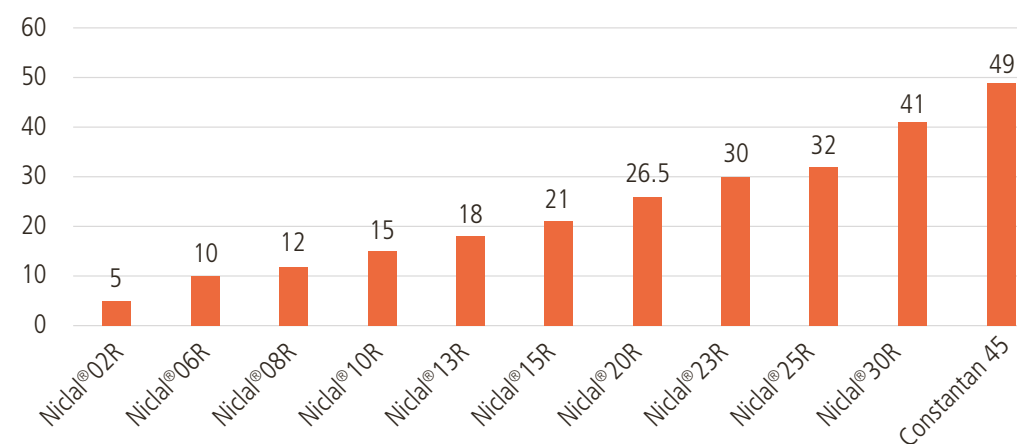
Alloy	ISO	UNS
Nical® 02R	CuNi ₂	NA
Nical® 06R	CuNi ₆	NA
Nical® 08R	CuNi ₈	NA
Nical® 10R	CuNi ₁₀	NA
Nical® 13R	CuNi ₁₃	NA
Nical® 15R	CuNi ₁₅	NA
Nical® 20R	CuNi ₂₀	C71000
Nical® 23R	CuNi ₂₃ MnFe	NA
Nical® 25R	CuNi ₂₅	C71300
Nical® 30R	CuNi ₃₀	NA
Constantan 45	CuNi ₄₄ Mn ₁	NA

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

ELECTRICAL RESISTIVITY AT 20°C (μΩ.cm)



Our standard range of resistance CuNi alloys cover a large range of electrical resistivity from **5 μΩ.cm** to **49 μΩ.cm**.



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our CuNi alloys are :

- RoHS and REACH compliant
- Mainly produced from recycled raw materials



Markets and applications

Electronics



- Bi-metallic contacts
- Heating component for circuit breaker

Energy



- Heating strips
- Mineral insulated cables

Other



- Currencies and tokens with highly controlled resistivity



Niclal® 02R CuNi₂



← Back

Niclal® 02R is a resistive Copper-Nickel (CuNi₂) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₂	NA	DIN 17471 n°2.0802

CHEMICAL COMPOSITION

Cu	Ni
Balance	2%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	140 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.7 x 10 ⁻⁶ /°C
Melting point	1090 °C
Corrosion resistance	★★★★★
Modulus of elasticity	118 GPa
Electrical properties	
Resistivity at 20°C	5 µΩ.cm
Typical temperature coefficient of electrical resistance from +25 to +105°C	1100 - 1700 ppm/°C
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

Bi-metallic contacts
Heating component for circuit breaker
Heating strips
Mineral insulated cables
Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

Welding
Plating
Forming

KEY FEATURES

High precision of resistivity

OTHER AVAILABLE FORMS

Rods
Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual

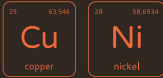
We also produce high quality machined blanks and parts.

To know more, visit:
www.lebronze-alloys.com



Niclal® 06R

CuNi₆



↩ Back

Niclal® 06R is a resistive Copper-Nickel (CuNi₆) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as fair corrosion resistance. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₆	NA	DIN 17471 n°2.0807

CHEMICAL COMPOSITION

Cu	Ni
Balance	6%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	66 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.4 x 10 ⁻⁶ /°C
Melting point	1095 °C
Corrosion resistance	★★★★★
Modulus of elasticity	120 GPa
Electrical properties	
Resistivity at 20°C	10 μΩ.cm
Typical temperature coefficient of electrical resistance from +25 to +105°C	500 - 900 ppm/°C
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

- Bi-metallic contacts
- Heating componentfor circuit breaker
- Heating strips
- Mineral insulated cables
- Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

- Welding
- Plating
- Forming

KEY FEATURES

- High precision of resistivity
- Fair corrosion resistance

OTHER AVAILABLE FORMS

- Rods
- Wire

STANDARD CAPABILITY

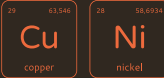
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request



Niclal® 08R

CuNi₈



↩ Back

Niclal® 08R is a resistive Copper-Nickel (CuNi₈) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as fair corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₈	NA	NA

CHEMICAL COMPOSITION

Cu	Ni
Balance	8%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	57 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.3 x 10 ⁻⁶ /°C
Corrosion resistance	★★★★★
Modulus of elasticity	124 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	12 μΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

- Bi-metallic contacts
- Heating componentfor circuit breaker
- Heating strips
- Mineral insulated cables
- Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

- Welding
- Plating
- Forming

KEY FEATURES

- High precision of resistivity
- Fair corrosion resistance

OTHER AVAILABLE FORMS

- Rods
- Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

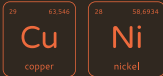
*Dimensions outside this range on request

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Niclal® 10R

CuNi₁₀



← Back

Niclal® 10R is a resistive Copper-Nickel (CuNi₁₀) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₀	NA	DIN 17471 n°2.0811

CHEMICAL COMPOSITION

Cu	Ni
Balance	10%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	50 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.1 x 10 ⁻⁶ /°C
Melting point	1100 °C
Corrosion resistance	★★★★★
Modulus of elasticity	126 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	15 μΩ.cm
Typical temperature coefficient of electrical resistance from +25 to +105°C	400 - 500 ppm/°C
Resistivity deviation	3σ = 5%

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

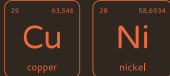
*Dimensions outside this range on request

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Niclal® 13R

CuNi₁₃



← Back

Niclal® 13R is a resistive Copper-Nickel (CuNi₁₃) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₃	NA	NA

CHEMICAL COMPOSITION

Cu	Ni
Balance	13%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	45 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.9 x 10 ⁻⁶ /°C
Corrosion resistance	★★★★★
Modulus of elasticity	140 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	18 μΩ.cm
Resistivity deviation	3σ = 5%

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

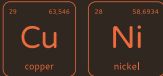
*Dimensions outside this range on request

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Niclal® 15R

CuNi₁₅



← Back

Niclal® 15R is a resistive Copper-Nickel (CuNi₁₅) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₅	NA	NA

CHEMICAL COMPOSITION

Cu	Ni
Balance	15%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	43 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.5 x 10 ⁻⁶ /°C
Corrosion resistance	★★★★★
Modulus of elasticity	142 GPa
Electrical properties	
Resistivity at 20°C	21 µΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

- Bi-metallic contacts
- Heating componentfor circuit breaker
- Heating strips
- Mineral insulated cables
- Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

- Welding
- Plating
- Forming

KEY FEATURES

- High precision of resistivity
- Good corrosion resistance

OTHER AVAILABLE FORMS

- Rods
- Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

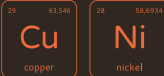
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Niclal® 20R

CuNi₂₀



← Back

Niclal® 20R is a resistive Copper-Nickel (CuNi₂₀) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₂₀	C71000	NA

CHEMICAL COMPOSITION

Cu	Ni
Balance	20%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	37.7 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.4 x 10 ⁻⁶ /°C
Corrosion resistance	★★★★★
Modulus of elasticity	144 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	26.5 µΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

- Bi-metallic contacts
- Heating componentfor circuit breaker
- Heating strips
- Mineral insulated cables
- Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

- Welding
- Plating
- Forming

KEY FEATURES

- High precision of resistivity
- Good corrosion resistance

OTHER AVAILABLE FORMS

- Rods
- Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

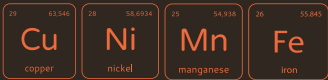
*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual



Niclal® 23R

CuNi₂₃MnFe



↩ Back

Niclal® 23R is a resistive Copper-Nickel (CuNi₂₃MnFe) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₂₃ MnFe	NA	DIN 17471 n°2.0881

CHEMICAL COMPOSITION

Cu	Ni	Mn
Balance	23%	1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	35 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.3 x 10 ⁻⁶ /°C
Melting point	1150 °C
Corrosion resistance	★★★★★
Modulus of elasticity	145 GPa
Electrical properties	
Resistivity at 20°C	30 μΩ.cm
Typical temperature coefficient of electrical resistance from +25 to +105°C	150 - 210 ppm/°C
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

Bi-metallic contacts
Heating componentfor circuit breaker
Heating strips
Mineral insulated cables
Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

Welding
Plating
Forming

KEY FEATURES

High precision of resistivity
Good corrosion resistance

OTHER AVAILABLE FORMS

Rods
Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

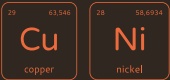
*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual



Niclal® 25R

CuNi₂₅



↩ Back

Niclal® 25R is a resistive Copper-Nickel (CuNi₂₅) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₂₅	C71300	CW350H

CHEMICAL COMPOSITION

Cu	Ni
Balance	25%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	33 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.3 x 10 ⁻⁶ /°C
Corrosion resistance	★★★★★
Modulus of elasticity	150 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	32 μΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

Bi-metallic contacts
Heating componentfor circuit breaker
Heating strips
Mineral insulated cables
Currencies and tokens with highly controlled resistivity

