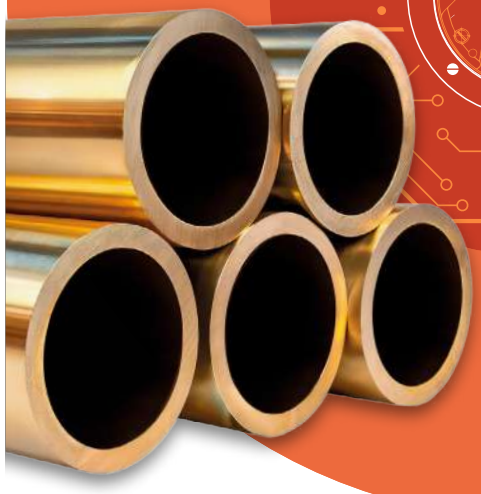
PRODUCT
CATALOG
Bars &
Hollows Bars

24

lebronze alloys



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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 730 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
- 4 service centers
- 730 employees
- 200 + alloys produced
- 239 M€ turnover

History of the Group

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.

2023-2024

The Group counts over 730 employees, 6 production sites and 4 service centers around the world and generates 239 M€ of sales.
Over the last two years, the Group has strengthened its distribution network by opening **two new service centers:** Lebronze alloys SE (Services Europe) in Breteuil, France, and Lebronze alloys NA in Bristol, USA.

Our worldwide footprint

- *Production plants*
- *Service centers*

LBA NA
USA
10 FTEs

LBA UK
England
13 FTEs

Lüdenscheid
Germany
120 FTEs

Rydzyna
Poland
42 FTEs

Dongguan
China
52 FTEs

LBA India
India
2 FTEs

LBA Asia
China
5 FTEs

Bornel
France
155 FTEs

Breteuil
France
85 FTEs

LBA SE
France
8 FTEs

Suippes
France
223 FTEs

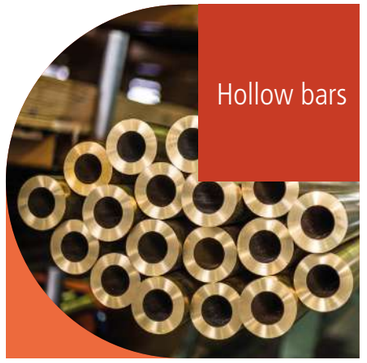
Paris
Corporate headquarters

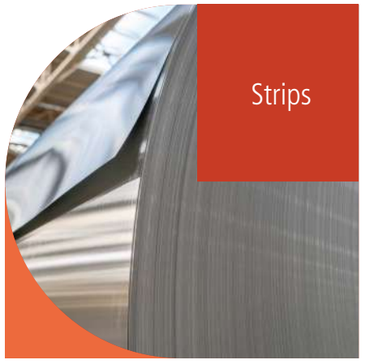
Product range at a glance

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

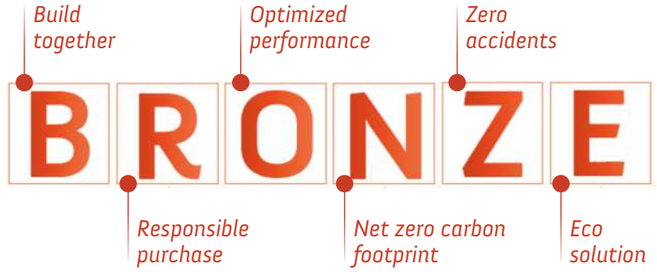
Finishing

- 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.

Optimized 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 actions 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 allows 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-check 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

afaq EN/AS/JISQ 9100 Aéronautique AFNOR CERTIFICATION

Certified site: Suippes

Nadcap Administered by PRI ACCREDITED

Heat treating

UKAS MANAGEMENT SYSTEMS 9963 — auva AS 9120 CERTIFIED

Certified service center: Lebronze alloys UK

General certifications

afaq ISO 9001 Qualité AFNOR CERTIFICATION

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

afaq ISO 14001 Environnement AFNOR CERTIFICATION

Certified sites: Breteuil, Suippes, Rydzyna.

afaq ISO 45001 Santé Sécurité au Travail AFNOR CERTIFICATION

Certified sites: Bornel

afaq ISO 50001 Énergie AFNOR CERTIFICATION

Certified sites: Lüdenscheid, Breteuil and Suippes.

CuAlNi alloys
Nickel Aluminum Bronze alloys
Corrosion resistance

Our Group offers a range of **nickel aluminium bronze alloys** composed of copper, aluminum, nickel and iron. These alloys offer a good combination of mechanical properties, such as **elevated hardness and tensile strength**, combined with a **high resistance to corrosion** (sea-water and saline mist). Main applications are in Marine and Aerospace as **screws, distributor bodies, rings, bushings, bearings** and many more. Our range of nickel aluminum bronze 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 alloys mainly as bars, hollow bars and plates, to be processed into relatively complex components.

PRODUCT PORTFOLIO

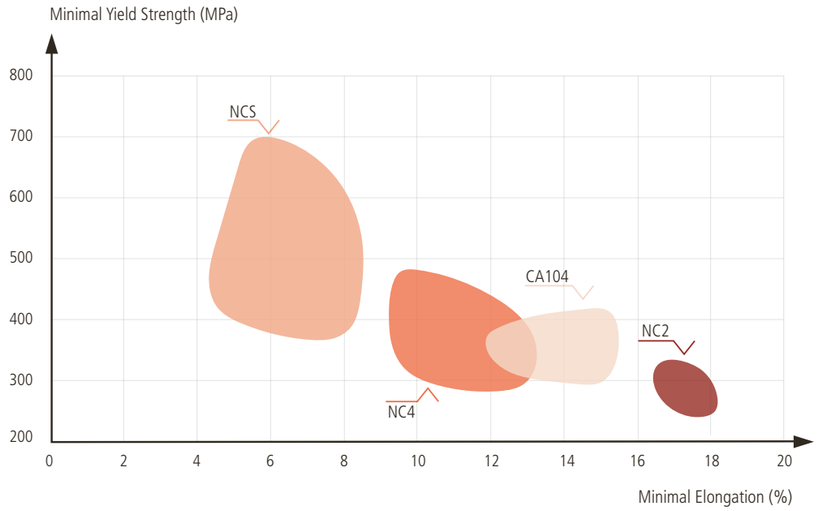
Alloy	ISO	UNS	Other designations	Aerospace specifications
NC2	CuAl9Ni5Fe4	NA	NA	NA
NC4	CuAl10Ni5Fe4	C63000	CW307G 2.0966	AMS 4640 NFL 14-705
CA104	CuAl10Ni5Fe4	NA	CA104	BS B23 BS 2B23
NCS	CuAl11Ni5Fe5	C63020	CW308G 2.0978	AMS 4590 NFL 14-706

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

**Other shapes on request*
***Depending on alloy, square / flat / rectangular / hexagonal bars*

KEY MECHANICAL PROPERTIES



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 CuAlNi alloys are:
- REACH and RoHS compliant
- On average produced with 98 % of recycled materials

Markets and applications

Aerospace

- Bearings and bushings
- Mechanical parts
- Rings

Marine & Defence

- Distributor bodies
- Marine trees
- Screws

NC2

$CuAl_9Ni_5Fe_4$

NC2 is a nickel-aluminum-bronze ($CuAl_9Ni_5Fe_4$) alloy designed for Marine applications. It is resistant to sea-water corrosion, saline mist and oxidation.

Cu copper | Al aluminum | Ni nickel | Fe iron

Back

Bars and Hollow Bars | CuAlNi alloys | NC2

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuAl9Ni5Fe4	NA	NA	NA	GAM MM11 GAM MM13 NFA 51-116 NES 833 DEFSTAN 02-833

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Al	Ni	Fe	Mn
Balance	9%	5%	4%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	7.6 g/cm³	0.25 lb/in³
Thermal conductivity	40 W/m.°C	23 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Relative magnetic permeability	1.5	
Electrical properties		
Resistivity at 20 °C (68 °F)	22 µΩ.cm	132.34 Ω. circ mil/ft
Electrical conductivity	8 %IACS	

TYPICAL APPLICATIONS

Marine and Defence industries

Exchanger plates
Fast evacuation pipes
Slipper for hydraulic pump
Marine trees
Screws

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Hot forming
Arc, MIG and TIG welding
Machinability index: 30% of free-cutting brass

KEY FEATURES

Suitable mechanical properties
Sea-water corrosion resistant
Saline mist resistant
Oxidation resistant

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)	Impact strength	
						IZOD (J)	KCU (J/Cm²)
For other dimensions and shapes, mechanical properties on demand							
Bars							
15 ≤ Ø ≤ 25 mm (0.59 ≤ Ø ≤ 0.98 in.)	Extruded	≥ 325 (≥ 47)	≥ 680 (≥ 99)	≥ 17	≥ 165	≥ 24	≥ 25
25 < Ø ≤ 100 mm (0.98 < Ø ≤ 3.94 in.)	Extruded or forged	≥ 295 (≥ 42)	≥ 640 (≥ 93)	≥ 17	≥ 160	≥ 27	≥ 25
Ø > 100 mm (Ø > 3.94 in.)	Extruded or forged	≥ 250 (≥ 36)	≥ 620 (≥ 90)	≥ 18	≥ 150	≥ 23	≥ 25
Hollow bars							
OD > 100 mm (OD > 3.94 in.)	Extruded or forged	≥ 250 (≥ 36)	≥ 620 (≥ 90)	≥ 18	≥ 150	≥ 23	≥ 25

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NC4

$CuAl_{10}Ni_5Fe_4$

29 63.546	13 26.981	28 58.6934	26 55.845
Cu copper	Al aluminum	Ni nickel	Fe iron

NC4 is a nickel-aluminum-bronze ($CuAl_{10}Ni_5Fe_4$) alloy designed for Aerospace and Marine applications. It offers a good combination of properties, such as high hardness, tensile strengh and corrosion resistance (sea-water, saline mist, and oxidation).

Back

Bars and Hollow Bars | CuAlNi alloys | NC4

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuAl10Ni5Fe4	C63000	CW307G 2.0966	AMS 4640 NFL 14-705	ASTM B124, ASTM B150 ASTM B171, NFA 51 116 EN 12420, EN 12163 EN 12165, EN 12167

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Al	Ni	Fe	Mn
Balance	10%	5%	4%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	7.6 g/cm³	0.25 lb/in³
Thermal conductivity	40 W/m.°C	23 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	125 GPa	18 130 ksi
Relative magnetic permeability	1.5	
Electrical properties		
Resistivity at 20 °C (68 °F)	22 µΩ.cm	132.34 Ω. circ mil/ft
Electrical conductivity	8 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings

Bushings and bearings for landing gears

Marine and Defence industries

Distributor bodies

Screws

Forged parts

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Hot forming

Arc, MIG and TIG welding

Machinability index: 30% of free-cutting brass

KEY FEATURES

Suitable mechanical properties

Sea-water corrosion resistant

Saline mist resistant

Oxidation resistant

MECHANICAL PROPERTIES

Size	Temper	Yield Strength 0.5% E.U.L MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
9.5 ≤ Ø ≤ 25.4 mm (0.375 ≤ Ø ≤ 1 in.)	HR50	≥ 469 (≥ 68)	≥ 760 (≥ 110)	≥ 10	201 - 248
25.4 < Ø ≤ 50.8 mm (1 < Ø ≤ 2 in.)	HR50	≥ 413 (≥ 60)	≥ 760 (≥ 110)	≥ 10	201 - 248
50.8 < Ø ≤ 76.2 mm (2 < Ø ≤ 3 in.)	HR50	≥ 379 (≥ 55)	≥ 723 (≥ 105)	≥ 10	187 - 241
76.2 < Ø ≤ 254 mm (3 < Ø ≤ 10 in.)	HR50, TQ50	≥ 345 (≥ 50)	≥ 689 (≥ 100)	≥ 10	187 - 241
9.5 ≤ Ø ≤ 280 mm (0.375 ≤ Ø ≤ 11 in.)	M	≥ 320* (≥ 46)*	≥ 690 (≥ 100)	≥ 13	≥ 180
Hollow bars					
OD ≥ 50 mm (OD ≥ 2 in.) Thickness ≥ 10 mm (≥ 0.4 in.)	HR50, TQ50	≥ 345 (≥ 50)	≥ 689 (≥ 100)	≥ 10	≥ 190
50 ≤ OD ≤ 280 mm (2 ≤ OD ≤ 11 in.)	M	≥ 320* (≥ 46)*	≥ 690 (≥ 100)	≥ 13	≥ 180

**0.2% offset*

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CA104

$CuAl_{10}Ni_5Fe_4$

CA104 is a nickel-aluminum-bronze ($CuAl_{10}Ni_5Fe_4$) alloy designed for Aerospace and Marine applications. It is resistant to sea-water corrosion, saline mist and oxidation.

