

Uba

lebronze alloys

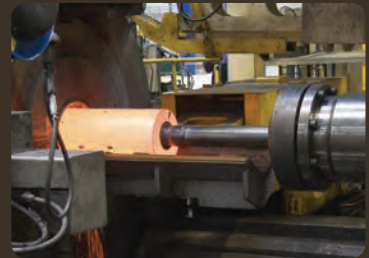


High performance alloys and components  
for Aerospace Industry

# Copper alloy Materials & Components

## Processes

- Semi-continuous and centrifugal casting
- Extrusion
- Forging
- Drawing
- Heat treatment
- Machining
- Non-Destructive Testing



## Products

- Round bars from 10 to 400 mm OD
- Hollow bars from 50 mm OD
- Flats, squares and hexagons
- Discs up to 600 mm dia
- Rings (from 10 mm to 600 mm OD) and blank bushings
- Fully machined parts including NDT's and surface treatment according to NADCAP requirements
- Bearing cages

# Forgings

*(Aluminium, Special steels, Inconel, Titanium)*

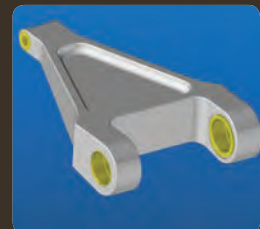
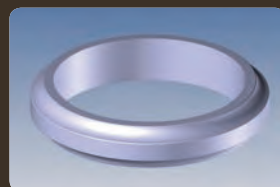


## Processes

- Open-die forging
- Closed-die forging
- Ring rolling
- Heat treatment
- Machining
- Non-Destructive Testing

## Products

- Bearing cages
- Casings
- Drag braces
- Gears
- Rolled rings
- Structural parts
- Torque tubes
- Torsion links
- Turbine shafts



# Wires, Strips and Cables (Copper and Nickel alloys)

## Processes

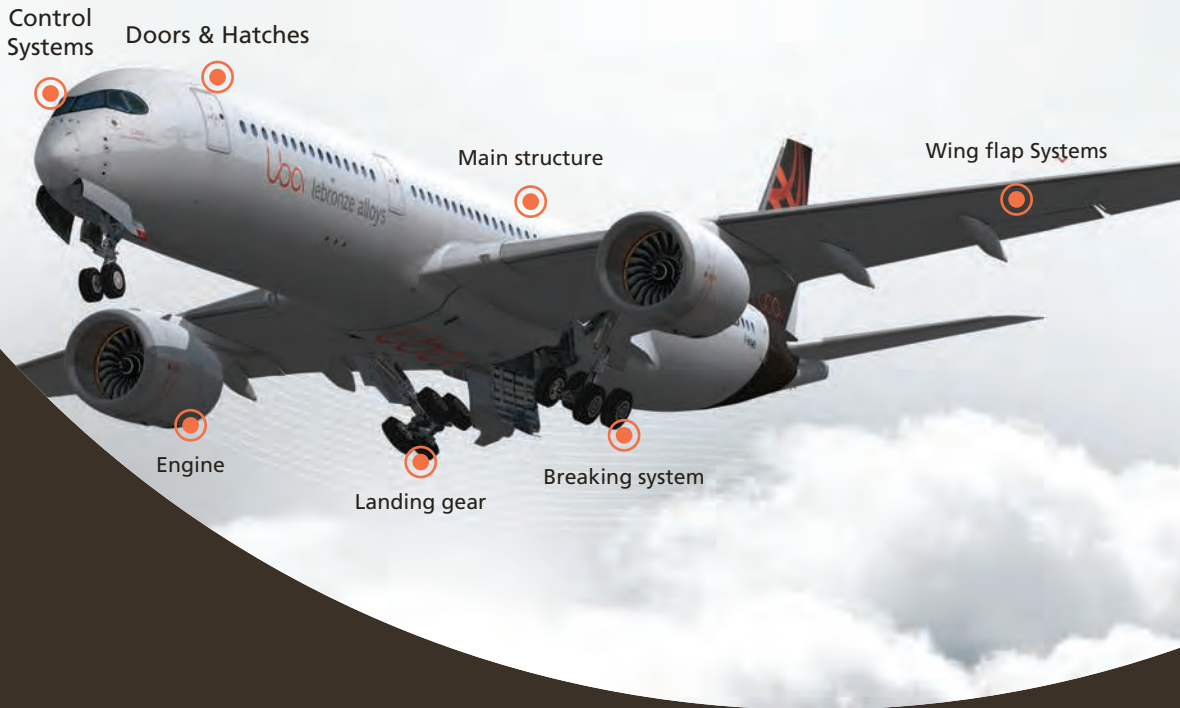
- Continuous and semi-continuous casting
- Extrusion
- Drawing
- Cold and hot rolling
- Slitting



## Products

- Cables and stranded Wires for Power systems
- Strip for hermetically sealed relays
- Rod and Wire for connectic ferrules
- Ferrule electrical contacts
- Connector shells
- Fasteners and rivets
- Strip for heat exchanger fins

# Discover our aerospace products



Wing flap Systems



Control Systems



Breaking system



Landing gear



Doors & Hatches



Engine



Main structure

For more than 50 years, Lebronze alloys has been the international reference for special copper alloys dedicated to the Aerospace industry.

Nowadays, our Group has become a leading solution developer in 45 countries to all major aircrafts, helicopters and space launchers, and holds the largest number of approvals for special steels, aluminium alloys, titanium alloys, superalloy parts and copper alloys.