COMPATIBLE DOWNSTREAM PROCESS

Welding
Plating
Forming

KEY FEATURES

High precision of resistivity
Good corrosion resistance

OTHER AVAILABLE FORMS

Rods
Wire

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

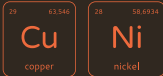
*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual



Niclal® 30R

CuNi₃₀



↶ Back

Niclal® 30R is a resistive Copper-Nickel (CuNi₃₀) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance. This alloy is compliant with ASTM B267 standard in terms of resistivity and temperature coefficient of electrical resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₃₀	NA	DIN 17471 n°2.0890

CHEMICAL COMPOSITION

Cu	Ni
Balance	30%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	29 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.2 x 10 ⁻⁶ /°C
Melting point	1180 °C
Corrosion resistance	★★★★★
Modulus of elasticity	154 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	41 μΩ.cm
Typical temperature coefficient of electrical resistance from +25 to +105°C	3900 - 4700 ppm/°C
Resistivity deviation	3σ = 5%

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual



Constantan 45

CuNi₄₄Mn₁



↶ Back

Constantan 45 is a resistive Copper-Nickel (CuNi₄₄Mn₁) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as great corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₄₄ Mn ₁	NA	DIN 17471 n°2.0842

CHEMICAL COMPOSITION

Cu	Ni	Mn
Balance	44%	1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	23 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.5 x 10 ⁻⁶ /°C
Melting point	1280 °C
Corrosion resistance	★★★★★
Modulus of elasticity	165 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	51 μΩ.cm
Resistivity deviation	3σ = 5%

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual

CuNi alloys

Sea-water resistance alloys

Sea-water and biofouling resistance

Our Group offers copper-nickel alloys **used for sea-water resistance applications**. These alloys exhibit high resistance to sea-water corrosion and to biofouling which provides various advantages compared to other copper alloys and steels

PRODUCT PORTFOLIO

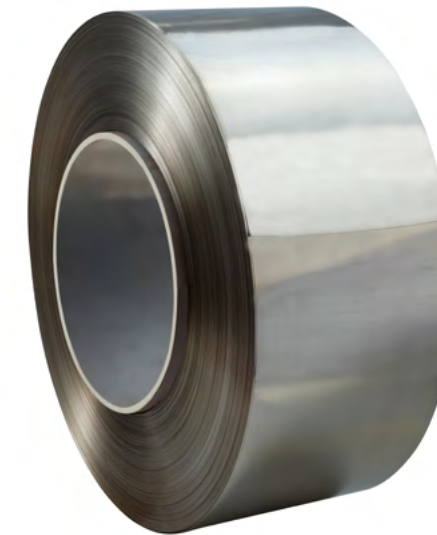
Alloy	ISO	UNS
Nical® 10-Fe	CuNi ₁₀ FeMn	C70600
Nical® 30-Fe	CuNi ₃₀ FeMn	C71500
Nical® 30A-Fe*	CuNi ₃₀ Mn ₂ Fe ₂	NA
Nical® 30B-Fe*	CuNi ₃₁ FeMn	NA
Nical® 25*	CuNi ₂₅	C71300

*For those alloys, technical data is on demand

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

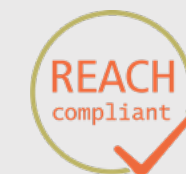


ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our CuNi alloys are :

- RoHS and REACH compliant
- Mainly produced from recycled raw materials



Markets and applications

Energy



- Heat exchangers
- Mechanical and piping components
- Submarine cables shielding

Health



- Desalination

Electronics

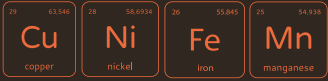


- Deep drawn cans



Niclal® 10-Fe

CuNi₁₀FeMn



← Back

Niclal® 10-Fe is a Copper-Nickel (CuNi₁₀FeMn) alloy produced by Lebronze alloys. It exhibits high resistance to sea-water corrosion and to biofouling which provides various advantages compared to other copper alloys and steels.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₀ FeMn	C70600	CW352H

CHEMICAL COMPOSITION

Cu	Ni	Fe
Balance	10%	1.5%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	50 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.1 x 10 ⁻⁶ /°C
Modulus of elasticity	126 GPa
Electrical properties	
Resistivity at 20°C	22 μΩ.cm

OTHER AVAILABLE FORMS

Rods
Wire
Bars
Machined parts

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Deep drawn cans
Electrical contacts
Heat exchangers and desalination components

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Deep drawing
Welding (TIG, MIG, Arc)
Brazing
Machining

KEY FEATURES

Sea-water corrosion resistance
Biofouling resistance

MECHANICAL PROPERTIES

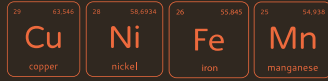
Temper	Yield Stength 0.2 % (MPa)	Tensile Stength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 120	≤ 350	≥ 35	≥ 95
½ hard H12	≥ 190	345 - 500	≥ 10	90 - 135
¾ hard H14	≥ 220	495 - 600	≥ 2	130 - 185

Disclaimer : Data for information only, non-contractual



Niclal® 30-Fe

CuNi₃₀FeMn



← Back

Niclal® 30-Fe is a Copper-Nickel (CuNi₃₀FeMn) alloy produced by Lebronze alloys. It exhibits high resistance to sea-water corrosion and to biofouling which provides various advantages compared to other copper alloys and steels.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₃₀ FeMn	C71500	CW354H

CHEMICAL COMPOSITION

Cu	Ni	Fe
Balance	31%	0.8%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	29 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.2 x 10 ⁻⁶ /°C
Modulus of elasticity	155 GPa
Electrical properties	
Resistivity at 20°C	40 μΩ.cm

OTHER AVAILABLE FORMS

Rods
Wire
Bars
Machined parts

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Deep drawn cans
Electrical contacts
Heat exchangers and desalination components

COMPATIBLE DOWNSTREAM PROCESS

Cold forming
Deep drawing
Welding (TIG, MIG, Arc)
Brazing
Machining

KEY FEATURES

Sea-water corrosion resistance
Biofouling resistance

MECHANICAL PROPERTIES

Temper	Yield Stength 0.2 % (MPa)	Tensile Stength (MPa)	Elongation (%)	Hardness (HV)
Annealed	≤ 140	≤ 400	≥ 30	≥ 115
½ hard H12	≥ 220	395 - 550	≥ 8	110 - 150
¾ hard H14	≥ 240	545 - 700	≥ 2	145 - 215

Disclaimer : Data for information only, non-contractual

CuNi alloys

Electronic grade alloys

Precision and stability in vacuum environment

Our Group offers copper-nickel alloys **used for electronic applications**. These alloys exhibit high **stability and precision of electrical properties** especially in vacuum environment thanks to a superior **metallurgical** cleanliness offered by our special production processes.

PRODUCT PORTFOLIO

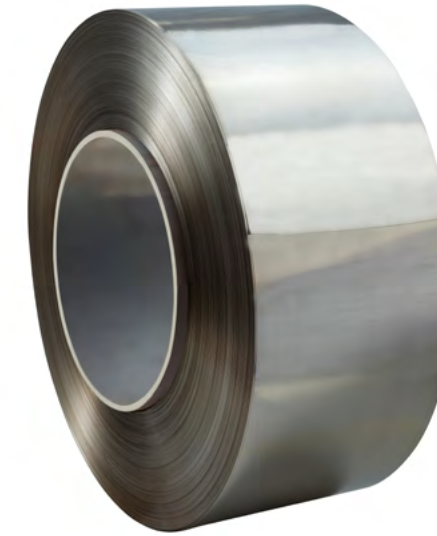
Alloy	ISO	UNS
Nical® 30B	CuNi ₃₀	NA
Constantan 45 SIE	CuNi ₄₄ Mn ₁	NA
Nical® 404*	NiCu ₄₇ FeMnSi	NA
Nical® 30A*	CuNi ₃₀ MnFe	NA
Nical® 30D*	CuNi ₃₀ MnFeSi	NA
Constantan 45A*	Proprietary	NA
Nical® 404B*	NiCu ₄₇ FeMnSi	NA

**For those alloys, technical data is on demand*

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

**Dimensions outside this range on request*



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our CuNi alloys are :

- RoHS and REACH compliant
- Mainly produced from recycled raw materials



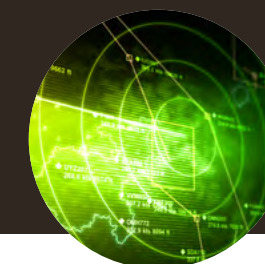
Markets and applications

Electronics



- Vacuum tubes
- Vacuum electronics

Defence

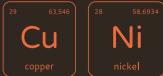


- Radars
- Sonars
- Telecommunication antennas



Niclal® 30B

CuNi₃₀



← Back

Niclal® 30B is an electronic grade Copper-Nickel (CuNi₃₀) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as good corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₃₀	NA	NA

CHEMICAL COMPOSITION

Cu	Ni
Balance	30%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	29 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16.2 x 10 ⁻⁶ /°C
Melting point	1180 °C
Modulus of elasticity	154 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	37 μΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

Vacuum tubes
Vacuum electronics components
Radars and sonars components
Telecommunication antennas

COMPATIBLE DOWNSTREAM PROCESS

Slitting

KEY FEATURES

High precision of resistivity
High temperature resistance
Good corrosion resistance

OTHER AVAILABLE FORMS

Rods
Wire

MECHANICAL PROPERTIES

Temper	Yield Stength 0.2 % (MPa)	Tensile Stength (MPa)	Elongation (%)	Hardness (HV)
Annealed	< 200	< 400	> 30	< 100