Cu copper | Al aluminum | Ni nickel | Fe iron

Back

Bars and Hollow Bars | CuAlNi alloys | CA104

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuAl10Ni5Fe4	NA	CA104	BS B23 BS 2B23	BS 2874

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Al	Ni	Fe	Mn
Balance	10%	5%	4%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	7.6 g/cm³	0.25 lb/in³
Thermal conductivity	40 W/m.°C	23 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	125 GPa	18 130 ksi
Relative magnetic permeability	1.5	
Electrical properties		
Resistivity at 20 °C (68 °F)	22 µΩ.cm	132.34 Ω. circ mil/ft
Electrical conductivity	8 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings

Bushings and bearings for landing gears

Marine and Defence industries

Distributor bodies and screws

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Hot forming

Arc, MIG and TIG welding

Machinability index: 30% of free-cutting brass

KEY FEATURES

Suitable mechanical properties

Sea-water corrosion resistant

Saline mist resistant

Oxidation resistant

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
16 ≤ Ø ≤ 18 mm (0.63 ≤ Ø ≤ 0.71 in.)	Extruded	≥ 400 (≥ 58)	≥ 700 (≥ 102)	≥ 15	≥ 190
18 < Ø ≤ 80 mm (0.71 < Ø ≤ 3.15 in.)	Extruded	≥ 370 (≥ 54)	≥ 700 (≥ 102)	≥ 12	≥ 190
Ø > 80 mm (Ø > 3.15 in.)	Extruded or forged	≥ 320 (≥ 46)	≥ 650 (≥ 94)	≥ 15	≥ 190
Hollow bars					
50 ≤ OD ≤ 80 (1.97 ≤ OD ≤ 3.15 in.) Thickness ≥ 10 mm (≥ 0.39 in.)	Extruded	≥ 370 (≥ 54)	≥ 700 (≥ 102)	≥ 12	≥ 190
OD > 80 mm (OD > 3.15 in.) Thickness ≥ 10 mm (≥ 0.39 in.)	Extruded or forged	≥ 320 (≥ 46)	≥ 650 (≥ 94)	≥ 12	≥ 190

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NCS

$CuAl_{11}Ni_5Fe_5$

Cu copper | Al aluminum | Ni nickel | Fe iron

NCS is a nickel-aluminum-bronze ($CuAl_{11}Ni_5Fe_5$) alloy designed for Aerospace and Hydraulic applications. It exhibits very high mechanical properties such as high hardness and high tensile strength.

It is also resistant to oxidation and corrosion in saline mist environment.

Back

Bars and Hollow Bars | CuAlNi alloys | NCS

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuAl11Ni5Fe5	C63020	CW308G 2.0978	AMS 4590 NFL 14-706	NFA 51 116, EN 12167 EN 12163, EN 12420 DIN 1756, ASTM B150

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Al	Ni	Fe
Balance	11%	5%	5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	7.5 g/cm³	0.25 lb/in³
Thermal conductivity	40 W/m.°C	23 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	125 GPa	18 130 ksi
Relative magnetic permeability	1.5	
Electrical properties		
Resistivity at 20 °C (68 °F)	22 µΩ.cm	132.34 Ω. circ mil/ft
Electrical conductivity	8 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings

Bushings and bearings for landing gears

Mechanical parts

Hydraulic industry

Pump block

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping with or without heat treatment

Hot forming

Arc, MIG and TIG welding

Machinability index: 30% of free-cutting brass

KEY FEATURES

High mechanical properties

Oxidation resistant

Corrosion resistant in saline mist aera

MECHANICAL PROPERTIES

Size	Processes	Temper	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand						
Bars						
19 ≤ Ø ≤ 25.4 mm (0.75 ≤ Ø ≤ 1 in.)	Heat treated	TQ50/TQ30	≥ 689 (≥ 100)	≥ 931 (≥ 135)	≥ 6	≥ 255
25.4 < Ø ≤ 50.8 mm (1 < Ø ≤ 2 in.)	Heat treated	TQ50/TQ30	≥ 655 (≥ 95)	≥ 896 (≥ 130)	≥ 6	≥ 255
50.8 < Ø ≤ 101.6 mm (2 < Ø ≤ 4 in.)	Heat treated	TQ50/TQ30	≥ 621 (≥ 90)	≥ 896 (≥ 130)	≥ 6	≥ 255
13 ≤ Ø ≤ 200 mm (0.5 ≤ Ø ≤ 7.87 in.)	Extruded or forged	M	≥ 390 (≥ 57)	≥ 740 (≥ 107)	≥ 8	≥ 185
20 ≤ Ø ≤ 80 mm (0.78 ≤ Ø ≤ 3.15 in.)	Extruded	.97	≥ 440 (≥ 64)	≥ 740 (≥ 107)	≥ 5	≥ 185
Hollow bars						
50.8 < OD ≤ 177.8 mm (2 < OD ≤ 7 in.)	Heat treated	TQ50	≥ 621 (≥ 90)	≥ 896 (≥ 130)	≥ 6	≥ 255
50 < OD ≤ 250 mm (2 < OD ≤ 10 in.)	Extruded or forged	M	≥ 390 (≥ 57)	≥ 740 (≥ 107)	≥ 8	≥ 185

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CuNiAl alloys
Copper Nickel Bronze alloys

Excellent corrosion resistance and high strength

Our Group offers a range of **copper nickel bronze alloys** composed of copper nickel and aluminum. These alloys are characterized by **high mechanical properties, excellent wear, corrosion and erosion resistance.** Main applications are in Aerospace, Oil & Gas and Marine and Defence as **bushings, bearings, control elements, fasteners** and many more.

Our range of copper nickel bronze 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

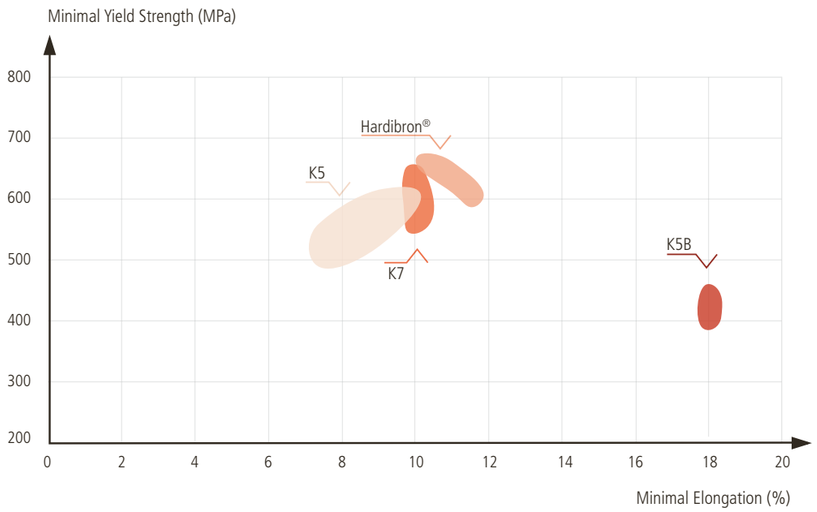
Alloy	ISO	UNS	Other designations	Aerospace specifications
K5	CuNi14Al2 CuNi14Al3	NA	NA	NFL 14-702
K5B	CuNi14Mn4AL2	NA	NA	NA
K7	CuNi14Al3Fe1	NA	2.1504	WL 2.1504 LN 9468
Hardibron®	CuNi14Al3Fe1	NA	2.1504	WL 2.1504 DTD 900/4805

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

*Other shapes on request
**Depending on alloy, square / flat / rectangular / hexagonal bars

KEY MECHANICAL PROPERTIES



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 CuNiAl alloys are:
- REACH and RoHS compliant
- On average produced with 93 % of recycled materials

Markets and applications

Aerospace

- Bearings and bushings
- Actuating sleeves
- Control surface components

Oil & Gas

- Marine topsides floating production systems
- Subsea seabed wellhead

Marine & Defence

- Control elements of submarines
- Fasteners for ships and submarines
- Mechanical seals

K5

$CuNi_{14}Al_2$
$CuNi_{14}Al_3$

Cu copper | Ni nickel | Al aluminum

Back

K5 is a copper-nickel-bronze ($CuNi_{14}Al_2$/$CuNi_{14}Al_3$) alloy which exhibits very high mechanical properties. This amagnetic alloy, used for Aerospace, Marine, and Defence applications, offers very good resistance to impact, fatigue and corrosion.

Bars and Hollow Bars | CuNiAl alloys | K5

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al2 CuNi14Al3	NA	NA	NFL 14-702	GAM MM11 GAM MM13

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Mn
Balance	14%	2 - 3%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.29 lb/in³
Thermal conductivity	30 W/m.°C	17 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	19 µΩ.cm	114.29 Ω. circ mil/ft
Electrical conductivity	9 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Bearings

Marine and Defence industries

Control elements of submarines

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Machinability index: 10% of free-cutting brass

KEY FEATURES

Very high mechanical properties

Very good resistance to sea-water corrosion and to oxidation

Good impact and fatigue resistance

No sparks on impact

Strictly non-magnetic

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
127 ≤ Section ≤ 2 000 mm² (0.2 ≤ Section ≤ 3.10 in.²)	Extruded or forged	≥ 590 (≥ 86)	≥ 780 (≥ 113)	≥ 10	≥ 215
2 000 < Section ≤ 11 000 mm² (3.10 < Section ≤ 17 in.²)	Extruded or forged	≥ 540 (≥ 78)	≥ 740 (≥ 107)	≥ 7	≥ 205
11 000 < Section ≤ 49 000 mm² (17 < Section ≤ 76 in.²)	Extruded or forged	≥ 500 (≥ 72)	≥ 720 (≥ 104)	≥ 7	≥ 200

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

K5B

$CuNi_{14}Mn_4Al_2$

Cu	Ni	Mn	Al
copper	nickel	manganese	aluminum

K5B is a copper-nickel-bronze ($CuNi_{14}Mn_4Al_2$) alloy designed for high strength applications in seawater environment. This alloys exhibits outstanding resistance to marine corrosion and erosion. It also has good anti-fouling properties and an excellent wear and galling resistance.

Back

Bars and Hollow Bars | CuNiAl alloys | K5B

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Mn4Al2	NA	NA	NA	NES 835 DEFSTAN 02-835

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Mn	Al	Fe
Balance	14%	4.5%	1.8%	1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.6 g/cm³	0.29 lb/in³
Thermal conductivity	25 W/m.°C	14 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	145 GPa	21 030 ksi
Relative magnetic permeability	< 1.01	
Impact strength ISOD	≥ 40 J	
Electrical properties		
Resistivity at 20 °C (68 °F)	30 µΩ.cm	180.46 Ω. circ mil/ft
Electrical conductivity	5 %IACS	

TYPICAL APPLICATIONS

Marine and Defence industries

Fasteners & controllers for submarines, pumps, shafts, mechanical seals, winch components, gears & shafts, and weapons handling equipment

Oil and Gas industry

Subsea bolting, shafts for pumps valves, valve spindles, hydraulic pistons and cylinders, hydraulic connectors, pressure couplings

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Machinability index: 20% of free-cutting brass

KEY FEATURES

High strength and toughness

Outstanding resistance to marine corrosion and erosion

Excellent wear resistance

Good anti-fouling properties

Excellent galling resistance especially with stainless steels

Good thermal properties

No Hydrogen embrittlement

Low magnetic permeability

Galvanic compatibility with other copper alloys and stainless steel

High performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)

Dimensional stability

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
69.85 ≤ Ø ≤ 125 mm (2.75 ≤ Ø ≤ 4.92 in.)	Forged	≥ 430 (≥ 62)	≥ 725 (≥ 105)	≥ 18	≥ 190
125 < Ø ≤ 139.7 mm (4.92 < Ø ≤ 5.5 in.)	Forged	≥ 400 (≥ 58)	≥ 710 (≥ 103)	≥ 18	≥ 190

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

K7

$CuNi_{14}Al_3Fe_1$

Cu copper | Ni nickel | Al aluminum | Fe iron

K7 is a copper-nickel-bronze ($CuNi_{14}Al_3Fe_1$) alloy designed for high strength applications in Aerospace. This alloy exhibits high mechanical properties and an outstanding resistance to metal-to-metal wear and galling. This alloy can perform at both elevated and sub-zero temperatures.