When it comes to civil or defense applications, to OEM's or MRO's, Lebronze alloys is providing a full range of high mechanical alloys from semi-finished products to machined components used in all systems and equipment and complying with all international standards.

## Copper & Nickel alloys

|                                       |  |  |                     |                               |  |  |   |                                |                         |   | Mechanical properties |                   |   |       |                       |       |          |     |  |
|---------------------------------------|--|--|---------------------|-------------------------------|--|--|---|--------------------------------|-------------------------|---|-----------------------|-------------------|---|-------|-----------------------|-------|----------|-----|--|
| Alloy                                 | Standards /<br>Nearest interna-<br>tional<br>standards   | Nominal<br>composition<br>%                            | Physical properties |                               |  |  |   |                                |                         | Size and condition  | Tensile<br>strength   |                   | Yield strength<br>0.2% offset or<br>0.5% E.U.L. (1) |       | Elongation<br>5,65 %S |       | Hardness |     |  |
|                                       |  |  | Density             | Electrical conductivity %IACS | Electrical resistivity at 20°C<br>μΩcm | Thermal conductivity 20° to<br>200° C W/mk | Coefficient of expansion 20° to<br>200° C x 10 <sup>-6</sup> /K | Relative magnetic permeability | Young's modulus kN/ mm2 |   | Mpa ≥ ; * = Mpa ≤     | ksi ≥ ; * = ksi ≤ | Mpa ≥   | ksi ≥ | % ≥                   | HB    | HRB      | HRC |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         |   |                       |                   |   |       |                       |       |          |     |  |
| <b>COPPERS (&gt;99% Cu)</b>           |  |  |                     |                               |  |  |   |                                |                         |   |                       |                   |   |       |                       |       |          |     |  |
| CUPROFOR                              | UNS C15600   | Cu : remainder<br>Co: 0.29<br>P: 0,095                 | 8,9                 | 85                            | 2,05                                   | 338  | 16,7  |                                | 140                     | strip: 0,05 ≤ thickness ≤ 3,5 mm<br>3 ≤ width ≤ 350 mm TLS temper (TRE)                                     | ≥ 500                 | ≥ 72              | ≥ 450   | 65    | 2                     | ≥ 150 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | wire: 1 ≤ Ø ≤ 12 mm<br>TLS temper (TRE)   | ≥ 500                 | ≥ 72              | ≥ 450   | 65    | 2                     |       |          |     |  |
| <b>HIGH COPPER ALLOYS (&gt;96%Cu)</b> |  |  |                     |                               |  |  |   |                                |                         |   |                       |                   |   |       |                       |       |          |     |  |
| CB2<br>CuBe2                          | ASTM B196 :<br>C 17200<br>AMS 4533 : C17200<br>AMS 4535 : C17200<br>RWMA class 4<br>QQC 530<br>DIN 17666, DIN<br>17672 wn 2.1247<br>NFL 14709<br>EN 12163 CW 101C  | Cu: remainder<br>Be: 1,9<br>Co: 0,3                    | 8,3                 | 28                            | 6                                      | 110  | 17  | 1,01                           | 130                     | discs 200 ≤ Ø ≤ 400 mm<br>7,9 in. ≤ Ø ≤ 15,7 in.  | 1050                  | 152               | 850   | 123   | 2                     | ≥ 320 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | plate 25 ≤ thickness ≤ 250<br>1 in. ≤ thickness ≤ 10 in.  | 1140                  | 165               | 965   | 140   | 2                     | ≥ 340 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | rods 19,05 ≤ Ø ≤ 50,8 mm<br>0,75 in. ≤ Ø ≤ 2 in. TER condition  | 1240                  | 180               | 1061  | 154   | 3                     | ≥ 360 | 37-45    |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | rods 50,8 ≤ Ø ≤ 76,2 mm<br>2 in. ≤ Ø ≤ 3 in. TER condition  | 1210                  | 175               | 1040  | 151   | 4                     | ≥ 360 | 37-45    |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | rods 19,05 ≤ Ø ≤ 150 mm<br>0,75 in. ≤ Ø ≤ 5,9 in. TR condition  | 1150                  | 167               | 965   | 140   | 4                     | ≥ 340 | 36-42    |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | rods 19,05 ≤ Ø ≤ 150 mm<br>0,75 in. ≤ Ø ≤ 5,9 in. T condition   | 570                   | 83                |   |       | 35                    | ≤ 150 | ≤ 85     |     |  |
|                                       |  |  |                     |                               |  |  |   |                                | Rings TR condition      | 1050  | 152                   | 850               | 123   | 2     | ≥ 320                 |       |          |     |  |
| N55<br>CuNi2Si                        | DIN 17666 wn<br>2.0855<br>DIN 17672 w<br>2.0855<br>DIN 44759 clA3,2<br>NFL 14-701<br>ISO 1187<br>EN 12163,<br>EN 12167,<br>EN 12420,<br>EN 12165 CW111C<br>DTD 498 | Cu: remainder<br>Ni: 2,3<br>Si: 0,6                    | 8,8                 | 38                            | 4,5                                    | 180  | 16  | 1,01                           | 130                     | section ≤ 1000 mm <sup>2</sup> - ≤ 1,55 in. TR temper   | 650                   | 94                | 590   | 86    | 10                    | ≥ 195 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | 1000 < section ≤ 2800 mm <sup>2</sup> -<br>1,55 in. <sup>2</sup> < section ≤ 4,3 in. <sup>2</sup> TR temper | 650                   | 94                | 500   | 72    | 10                    | ≥ 195 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | 2800 < section ≤ 60 000 mm <sup>2</sup> -<br>4,3 in. <sup>2</sup> < section ≤ 93 in. <sup>2</sup> TR temper | 590                   | 86                | 440   | 64    | 8                     | ≥ 190 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | section > 60 000 mm <sup>2</sup> - section > 93 in. <sup>2</sup><br>TR temper                               | 490                   | 71                | 340   | 49    | 8                     | ≥ 160 |          |     |  |
| C 97<br>CuPb1P                        | UNS C19160   | Cu: remainder<br>Pb: 1,0<br>Ni: 1,0<br>P: 0,2          | 8,9                 | > 50                          |  | 245  | 18  |                                | 124                     | wire: Ø ≥ 1 - ≤ 14 mm<br>rods: Ø ≥ 1 - ≤ 10 mm  | ≥ 550                 | ≥ 79              | ≥ 490   | ≥ 71  | ≥ 3                   | ≥ 140 |          |     |  |
| C 98<br>CuPb1P                        | UNS C19140   | Cu: remainder<br>Pb: 0,5<br>Ni: 1,0<br>P: 0,2          | 8,9                 | > 50                          |  | 245  | 18  |                                | 124                     | wire: Ø ≥ 1 - ≤ 14 mm<br>rods: Ø ≥ 1 - ≤ 10 mm  | ≥ 550                 | ≥ 79              | ≥ 490   | ≥ 71  | ≥ 3                   | ≥ 140 |          |     |  |
| C 99<br>CuPb1P                        | UNS C18700   | Cu: remainder<br>Pb: 1,0<br>Ni: 0,01                   | 8,9                 | 85                            |  | 380  | 17  | non magnetic                   | 115                     | wire: Ø ≥ 1 - ≤ 19 mm<br>rods: Ø ≥ 1 - ≤ 10 mm  | ≥ 260                 | ≥ 38              | ≥ 180   | ≥ 26  | ≥ 8                   | ≥ 80  |          |     |  |
| <b>UNLEADED BRASSES (Cu-Zn)</b>       |  |  |                     |                               |  |  |   |                                |                         |   |                       |                   |   |       |                       |       |          |     |  |
| Z44<br>CuZn23Al4MnFeNi                | NFL14708   | Cu: remainder<br>Zn: 23<br>Al: 5<br>Mn: 2,5<br>Fe: 2   | 7,8                 | 9                             | 18                                     | 40   | 17  | 1,2                            | 105                     |   | 590                   | 86                | 270   | 39    | 15                    | ≥ 170 |          |     |  |
| ZA9<br>CuZn19Al6MnFe                  | NFL 14707  | Cu: remainder<br>Zn: 18<br>Al: 7<br>Mn: 5,5<br>Fe: 3,5 | 7,6                 | 6                             | 28                                     | 35   | 17  | 1,2                            | 110                     | section ≤ 2000 mm <sup>2</sup> - section ≤<br>3,1 in. <sup>2</sup>  | 830                   | 120               | 590   | 86    | 10                    | ≥ 225 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         | section > 2000 mm <sup>2</sup> - section ><br>3,1 in. <sup>2</sup>  | 780                   | 113               | 540   | 78    | 7                     | ≥ 225 |          |     |  |
|                                       |  |  |                     |                               |  |  |   |                                |                         |   | 780                   | 113               | 540   | 78    | 7                     | ≥ 225 |          |     |  |