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

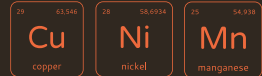
*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual



Constantan 45 SIE

CuNi₄₄Mn₁



← Back

Constantan 45 SIE is an electronic grade Copper-Nickel (CuNi₄₄Mn₁) alloy designed and produced by Lebronze alloys. It exhibits high precision of resistivity, even at high temperatures, as well as great corrosion resistance.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₄₄ Mn ₁	NA	DIN 17471 n°2.0842

CHEMICAL COMPOSITION

Cu	Ni	Mn
Balance	44%	1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	23 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.5 x 10 ⁻⁶ /°C
Melting point	1280 °C
Modulus of elasticity	165 GPa
Specific heat capacity	0.38 J/g.°C
Electrical properties	
Resistivity at 20°C	49 μΩ.cm
Resistivity deviation	3σ = 5%

TYPICAL APPLICATIONS

Vacuum tubes
Vacuum electronics components
Radars and sonars components
Telecommunication antennas

COMPATIBLE DOWNSTREAM PROCESS

Slitting

KEY FEATURES

High precision of resistivity
High temperature resistance
Good corrosion resistance

OTHER AVAILABLE FORMS

Rods
Wire

MECHANICAL PROPERTIES

Temper	Yield Stength 0.2 % (MPa)	Tensile Stength (MPa)	Elongation (%)	Hardness (HV)
Annealed	< 250	< 450	> 40	< 120

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

Disclaimer : Data for information only, non-contractual

CuZnNi alloys

Unleaded nickel silver alloys

Formability and solderability

Our Group offers a wide range of nickel silver alloys **used for various applications**. These alloys exhibit high deep drawing formability and excellent solderability.

PRODUCT PORTFOLIO

Alloy	ISO	UNS
Nical® 101*	CuNi ₁₀ Zn ₂₈	NA
Nical® 120	CuNi ₁₂ Zn ₂₄	C75700
Nical® 150*	CuNi ₁₅ Zn ₂₃	NA
Nical® 180	CuNi ₁₈ Zn ₂₁	NA
Nical® 180A*	CuNi ₁₈ Zn ₁₇	C75200
Nical® 181*	CuNi ₁₈ Zn ₂₇	C77000
Strong 400*	CuNi ₃₇ Zn ₁₂	NA
Nical® 450*	CuNi ₄₅ Zn ₂₃	NA

**For those alloys, technical data is on demand*

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

**Dimensions outside this range on request*



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our CuZnNi alloys are :

- RoHS and REACH compliant
- Mainly produced from recycled raw materials



Markets and applications

Luxury

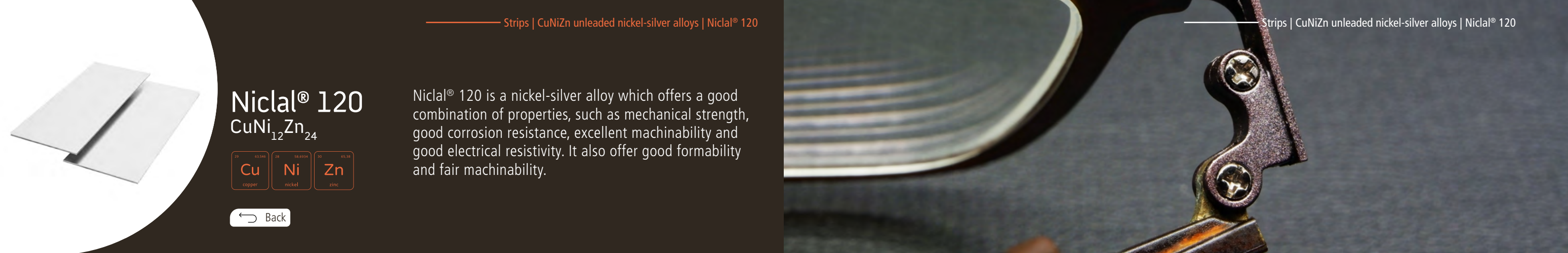


- Watch micro-components
- Spectacle components

Electronics



- Contacts
- Connectors



Niclal® 120

CuNi₁₂Zn₂₄



← Back

Niclal® 120 is a nickel-silver alloy which offers a good combination of properties, such as mechanical strength, good corrosion resistance, excellent machinability and good electrical resistivity. It also offer good formability and fair machinability.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₂ Zn ₂₄	C75700	CW403J

CHEMICAL COMPOSITION

Cu	Ni	Zn
64%	12%	Balance

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.7 g/cm³
Thermal conductivity	33 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16 x 10 ⁻⁶ /°C
Modulus of elasticity	125 GPa
Electrical properties	
Electrical resistivity at 20°C	22.7 µΩ.cm

TYPICAL APPLICATIONS

Silverware
Watch components
Medals
Eyewear components
Pen tips
Lighters components
Electronic components
Lock industry components
Fittings

COMPATIBLE DOWNSTREAM PROCESS

Machining
Cold working
Deep drawing
Welding
Brazing
Stamping

KEY FEATURES

Mechanical strength
Corrosion resistance
Amagetism
Yellow-silver color

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
¼ hard H11	≥ 210	410 - 510	≥20	110 - 140
½ hard H12	≥ 360	470 - 570	≥8	135 - 165
¾ hard H13	≥ 480	560 - 640	≥4	160 - 190
4/4 hard H14	≥ 590	640 - 700	≈1	190 - 205
Spring H15	≥ 640	> 700	NA	> 205

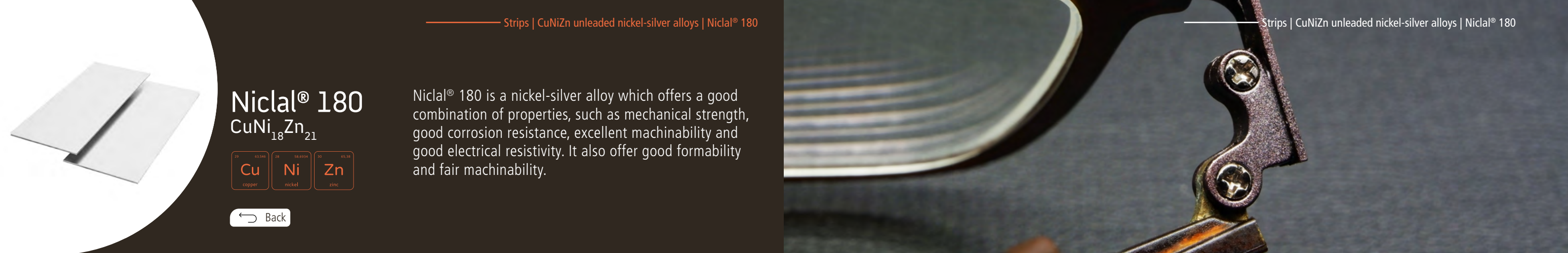
BENDING PROPERTIES

Temper	90° Bending*	180° Bending*
	Transverse (good way)	
¼ hard H11	0*t	0*t
½ hard H12	1*t	2*t
¾ hard H13	1*t	3*t
4/4 hard H14	2*t	4*t
Spring H15	3*t	NA

*Bending across the rolling direction (transverse or good way). According to DIN 5011 dated 25/10/85. Figures represent min bending radius.

OTHER AVAILABLE FORMS

Wire
Rods



Niclal® 180

CuNi₁₈Zn₂₁



← Back

Niclal® 180 is a nickel-silver alloy which offers a good combination of properties, such as mechanical strength, good corrosion resistance, excellent machinability and good electrical resistivity. It also offer good formability and fair machinability.

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₁₈ Zn ₂₁	NA	CW409J

CHEMICAL COMPOSITION

Cu	Ni	Zn
61%	18%	Balance

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.7 g/cm³
Thermal conductivity	23 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	17.7 x 10 ⁻⁶ /°C
Modulus of elasticity	135 GPa
Electrical properties	
Electrical resistivity at 20°C	32 µΩ.cm

TYPICAL APPLICATIONS

Silverware
Watch components
Medals
Eyewear components
Pen tips
Lighters components
Electronic components
Lock industry components
Fittings

COMPATIBLE DOWNSTREAM PROCESS

Machining
Cold working
Deep drawing
Welding
Brazing
Stamping

KEY FEATURES

Mechanical strength
Corrosion resistance
Amagetism
Silver color

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
¼ hard H11	≥ 250	450 - 520	≥ 20	120 - 150
½ hard H12	≥ 390	490 - 590	≥ 7	145 - 175
¾ hard H13	≥ 480	560 - 640	≥ 5	170 - 200
¾ hard H14	≥ 560	640 - 690	≈ 1	200 - 215
Spring H15	≥ 630	> 690	NA	> 215

BENDING PROPERTIES

Temper	90° Bending*	180° Bending*
	Transverse (good way)	
¼ hard H11	0*t	0*t
½ hard H12	1*t	2*t
¾ hard H13	1*t	3*t
¾ hard H14	2*t	4*t
Spring H15	NA	NA

*Bending across the rolling direction (transverse or good way). According to DIN 5011 dated 25/10/85. Figures represent min bending radius.

OTHER AVAILABLE FORMS

Wire
Rods



Other

High performance copper alloys

PRODUCT PORTFOLIO

Alloy	ISO	UNS
Cuprofor®	CuCoP	C15600
Siclanic® S	CuNi ₂ Si	NA

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

**Dimensions outside this range on request*

ESG Performance

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- Our others alloys are :
- RoHS and REACH compliant
 - Mainly produced from recycled raw materials

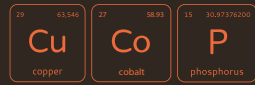


We are committed to decarbonation.