Back

Bars and Hollow Bars | CuNiAl alloys | K7

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al3Fe1	NA	2.1504	WL 2.1504 LN 9468	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Fe	Mn
Balance	14%	3%	1%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.5 g/cm³	0.29 lb/in³
Thermal conductivity	71 W/m.°C	41 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	145 GPa	21 030 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	16 µΩ.cm	96.24 Ω. circ mil/ft
Electrical conductivity	10 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Landing gear bushings and bearings
Cargo system bushings
Actuating sleeves
Control surface components
Flap systems

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping
Machinability index: 10% of free-cutting brass

KEY FEATURES

High mechanical properties
High ductility
Outstanding resistance to corrosion & erosion
Excellent wear and galling resistance
Good thermal properties
Good impact resistance
No sparks on impact
Non-magnetic
Stable performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)
Dimensional stability

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
12.7 < Ø ≤ 50 mm (0.5 < Ø ≤ 2 in.)	Extruded	≥ 640 (≥ 93)	≥ 780 (≥ 113)	≥ 10	≥ 230
50 < Ø ≤ 127 mm (2 < Ø ≤ 5 in.)	Extruded or forged	≥ 590 (≥ 86)	≥ 780 (≥ 113)	≥ 10	≥ 225
127 < Ø ≤ 250 mm (2 < Ø ≤ 9.84 in.)	Extruded or forged	≥ 550 (≥ 79)	≥ 760 (≥ 110)	≥ 10	≥ 225

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Hardibron®

$CuNi_{14}Al_3Fe_1$

Cu copper | Ni nickel | Al aluminum | Fe iron

Hardibron® is a copper-nickel-bronze ($CuNi_{14}Al_3Fe_1$) alloy designed for high strength applications in seawater environment. This amagnetic alloy combines outstanding mechanical properties, high ductility and high resistance to wear, galling, marine corrosion and erosion. It does not produce sparks on impact.

Back

Bars and Hollow Bars | CuNiAl alloys | Hardibron®

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi14Al3Fe1	NA	2.1504	WL 2.1504 DTD 900/4805	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Al	Fe	Mn
Balance	14%	3%	1%	0.5%

TYPICAL APPLICATIONS

Oil and Gas industry

Marine Topsides Floating Production Systems: marine shafts, bearing bushes, offshore bolting, valves, pumps.

Subsea Wellhead: hydraulic and electrical connections ROV and AUV to Wellhead fap connectors, ROV tools, valves.

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.5 g/cm³	0.29 lb/in³
Thermal conductivity	71 W/m.°C	41 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	145 GPa	21 030 ksi
Relative magnetic permeability	< 1.01	
Impact strength IZOD	≥ 14 J	
Electrical properties		
Resistivity at 20 °C (68 °F)	16 µΩ.cm	96.24 Ω. circ mil/ft
Electrical conductivity	10 %IACS	

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Machinability index: 10% of free-cutting brass

KEY FEATURES

Very high mechanical properties

High ductility

Outstanding resistance to marine corrosion and erosion

Excellent wear and galling resistance

Good thermal properties

Good impact and fatigue resistance

No sparks on impact

Strictly non-magnetic

Stable performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)

Dimensional stability

MECHANICAL PROPERTIES

Size	Processes	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
12.7 < Ø ≤ 70 mm (0.5 < Ø ≤ 2.76 in.)	Extruded or forged	≥ 640 (≥ 93)	≥ 850 (≥ 123)	≥ 10	≥ 240
70 < Ø < 127 mm (2.76 < Ø < 5 in.)	Extruded or forged	≥ 590 (≥ 86)	780 (≥ 113)	≥ 12	≥ 240

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Hardiall® CuNiSn alloys
Copper Nickel Tin alloys
Superior strength and hardness

Hardiall® is a **proprietary range of spinodal alloys** composed of copper, nickel and tin. These alloys are designed for **high strength applications** and are characterized by **high yield and tensile strength** and **superior hardness.** Hardiall® is widely used in the Aerospace, Automotive, Industrial, Off-highway mining and Oil & Gas sectors. These amagnetic alloys present excellent wear resistance and high performance in harsh environments.

Hardiall® is a direct replacement to beryllium copper (CuBe2) and leaded beryllium copper (CuBe2Pb).

We provide Hardiall® as bars, hollow bars and plates, to be processed into relatively complex components.

PRODUCT PORTFOLIO

Alloy	ISO	UNS	Other designations	Aerospace specifications
Hardiall®	CuNi15Sn8	C72900	CW355H	AMS 4596 AMS 4597 AMS 4598
Hardiall® Eco	CuNi9Sn6	C72700	NA	NA

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

**Other shapes on request*
***Depending on alloy, square / flat / rectangular / hexagonal bars*

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 Hardiall® alloys are:
- REACH and RoHS compliant
- On average produced with 94 % of recycled materials

Markets and applications

Aerospace

- Bearings and bushings for landing gears, flight controls and attachments

Automotive

- Bearings and bushings for braking and steering systems
- Valve guides

Industrial

- Bearings, bushings, wear contact pads for heavy metallurgical equipment
- Gear drives worm wheels

Off-Highway Mining

- Linkage bearings and bushings
- Tri-cone reamer drill bits thrust washers

Oil & Gas

- Bearings and bushings for drilling components

HARDIALL®

$CuNi_{15}Sn_8$

Cu	Ni	Sn
copper	nickel	tin

Back

Hardiall® is a spinodally hardened copper-nickel-tin ($CuNi_{15}Sn_8$) alloy designed for high strength applications. 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.

Bars and Hollow Bars | CuNiSn alloys | Hardiall®

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi15Sn8	C72900	CW355H	AMS 4596, AMS 4597 AMS 4598	EN 12163, ASTM B929, NACE MR0175

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Sn
Balance	15%	8%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.94 g/cm³	0.29 lb/in³
Thermal conductivity	38 W/m.°C	22 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16.4 x 10^{-6}/°C	9.11 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	1.001	
Electrical properties		
Resistivity at 20 °C (68 °F)	23 µΩ.cm	138 Ω. circ mil/ft
Electrical conductivity	7.5 %IACS	

TYPICAL APPLICATIONS

Aerospace

Bushings and bearings in actuation systems for landing gears, primary and secondary flight controls, and attachments.

Automotive

Powertrain (valve guides, thrust washers, bearings, piston pins bushings). Bushings for braking and steering systems

Industrial

Bushings, bearings, wear contact pads in heavy metallurgical equipment. Gear drives worm wheels.

Off-highway mining

Linkage bushings and bearings, Tri-cone reamers drill bits thrust washers and bushings.

Oil and Gas

Bushings and bearings for drilling components, valves, wellhead controls, thrust washers, guide seals, and housings.

KEY FEATURES

High strength and hardness

Corrosion and erosion resistant

Non-magnetic and non-sparking

Excellent wear and galling resistance

No hydrogen embrittlement

High performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Hot forming 750 to 900 °C

Cold forming

Arc, MIG and TIG welding

Machinability index: 200% of free-cutting steel

MECHANICAL PROPERTIES

Temper*	Minimal Yield Strength 0.2% MPa (ksi)	Minimal Tensile Strength MPa (ksi)	Minimal Elongation (%)	Minimal Hardness (HRC)	Size (mm)	Size (in.)
For other dimensions and shapes, mechanical properties on demand						
Bars - Wrought, solution heat treated and spinodal heat treated						
Hardiall® TX 90	620 / (90)	760 / (110)	15	23	15 ≤ Ø < 108 mm	0.60 ≤ Ø < 4.25 in.
	620 / (90)	760 / (110)	12	23	108 < Ø ≤ 170 mm	4.25 < Ø ≤ 6.7 in.
Hardiall® TX 105	724 / (105)	827 / (120)	10	27	15 ≤ Ø ≤ 127 mm	0.60 ≤ Ø ≤ 5 in.
	724 / (105)	827 / (120)	6	27	127 < Ø ≤ 170 mm	5 < Ø ≤ 6.7 in.
Hardiall® TX 110	760 / (110)	910 / (132)	10	30	15 ≤ Ø ≤ 108 mm	0.60 ≤ Ø ≤ 4.25 in.
	760 / (110)	876 / (127)	6	30	108 < Ø ≤ 170 mm	4.25 < Ø ≤ 6.7 in.
Bars - Wrought, solution heat treated, cold worked and spinodal heat treated						
Hardiall® TS 120U	755 / (110)	827 / (120)	15	24	19 ≤ Ø < 82 mm	3/4 ≤ Ø < 3.25 in.
Hardiall® TS 130	896 / (130)	965 / (140)	10	24	19 ≤ Ø < 82 mm	3/4 ≤ Ø < 3.25 in.
Hardiall® TS 160U	1069 / (155)	1137 / (165)	6	34	19 ≤ Ø < 40 mm	3/4 ≤ Ø < 1.57 in.
	1035 / (150)	1103 / (160)	3	34	40 ≤ Ø < 82 mm	1.57 ≤ Ø < 3.25 in.
Hollow bars - Wrought, solution heat treated and spinodal heat treated (length limited to 1000 mm / 39.37 in.) Thickness: 10 to 20 % of OD						
Hardiall® TX 110	760 / (110)	903 / (131)	8	30	50 ≤ OD < 217.4 mm	2 ≤ OD < 8.55 in.

**Figures following the tempers letters represent minimum yield or tensile strength*

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

HARDIALL® ECO

$CuNi_9Sn_6$

Cu copper | Ni nickel | Sn tin

Back

Hardiall® Eco is a variant of the Hardiall® alloy with less nickel and tin but still a good balance for high strength applications. It is non-magnetic and resists mechanical wear, galling, stress relaxation, corrosion and erosion.

Hardiall® eco is a direct replacement to beryllium copper and leaded beryllium copper.

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi9Sn6	C72700	NA	NA	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Sn
Balance	9%	6%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	53.6 W/m.°C	32.6 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17.25 x 10^{-6}/°C	9.58 µin/in °F
Young's modulus	120 GPa	17 400 ksi
Relative magnetic permeability	< 1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	14.4 µΩ.cm	86.6 Ω. circ mil/ft
Electrical conductivity	12 %IACS	

TYPICAL APPLICATIONS

Construction and mining

Heavy vehicles excavators, continuous miners haul truck, shovel draglines, pivot bushings, bearings, thrust washers

Automotive

Racing Cars Powertrain (valve guides, thrust washers, bearings, piston pins)

Braking and Steering Systems (Brake caliper bushings, Steering bushings)

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging, or die stamping

Hot forming

Cold forming

KEY FEATURES

High strength and hardness

Corrosion and erosion resistant

Non-magnetic

Excellent lubricity

Excellent wear and galling resistance

Non-sparking

No hydrogen embrittlement

High performance at both elevated and sub-zero temperatures -125 °C (-193 °F) up to 300 °C (572 °F)

MECHANICAL PROPERTIES

Size	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HRC)
For other dimensions and shapes, mechanical properties on demand					
Bars					
Ø ≤ 108 mm (Ø ≤ 4.25 in.)	TX 105	≥ 724 (≥ 105)	827 (≥ 120)	≥ 6	≥ 27
108 < Ø ≤ 170 mm (4.25 < Ø ≤ 6.7 in.)	TX 100	≥ 689 (≥ 100)	≥ 790 (≥ 115)	≥ 5	≥ 25
Hollow bars Thickness 10 to 20% of OD					
50 ≤ OD ≤ 170 mm (2 ≤ OD ≤ 6.7 in.)	TX 105	≥ 724 (≥ 105)	≥ 827 (≥ 120)	≥ 6	≥ 27
170 < OD ≤ 203 mm (6.7 < OD ≤ 8 in.)	TX 100	≥ 689 (≥ 100)	≥ 790 (≥ 115)	≥ 5	≥ 27

**Figures following the tempers letters represent minimum yield or tensile strength.*
TX: wrought, solution heat treated and spinodal heat treated

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CuNiSi alloys
Nickel Silicon Bronze alloys
High electrical and thermal properties

Our range of **nickel silicon bronze alloys**, composed of copper, nickel and silicon, is designed for applications requiring a **good combination of mechanical, electrical and thermal properties.** Main applications are in the Automotive and Plastic sectors as **bearings, bushings, mold inserts** and many more.