## Copper & Nickel alloys

|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | Mechanical properties  |               |   |       |            |          |      |       |         |
|-----------------------------------|--|---|---------------------|-------------------------------|-------------------------------------|--|--|--------------------------------|------------------------------------|--------------------|--|---------------|---|-------|------------|----------|------|-------|---------|
| Alloy                             | Standards / Nearest international standards  | Nominal composition %                         | Physical properties |                               |                                     |  |  |                                |                                    | Size and condition | Tensile strength   |               | Yield strength 0.2% offset or 0.5% E.U.L. (1) |       | Elongation | Hardness |      |       |         |
|                                   |  |   | Density             | Electrical conductivity %IACS | Electrical resistivity at 20°c µΩcm | Thermal conductivity 20° to 200°c W/mK | Coefficient of expansion 20° to 200° c x 10 <sup>-6</sup> /K | Relative magnetic permeability | Young's modulus kN/mm <sup>2</sup> |                    | Mpa ≥ *  | ksi ≥ *       | Mpa ≥   | ksi ≥ | % ≥        | HB       | HRB  | HRC   |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       | Mpa ≥ * |
| <b>LEADED BRASSES (Cu-Zn-Pb)</b>  |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       |         |
| LBU<br>CuZn39Pb2                  | NFL14710<br>NFA 51-105<br>EN 12164 CW612N<br>ISO 426<br>DIN 17660 WN 20402   | Cu: remainder<br>Zn: 39<br>Pb: 2<br>Sn: 0.5   | 8,4                 | 11                            | 15                                  |  |  |                                | 17                                 | 100                | section ≤ 2000 mm <sup>2</sup> - section ≤ 3,1 in. <sup>2</sup> 1/2 hard temper                              | 380           |   | 120   |            | 20       | ≥90  |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | section > 2000 mm <sup>2</sup> - section > 3,1 in. <sup>2</sup> 1/2 hard temper                              | 400           |   | 250   |            | 20       | ≥115 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | section > 2000 mm <sup>2</sup> - section > 3,1 in. <sup>2</sup> 1/2 hard temper                              | 380           |   | 170   |            | 15       | ≥105 |       |         |
| <b>PHOSPHOR BRONZES (Cu-Sn-P)</b> |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       |         |
| BE10<br>CuSn8,5P                  | DIN17662<br>WN 21030<br>EN 12163<br>CW453K<br>NFL14703<br>ISO427<br>DTD 265 A<br>QQB 750 D<br>BS 2874 PB 104<br>SAE J 461 CA 521 | Cu: remainder<br>Sn:8<br>P: 0,2               | 8,8                 | 11                            | 15                                  | 67                                     | 18   |                                |                                    | 115                | section ≤ 25000 mm <sup>2</sup> - section ≤ 38,75 in. <sup>2</sup>   | 400           | 58  | 175   | 25         | 60       | ≥80  |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | 1/2 hard temper  | 440           | 64  | 220   | 32         | 30       | ≥110 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | hard temper  | 490           | 71  | 320   | 46         | 10       | ≥135 |       |         |
| <b>SILICON BRONZES (Cu-Si-Sn)</b> |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       |         |
| SI45Z<br>CuSi3Fe2Zn3              | AMS4616  | Cu: remainder<br>Si: 3<br>Zn: 3<br>Fe: 1,5    | 8,6                 | 8                             | 21,5                                | 30                                     | 17,5   |                                |                                    | 110                | cold worked temper H   | 540           | 78  | 340   | 49         | 12       | ≥150 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | as manufactured temper M   | 390           | 57  | 140   | 20         | 30       | ≥90  |       |         |
| <b>COPPER NICKELS (Cu-Ni-Fe)</b>  |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       |         |
| SICLANIC 5                        | din 17666<br>n° 2.0855<br>EN 1654<br>CW111C  | Cu : remainder<br>Ni : 2,5<br>Si : 0,6        | 8,9                 | 43                            | 4,1                                 | 188                                    | 19   |                                |                                    | 130                | strip : 0,05 ≤ thickness ≤ 3,5mm<br>3 ≤ width ≤ 350 mm<br>TH4 temper   | ∞             | ∞   | ∞     | ∞          | 8        | ∞    | 195   |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | wire : 1 ≤ Ø ≤ 12 mm<br>TH4 temper   | 700           | 101   | 600   | 87         | 7        |      |       |         |