To know more, visit:
www.lebronze-alloys.com



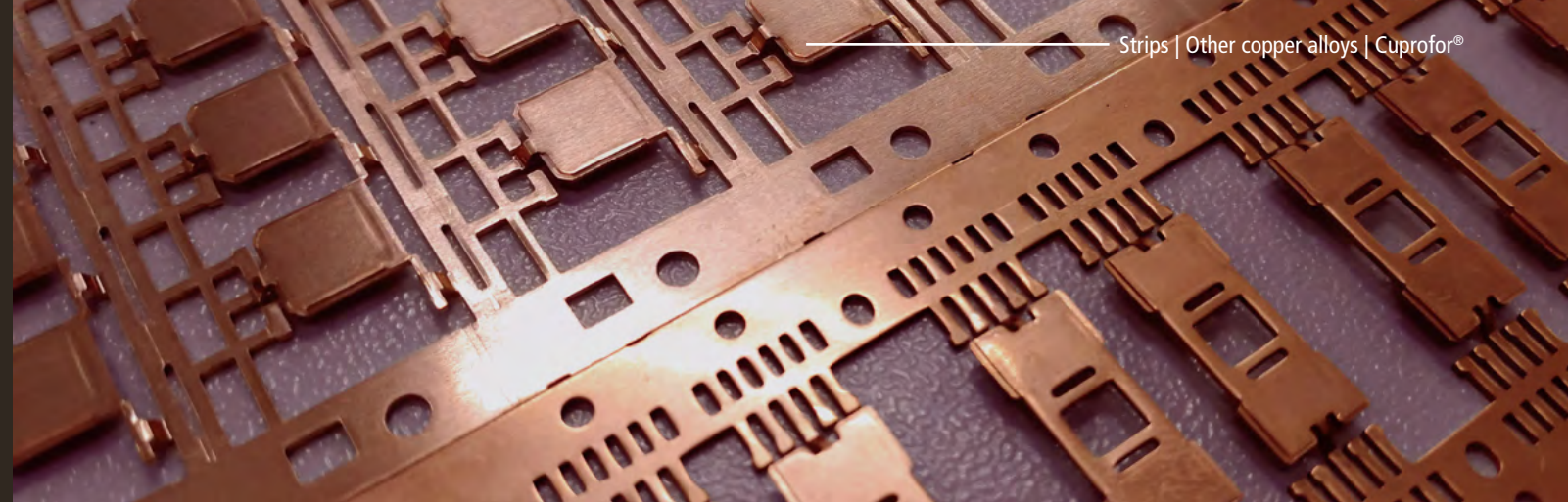
Cuprofor® CuCoP



← Back

Strips | Other copper alloys | Cuprofor®

Cuprofor® is a low alloyed copper developed by Lebronze alloys as a solution for high performance electronic and electrical applications. Cuprofor® displays high electrical and thermal conductivity, good mechanical properties, excellent temperature stability and high formability.



Strips | Other copper alloys | Cuprofor®

MATERIAL DESIGNATION

ISO	UNS	Others
CuCoP	C15600	NA

CHEMICAL COMPOSITION

Cu	Co	P
Balance	0.3%	0.1%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	338 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	16 x 10 ⁻⁶ /°C
Modulus of elasticity	140 GPa
Melting point	1080 °C
Electrical properties	
Electrical conductivity	> 85 %IACS
Electrical resistivity at 20°C	2.1 µΩ.cm

TYPICAL APPLICATIONS

Heat sinks for power transistors
Support media for printed circuits
Electrical contacts
Contact mounts
Pushbuttons
Conductive parts
Electrical connections and terminals
Heat exchangers
Seals and washers
Dephasing rings
Shunts

COMPATIBLE DOWNSTREAM PROCESS

Stamping
Bending
Cold forming
Soldering
Soft soldering
Silver soldering with AGECLA fillers
Copper-phosphorus soldering with PHOSCLA fillers
Electroplating and electroless nickel plating

KEY FEATURES

Excellent electrical conductivity
Great mechanical strength up to 500°C
Great fatigue resistance

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

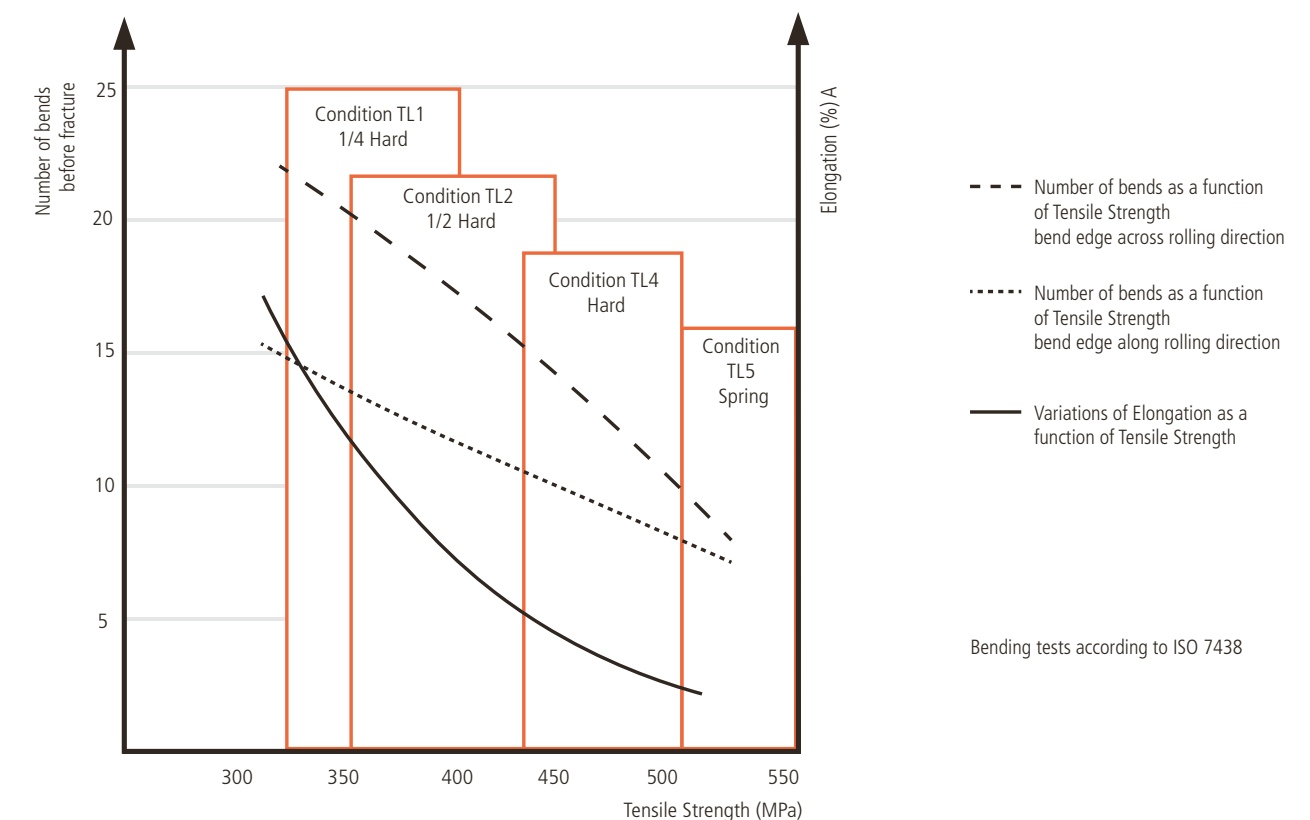
MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
¼ hard TL1	≥ 220	320 - 400	≥ 15	110 - 125
½ hard TL2	≥ 300	350 - 440	≥ 10	115 - 140
¾ hard TL4	≥ 360	430 - 500	≥ 4	135 - 160
Spring TL5	≥ 450	> 500	2	> 150