We provide these alloys mainly as bars, hollow bars and plates, to be processed into relatively complex components.

PRODUCT PORTFOLIO

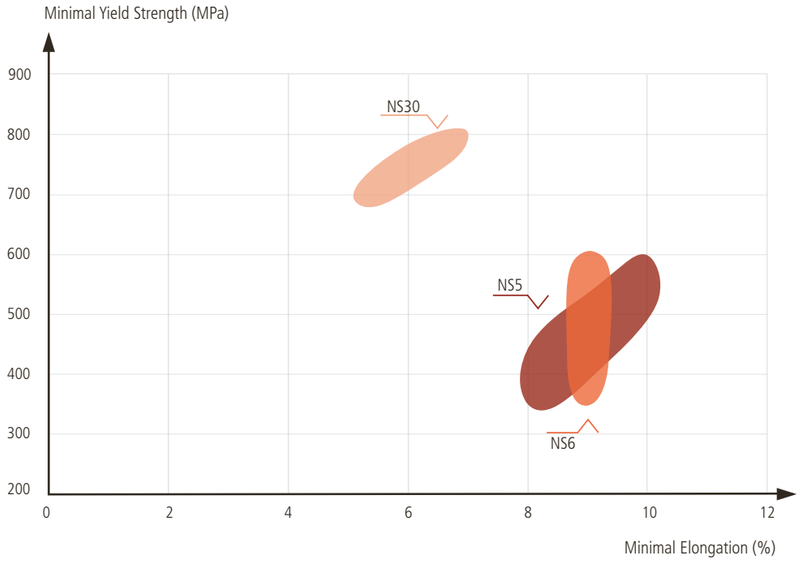
Alloy	ISO	UNS	Other designations	Aerospace specifications
NS5	CuNi2Si CuNi3Si	NA	CW111C 2.0855	NFL 14-701 DTD 498
NS6	CuNi3Si	C18000	NA	NA
NS30	CuNi7Si2Cr	NA	NA	NA

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

*Other shapes on request
**Depending on alloy, square / flat / rectangular / hexagonal bars

KEY MECHANICAL PROPERTIES



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 CuNiSi alloys are:
- REACH and RoHS compliant
- On average produced with 94 % of recycled materials

Markets and applications

Automotive

- Bearings
- Bushings
- Inserts

Plastic

- Mold inserts
- Injection components

Other

- Pistons / plunger tips for die casting machines
- Welding shanks and wheels

NS5

$CuNi_2Si$
$CuNi_3Si$

Cu copper | Ni nickel | Si silicon

Back

NS5 is a nickel-silicon-bronze ($CuNi_2Si$ / $CuNi_3Si$) age hardening alloy designed for high strength applications. It exhibits good electrical and thermal properties and resists mechanical wear, galling, with a moderate resistance to marine corrosion.

Bars and Hollow Bars | CuNiSi alloys | NS5

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi2Si CuNi3Si	NA	CW111C 2.0855	NFL 14-701 DTD 498	EN 12163, EN 12167 EN 12420, EN 12165 DIN 1756

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Si
Balance	2.3%	0.6%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.8 g/cm³	0.32 lb/in³
Thermal conductivity	180 W/m.°C	104 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	4.5 µΩ.cm	27.07 Ω. circ mil/ft
Electrical conductivity	38 %IACS	

TYPICAL APPLICATIONS

Plunger tips for die casting machines

Aeronautics industry

Bearing cages , Short-circuit rings, Rotors, Antifriction rings

Automotive industry

Insert for plastic injection moulds

Railway industry

Connectors, Valve guides

Oil and Gas industry

Top drives short circuit rings, rotor wedges and bars, downhole tools high strength fasteners, bushings and bearings, mechanical seals, shear pins, hydraulic valve bodies, pump components and ball valves.

KEY FEATURES

High mechanical properties
Good resistance to softening at elevated and sub-zero temperatures
Good electrical and thermal properties
Corrosion resistance in marine environments
Good spark resistance
Good antifriction properties
Low magnetic permeability
Excellent antifouling behavior
Excellent cold workability in soft temper

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening, plus cold-drawing for small diameters
Suitable for cold forming in quenched condition, but the hardened condition must be obtained after forming
Suitable for hard brazing, but loss of mechanical properties

Bars and Hollow Bars | CuNiSi alloys | NS5

MECHANICAL PROPERTIES

Size	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Round / Square / Flat Bars					
Section ≤ 1000 mm² (Section ≤ 1.55 in.²)	TER	≥ 590 (≥ 86)	≥ 650 (≥ 94)	≥ 10	≥ 195
1000 < Section ≤ 2800 mm² (1.55 < Section ≤ 4.3 in.²)	TR	≥ 500 (≥ 72)	≥ 650 (≥ 94)	≥ 10	≥ 195
2800 < Section ≤ 60 000 mm² (4.3 < Section ≤ 93 in.²)	TR	≥ 440 (≥ 64)	≥ 590 (≥ 86)	≥ 8	≥ 190
Section > 60 000 mm² (Section > 93 in.²)	TR	≥ 340 (≥ 49)	≥ 490 (≥ 71)	≥ 8	≥ 160
Hollow bars					
56 ≤ OD ≤ 250 mm (2.2 ≤ OD ≤ 10 in.)	TR	≥ 440 (≥ 64)	≥ 590 (≥ 86)	≥ 8	≥ 190

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NS6

$CuNi_3Si$

Cu copper | Ni nickel | Si silicon

Back

NS6 is a nickel-silicon-bronze ($CuNi_3Si$) age hardening alloy. It exhibits good mechanical properties and superior electrical and thermal properties. It also has good antifriction properties.

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi3Si	C18000	NA	NA	RWMA class 3 AWS J1.3

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Si	Cr
Balance	2.3%	0.6%	0.6%

TYPICAL APPLICATIONS

Plunger tips for die casting machines
Parts for resistance welding
Insert for plastic injection molds

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.8 g/cm³	0.32 lb/in³
Thermal conductivity	180 W/m.°C	104 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Electrical properties		
Resistivity at 20 °C (68 °F)	≤ 3.8 µΩ.cm	≤ 22.86 Ω. circ mil/ft
Electrical conductivity	≥ 45 %IACS	

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die-stamping followed by quenching and hardening, plus cold-drawing for small diameters
Suitable for cold forming in quenched condition, but the hardened condition must be obtained after forming
Suitable for hard brazing, but loss of mechanical properties

KEY FEATURES

Good mechanical properties
Good electrical and thermal properties
Good antifriction properties

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Round Bars					
3.175 ≤ Ø ≤ 25.4 mm (0.125 ≤ Ø ≤ 1 in.)	TER	≥ 590 (≥ 86)	≥ 655 (≥ 95)	≥ 9	≥ 195
25.4 ≤ Ø ≤ 50.8 mm (1 ≤ Ø ≤ 2 in.)	TR	≥ 500 (≥ 72)	≥ 650 (≥ 95)	≥ 9	≥ 195
50.8 < Ø ≤ 114.3 mm (2 < Ø ≤ 4.5 in.)	TR	≥ 500 (≥ 72)	≥ 610 (≥ 88)	≥ 9	≥ 195
114.3 ≤ Ø ≤ 381 mm (4.5 ≤ Ø ≤ 15 in.)	TR	≥ 345 (≥ 50)	≥ 610 (≥ 88)	≥ 9	≥ 195
Square / Rectangular Bars					
Section ≥ 500 mm² (≥ 0.77 in²) a ≤ 25 mm (≤ 0.94 in.)	TER	≥ 590 (≥ 86)	≥ 655 (≥ 95)	≥ 9	≥ 195
a > 25 mm (a > 0.94 in.)	TR	≥ 345 (≥ 50)	≥ 610 (≥ 88)	≥ 9	≥ 195
Plates					
19.05 ≤ a ≤ 25.4 mm (0.75 ≤ a ≤ 1 in.)	TR	≥ 345 (≥ 50)	≥ 650 (≥ 95)	≥ 9	≥ 195
25.4 ≤ a ≤ 50.8 mm (1 ≤ a ≤ 2 in.)	TR	-	≥ 620 (≥ 90)	≥ 9	≥ 195
a > 50.8 mm (a > 2 in.)	TR	≥ 345 (≥ 50)	≥ 610 (≥ 88)	≥ 9	≥ 195

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NS30

$CuNi_7Si_2Cr$

Cu	Ni	Si	Cr
copper	nickel	silicon	chromium

Back

NS30 is a nickel-silicon-bronze ($CuNi_7Si_2Cr$) alloy designed for applications requiring a combination of high thermal dissipation and high strength. NS30 is non-sparking and resistant to corrosion.

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi7Si2Cr	NA	NA	NA	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Si	Cr
Balance	7%	2%	1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.7 g/cm³	0.31 lb/in³
Thermal conductivity	135 W/m.°C	78 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	5.7 µΩ.cm	34.3 Ω. circ mil/ft
Electrical conductivity	30 %IACS	

TYPICAL APPLICATIONS

Automotive industry

Fuel and CO_2 efficient touring cars, valve seats, valve guides, liners.

Bearings and bushings valvetrain components for racing cars

Plastic industry

Mold inserts for injection molding, injection and extrusion blow molding.

Injection components (manifolds) for hot runner systems

Other applications

Welding shanks and wheels. High pressure die casting plunger tips/pistons

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening, plus cold-drawing for small diameters

Suitable for hard brazing, but loss of mechanical properties

KEY FEATURES

High thermal conductivity

High strength

Excellent wear & galling resistance

Good corrosion resistance

Fair machinability

Non-sparking

Good impact & fatigue resistance

Low magnetic permeability

Stable performance at elevated temperatures up to 350 °C (662 °F)

Dimensional stability

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness	
					(HB)	(HRC)
For other dimensions and shapes, mechanical properties on demand						
Bars						
Ø ≤ 50.8 mm (Ø ≤ 2 in.)	TER	≥ 800 (≥ 116)	≥ 900 (≥ 131)	≥ 7	≥ 270	≥ 26
50.8 < Ø ≤ 127 mm (1.97 < Ø ≤ 5 in.)	TR	≥ 700 (≥ 102)	≥ 800 (≥ 116)	≥ 5	≥ 250	≥ 25
Hollow bars						
OD > 101.6 mm (OD > 4 in.) Thickness: 10-25.4 mm (0.4 to 1 in.)	TR	≥ 700 (≥ 102)	≥ 800 (≥ 116)	≥ 5	≥ 250	≥ 25
Plates						
a ≤ 50.8 mm (a ≤ 2 in.)	TR	≥ 700 (≥ 102)	≥ 800 (≥ 116)	≥ 5	≥ 250	≥ 25

**TER: solution annealed and quenched, cold worked and aged.*
TR: solution annealed, quenched and aged

OTHER AVAILABLE FORMS

Billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Back

Navinic CuNi alloys
Copper Nickel alloys

Superior resistance to marine corrosion

Navinic is our range of **copper nickel alloys** designed for **high strength applications in the Marine and Defence industries.** Characterized by an **excellent resistance to marine corrosion** (seawater, brine and sea atmospheric exposure), they also have a **good behaviour in ammoniacal environments.**

We provide Navinic alloys mainly as bars, plates, hollow bars, tubes and fittings, to be processed into relatively complex components.