| DECLAFOR                          |  | Cu: remainder<br>Ni : 7,5<br>Si : 5<br>Te     | 8,8                 | 13                            | 4,1                                 | 188                                    | 19   |                                |                                    | 130                | rod : 1 ≤ Ø ≤ 10 mm<br>TDX temper  | ∞             | ∞   | ∞     | ∞          | 3        | ∞    | 230   |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | rod : 1 ≤ Ø ≤ 10 mm<br>THX temper  | 950           | 138   | 910   | 132        | 3        | ∞    | 300   |         |
| NICLAL 30 Fe                      | ASTM B122<br>UNS C71500  | Cu: remainder<br>Ni :31<br>Fe:0.8<br>Mn:0.8   | 8,85                | 4,2                           | 40                                  | 29                                     | 16,2   |                                |                                    | 155                | strip : 0,05 ≤ thickness ≤ 3,5mm<br>3 ≤ width ≤ 350 mm<br>Annealed temper                                    | ∞             | ∞   | ∞     | ∞          | 30       | ≥ 80 |       |         |
| CONSTANTAN 45                     | DIN 17664<br>Wr 2.0842   | Cu : remainder<br>Ni :44<br>Mn:0.8            | 8,85                | 3,6                           | 49                                  | 25                                     | 15   |                                |                                    | 155                | strip : 0,05 ≤ thickness ≤ 3,5mm<br>3 ≤ width ≤ 350 mm<br>Annealed temper                                    | ∞             | ∞   | ∞     | ∞          | 30       | ≥ 80 |       |         |
| NICLAFOR 1000                     | ASTM B740<br>UNS C72700  | Cu: remainder<br>Ni : 9<br>Sn : 6             | 8,9                 | 12                            | 14,3                                | 53,6                                   | 17,25  |                                |                                    | 120                | strip : 0,05 ≤ thickness ≤ 3,5mm<br>3 ≤ width ≤ 350 mm TH4 temper  | 1000/<br>1100 | 145/<br>159                                   | 900   | 130        | 3        | ∞    | 320   |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | wire : 1 ≤ Ø ≤ 12 mm<br>TH4 temper   | 1100/<br>1200 | 159/<br>174                                   | 1000  | 145        | 2        | ∞    | 330   |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | rod : 1 ≤ Ø ≤ 12 mm<br>TD4 temper  | 780/<br>880   | 113/<br>127                                   | 700   | 101        | 2        | ∞    | 230   |         |
| K5<br>CuNi14Al                    | NFL14702   | Cu: remainder<br>Ni: 14<br>Al: 3              | 8,6                 | 9                             | 19                                  | 30                                     | 17   | ≤1,01                          |                                    | 145                | section ≤ 2000 mm <sup>2</sup> - ≤ 3,10 in <sup>2</sup>  | 780           | 113   | 590   | 86         | 10       | ≥215 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | 2000 mm <sup>2</sup> < section ≤ 11000 mm <sup>2</sup> - 3,10 in <sup>2</sup> < section ≤ 17 in <sup>2</sup> | 740           | 107   | 540   | 78         | 7        | ≥205 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | section > 11000 mm <sup>2</sup> - section > 17 in <sup>2</sup>   | 720           | 104   | 500   | 72         | 7        | ≥200 |       |         |
| K7<br>CuNi14Al                    | LN 9468 WL 2,1504-1  | Cu: remainder<br>Ni: 14,5<br>Al: 2,5<br>Fe: 1 | 8,6                 | 9                             | 19                                  | 30                                     | 17   | ≤1,01                          |                                    | 145                | section ≤ 180 mm <sup>2</sup> - ≤ 0,3 in <sup>2</sup>  | 830           | 120   | 690   | 100        | 10       | ≥240 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | 180 mm <sup>2</sup> < section ≤ 2000 mm <sup>2</sup> - 0,3 in <sup>2</sup> < section ≤ 3,1 in <sup>2</sup>   | 780           | 113   | 640   | 93         | 10       | ≥230 |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | 2000 mm <sup>2</sup> < section ≤ 13000 mm <sup>2</sup> - 3,10 in <sup>2</sup> < section ≤ 20 in <sup>2</sup> | 780           | 113   | 590   | 86         | 10       | ≥225 |       |         |
| <b>NICKEL SILVERS (Cu-Ni-Zn)</b>  |  |   |                     |                               |                                     |  |  |                                |                                    |                    |  |               |   |       |            |          |      |       |         |
| ARCAP AP1D                        | UNS C76390   | Cu: remainder<br>Ni : 25<br>Zn : 11,5<br>Pb   | 8,8                 | 4,3                           | 35                                  | 25                                     | 16   |                                |                                    | 145                | rod : 1 ≤ Ø ≤ 29 mm<br>Hard temper   | ≥600          | ≥ 87  | ≥ 500 | ≥ 73       | 2        |      |       |         |
|                                   |  |   |                     |                               |                                     |  |  |                                |                                    |                    | rod : 29 ≤ Ø ≤ 43 mm<br>Hard temper Casting Structure  |               |   |       |            |          |      | ≥ 160 |         |