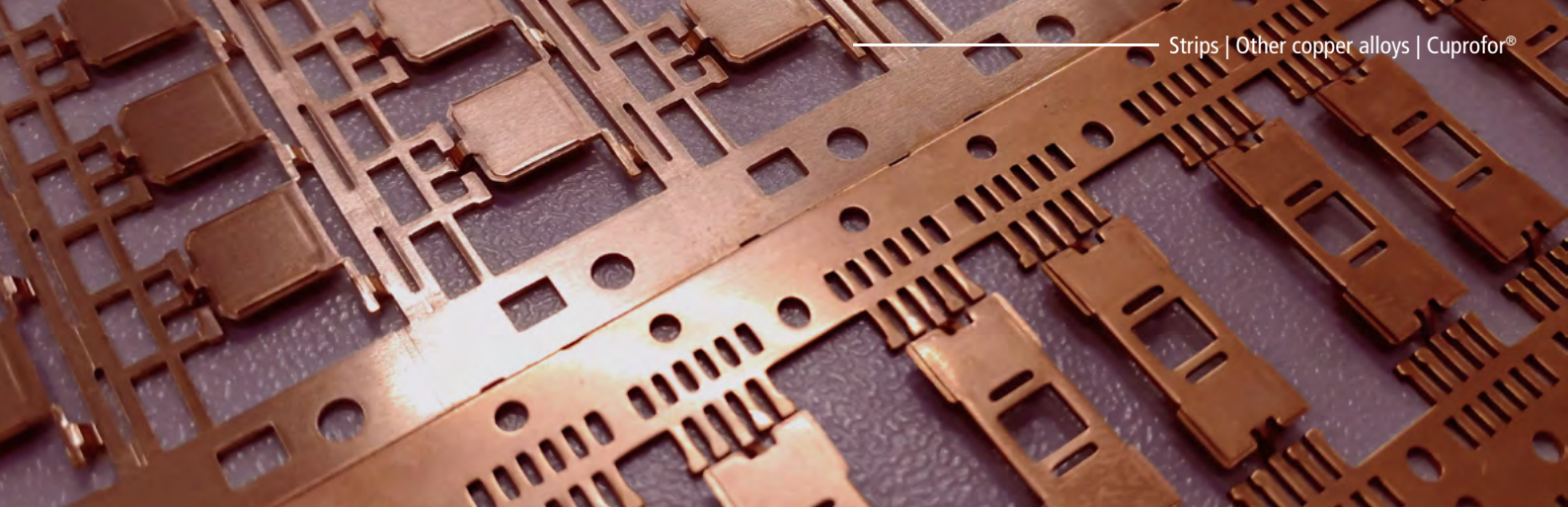
OTHER AVAILABLE FORMS

Wire
Rods

BENDING TECHNICAL INFORMATION



Disclaimer : Data for information only, non-contractual



Siclanic® S

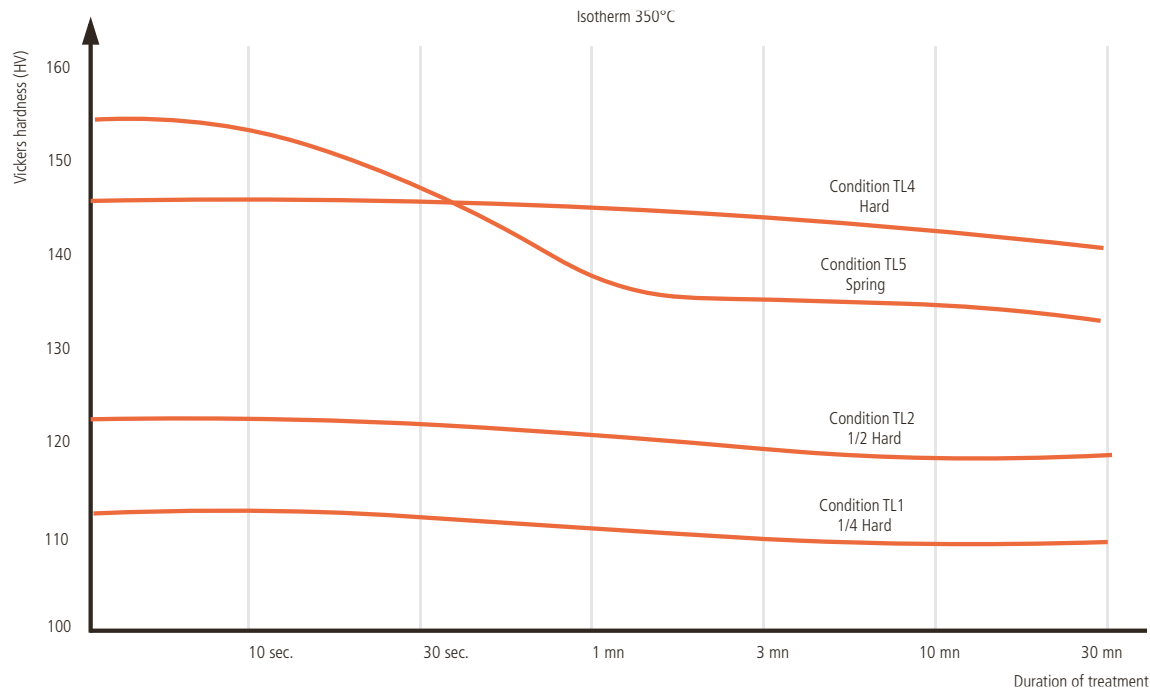
CuNi₂Si

Cu	Ni	Si
copper	nickel	silicon

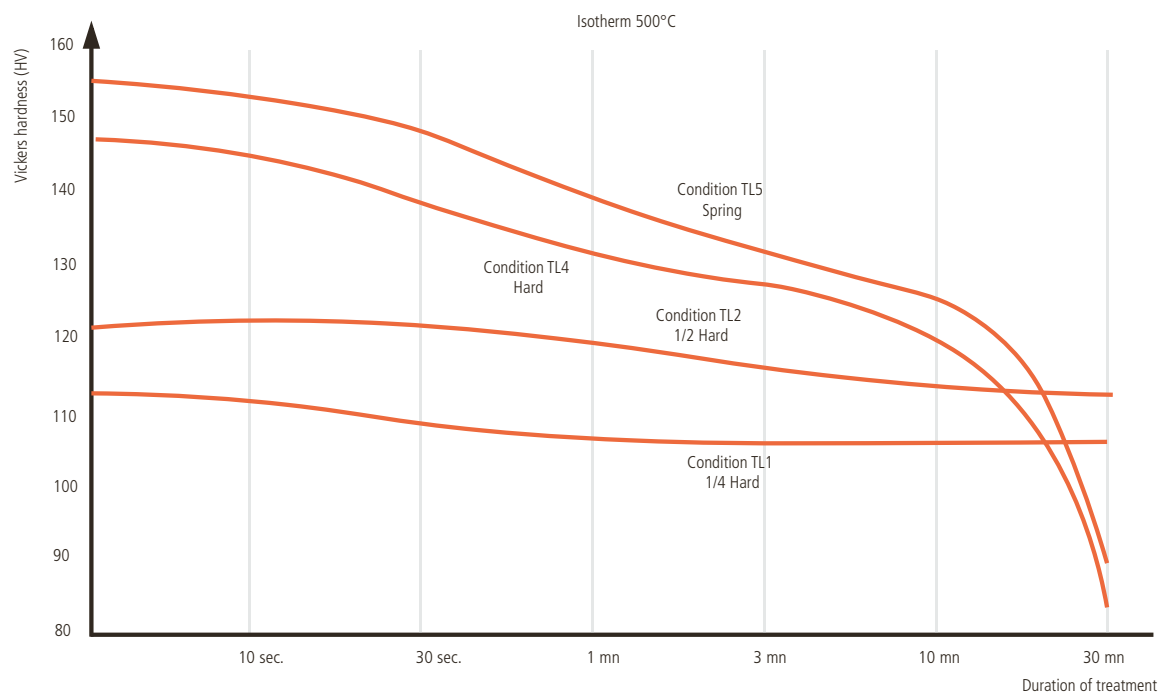
↩ Back

Siclanic S® is a CuNi₂Si alloy, hardenable by heat treatment, which offers excellent electrical conductivity, mechanical strength and fatigue resistance.

ISOTHERM CURVES OF HARDNESS OVER TIME AT 350 °C



ISOTHERM CURVES OF HARDNESS OVER TIME AT 500 °C



Disclaimer : Data for information only, non-contractual

MATERIAL DESIGNATION

ISO	UNS	Others
CuNi ₂ Si	NA	CW111C

CHEMICAL COMPOSITION

Cu	Ni	Si
Balance	2%	1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C	8.9 g/cm³	
Thermal conductivity	Quenched state	84 W/m.°C
	Precipitation hardened state	188.4 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	19 x 10 ⁻⁶ /°C	
Modulus of elasticity	Quenched state	120 GPa
	Precipitation hardened state	130 GPa
Melting point	1075 °C	

Electrical properties

Electrical resistivity at 20°C	Quenched state	7.8 μΩ.cm
	Precipitation hardened state	< 4.1 μΩ.cm
Electrical conductivity	Quenched state	< 24 %IACS
	Precipitation hardened state	> 43 %IACS