PRODUCT PORTFOLIO

Alloy	ISO	UNS	Other designations	Aerospace specifications
Navinic 10	CuNi10Fe1Mn	C70600 C70610 C70620 7060X	CN 102 WN 2.0872 2.1972 CW352H	NA
Navinic 30	CuNi30Mn1Fe	C71500 C71520	CN107 WN 2.0882 CW354H	NA

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

*Other shapes on request
**Depending on alloy, square / flat / rectangular / hexagonal bars

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 Navinic alloys are:
- REACH and RoHS compliant
- On average produced with 91 % of recycled materials

Markets and applications

Marine & Defence

- Seawater pipeline systems

Navinic 10

$CuNi_{10}Fe_1Mn$

Cu copper | Ni nickel | Fe iron | Mn manganese

Navinic 10 is a copper-nickel ($CuNi_{10}Fe_1Mn$) alloy designed for the Marine and Defence industries. This alloy offers superior resistance to marine corrosion (seawater, brine and sea atmospheric exposures) but also has a good behaviour in ammoniacal environments.

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MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi10Fe1Mn	C70600 C70610 C70620 7060X	CN102 WN 2.0872 2.1972 CW352H	NA	ASTM B151-B171-B466-B467 MIL T 16420 K, MIL C 15726 MIL C 24679, BS 2871, BS 2874, DEF STAN 02-879 DIN 17664, DIN 17671 DIN 17672, DIN 86019 DIN 1755, VG 85 004 EEMUA 234, EN 12163 EN 12449, EN 12165 EN 12420

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Fe	Mn
Balance	10%	1.6%	0.7%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	50 W/m.°C	29 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Magnetic permeability	1.01 to 1.7	
Electrical properties		
Resistivity at 20 °C (68 °F)	19 µΩ.cm	114.3 Ω. circ mil/ft
Electrical conductivity	9 %IACS	

TYPICAL APPLICATIONS

Marine and Defence industries

Seawater pipeline systems:

- Shipbuilding (cooling, fire-circuit)
- Offshore platform (fire-circuit)
- Desalination plant

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping

Cold drawing

Heat treatment

Hot working

Cold working (bending, expending, drawing) for manufacturing of thin pipes and fittings.

Arc, MIG, TIG welding

Hard and soft brazing

Machinability: 20% of free-cutting brass

KEY FEATURES

Excellent resistance to seawater corrosion

- By pitting corrosion in stagnant water
- By erosion-corrosion and cavitation in circulation (3.5 m/s max)
- By stress corrosion
- By fouling corrosion

Bars and Hollow Bars | CuNi alloys | Navinic 10

MECHANICAL PROPERTIES

Size	Temper	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
15.875 ≤ Ø ≤ 315 mm (0.59 ≤ Ø ≤ 12.4 in.)	Annealed	≥ 110 (≥ 16)	≥ 310 (≥ 44)	≥ 35	≥ 70
19.05 ≤ Ø ≤ 25.4 mm (0.75 ≤ Ø ≤ 1 in.)	Cold worked	≥ 250 (≥ 36)	≥ 350 (≥ 51)	≥ 15	≥ 100
Hollow bars and Tubes					
16 ≤ OD ≤ 368.1 mm (0.63 ≤ OD ≤ 14.5 in.)	Annealed	≥ 110 (≥ 16)	≥ 310 (≥ 44)	≥ 35	≥ 70

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, marine tubes & fitting, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Navinic 30

$CuNi_{30}Mn_1Fe$

29 63.546 Cu copper	28 58.6934 Ni nickel	25 54.938 Mn manganese	26 55.845 Fe iron

Navinic 30 is a copper-nickel ($CuNi_{30}Mn_1Fe$) alloy used for high strength applications in the Marine and Defence industries. This alloy offers outstanding resistance to marine corrosion (seawater, brine and sea atmospheric exposures) but also has a good behaviour in ammoniacal environments.

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Bars and Hollow Bars | CuNi alloys | Navinic 30

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi30Mn1Fe	C71500 C71520	CN107 WN 2.0882 CW354H	NA	ASTM B151-B171-B466-B467 MIL T 16420 K, MIL C 15726 MIL C 24679, BS 2871, BS 2874, DEF STAN 02-879 DIN 17664, DIN 17671 DIN 17672, EN 12163 EN 12420, EN 12165 EN 12449

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Mn	Fe
Balance	30%	0.5%	1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	30 W/m.°C	17 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	16 x 10^{-6}/°C	8.89 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	34 µΩ.cm	204.5 Ω. circ mil/ft
Electrical conductivity	5 %IACS	

TYPICAL APPLICATIONS

Marine and Defence industries

Seawater pipeline systems:

- Shipbuilding (submarine pressurized circuit)
- Exchanger pipes

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping

Cold drawing

Heat treatment

Hot working

Cold working (bending, expending, drawing) for manufacturing of thin pipes and fittings.

Arc, MIG, TIG welding

Hard and soft brazing

Machinability: 20% of free-cutting brass

KEY FEATURES

Non-magnetic

Excellent resistance to seawater corrosion

- By pitting corrosion in stagnant water
- By erosion-corrosion and cavitation in circulation (3.5 m/s max)
- By stress corrosion
- By fouling corrosion

MECHANICAL PROPERTIES

Size	Temper	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
15.875 ≤ Ø ≤ 254 mm (0.59 ≤ Ø ≤ 10 in.)	Annealed	≥ 130 (≥ 19)	≥ 350 (≥ 51)	≥ 30	≥ 80
19.05 ≤ Ø ≤ 25.4 mm (0.75 ≤ Ø ≤ 1 in.)	Cold worked	≥ 300 (≥ 43)	≥ 460 (≥ 65)	≥ 15	≥ 120
Hollow bars and Tubes					
10 ≤ OD ≤ 273.05 mm (0.4 ≤ OD ≤ 10.75 in.)	Annealed	≥ 130 (≥ 19)	≥ 350 (≥ 51)	≥ 30	≥ 80

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, marine tubes & fitting, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Low-alloyed copper alloys

High electrical and thermal conductivity

Our Group offers a wide range of **low-alloyed copper alloys**, usually composed of copper, chrome and/or zirconium.

These alloys are widely used for their **high electrical and thermal conductivity.** Main applications are **electrodes** in resistance welding, **rotor bars** and **connectors** for electrical systems, and **casting wheels, moulds** for the Iron and Steel industry. Other applications can also be found in Aerospace and Electronics.

PRODUCT PORTFOLIO

Alloy	ISO	UNS	Other designations	Aerospace specifications
CRM15	CuCr1	C18200 C18400	CC101 CW105C	NA
CRM16	CuCr1Zr	C18100 C18150	CA184 CC102 CW106C WN 2.1293	NA
CRM16 E	CuCr1Zr	C18100 C18150	CA184 CC102 CW106C WN 2.1293	NA
CRM16 HP	CuCr1Zr	C18150	NA	NA
ZR16X	CuZr	C15000	WN 2.1580 CW120C	NA
Cupro-U (ASTM B624)	CuCrZr	NA	NA	NA

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

**Other shapes on request*
***Depending on alloy, square / flat / rectangular / hexagonal bars*

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 Low-alloyed copper alloys are:
- REACH and RoHS compliant
- On average produced with 90 % of recycled materials

Markets and applications

Resistance welding

- Electrodes
- Parts

Electrical

- Rotor bars
- Connectors

Aerospace

- Booster engines
- Nozzles

CRM15

$CuCr_1$

29 63.546 Cu copper

24 51.9961 Cr chromium

Back

CRM15 is a low-alloyed copper ($CuCr_1$) alloy which exhibits high electrical and thermal conductivity and suitable mechanical properties. CRM15 is suitable for many applications, including resistance welding.

Bars and Hollow Bars | Low-alloyed copper alloys | CRM15

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCr1	C18200 C18400	CC101 CW105C	NA	RWMA class 2 AWS J 1.3/1.3M class 2 BS 2874, ISO 5182 A2/1 BS 4577 A2/1

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Cr
Balance	0.5 - 1%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	320 W/m.°C	185 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	2.15 µΩ.cm	12.93 Ω. circ mil/ft
Electrical conductivity	80 %IACS	

TYPICAL APPLICATIONS

Resistance welding

Electrodes, parts for welding machine guns (shanks, arms, sections, blanks)

Electrical industry

Rotor bars, connectors

Iron and steel industry

Casting wheels, moulds

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening plus cold-drawing for small diameters

Cold forming (bending, stamping, extrusion)

Weldable with electron beam

Hard brazing, but loss of mechanical properties

Machinability: 20 % of free-cutting brass

KEY FEATURES

High electrical and thermal conductivity

Suitable mechanical properties

Good annealing resistance

OTHER AVAILABLE FORMS

Hollow bars, square / flat / hexagonal bars, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Round Bars					
10 ≤ Ø ≤ 25.4 mm (0.39 ≤ Ø ≤ 1 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 150
26 ≤ Ø ≤ 45 mm (1.02 ≤ Ø ≤ 1.77 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 140
45 < Ø ≤ 80 mm (1.77 < Ø ≤ 3.15 in.)	TER	≥ 360 (≥ 52)	≥ 440 (≥ 64)	≥ 18	≥ 140
20 ≤ Ø ≤ 350 mm (0.79 ≤ Ø ≤ 13.78 in.)	TR	≥ 240 (≥ 35)	≥ 350 (≥ 51)	≥ 20	≥ 120
Plates					
4 ≤ a ≤ 10 mm (0.16 ≤ a ≤ 0.40 in.)	TER	≥ 350 (≥ 51)	≥ 400 (≥ 58)	≥ 10	≥ 125
16 ≤ a ≤ 250 mm (0.60 ≤ a ≤ 10 in.)	TR	≥280 (≥ 41)	≥ 380 (≥ 55)	≥ 20	≥ 120

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CRM16

$CuCr_1Zr$

Cu copper | Cr chromium | Zr zirconium

Back

CRM16 is an age-hardening Copper-chromium-zirconium alloy ($CuCr_1Zr$) which exhibits high electrical and thermal conductivity and suitable mechanical properties. CRM16 is used for many applications including resistance welding.

Bars and Hollow Bars | Low-alloyed copper alloys | CRM16

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCr1Zr	C18100 C18150	CA184 CC102 CW106C WN 2.1293	NA	AWS J1.3, RWMA class 2 BS 2874, EN 12163 EN 12165, EN 12420 EN 12167, DIN 17666 DIN 17672, DIN 44759 ISO 5182 A2/2 and A2/3

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Cr	Zr	Others
Balance	0.4 - 1%	0.03 - 0.15%	≤ 0.20%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	320 W/m.°C	185 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17.5 x 10^{-6}/°C	9.7 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	≤ 2.3 µΩ.cm	≤ 13.83 Ω. circ mil/ft
Electrical conductivity	≥ 75 %IACS	

TYPICAL APPLICATIONS

Resistance welding

Electrodes, parts for welding machine guns (shanks, arms, sections, blanks)

Electrical industry

Rotor bars, connectors

Iron and steel industry

Casting wheels, moulds

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening plus cold-drawing for small diameters

Cold forming (bending, stamping, extrusion)

Weldable with electron beam

Hard brazing, but loss of mechanical properties

Machinability: 20 % of free-cutting brass

KEY FEATURES

High electrical and thermal conductivity

Suitable mechanical properties

Good annealing resistance

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Round Bars					
10 ≤ Ø ≤ 25.4 mm (0.39 ≤ Ø ≤ 1 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 150
26 ≤ Ø ≤ 45 mm (1.02 ≤ Ø ≤ 1.77 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 140
45 < Ø ≤ 80 mm (1.77 < Ø ≤ 3.15 in.)	TER	≥ 360 (≥ 52)	≥ 440 (≥ 64)	≥ 18	≥ 140
20 ≤ Ø ≤ 350 mm (0.78 ≤ Ø ≤ 13.78 in.)	TR	≥ 240 (≥ 35)	≥ 350 (≥ 51)	≥ 20	≥ 120
Flat / Square / Rectangular / Hexagonal Bars					
a ≤ 40 mm (a ≤ 1.57 in.)	TR	≥ 390 (≥ 56)	≥ 440 (≥ 64)	≥ 10	≥ 135
a > 40 mm (a > 1.57 in.)	TR	≥ 255 (≥ 37)	≥ 370 (≥ 53)	≥ 18	≥ 120
Plates					
4 ≤ a ≤ 10 mm (0.16 ≤ a ≤ 0.40 in.)	TER	≥ 350 (≥ 51)	≥ 400 (≥ 58)	≥ 10	≥ 125
16 ≤ a ≤ 250 mm (0.60 ≤ a ≤ 10 in.)	TR	≥280 (≥ 41)	≥ 380 (≥ 55)	≥ 20	≥ 120

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CRM16 E

$CuCr_1Zr$

29 63.546	24 51.9961	40 91.224
Cu copper	Cr chromium	Zr zirconium

Back

CRM16 E is a variant of CRM16 ($CuCr_1Zr$) specially designed for forged products. It exhibits high electrical and thermal conductivity and suitable mechanical properties. CRM16 E is typically used for applications of larger dimensions and working at high temperature.