Copper & Nickel alloys

| Alloy | Standards / Nearest international standards | Nominal composition % | Physical properties |                               |  |  |  |                                |                        |                  | Size and condition | Mechanical properties                         |       |                    |          |     |    |     |
|-------|---|-----------------------|---------------------|-------------------------------|--|--|--|--------------------------------|------------------------|------------------|--------------------|---|-------|--------------------|----------|-----|----|-----|
|       |   |                       | Density             | Electrical conductivity %IACS | Electrical resistivity at 20°C<br>μΩcm | Thermal conductivity 20° to 200°c W/mk | Coefficient of expansion 20° to 200° c x 10 <sup>-6</sup> /K | Relative magnetic permeability | Young's modulus kN/mm2 | Tensile strength |                    | Yield strength 0,2% offset or 0,5% E.U.L. (1) |       | Elongation 5,65 %S | Hardness |     |    |     |
|       |   |                       |                     |                               |  |  |  |                                |                        | Mpa ≥ *          |                    | ksi ≥ *                                       | Mpa ≥ |                    | ksi ≥    | % ≥ | HB | HRB |

ALUMINIUM BRONZES (Cu-Al-Ni-Fe-Si-Sn)

|                       |  |  |     |   |    |    |    |     |     |  |     |     |         |        |      |            |  |          |
|-----------------------|--|--|-----|---|----|----|----|-----|-----|--|-----|-----|---------|--------|------|------------|--|----------|
| AMS 4881              | AMS 4881<br>ASTM B271<br>C95520  | Cu: remainder<br>Al: 11<br>Ni: 5<br>Fe: 5              | 7,5 | 8 | 22 | 40 | 16 | 1,5 | 125 | nominal thickness ≤ 1 in.  | 896 | 130 | 655     | 95     | 3    |            |  | IV<br>28 |
|                       |  |  |     |   |    |    |    |     |     | nominal thickness > 1 in. separately cast specimen                     | 896 | 130 | 655     | 95     | 3    |            |  | IV<br>28 |
|                       |  |  |     |   |    |    |    |     |     | nominal thickness > 1 in. specimen from any area of casting            | 860 | 125 | 621     | 90     | 2    |            |  | IV<br>28 |
| AMS4880               | AMS 4880<br>C95510   | Cu: remainder<br>Al: 10<br>Ni: 5<br>Fe: 3              | 7,6 | 8 | 22 | 40 | 16 | 1,3 | 125 | nominal thickness ≤ 1 in.  | 724 | 105 | 431     | 62,5   | 9    |            |  |          |
|                       |  |  |     |   |    |    |    |     |     | nominal thickness > 1 in. separately cast specimen                     | 724 | 105 | 431     | 62,5   | 9    |            |  |          |
|                       |  |  |     |   |    |    |    |     |     | nominal thickness > 1 in. specimen from any area of casting            | 655 | 95  | 345     | 50     | 8    |            |  |          |
| CA104<br>CuAl10Ni5Fe4 | BS B23, B5 2874<br>DTD 197   | Cu: remainder<br>Al: 10<br>Ni: 5<br>Fe: 4,5<br>Mn: 0,5 | 7,6 | 8 | 22 | 40 | 16 | 1,5 | 125 | rods 16 ≤ Ø ≤ 18 mm  | 700 | 102 | 400     | 58     | 15   | 190        |  |          |
|                       |  |  |     |   |    |    |    |     |     | rods 18 < Ø ≤ 80 mm  | 700 | 94  | 370     | 54     | 12   | 190        |  |          |
|                       |  |  |     |   |    |    |    |     |     | rods Ø > 80 mm   | 650 | 94  | 320     | 46     | 15   | 190        |  |          |
|                       |  |  |     |   |    |    |    |     |     | tubes 50 ≤ Ø ≤ 80, thickness ≥ 10 mm                                   | 700 | 94  | 370     | 54     | 12   | 190        |  |          |
|                       |  |  |     |   |    |    |    |     |     | tubes, rings, discs Ø > 80 mm, thickness ≥ 10 mm                       | 650 | 94  | 320     | 46     | 12   | 190        |  |          |