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

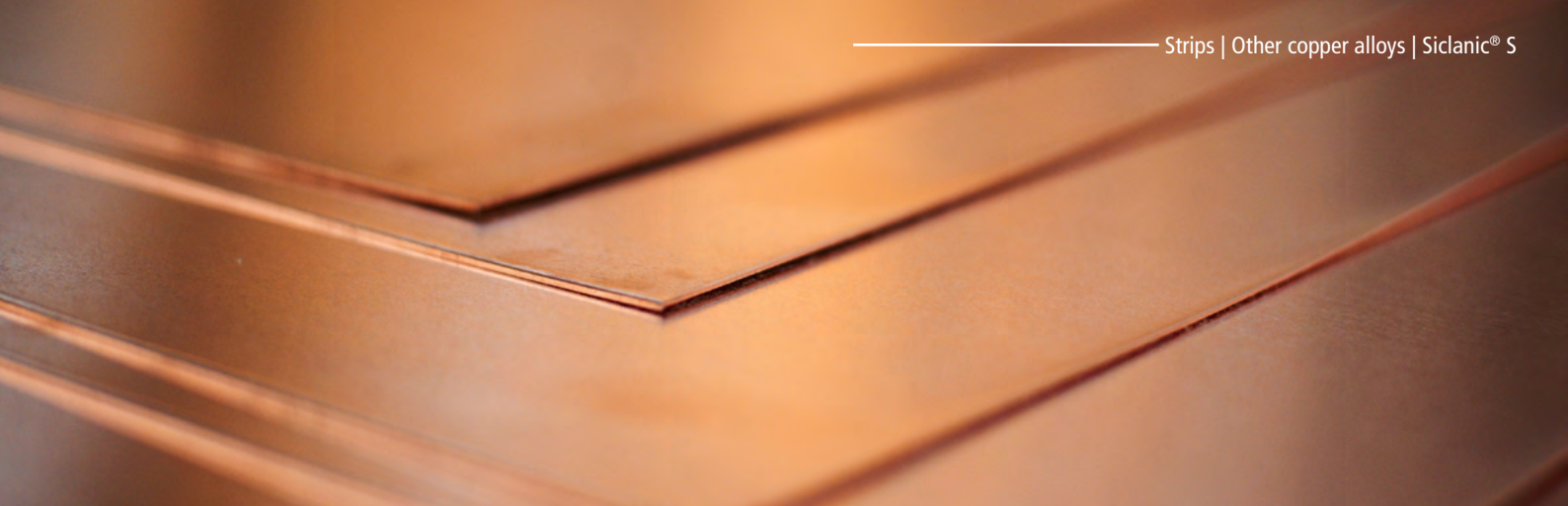
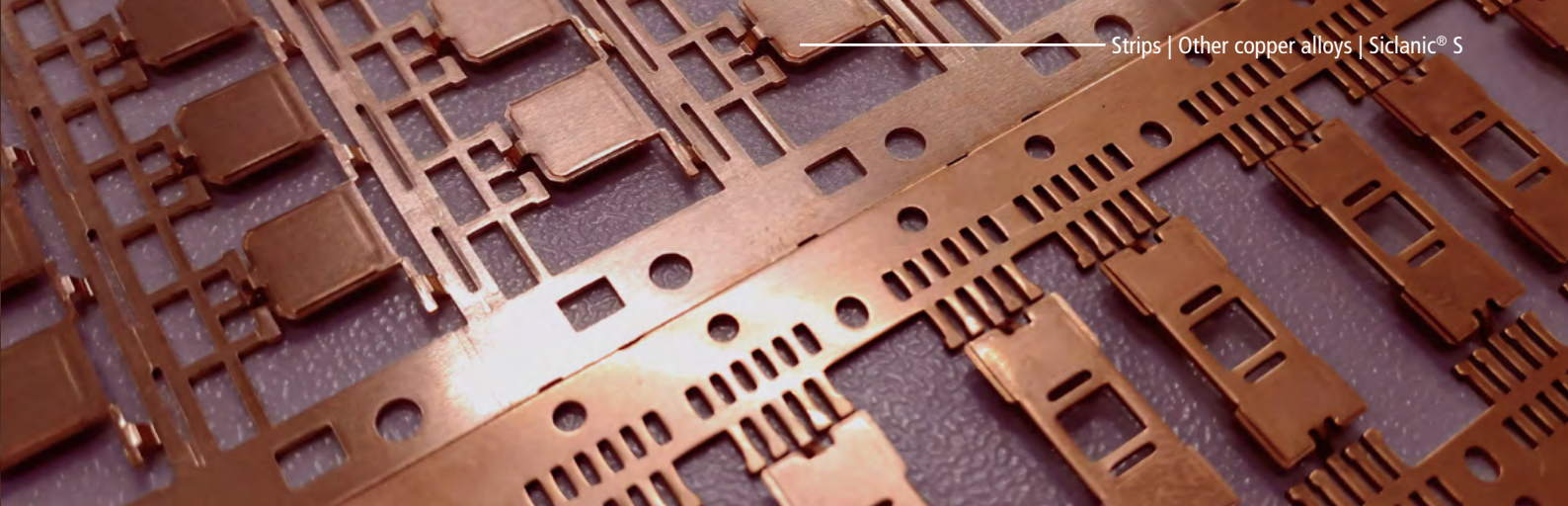
Conductive contact blades
Switches/circuit breakers
Thermostat
Pressure switches
Contactors
Pieces for railway applications
Automotive commutators, relay blades
Relay springs
Washers for pressure/for pressure sensitive switch

COMPATIBLE DOWNSTREAM PROCESS

Cold stamping
Hot stamping
Coating
Bending
Soldering
Welding

KEY FEATURES

High formability before thermal treatment
Excellent electrical conductivity
Great mechanical strength
Great fatigue resistance
Good thermal stress relaxation resistance
Good corrosion resistance



MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Solution treated & cold worked				
TB quenched state	140 - 170	270 - 300	> 30	70 - 85
TD3 quenched state ½ hard	290 - 380	320 - 400	> 10	105 - 125
TD4 quenched state hard	390 - 450	400 - 470	> 3	195 - 250
Mill hardened				
TF quenched and precipitation treated	450 - 550	580 - 680	> 10	170 - 190
TH3 quenched and precipitation treated	530 - 630	600 - 700	> 10	190 - 215
TH4 quenched hard precipitation treated	590 - 700	630 - 800	> 8	195 - 250

BENDING PROPERTIES

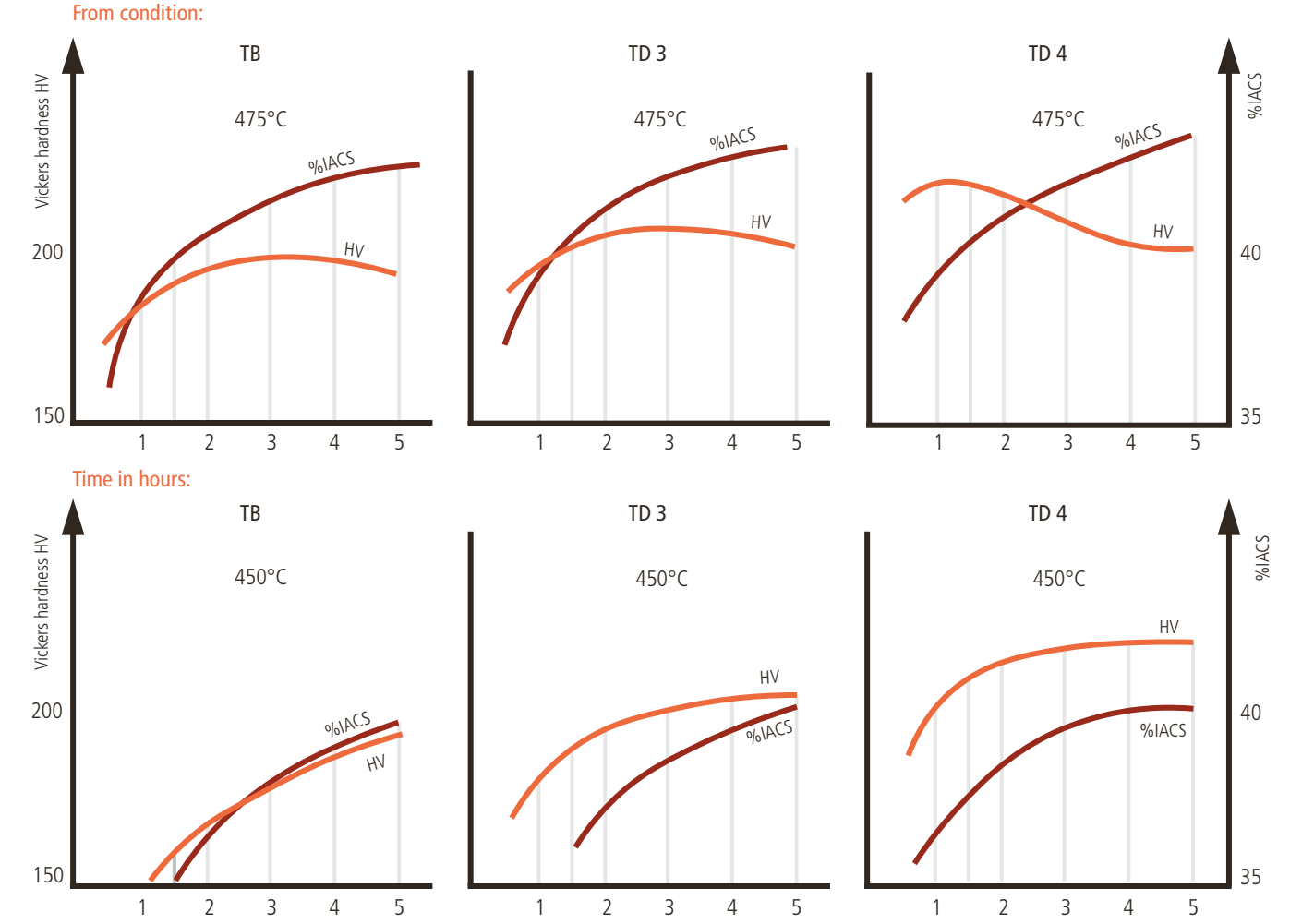
Temper	90° Bending*	180° Bending*
	Transverse (good way)	
TB	0*t	0*t
TD3	0*t	1*t
TD4	3*t	3*t
TF	0*t	0*t
TH3	1*t	1*t
TH4	1*t	2*t

*Bending across the rolling direction (transverse or good way). According to DIN 5011 dated 25/10/85. Figures represent min bending radius.

OTHER AVAILABLE FORMS

Wire
Rods

BENDING TECHNICAL INFORMATION



Disclaimer : Data for information only, non-contractual

Pure nickel

Superior formability and high corrosion resistance

Lebronze alloys is one of the market leaders of pure nickel strips, fully integrated from casting to final slitting.

Based on more than 50 years of experience, our pure nickel strips are widely used in the most stringent applications and recognized for their unique combination of properties:

- Corrosion resistance
- Unique formability (bending, deep drawing, expanded metal forming...)
- Solderability and weldability
- Electrical conductivity

Our advanced casting techniques allows superior metallurgical cleanliness, specially required for thin nickel strips and vacuum applications.

PRODUCT PORTFOLIO

Alloy	ISO	ASTM
Nickel 200	NiMnSiC	N02200
Nickel 201	NiMnSiC	N02201
Nickel 206	NiMnSiC	NA
Nickel 206A	NiMnSiC	NA
Nickel 206C	NiMnSiC	NA

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

NICKEL PURITY GRADES

We propose 5 different grades of pure nickel differing on their nickel and carbon content.