Bars and Hollow Bars | Low-alloyed copper alloys | CRM16 E

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCr1Zr	C18100 C18150	CA184 CC102 CW106C WN 2.1293	NA	AWS J1.3, RWMA class 2 BS 2874, EN 12163 EN 12165, EN 12420 EN 12167, DIN 17666 DIN 17672

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Cr	Zr	Others
Balance	0.4 - 1%	0.10 - 0.25%	≤ 0.20%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	320 W/m.°C	185 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	≤ 2.3 µΩ.cm	≤ 13.83 Ω. circ mil/ft
Electrical conductivity	≥ 75 %IACS	

TYPICAL APPLICATIONS

Resistance welding
Welding wheels
Electrical industry
Rotor rings, connectors
Iron and steel industry
Casting wheels, moulds

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening
Cold forming (bending, stamping, extrusion)
Weldable with electron beam
Hard brazing, but loss of mechanical properties
Machinability: 20 % of free-cutting brass

KEY FEATURES

High electrical and thermal conductivity
Suitable mechanical properties
Good annealing resistance

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
Ø ≤ 100 mm (Ø ≤ 3.94 in.)	TR	≥ 280 (≥ 41)	≥ 380 (≥ 55)	≥ 15	≥ 120
Ø > 100 mm (Ø > 3.94 in.)	TR	≥ 240 (≥ 35)	≥ 380 (≥ 55)	≥ 15	≥ 110
Discs and Rings					
OD ≤ 100 mm (OD ≤ 3.94 in.)	TR	≥ 280 (≥ 41)	≥ 380 (≥ 55)	≥ 15	≥ 130
Plates					
a ≤ 100 mm (a ≤ 3.94 in.)	TR	≥ 280 (≥ 41)	≥ 380 (≥ 55)	≥ 15	≥ 120

**TR: solution annealed, quenched and aged*

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CRM16 HP

$CuCr_1Zr$

29	24	40
63.546	51.9961	91.224
Cu	Cr	Zr
copper	chromium	zirconium

Back

CRM16 HP is a variant of CRM16 ($CuCr_1Zr$) with high purity designed for very sensitive and demanding applications in electrical and space industries. It exhibits high electrical and thermal conductivity and suitable mechanical properties

Bars and Hollow Bars | Low-alloyed copper alloys | CRM16 HP

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCr1Zr	C18150	NA	NA	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Cr	Zr	Others
Balance	0.5 - 0.8%	0.03 - 0.10%	Fe ≤ 0.04% Impurities ≤ 0.10%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	320 W/m.°C	185 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	120 GPa	17 405 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	2.0 µΩ.cm	12.03 Ω. circ mil/ft
Electrical conductivity	85 %IACS	

TYPICAL APPLICATIONS

Components for particle accelerators

Electrical industry

Rotor bars, connectors, rings, discs

Space industry

Booster engines, nozzles

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening plus cold-drawing for small diameters

Cold forming (bending, stamping, extrusion)

Weldable with electron beam

Hard brazing, but loss of mechanical properties

Machinability: 20 % of free-cutting brass

KEY FEATURES

High purity

Very high electrical and thermal conductivity

Suitable mechanical properties

Good annealing resistance

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
10 ≤ Ø ≤ 25.4 mm (0.39 ≤ Ø ≤ 1 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 150
26 ≤ Ø ≤ 45 mm (1.02 ≤ Ø ≤ 1.77 in.)	TER	≥ 420 (≥ 61)	≥ 480 (≥ 70)	≥ 18	≥ 140
45 < Ø ≤ 80 mm (1.77 < Ø ≤ 3.15 in.)	TER	≥ 360 (≥ 52)	≥ 440 (≥ 64)	≥ 18	≥ 140
20 ≤ Ø ≤ 350 mm (0.78 ≤ Ø ≤ 13.78 in.)	TR	≥ 240 (≥ 35)	≥ 350 (≥ 51)	≥ 20	≥ 120
Flat / Square / Rectangular / Hexagonal Bars					
a ≤ 40 mm (a ≤ 1.57 in.)	TR	≥ 390 (≥ 56)	≥ 440 (≥ 64)	≥ 10	≥ 135
a > 40 mm (a > 1.57 in.)	TR	≥ 255 (≥ 37)	≥ 370 (≥ 53)	≥ 18	≥ 120
Plates					
4 ≤ a ≤ 10 mm (0.16 ≤ a ≤ 0.40 in.)	TER	≥ 350 (≥ 51)	≥ 400 (≥ 58)	≥ 10	≥ 125
16 ≤ a ≤ 250 mm (0.60 ≤ a ≤ 10 in.)	TR	≥ 280 (≥ 41)	≥ 380 (≥ 55)	≥ 20	≥ 120

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

ZR16X

CuZr

29 63.546 Cu copper

40 91.224 Zr zirconium

Back

ZR16X is a low-alloyed copper (CuZr) alloy which exhibits high electrical and thermal conductivity and suitable mechanical properties. ZR16X is a material of choice for resistance welding applications.

Bars and Hollow Bars | Low-alloyed copper alloys | ZR16X

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuZr	C15000	WN 2.1580 CW120C	NA	AWS J1.3, RWMA class 1 DIN 17666, DIN 17672 ISO 5182 A2/4, EN 12163 EN 12167, EN 12420

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Zr
Balance	0.15%

TYPICAL APPLICATIONS

Resistance welding

Electrodes, sections

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm^3	0.32 lb/in^3
Thermal conductivity	320 W/m.°C	185 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	110 GPa	15 954 ksi
Magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	≤ 2.05 µΩ.cm	≤ 12.33 Ω circ mil/ft
Electrical conductivity	≥ 85 %IACS	

COMPATIBLE DOWNSTREAM PROCESS

Forging, extrusion or drawing
Hot and cold working
Hard and soft brazing

KEY FEATURES

High electrical and thermal conductivity
Suitable mechanical properties
Good annealing resistance

MECHANICAL PROPERTIES

Size	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
Ø ≤ 25.4 mm (Ø ≤ 1 in.)	TER	≥ 280 (≥ 41)	≥ 320 (≥ 46)	≥ 18	≥ 120

**TER: solution annealed and quenched, cold worked and aged*

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Cupro-U

CuCrZr

29 63.546 Cu copper
24 51.9961 Cr chromium
40 91.224 Zr zirconium

Back

Cupro-U is an age hardening low-alloyed copper (CuCrZr) alloy optimized for high strength and high conductivity applications.

In addition, Cupro-U is a direct susbtitute to cadmium-copper. It is also a lead-free and beryllium-free material.

Bars and Hollow Bars | Low-alloyed copper alloys | Cupro-U

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCrZr	NA	NA	NA	ASTM B 624

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Cr	Zr
Balance	0.1-0.6%	0.02-0.06%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.94 g/cm³	0.32 lb/in³
Thermal conductivity	330 W/m.°C	191 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.5 µin/in °F
Young's modulus	120 GPa	17 404 ksi
Magnetic permeability	< 1.01	
Electrical properties		
Temperature coefficient of electrical resistance TCR	3370 ppm/°C	1872 ppm/°F
Electrical conductivity	≥ 88% IACS	

TYPICAL APPLICATIONS

Aerospace industry

Electronics industry

Single-core and multi-core conductor cables
Electromagnetic shielding
Thermal and electrical conductive fasteners
High power density connectors

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, drawing or wire drawing
Hot and cold working

KEY FEATURES

High strength and high conductivity
High flex life
Fair resistance to corrosive environments
Working temperature resistance up to 400 °C (752 °F)
Non-magnetic
Excellent plating ability

MECHANICAL PROPERTIES

Size	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand				
Bars				
Ø < 20 mm (Ø < 0.78 in.)	≥ 420 (≥ 61)	≥ 460 (≥ 66)	≥ 10	≥ 130

OTHER AVAILABLE FORMS

Strips, sheets, rods, wires, standard & complex profiles, welding electrodes, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Low-beryllium copper alloys

High mechanical properties

Our Group offers a range of low-beryllium copper alloys. These alloys exhibit high mechanical properties combined with suitable electrical and thermal properties. They also present good anti-friction properties.

PRODUCT PORTFOLIO

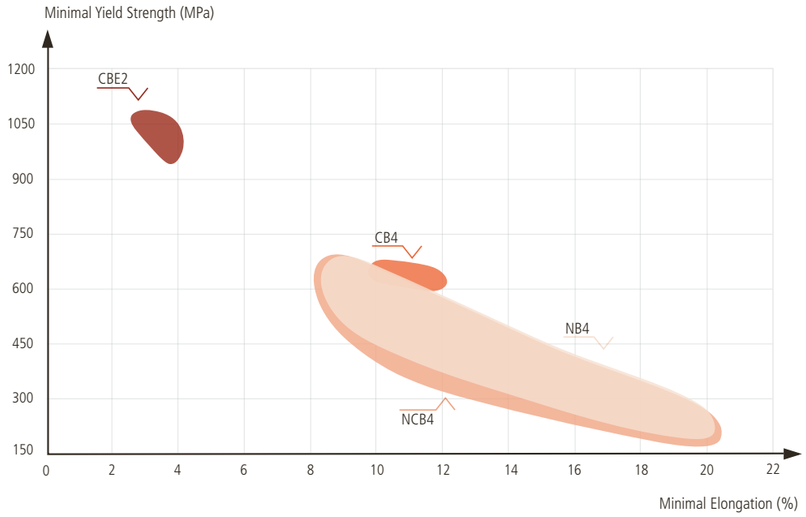
Alloy	ISO	UNS	Other designations	Aerospace specifications
CBE2	CuBe2	C17200	WN 2.1247 CW101C	AMS 4533 NFL 14-709
CB4	CuCo2Be	NA	CC112 WN 2.1285 CW104C	NA
NCB4	CuNi1Co1Be	C17540	CW103C	NA
NB4	CuNi2Be	C17510	WN 2.0850 CW110C	NA

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

**Other shapes on request*
***Depending on alloy, square / flat / rectangular / hexagonal bars*

KEY MECHANICAL PROPERTIES



Markets and applications

Automotive

- Rings
- Head of pistons

Industrial

- Plungers
- Die
- Short circuit ring

Resistance welding

- Resistance welding of thick plates or stainless steel

CBE2

$CuBe_2$

Cu copper | Be beryllium

Back

CBE2 is a low-beryllium copper ($CuBe_2$) alloy used in various industries such as Aerospace, Automotive, and Off-highway mining. CBE2 exhibits outstanding mechanical properties with high hardness and high electrical conductivity.