| NCS<br>CuAl11Ni5Fe5   | NFA 51-116<br>NFL 14-706<br>DIN 17665<br>WN 20978<br>DIN 17672<br>WN 20978<br>EN 12167,<br>EN 12163,<br>EN 12420<br>CW308G   | Cu: remainder<br>Al: 11<br>Ni: 5<br>Fe: 5              | 7,5 | 8 | 22 | 40 | 16 | 1,5 | 125 |  | 740 | 107 | 390     | 57     | 8    | ≥185       |  |          |
|                       |  |  |     |   |    |    |    |     |     | .97 condition  | 740 | 107 | 440     | 64     | 5    | ≥185       |  |          |
| AMS4590               | AMS4590<br>ASTM B150 :<br>C63020   | Cu: remainder<br>Al: 11<br>Ni: 5<br>Fe: 5              | 7,5 | 8 | 22 | 40 | 16 |     | 125 | 19 ≤ Ø ≤ 25,4 - 0,75 in. ≤ Ø ≤ 1 in.                                   | 931 | 135 | 689     | 100    | 6    | 255        |  |          |
|                       |  |  |     |   |    |    |    |     |     | 25,4 < Ø ≤ 50,8 - 1 in. < Ø ≤ 2 in.                                    | 896 | 130 | 655     | 95     | 6    | 255        |  |          |
|                       |  |  |     |   |    |    |    |     |     | 50,8 < Ø ≤ 101,6 - 2 in. < Ø ≤ 4 in.                                   | 896 | 130 | 621     | 90     | 6    | 255        |  |          |
| VNC<br>CuAl10Mn7Fe2   |  | Cu: remainder<br>Al: 9<br>Mn: 7<br>Fe: 2,5             | 7,5 |   |    |    |    |     | 16  | 120  | 690 |     | 320     | 13     | ≥170 |            |  |          |
| NC4<br>CuAl10Ni5Fe4   | ASTM B124-<br>B150- B171:<br>C63000<br>SAE J 463<br>CA 630<br>AMS 4640:<br>C63000<br>DIN 17665,<br>wn 2.0966<br>DIN 17672,<br>wn 2.0966<br>NFL 14705<br>ISO 428 et 1338<br>NFA 51 116<br>EN 12420,<br>EN 12163,<br>EN 12165,<br>EN 12167<br>CW307G | Cu: remainder<br>Al: 10<br>Ni: 5<br>Fe: 4<br>Mn: 0,5   | 7,6 | 8 | 22 | 40 | 16 | 1,5 | 125 | as manufactured temper M   | 690 | 100 | 320     | 46     | 13   | ≥180       |  |          |
|                       |  |  |     |   |    |    |    |     |     | rods 12,7 ≤ Ø ≤ 25,4 mm - 0,5 in. ≤ Ø ≤ 1 in. HR50 temper              | 760 | 110 | 469 (1) | 68 (1) | 10   | 201 to 248 |  |          |
|                       |  |  |     |   |    |    |    |     |     | rods 25,4 < Ø ≤ 50,8 mm - 1 in. < Ø ≤ 2 in. HR50 temper                | 760 | 110 | 413 (1) | 60 (1) | 10   | 201 to 248 |  |          |
|                       |  |  |     |   |    |    |    |     |     | rods 50,8 < Ø ≤ 76,2 mm - 2 in. < Ø ≤ 3 in. HR50 temper                | 723 | 105 | 379 (1) | 55 (1) | 10   | 187 to 241 |  |          |
|                       |  |  |     |   |    |    |    |     |     | Rods 76,2 < Ø ≤ 254 mm - 3 in. < Ø ≤ 10 in. HR50, TQ50 temper          | 689 | 100 | 345 (1) | 50 (1) | 10   | 187 to 241 |  |          |
|                       |  |  |     |   |    |    |    |     |     | tubes Ø ≥ 50 mm - 2 in., thickness ≥ 10 mm - 0,4 in. HR50, TQ50 temper | 689 | 95  | 345 (1) | 50 (1) | 10   | 190        |  |          |

NICKEL ALLOYS

|             |                        |   |      |     |     |    |      |  |     |  |      |     |      |     |    |      |  |  |
|-------------|------------------------|---|------|-----|-----|----|------|--|-----|--|------|-----|------|-----|----|------|--|--|
| NICKEL 206C | DIN 17740<br>Wr 2.4061 | Ni ≥ 99,6<br>C: 0,02 % max                  | 8,89 | 21  | 8,3 | 88 | 13,3 |  | 210 | strip : 0,05 ≤ thickness ≤ 3,5 mm<br>3 ≤ width ≤ 350 mm<br>Annealed temper | ≥380 | ≥55 | ≥150 | ≥22 | 30 | ≥ 80 |  |  |
| NICKEL 400  | ASTM B127<br>N04400    | Cu: 32<br>Ni :63 max<br>Mn:2 max<br>Fe: 1,7 | 8,83 | 3,6 | 55  | 22 | 13,9 |  | 179 | strip : 0,05 ≤ thickness ≤ 3,5 mm<br>3 ≤ width ≤ 350 mm<br>Annealed temper | ≥500 | ≥72 | ≥200 | ≥29 | 30 | ≥100 |  |  |
|             |                        |   |      |     |     |    |      |  |     | wire : 1 ≤ Ø ≤ 12 mm<br>Annealed temper                                    | ≥500 | ≥72 | ≥200 | ≥29 | 30 |      |  |  |