Nickel range	Nickel 200	Nickel 201	Nickel 206	Nickel 206 C	Nickel 206 A
Ni (minimum)	99.2 %	99.0 %	99.6 %	99.6 %	99.0 %
C	0.10	0.02	0.08	0.02	0.02
Si	0.25	0.25	0.10	0.10	0.10
Mn	0.35	0.35	0.30	0.20	0.35
S	0.005	0.005	0.005	0.005	0.005
Cu	0.25	0.25	0.15	0.10	0.15
Fe	0.40	0.40	0.25	0.20	0.25
Ti	0.10	0.10	0.10	0.10	0.10
Mg	0.15	0.15	0.15	0.15	0.15



ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our pure nickel alloys are :

- RoHS and REACH compliant



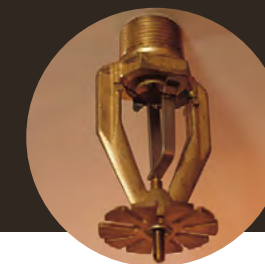
Markets and applications

Electronics



- Battery packs

Others



- Bursting discs
- Sprinkler parts
- Heat exchangers



Nickel 200

NiMnSiC



← Back

Nickel 200 is one of our pure Nickel products. Our advanced casting techniques allow superior metallurgical cleanliness, specially required for thin Nickel strips and vacuum applications. Our fully integrated manufacturing process allows full mastery of our product properties.



MATERIAL DESIGNATION

ISO	ASTM	Others
NiMnSiC	N02200	DIN 17740 W n°2.4066

CHEMICAL COMPOSITION

Ni	> 99.2%
C	< 0.1000 %
Si	< 0.2500 %
Mn	< 0.3500 %
S	< 0.0050 %
Cu	< 0.2500 %
Fe	< 0.4000 %
Ti	< 0.1000 %
Mg	< 0.1500 %

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	74.9 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.3 x 10 ⁻⁶ /°C
Modulus of elasticity	204-210 GPa
Corrosion resistance	★★★★★
Electrical resistivity at 20°C	9.5 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Shunts and precision resistors
Bursting discs
Battery pack connectors
Electronic components
Telecommunications
Currency and medals
Sprinkler parts
Cathodes in hydrogen fuel cells
Flux cored wires

COMPATIBLE DOWNSTREAM PROCESS

Deep drawing
Soldering
Welding

KEY FEATURES

Corrosion resistance
Electrical conductivity
High purity

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	> 150	> 400	> 40	< 130
¼ hard H11	> 200	> 400	> 15	130 - 170
½ hard H12	> 280	> 500	> 10	160 - 210
¾ hard H13	> 400	> 560	> 5	170 - 230
4/4 hard H14	> 450	> 560	> 1	> 210
Spring H15	> 500	> 600	> 1	210 - 290



Nickel 201

NiMnSiC



← Back

Nickel 201 is one of our pure Nickel products. Our advanced casting techniques allow superior metallurgical cleanliness, specially required for thin Nickel strips and vacuum applications. Our fully integrated manufacturing process allows full mastery of our product properties.



MATERIAL DESIGNATION

ISO	ASTM	Others
NiMnSiC	N02201	DIN 17740 W n°2.4068

CHEMICAL COMPOSITION

Ni	> 99.0 %
C	< 0.0200 %
Si	< 0.2500 %
Mn	< 0.3500 %
S	< 0.0050 %
Cu	< 0.2500 %
Fe	< 0.4000 %
Ti	< 0.1000 %
Mg	< 0.1500 %

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	79.2 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.3 x 10 ⁻⁶ /°C
Modulus of elasticity	204 - 210 GPa
Corrosion resistance	★★★★★
Electrical resistivity at 20°C	9.5 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Shunts and precision resistors
Bursting discs
Battery pack connectors
Electronic components
Telecommunications
Currency and medals
Sprinkler parts
Cathodes in hydrogen fuel cells
Flux cored wires

COMPATIBLE DOWNSTREAM PROCESS

Deep drawing
Soldering
Welding

KEY FEATURES

Corrosion resistance
Electrical conductivity
High purity
Low in Carbon
Suitable for high temperature use without intergranular corrosion

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	> 100	> 380	> 40	< 110
¼ hard H11	> 250	380 - 500	> 25	130 - 160
½ hard H12	> 350	420 - 550	> 15	150 - 200
¾ hard H13	> 400	450 - 600	> 10	170 - 210
4/4 hard H14	> 450	> 560	> 2	> 180



Nickel 206

NiMnSiC



← Back

Nickel 206 is one of our pure Nickel products. Our advanced casting techniques allow superior metallurgical cleanliness, specially required for thin Nickel strips and vacuum applications. Our fully integrated manufacturing process allows full mastery of our product properties.



MATERIAL DESIGNATION

ISO	ASTM	Others
NiMnSiC	NA	DIN 17740 W n°2.4060

CHEMICAL COMPOSITION

Ni	> 99.6 %
C	< 0.0800 %
Si	< 0.1000 %
Mn	< 0.3000 %
S	< 0.0050 %
Cu	< 0.1500 %
Fe	< 0.2500 %
Ti	< 0.1000 %
Mg	< 0.1500 %

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	70 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.3 x 10 ⁻⁶ /°C
Modulus of elasticity	204 - 210 GPa
Corrosion resistance	★★★★★
Electrical resistivity at 20°C	8.8 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Shunts and precision resistors
Bursting discs
Battery pack connectors
Electronic components
Telecommunications
Currency and medals
Sprinkler parts
Cathodes in hydrogen fuel cells
Flux cored wires

COMPATIBLE DOWNSTREAM PROCESS

Deep drawing
Soldering
Welding

KEY FEATURES

Corrosion resistance
Electrical conductivity
High purity
Low in Carbon
Suitable for high temperature use without intergranular corrosion

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	110 - 310	350 - 450	> 40	< 110
¼ hard H14	480 - 650	550 - 670	0 - 2	165 - 230



Nickel 206A

NiMnSiC



← Back

Nickel 206A is one of our pure Nickel products. Our advanced casting techniques allow superior metallurgical cleanliness, specially required for thin Nickel strips and vacuum applications. Our fully integrated manufacturing process allows full mastery of our product properties.



MATERIAL DESIGNATION

ISO	ASTM	Others
NiMnSiC	NA	NA

CHEMICAL COMPOSITION

Ni	> 99.0 %
C	< 0.0200 %
Si	< 0.1000 %
Mn	< 0.3000 %
S	< 0.0050 %
Cu	< 0.1500 %
Fe	< 0.2500 %
Ti	< 0.1000 %
Mg	< 0.1500 %

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	70 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.3 x 10 ⁻⁶ /°C
Modulus of elasticity	204 - 210 GPa
Corrosion resistance	★★★★★
Electrical resistivity at 20°C	8.75 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

- Shunts and precision resistors
- Bursting discs
- Battery pack connectors
- Electronic components
- Telecommunications
- Currency and medals
- Sprinkler parts
- Cathodes in hydrogen fuel cells
- Flux cored wires

COMPATIBLE DOWNSTREAM PROCESS

- Deep drawing
- Soldering
- Welding

KEY FEATURES

- Corrosion resistance
- Electrical conductivity
- High purity
- Low in Carbon
- Suitable for high temperature use without intergranular corrosion

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	> 150	< 450	> 30	< 130



Nickel 206C

NiMnSiC



← Back

Nickel 206C is one of our pure Nickel products. Our advanced casting techniques allow superior metallurgical cleanliness, specially required for thin Nickel strips and vacuum applications. Our fully integrated manufacturing process allows full mastery of our product properties.



MATERIAL DESIGNATION

ISO	UNS	Others
NiMnSiC	NA	DIN 17740 W n°2.4061

CHEMICAL COMPOSITION

Ni	> 99.6 %
C	< 0.0200 %
Si	< 0.1000 %
Mn	< 0.2000 %
S	< 0.0050 %
Cu	< 0.1000 %
Fe	< 0.2000 %
Ti	< 0.1000 %
Mg	< 0.1500 %

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.9 g/cm³
Thermal conductivity	70 W/m.°C
Coefficient of thermal expansion from 20 to 200 °C	13.3 x 10 ⁻⁶ /°C
Modulus of elasticity	204 - 210 GPa
Corrosion resistance	★★★★★
Electrical resistivity at 20°C	8.3 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

TYPICAL APPLICATIONS

Shunts and precision resistors
Bursting discs
Battery pack connectors
Electronic components
Telecommunications
Currency and medals
Sprinkler parts
Cathodes in hydrogen fuel cells
Flux cored wires

COMPATIBLE DOWNSTREAM PROCESS

Deep drawing
Soldering
Welding

KEY FEATURES

Corrosion resistance
Electrical conductivity
High purity
Low in Carbon
Suitable for high temperature use without intergranular corrosion

MECHANICAL PROPERTIES

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	110 - 310	350 - 450	> 40	< 110
¼ hard H11	> 210	> 380	> 25	> 150
½ hard H12	300 - 500	410 - 570	15 - 25	150 - 170
¾ hard H13	380 - 560	430 - 580	1 - 10	160 - 200
4/4 hard H14	480 - 650	550 - 670	0 - 2	165 - 230
Full hard H15	< 760	< 830	0 - 2	220 - 260

Nickel alloys

Chemical corrosion resistance

Lebronze alloys is one of the market leaders of specialty high performance nickel alloys. Our portfolio is composed of various specific alloys known under the Niclal® brand.

For these alloys, our metallurgical process is fully integrated from foundry to final heat treatment. This allows full traceability and adapted final properties. Our nickel alloys are available in strips, sheets and wires formats. For other chemistries, please contact our teams.