Bars and Hollow Bars | Low-beryllium copper alloys | CBE2

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuBe2	C17200	WN 2.1247 CW101C	AMS 4533 NFL 14-709	ASTM B196, RWMA class 4 QQC 530, DIN 17666 DIN 17672, EN 12163 EN 12165, EN 12420

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Be	Co
Balance	1.9%	0.3%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.3 g/cm³	0.30 lb/in³
Thermal conductivity	110 W/m.°C	64 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	6 µΩ.cm	36.09 Ω. circ mil/ft
Electrical conductivity	28 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings and bearing parts for aircrafts landing gears

Parts for locking mechanism

Automotive industry

Rings for formula 1 engines

Cryogenics applications

Parts for Ariane engine

Off-highway mining industry

Drilling parts for Christmas trees, deep water connections

Mould industry

Injection mould tool and insert

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging followed by quenching and hardening, plus cold-drawing for small diameters

Cold forming in quenched condition, but the hardened condition must be obtained after forming

KEY FEATURES

Very high mechanical properties

Good anti-friction properties

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
19.05 ≤ Ø ≤ 50.8 mm (0.75 ≤ Ø ≤ 2 in.)	TER	≥ 1 061 (≥ 154)	≥ 1 240 (≥ 180)	≥ 3	≥ 360
50.8 ≤ Ø ≤ 76.2 mm (2 ≤ Ø ≤ 3 in.)	TER	≥ 1 040 (≥ 151)	≥ 1 210 (≥ 175)	≥ 4	≥ 360
19.5 ≤ Ø ≤ 150 mm (0.75 ≤ Ø ≤ 5.9 in.)	TR	≥ 965 (≥ 140)	≥ 1 150 (≥ 167)	≥ 4	≥ 340
19.5 ≤ Ø ≤ 150 mm (0.75 ≤ Ø ≤ 5.9 in.)	T	-	≥ 570 (≥ 83)	≥ 35	≥ 150 HRB (≥ 80 HRB)
Discs and Rings					
200 ≤ Ø ≤ 400 mm (7.9 ≤ Ø ≤ 15.7 in.)	TR	≥ 850 (≥ 123)	≥ 1 050 (≥ 152)	≥ 2	≥ 320
Plates					
25 ≤ a ≤ 250 mm (1 ≤ a ≤ 10 in.)	TR	≥ 965 (≥ 140)	≥ 1 140 (≥ 165)	≥ 2	≥ 340

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged
T: solution annealed and quenched

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

CB4

$CuCo_2Be$

Cu copper | Co cobalt | Be beryllium

Back

CB4 is a low-beryllium copper ($CuCo_2Be$) alloy which exhibits high mechanical properties combined with suitable electrical and thermal properties. It also has good anti-friction properties.

Bars and Hollow Bars | Low-beryllium copper alloys | CB4

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuCo2Be	NA	CC112 WN 2.1285 CW104C	NA	BS 2874, DIN 17666 DIN 17672, DIN 44759 EN 12163, EN 12165 EN 12167, EN 12420

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Co	Be
Balance	2.2%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	200 W/m.°C	116 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17.5 x 10^{-6}/°C	9.72 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	≤ 4 µΩ.cm	≤ 24.06 Ω. circ mil/ft
Electrical conductivity	43 %IACS	

TYPICAL APPLICATIONS

Automotive industry

Head of pistons for diesel engine

Industrial applications

Plungers for die casting

Die for continuous casting ingot

Short circuit ring for squirrel cage motors

Welding industry

Resistance welding of thick plates or stainless steel

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening, plus cold-drawing for small diameters

Cold forming in quenched condition, but the hardened condition must be obtained after forming

Hard brazing, but loss of mechanical properties

KEY FEATURES

High mechanical properties

Suitable electrical and thermal properties

Good antifriction properties

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Round Bars					
Ø ≤ 60 mm (Ø ≤ 2.3 in.)	TR or TER	≥ 610 (≥ 88)	≥ 740 (≥ 107)	≥ 10	≥ 230
Ø > 60 mm (Ø > 2.3 in.)	TR	≥ 570 (≥ 82)	≥ 690 (≥ 100)	≥ 12	≥ 220
Flat / Square / Rectangular / Hexagonal Bars					
a ≤ 50 mm (a ≤ 2 in.)	TR or TER	≥ 610 (≥ 88)	≥ 740 (≥ 107)	≥ 10	≥ 230
a > 50 mm (a > 2 in.)	TR	≥ 570 (≥ 82)	≥ 690 (≥ 100)	≥ 12	≥ 220
Forgings					
Section ≥ 1000 mm² (Section ≥ 1.55 in.²)	TR	≥ 550 (≥ 80)	≥ 700 (≥ 101)	≥ 15	≥ 220

**TER: solution annealed and quenched, cold worked and aged*
TR: solution annealed, quenched and aged

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NCB4

$CuNi_1Co_1Be$

Cu copper | Ni nickel | Co cobalt | Be beryllium

NCB4 is a low-beryllium copper ($CuNi_1Co_1Be$) alloy which exhibits high mechanical properties combined with suitable electrical and thermal properties. It also has good anti-friction properties.

Back

Bars and Hollow Bars | Low-beryllium copper alloys | NCB4

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi1Co1Be	C17540	CW103C	NA	RWMA class 3, AWS J1.3 EN 12163, EN 12165 EN 12167, EN 12420

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Co	Be
Balance	1%	1%	0.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	200 W/m.°C	116 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	< 1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	3.45 µΩ.cm	20.75 Ω. circ mil/ft
Electrical conductivity	45 %IACS	

TYPICAL APPLICATIONS

Automotive industry

Head of pistons for diesel engine

Industrial applications

Plungers for die casting

Die for continuous casting ingot

Short circuit ring for squirrel cage motors

Welding industry

Resistance welding of thick plates or stainless steel

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening, plus cold-drawing for small diameters

Cold forming in quenched condition, but the hardened condition must be obtained after forming

Hard brazing, but loss of mechanical properties

KEY FEATURES

High mechanical properties

Suitable electrical and thermal properties

Good anti-friction properties

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)	Hardness (HRB)
For other dimensions and shapes, mechanical properties on demand						
Round Bars						
12.7 ≤ Ø ≤ 50.8 mm (0.5 ≤ Ø ≤ 2 in.)	TER	≥ 650 (≥ 94)	≥ 760 (≥ 110)	≥ 9	≥ 240	≥ 100
12.7 ≤ Ø ≤ 50.8 mm (0.5 ≤ Ø ≤ 2 in.)	TE	≥ 320 (≥ 45)	≥ 450 (≥ 65)	≥ 15	≥ 120	≥ 70
12.7 ≤ Ø ≤ 304.8 mm (0.5 ≤ Ø ≤ 12 in.)	TR	≥ 520 (≥ 75)	≥ 690 (≥ 100)	≥ 9	≥ 230	≥ 98
12.7 ≤ Ø ≤ 304.8 mm (0.5 ≤ Ø ≤ 12 in.)	T	≥ 70 (≥ 10)	≥ 240 (≥ 35)	≥ 20	≤ 95	≤ 50
Flat Bars						
19.05 ≤ a ≤ 63.5 mm (3/4 ≤ a ≤ 2.5 in.)	TER	≥ 650 (≥ 94)	≥ 750 (≥ 109)	≥ 8	≥ 240	≥ 103
Plates**						
a ≥ 19.05 mm (a ≥ 3/4 in.)	TR	≥ 550 (≥ 80)	≥ 690 (≥ 100)	≥ 10	≥ 230	≥ 98
a ≥ 19.05 mm (a ≥ 3/4 in.)	T	≥ 170 (≥ 25)	≥ 240 (≥ 35)	≥ 20	≤ 90	≤ 45

**TER: solution annealed and quenched, cold worked and aged*
TE: solution annealed, quenched and cold worked
TR: solution annealed, quenched and aged
T: solution annealed and quenched
***Width: 305 - 686 mm (12 - 27 in.) - max / Section: 70 000 mm² (108 in.²)*

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

NB4

$CuNi_2Be$

Cu copper | Ni nickel | Be beryllium

Back

NB4 is a low-beryllium copper ($CuNi_2Be$) alloy which exhibits high mechanical properties combined with suitable electrical and thermal properties. It also has good anti-friction properties.

Bars and Hollow Bars | Low-beryllium copper alloys | NB4

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuNi2Be	C17510	WN 2.0850 CW110C	NA	AWS J1.3, RWMA class 3 ASTM B 441, DIN 17666 DIN 17672, EN 12163 EN 12167

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Ni	Be
Balance	2%	0.4%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.9 g/cm³	0.32 lb/in³
Thermal conductivity	230 W/m.°C	133 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	130 GPa	18 855 ksi
Relative magnetic permeability	< 1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	3.83 µΩ.cm	23.04 Ω. circ mil/ft
Electrical conductivity	45 %IACS	

TYPICAL APPLICATIONS

Automotive industry

Head of pistons for diesel engine

Industrial applications

Plungers for die casting

Die for continuous casting ingot

Short circuit ring for squirrel cage motors

Welding industry

Resistance welding of thick plates or stainless steel

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping followed by quenching and hardening, plus cold-drawing for small diameters

Suitable for cold forming in quenched condition, but the hardened condition must be obtained after forming

Suitable for hard brazing, but loss of mechanical properties

KEY FEATURES

High mechanical properties

Suitable electrical and thermal properties

Good anti-friction properties

MECHANICAL PROPERTIES

Size diameter Ø or thickness a	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)	Hardness (HRB)
For other dimensions and shapes, mechanical properties on demand						
Bars						
12.7 ≤ Ø ≤ 50.8 mm (0.5 ≤ Ø ≤ 2 in.)	TER	≥ 660 (≥ 95)	≥ 760 (≥ 110)	≥ 9	≥ 240	≥ 100
12.7 ≤ Ø ≤ 50.8 mm (0.5 ≤ Ø ≤ 2 in.)	TE	≥ 320 (≥ 45)	≥ 450 (≥ 65)	≥ 15	≥ 120	≥ 70
12.7 ≤ Ø ≤ 304.8 mm (0.5 ≤ Ø ≤ 12 in.)	TR	≥ 520 (≥ 75)	≥ 690 (≥ 100)	≥ 9	≥ 230	≥ 98
12.7 ≤ Ø ≤ 304.8 mm (0.5 ≤ Ø ≤ 12 in.)	T	≥ 70 (≥ 10)	≥ 240 (≥ 35)	≥ 20	≤ 95	≤ 50
Plates**						
a ≥ 19.05 mm (a ≥ 0.75 in.)	TR	≥ 550 (≥ 80)	≥ 690 (≥ 100)	≥ 10	≥ 230	≥ 98
a ≥ 19.05 mm (a ≥ 0.75 in.)	T	≥ 170 (≥ 25)	≥ 240 (≥ 35)	≥ 20	≤ 90	≤ 45

**TER: solution annealed and quenched, cold worked and aged*
TE: solution annealed, quenched and cold worked
TR: solution annealed, quenched and aged
T: solution annealed and quenched
***Width: 305-686 mm (12-27 in.) / Section: ≤ 70 000 mm² (108 in²)*

OTHER AVAILABLE FORMS

Hollow bars, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

We also produce copper and nickel alloy strips and sheets.

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

Other high performance copper alloys

PRODUCT PORTFOLIO

Alloy	ISO	UNS	Other designations	Aerospace specifications
BE10	CuSn8P	C52100	WN 2.1030 CW459K CW453K PB104	NFL 14-703
ZA9	CuZn19Al6	NA	NA	NFL 14-707
Si45Z	CuSi3Fe2Zn3	C65620	NA	AMS 4616

STANDARD CAPABILITY*

Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

**Other shapes on request*
***Depending on alloy, square / flat / rectangular / hexagonal bars*

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 other copper alloys are:
- REACH and RoHS compliant
- On average produced with 93 % of recycled materials

REACH compliant
RoHS compliant

BE10

$CuSn_8P$

29	50	15
63.546	118.71	30.973976200
Cu	Sn	P
copper	tin	phosphorus

Back

BE10 is a bronze ($CuSn_8P$) alloy which is resistant to sea-water corrosion, erosion and cavitation. This alloy also exhibits good friction properties without lubricant, which is ideal for the Aerospace industry.