## Alloys for forgings

|                         |   |                       |                     |                               |   |  |  |                                |                         |                                     | Mechanical properties       |                             |   |            |                    |       |          |      |  |
|-------------------------|---|-----------------------|---------------------|-------------------------------|---|--|--|--------------------------------|-------------------------|-------------------------------------|-----------------------------|-----------------------------|---|------------|--------------------|-------|----------|------|--|
| Alloy                   | Standards / Nearest international standards | Nominal composition % | Physical properties |                               |   |  |  |                                |                         | Size and condition                  | Tensile strength            |                             | Yield strength 0.2% offset or 0.5% E.L.L. (f) |            | Elongation 5,65 %S |       | Hardness |      |  |
|                         |   |                       | Density             | Electrical conductivity %IACS | Electrical resistivity at 20°C $\mu\Omega\text{cm}$ | Thermal conductivity 20° to 200°C W/mK | Coefficient of expansion 20° to 200° c x 10 <sup>-6</sup> /K | Relative magnetic permeability | Young's modulus kN/ mm2 |                                     | Mpa $\geq$ ; * = Mpa $\leq$ | ksi $\geq$ ; * = ksi $\leq$ | Mpa $\geq$                                    | ksi $\geq$ | % $\geq$           | HB    | HRB      | HRC  |  |
|                         |   |                       |                     |                               |   |  |  |                                |                         |                                     |                             |                             |   |            |                    |       |          |      |  |
| <b>ALUMINIUM ALLOYS</b> |   |                       |                     |                               |   |  |  |                                |                         |                                     |                             |                             |   |            |                    |       |          |      |  |
| 2618                    |   | AlCu2Mg1,5Ni1Fe       | 2,76                | xxx                           | 0,002   | 920                                    | 22,3   | xxx                            | 75                      | T6                                  | 410                         | 59                          | 340   | 49         | 6                  | > 115 | > 65     | xxx  |  |
| 6082                    |   | AlSiMg1Mn0,5          | 2,71                | xxx                           | 0,004   | 180                                    | 23,5   | xxx                            | 69                      | T6                                  | 315                         | 46                          | 280   | 40         | 12                 | > 95  | > 52     | xxx  |  |
| 7050                    |   | AlZn6CuMgZr           | 2,83                | > 38%                         | 0,004   | 154                                    | 23,5   | xxx                            | 71,5                    | T74                                 | 490                         | 71                          | 420   | 61         | 9                  | > 135 | > 74     | xxx  |  |
| 7075                    |   | AlZn5,-5Cu1,5Mg2,5    | 2,8                 | > 38%                         | 0,005   | 130                                    | 23,5   | xxx                            | 71,5                    | T6                                  | 565                         | 82                          | 495   | 72         | 11                 | > 135 | > 74     | xxx  |  |
| <b>TITANIUM ALLOYS</b>  |   |                       |                     |                               |   |  |  |                                |                         |                                     |                             |                             |   |            |                    |       |          |      |  |
| TA6V                    |   | TiAl6V4               | 4,43                | xxx                           | 0,17  | 6,7                                    | 9  | xxx                            | 110                     | Austenitized / Tempered             | 1000                        | 145                         | 900   | 130        | 18                 | xxx   | xxx      | xxx  |  |
| <b>SUPERALLOYS</b>      |   |                       |                     |                               |   |  |  |                                |                         |                                     |                             |                             |   |            |                    |       |          |      |  |
| Inco 625                |   | NiCr22Mo9Nb           | 8,4                 | xxx                           | 0,129   | 9,8                                    | 13   | xxx                            | 206                     | Austenitized state grade 2 (20°C)   | 750                         | 109                         | 350   | 51         | 60                 | xxx   | xxx      | xxx  |  |
|                         |   |                       |                     |                               |   |  |  |                                |                         | Austenitized state grade 2 (600°C)  | 650                         | 94                          | 250   | 36         | 65                 | < 255 | xxx      | < 25 |  |
|                         |   |                       |                     |                               |   |  |  |                                |                         | Austenitized state grade 2 (700°C)  | 550                         | 80                          | 210   | 30         | 75                 | xxx   | xxx      | xxx  |  |
| Inco 718                |   | NiCr19Fe19Nb-5Mo3     | 8,2                 | xxx                           | 0,125   | 11                                     | 13,5   | xxx                            | 199                     | Austenitized state Tempered (20°C)  | 1360                        | 197                         | 1120  | 162        | 18                 | > 360 | xxx      | > 39 |  |
|                         |   |                       |                     |                               |   |  |  |                                |                         | Austenitized state Tempered (600°C) | 1150                        | 167                         | 1000  | 145        | 19                 | > 350 | xxx      | > 38 |  |
|                         |   |                       |                     |                               |   |  |  |                                |                         | Austenitized state Tempered (700°C) | 1010                        | 146                         | 900   | 130        | 23                 | > 340 | xxx      | > 36 |  |
| <b>SPECIAL STEELS</b>   |   |                       |                     |                               |   |  |  |                                |                         |                                     |                             |                             |   |            |                    |       |          |      |  |
| 17-4Ph                  |   | X5CrNiCuNb16-4        | 7,8                 | xxx                           | xxx   | xxx                                    | 10,4   | xxx                            | 200                     | H900                                | 1310                        | 190                         | 1172  | 170        | 10                 | xxx   | xxx      | xxx  |  |
| 15-5Ph                  |   | X5CrNiCu15-5          | 7,8                 | xxx                           | xxx   | xxx                                    | 10,4   | xxx                            | 200                     | H1025                               | 1120                        | 165                         | 1060  | 155        | 15                 | xxx   | xxx      | xxx  |  |
| 316L                    |   | X2CrNiMo17.12.2       | 7,9                 | xxx                           | 0,076   | 16                                     | 16,8   | xxx                            | 215                     | Austenitized state                  | 500-700                     | 72-102                      | 200   | 29         | 40                 | xxx   | xxx      | xxx  |  |