PRODUCT PORTFOLIO

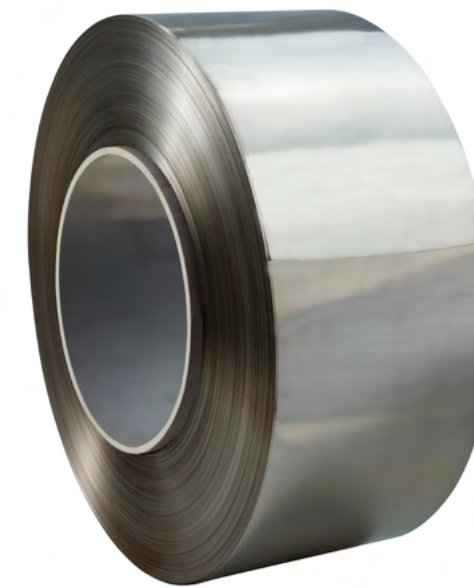
Alloy	ISO	ASTM
Niclal® 400	NiCu ₃₂ Fe ₂ Mn	N04400
Niclal® 400 BC*	CuNi ₆₄	N04400
Niclal® 4QQN*	CuNi ₆₄	N04400
Other chemistries on demand		

*For those alloys, technical data is on demand

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

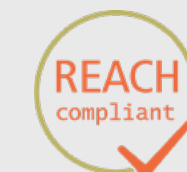


ESG Performance

We aim to offer our Customers products with the leading grade of environmental footprint. To achieve this, we make major investments in innovative processes aiming to optimize energy and water consumption and increasing the use of recycled raw materials. More specifically, we have developed state-of-the-art recycling know-how based on specialized purchasers for sourcing end of life materials to be processed in our Group Upcycling Workshop. Another key aspect of our ESG strategy is to offer substitutes for alloys that are not REACH and RoHS compliant.

Our nickel alloys are :

- RoHS and REACH compliant
- Mainly produced from recycled raw materials



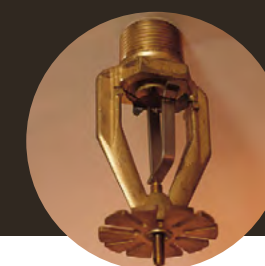
Markets and applications

Energy



- Heat exchangers

Others



- Sprinkler parts
- Fasteners
- Chlorine valves
- Mechanical components



Niclal® 400

NiCu₃₂Fe₂Mn

Ni
nickel

Cu
copper

Fe
iron

Mn
manganese

← Back

Niclal® 400 is a nickel alloy demonstrating excellent resistance to seawater and chloralkali corrosion. Its properties make it an ideal material for sprinkler and mechanical components in highly corrosive environments.



MATERIAL DESIGNATION

ISO	ASTM	Others
NiCu ₃₂ Fe ₂ Mn	N04400	DIN 17743 Wr N°2.4360

CHEMICAL COMPOSITION

Ni	Cu	Fe
Balance	32%	2%

PHYSICAL PROPERTIES

General properties	
Density at 20 °C	8.8 g/cm³
Thermal conductivity	22 W/m.°C
Coefficient of thermal expansion from 20 to 300 °C	13.9 x 10 ⁻⁶ /°C
Modulus of elasticity	179 GPa
Electrical properties	
Electrical conductivity at 20°C	7.5 % IACS
Electrical resisitivity at 20°C	54.7 µΩ.cm

STANDARD CAPABILITY

Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request

OTHER AVAILABLE FORMS

Wire
Rods

TYPICAL APPLICATIONS

- Sprinkler
- Fastener
- Chlorine valves
- Oil and Gas gaskets
- Heat exchangers
- Mechanical components

COMPATIBLE DOWNSTREAM PROCESS

- Cold working
- Deep drawing
- Welding

KEY FEATURES

- Excellent resistance to seawater and chloralkali corrosion
- High mechanical properties

STRIPS MECHANICAL PROPERTIES

Temper	Thickness (mm)	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness (HV)
Annealed	< 2	< 200	< 580	> 35	< 140
	2 - 3.5	> 180	< 540	> 35	< 140
¼ hard H11	All thickness	> 300	550 - 610	> 25	160 - 200
½ hard H12	All thickness	> 500	600 - 660	> 12	180 - 230
¾ hard H13	All thickness	> 560	650 - 720	> 7	200 - 250
¾ hard H14	All thickness	> 650	700 - 820	> 2	220 - 270
Spring H15	All thickness	> 700	> 800	~ 1	> 250

SHEETS MECHANICAL PROPERTIES ACCORDING TO ASTM B127

Temper	Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)
Annealed	> 195	485 - 585	> 35
¾ hard H14	> 620	> 690	> 2

Table

Strips and sheets product portfolio

Alloy name	ISO	UNS	Other designations
CuMn current sensing alloys			
Nical® 28	CuMn ₆ Sn ₂		DIN 17764 n°2.0842
Nical® 29	CuMn ₇ Sn ₂		
Nical® 37	CuMn ₁₀ Ni ₄		
Nical® 38	CuMn ₁₀ Ni ₄		
Nical® 42	CuMn ₁₁ Ni ₄		
Nical® 43	CuMn ₁₂ Ni ₄		
Nical® 43A	CuMn ₁₂ Ni ₂		
Nical® 47	CuMn ₁₄ Ni ₂		
Nical® 48	CuMn ₁₃ Ni ₄		
Constantan 45 TCR	CuNi ₄₄ Mn ₁ Fe		
Nical® 50	Proprietary		
Nical® 70	Proprietary		
Nical® 80	Proprietary		
CuNiSn spinodal alloys			
Hardial®	CuNi ₁₅ Sn ₈	C72900	
Niclafor® 1000	CuNi ₉ Sn ₆	C72700	ASTM B740
Declafor 1015	CuNi _{7.5} Sn ₅ Te	C72670	
Nical® 725	CuNi ₉ Sn ₂		CW351H
ARCAP® alloys			
ARCAP® AP1C	Cu ₅₆ Ni ₂₅ Zn ₁₉	C79360	DIN 17471 2.0842
ARCAP® AP1	Cu ₆₄ Ni ₂₅ Zn ₁₁		
ARCAP® AP4	Cu ₅₅ Ni ₄₄ Mn ₁		
CuNi resistance alloys			
Nical® 02R	CuNi ₂		DIN 17471 n°2.0802
Nical® 06R	CuNi ₆		DIN 17471 n°2.0807
Nical® 08R	CuNi ₈		DIN 17471 n°2.0811
Nical® 10R	CuNi ₁₀		
Nical® 13R	CuNi ₁₃		
Nical® 15R	CuNi ₁₅		DIN 17471 n°2.0881
Nical® 20R	CuNi ₂₀	C71000	
Nical® 23R	CuNi ₂₃ MnFe		
Nical® 25R	CuNi ₂₅	C71300	CW350H
Nical® 30R	CuNi ₃₀		DIN 17471 n°2.0890
Constantan 45	CuNi ₄₄ Mn ₁		DIN 17471 n°2.0842
CuNi sea-water resistance alloys			
Nical® 10-Fe	CuNi ₁₀ FeMn	C70600	CW352H
Nical® 30-Fe	CuNi ₃₀ FeMn	C71500	CW354H
Nical® 30A-Fe	CuNi ₃₀ Mn ₂ Fe ₂		
Nical® 30B-Fe	CuNi ₃₁ FeMn		
Nical® 25	CuNi ₂₅	C71300	

Table

Strips and sheets product portfolio

Alloy name	ISO	UNS	Other designations
CuNi electronic grade alloys			
Nical® 30B	CuNi ₃₀		DIN 17471 n°2.0842
Constantan 45 SIE	CuNi ₄₄ Mn ₁		
Nical® 404	NiCu ₄₇ FeMnSi		
Nical® 30A	CuNi ₃₀ MnFe		
Nical® 30D	CuNi ₃₀ MnFeSi		
Constantan 45A	Proprietary		
Nical® 404B	NiCu ₄₇ FeMnSi		
CuZnNi alloys			
Nical® 101	CuNi ₁₀ Zn ₂₈		
Nical® 120	CuNi ₁₂ Zn ₂₄		
Nical® 150	CuNi ₁₅ Zn ₂₃		CW409J
Nical® 180	CuNi ₁₈ Zn ₂₁		
Nical® 180A	CuNi ₁₈ Zn ₁₇	C75200	
Nical® 181	CuNi ₁₈ Zn ₂₇	C77000	
Strong 400	CuNi ₃₇ Zn ₁₂		
Nical® 450	CuNi ₄₅ Zn ₂₃		
Other high performance copper alloys			
Cuprofor®	CuCoP	C15600	CW111C
Siclanic® S	CuNi ₂ Si		

Alloy name	ISO	ASTM	Other designations
Pure Nickel			
Nickel 200	NiMnSiC	N02200	DIN 17740 W n°2.4066
Nickel 201	NiMnSiC	N02201	DIN 17740 W n°2.4068
Nickel 206	NiMnSiC		DIN 17740 W n°2.4060
Nickel 206A	NiMnSiC		
Nickel 206C	NiMnSiC		DIN 17740 W n°2.4061
Nickel alloys			
Nical® 400	NiCu ₃₂ Fe ₂ Mn	N04400	DIN 17743 W N°2.4360
Nical® 400 BC	CuNi ₆₄	N04400	
Nical® 4QQN	CuNi ₆₄	N04400	

Standard capability			
Format	Thickness	Width	Length
Strips	0.08 - 3.5 mm	3 - 380 mm	NA
Sheets	0.25 - 3.5 mm	20 - 380 mm*	500 - 3000 mm*

*Dimensions outside this range on request



lebronze alloys

Métallurgie d'exception

www.lebronze-alloys.com