Bars and Hollow Bars | Other copper alloys | BE10

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuSn8P	C52100	WN 2.1030 CW459K CW453K PB104	NFL 14-703	DIN 17662 EN 12163 BS 2874

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Sn	P
Balance	8%	0.2%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.8 g/cm³	0.29 lb/in³
Thermal conductivity	67 W/m.°C	39 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	18 x 10^{-6}/°C	10 µin/in °F
Young's modulus	115 GPa	16 679 ksi
Relative magnetic permeability	< 1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	15 µΩ.cm	90.23 Ω. circ mil/ft
Electrical conductivity	11 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings

Bushings and bearings for landing gears

Industrial applications

Chemical hardware, perforated sheets, textile machinery, welding rots

COMPATIBLE DOWNSTREAM PROCESS

Cold working

Soldering

Brazing

Resistance butt welding

Machinability index: 20% of free-cutting brass

KEY FEATURES

Friction without lubricant

Sea-water corrosion resistant

Erosion and cavitation resistant

MECHANICAL PROPERTIES

Size	Temper	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
Section ≤ 25 000 mm² (Section ≤ 38.75 in.²)	Annealed	≥ 175 (≥ 25)	≥ 400 (≥ 58)	≥ 60	≥ 80
Section ≤ 13 500 mm² (Section ≤ 20.93 in.²)	1/2 Hard	≥ 290 (≥ 42)	≥ 450 (≥ 65)	≥ 30	≥ 110

OTHER AVAILABLE FORMS

Hollow bars, plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

ZA9

$CuZn_{19}Al_6$

Cu copper | Zn zinc | Al aluminum

Back

ZA9 is a high resistance brass ($CuZn_{19}Al_6$) alloy designed for Aerospace applications. With its high mechanical properties, good anti-friction properties and resistance to oxidation, this alloys meet the most stringent needs of this industry.

Bars and Hollow Bars | Other copper alloys | ZA9

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuZn19Al6	NA	NA	NFL 14-707	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Zn	Al	Mn	Fe
Balance	18%	7%	5.5%	3.5%

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	7.6 g/cm³	0.27 lb/in³
Thermal conductivity	35 W/m.°C	20 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	110 GPa	15 954 ksi
Magnetic permeability	1.2	
Electrical properties		
Resistivity at 20 °C (68 °F)	28 µΩ.cm	168.43 Ω. circ mil/ft
Electrical conductivity	6 %IACS	

TYPICAL APPLICATIONS

Aerospace industry

Rings (friction-guidance) for landing gears

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die stamping

Hot forming

Machinability: 10% of free-cutting brass

KEY FEATURES

High mechanical properties

Good anti-friction properties

Oxidation resistant

MECHANICAL PROPERTIES

Size	Temper*	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
Section ≤ 2 000 mm² (Section ≤ 3.1 in.²)	F / H3	≥ 590 (≥ 86)	≥ 830 (≥ 120)	≥ 10	≥ 225
Section > 2 000 mm² (Section > 3.1 in.²)	F / H3	≥ 540 (≥ 78)	≥ 780 (≥ 113)	≥ 7	≥ 225
Hollow bars					
Section ≤ 2 000 mm² (Section ≤ 3.1 in.²)	F / H3	≥ 590 (≥ 86)	≥ 830 (≥ 120)	≥ 10	≥ 225
Section > 2 000 mm² (Section > 3.1 in.²)	F / H3	≥ 540 (≥ 78)	≥ 780 (≥ 113)	≥ 7	≥ 225

**F: as-manufactured*
H3: as-manufactured and stress relieved

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

Si45Z

$CuSi_3Fe_2Zn_3$

29 63.546	14 28.085	26 55.845	30 65.38
Cu copper	Si silicon	Fe iron	Zn zinc

Back

Si45Z is a $CuSi_3Fe_2Zn_3$ alloy which exhibits excellent swaging performances and galling properties. Si45Z is most commonly used in the Aeronautics industry due to its good antifriction properties.

Bars and Hollow Bars | Other copper alloys | SI45Z

MATERIAL DESIGNATION

ISO	UNS	Other designations	Aerospace specifications	Other standards
CuSi3Fe2Zn3	C65620	NA	AMS 4616	NA

CHEMICAL COMPOSITION (WEIGHT%)

Cu	Si	Zn	Fe
Balance	3%	3%	1.5%

TYPICAL APPLICATIONS

Aeronautics industry

Bearing cages

Rotor bars for engine

Automotive industry

Valve guides

PHYSICAL PROPERTIES

General properties		
Density at 20 °C (68 °F)	8.6 g/cm³	0.29 lb/in³
Thermal conductivity	30 W/m.°C	17 BTU/(h.ft.°F)
Coefficient of thermal expansion from 20 to 300 °C (68 °C to 572 °F)	17 x 10^{-6}/°C	9.44 µin/in °F
Young's modulus	110 GPa	15 954 ksi
Relative magnetic permeability	1.01	
Electrical properties		
Resistivity at 20 °C (68 °F)	21.5 µΩ.cm	129.3 Ω. circ mil/ft
Electrical conductivity	8 %IACS	

COMPATIBLE DOWNSTREAM PROCESS

Extrusion, forging or die-stamping followed by cold-drawing for small diameters

Cold working

Welding

Hard and soft brazing

Machinability index: 30% of free-cutting brass

KEY FEATURES

Excellent swaging performances

Excellent galling properties

Good antifriction properties

Good resistance to oxidation

Good machinability

Low magnetic permeability

MECHANICAL PROPERTIES

Size	Temper	Yield Strength 0.2% MPa (ksi)	Tensile Strength MPa (ksi)	Elongation (%)	Hardness (HB)
For other dimensions and shapes, mechanical properties on demand					
Bars					
15.88 ≤ Ø ≤ 76.2 mm (5/8 ≤ Ø ≤ 3 in.)	Cold worked	≥ 340 (≥ 49)	≥ 540 (≥ 78)	≥ 12	≥ 150
15.88 ≤ Ø ≤ 152.4 mm (5/8 ≤ Ø ≤ 6 in.)	As-manufactured or Stress relieved	≥ 140 (≥ 20)	≥ 390 (≥ 57)	≥ 30	≥ 90
Hollow bars					
63.5 ≤ OD ≤ 231.78 mm (2.5 ≤ OD ≤ 9.12 in.) ID ≥ 35 mm (1.38 in.) Thickness ≥ 10 mm (0.4 in.)	As-manufactured or Stress relieved	≥ 140 (≥ 20)	≥ 390 (≥ 57)	≥ 30	≥ 90

OTHER AVAILABLE FORMS

Plates, billets, strips, sheets, rods, wires, standard & complex profiles, machined blanks and parts

Disclaimer : Data for information only, non-contractual / Dimensions outside these ranges on request

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Table
Bars and Hollow Bars product portfolio

Alloy name	ISO	UNS	Other designations
CuAlNi Nickel Aluminum Bronze alloys			
NC2	CuAl9Ni5Fe4		
NC4	CuAl10Ni5Fe4	C63000	CW307G 2.0966
CA104	CuAl10Ni5Fe4		CA104
NCS	CuAl11Ni5Fe5	C63020	CW308G 2.0978
CuNiAl Copper Nickel Bronze alloys			
K5	CuNi14Al2 CuNi14Al3		
K5B	CuNi14Mn4Al2		
K7	CuNi14Al3Fe1		2.1504
Hardibron®	CuNi14Al3Fe1		2.1504
CuNiSn Hardiall® alloys			
Hardiall®	CuNi15Sn8	C72900	CW355H
Hardiall® Eco	CuNi9Sn6	C72700	
CuNiSi alloys			
NS5	CuNi2Si CuNi3Si		CW111C 2.0855
NS6	CuNi3Si	C18000	
NS30	CuNi7Si2Cr		
CuNi Navinic alloys			
Navinic 10	CuNi10Fe1Mn	C70600 C70610 C70620 7060X	CN102 WN 2.0872 2.1972 CW352H
Navinic 30	CuNi30Mn1Fe	C71500 C71520	CN107 WN 2.0882 CW354H

Table
Bars and Hollow Bars product portfolio

Aerospace specifications	Other standards
CuAlNi Nickel Aluminum Bronze alloys	
	GAM MM11, GAM MM13, NFA 51-116, NES 833, DEFSTAN 02-833
AMS 4640 NFL 14-705	ASTM B124-B150-B171, NFA 51 116, EN 12420, EN 12163, EN 12165, EN 12167
BS B23 BS 2B23	BS 2874
AMS 4590 NFL 14-706	ASTM B150, NFA 51 116, EN 12167, EN 12163, EN 12420, DIN 1756
CuNiAl Copper Nickel Bronze alloys	
NFL 14-702	GAM MM11 GAM MM13
	NES 835 DEFSTAN 02-835
WL 2.1504 LN 9468	
WL 2.1504 DTD 900/4805	
CuNiSn Hardiall® alloys	
AMS 4596 AMS 4597 AMS 4598	EN 12163 ASTM B929 NACE MR0175
CuNiSi alloys	
NFL 14-701 DTD 498	EN 12163, EN 12167, EN 12420, EN 12165, DIN 1756
	RWMA class 3, AWS J1.3
CuNi Navinic alloys	
	ASTM B151-B171-B466-B467, MIL T 16420 K, MIL C 15726, MIL C 24679, BS 2871, BS 2874, DEF STAN 02-879, DIN 17664, DIN 17671, DIN 17672, DIN 86019, DIN 1755, VG 85 004, EEMUA 234, EN 12163, EN 12449, EN 12165, EN 12420
	ASTM B151-B171-B466-B467, MIL T 16420 K, MIL C 15726, MIL C 24679, BS 2871, BS 2874, DEF STAN 02-879, DIN 17664, DIN 17671, DIN 17672, EN 12163, EN 12420, EN 12165, EN 12449

Table
Bars and Hollow Bars product portfolio

Alloy name	ISO	UNS	Other designations
Low-alloyed copper alloys			
CRM15	CuCr1	C18200 C18400	CC101 CW105C
CRM16	CuCr1Zr	C18100 C18150	CA184, CC102 CW106C, WN 2.1293
CRM16 E	CuCr1Zr	C18100 C18150	CA184, CC102 CW106C, WN 2.1293
CRM16 HP	CuCr1Zr	C18150	
ZR16X	CuZr	C15000	WN 2.1580 CW120C
Cupro-U	CuCrZr		
Low-beryllium copper alloys			
CBE2	CuBe2	C17200	WN 2.1247 CW101C
CB4	CuCo2Be		CC112 WN 2.1285 CW104C
NCB4	CuNi1Co1Be	C17540	CW103C
NB4	CuNi2Be	C17510	WN 2.0850 CW110C
Other high performance copper alloys			
BE10	CuSn8P	C52100	WN 2.1030, CW459K CW453K, PB104
ZA9	CuZn19Al6		
SI45Z	CuSi3Fe2Zn3	C65620	

Table
Bars and Hollow Bars product portfolio

Aerospace specifications	Other standards
Low-alloyed copper alloys	
	RWMA class 2, AWS J 1.3/1.3M class 2, BS 2874, ISO 5182 A2/1, BS 4577 A2/1
	AWS J1.3, RWMA class 2, BS 2874, EN 12163, EN 12165, EN 12420, EN 12167, DIN 17666, DIN 17672, DIN 44759, ISO 5182 A2/2 and A2/3
	AWS J1.3, RWMA class 2, BS 2874, EN 12163, EN 12165, EN 12420, EN 12167, DIN 17666, DIN 17672
	AWS J1.3, RWMA class 1, DIN 17666, DIN 17672, ISO 5182 A2/4, EN 12163, EN 12167, EN 12420
	ASTM B624
Low-beryllium copper alloys	
AMS 4533 NFL 14-709	ASTM B196, RWMA class 4, QQC 530, DIN 17666, DIN 17672, EN 12163, EN 12165, EN 12420
	BS 2874, DIN 17666, DIN 17672, DIN 44759, EN 12163, EN 12165, EN 12167, EN 12420
	RWMA class 3, AWS J1.3, EN 12163, EN 12165, EN 12167, EN 12420
	AWS J1.3, RWMA class 3, ASTM B 441, DIN 17666, DIN 17672, EN 12163, EN 12167
Other high performance copper alloys	
NFL 14-703	DIN 17662 EN 12163 BS 2874
NFL 14-707	
AMS 4616	

Standard capability*			
Round Bars	Other Bars**	Hollow bars	Plates
ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS	ALL DIMENSIONS

Other shapes on request
***Depending on alloy, square / flat / rectangular / hexagonal bars*

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