## Quality

All our certifications and approvals are available on [www.lebronze-alloys.com](http://www.lebronze-alloys.com)

# Uba

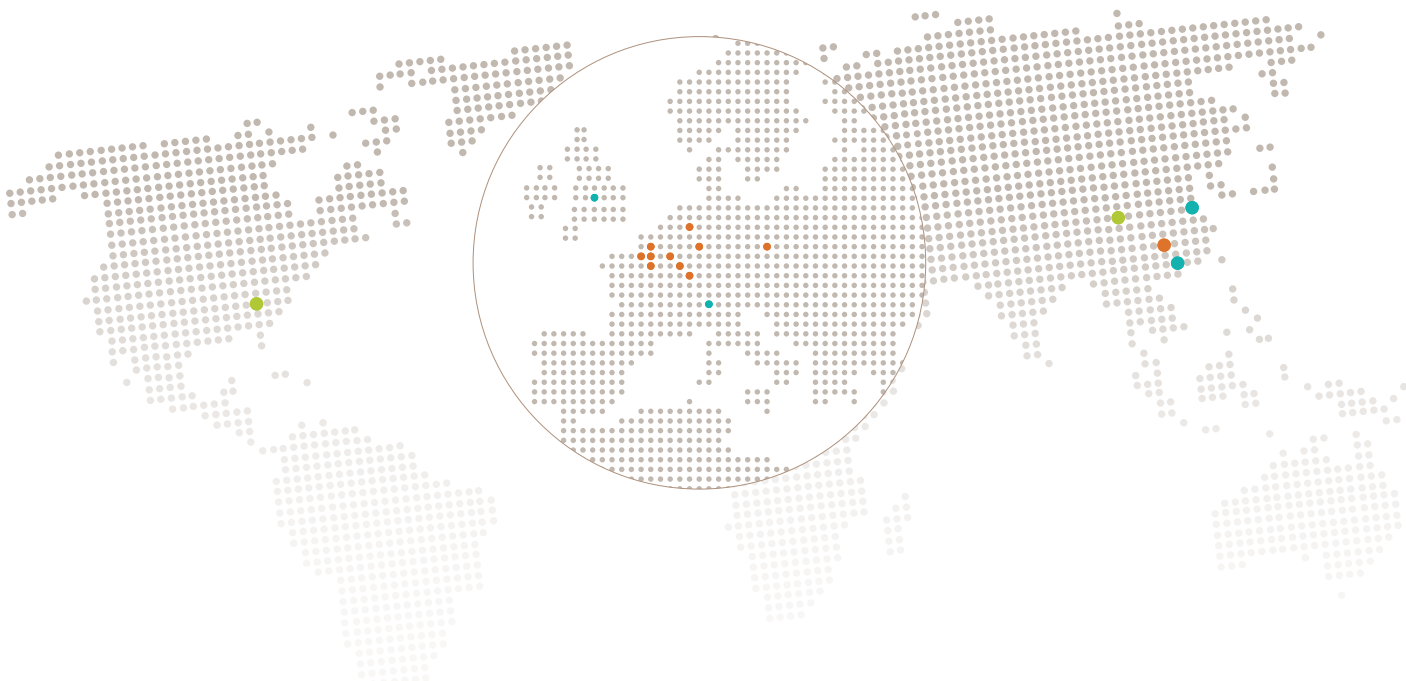
## lebronze alloys

Lebronze alloys Group was born from the integration of different companies specializing in development and production of technical high performance alloys components : copper alloys, nickel alloys, but also aluminium alloys, specialty steels, stainless steels, titanium and nickel superalloys.

Thanks to a multidisciplinary know-how, the Group provides innovative solutions to all major industries such as Aerospace, Power, E-mobility, Oil & Gas, Railway but also in sectors manufacturing smaller equipment and products.

Our 14 production facilities and 1,300 employees manage a unique range of metal processing technologies: continuous and semi-continuous casting, sand casting, die precision chill casting, centrifugal casting, extrusion, ring rolling, 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.



**LT** Lebronze Tuffaloy  
North America

● Greer, SC

Uba  
lebronze alloys

- Bornel
- Breteuil
- Custines
- Dangu
- Sélestat
- Suippes
- Taverny
- Pescheria Borromeo (IT)

Uba  
lebronze alloys | Germany

- Lüdenscheid
- Siegen

Uba  
lebronze alloys | UK

- wolverhampton

**SWLI**

- Xi'an, China

Uba  
lebronze alloys | Poland

- Rydzyna

Uba  
lebronze alloys | Asia

- Hong-Kong

Uba  
lebronze alloys | China

- Dongguan
- Suzhou