

Colsibro® is a precipitation hardening copper nickel silicon that offers a remarkable blend of physical and mechanical attributes unrivalled by many other grades of copper alloy. Its combination of high strength, corrosion resistance, high thermal and electrical conductivity, excellent wear resistance, spark resistance and good cryogenic properties has enabled Colsibro® to find a place in virtually every engineering field, from electrical to mechanical and automotive to marine. Colsibro® is a high copper alloy with small additions of nickel and silicon, which combine to increase the strength, hardness and wear resistance of the material, while retaining many of the physical benefits of copper itself.



Columbia Metals stocks Colsibro® in the fully heat treated condition, which maximises the mechanical strength levels. These are developed by a combination of cold work and heat treatment, with the heat treatment or ageing process forming a nickel silicide precipitate that hardens the metal matrix. This gives Colsibro® a better strength level than many stainless steels and low alloy steels. It also gives Colsibro® the benefit of a yield strength that is approximately 90% that of the ultimate tensile strength, while retaining a good level of ductility. Fully age hardened Colsibro® also offers a high hardness level, an excellent wear resistance, anti-friction properties and very good bearing properties especially under high loading against hardened steels.

Colsibro® has a very good corrosion resistance in many marine and industrial applications and is superior to many other copper-based alloys and copper itself. With a high corrosion resistance in fresh water and sea water, it offers excellent resistance to wet sulphurous atmospheres and a freedom from stress corrosion and hydrogen embrittlement. Combined with a very low magnetic permeability and excellent cryogenic temperature properties, Colsibro® is an ideal choice for use in marine hardware, subsea connector applications and for non-magnetic instrumentation both above and below the waterline.

- HIGH MECHANICAL STRENGTH
- PROOF STRENGTH 90% OF UTS
- EXCELLENT WEAR RESISTANCE
- HIGH ELECTRICAL CONDUCTIVITY
- VERY GOOD CORROSION RESISTANCE
- LOW MAGNETIC PERMEABILITY
- HIGH THERMAL CONDUCTIVITY
- READILY MACHINABLE
- GOOD DUCTILITY AND FORMABILITY
- SPARK RESISTANT

The high copper content of Colsibro® ensures it maintains an impressive thermal and electrical conductivity value. This, combined with its resistance to softening up to ~300°C, a high wear resistance and its mechanical strength makes Colsibro® the perfect selection for high performance engine components such as valve guides, valve seats, gears and bushes. The high

conductivity values are also essential to the specification of Colsibro® in numerous other components including welding electrodes, resistance welding wheels, current-carrying electrical components and connectors, rotary contacts and heavy duty switchgear.

Colsibro® offers good fabrication properties and is readily machined especially in the heat treated condition where close machining tolerances can be held. Forming is possible either hot or cold but both processes are better performed in the solution treated condition with any age hardening treatment being applied to the finished component. It can be soldered, brazed and welded by conventional MIG and TIG methods.

Colsibro® can be used for slip rings, bearing cages, bushes, high strength fasteners, thrust pads, mechanical seals, valve bodies, short circuit rings, plugs and sockets and resistance welding components including wheels and electrodes, flash butt welding dies, masonry fixings and spark resistant safety tools.

**PLEASE CONTACT US FOR AN IMMEDIATE QUOTATION OR TECHNICAL ADVICE**

**North, Scotland & International**

**Tel: 01422 343026**

**Fax: 01422 346587**

[halifaxsales@columbiametals.co.uk](mailto:halifaxsales@columbiametals.co.uk)

[export@columbiametals.co.uk](mailto:export@columbiametals.co.uk)

**South, Midlands & Wales**

**Tel: 01234 608888**

**Fax: 01234 608800**

[sales@columbiametals.co.uk](mailto:sales@columbiametals.co.uk)



## Technical Data

## Nominal Composition (%)

| Cu  | Ni        | Si        |
|-----|-----------|-----------|
| Rem | 1.6 - 2.2 | 0.4 - 0.8 |

## Mechanical Properties (specification minima)

|  | ≤30mm dia | 30 ≤ 50mm dia | 50 ≤ 90mm dia |
|--|-----------|---------------|---------------|
| Ultimate Tensile Strength (N/mm <sup>2</sup> ) | 640       | 600           | 550           |
| 0.2% Proof Strength (N/mm <sup>2</sup> )       | 590       | 510           | 430           |
| Elongation (%)                                 | 10        | 10            | 10            |
| Hardness (HB)                                  | 180       | 165           | 155           |

## Typical Physical Properties

|  |             |
|--|-------------|
| Density (g/cm <sup>3</sup> )                             | 8.87        |
| Melting Range (°C)                                       | 1040 - 1060 |
| Thermal conductivity (20°C; W/m°K)                       | 160         |
| Coeff. Thermal Exp. (0-400°C; m/m°K x 10 <sup>-6</sup> ) | 16.0        |
| Electrical Conductivity (IACS)                           | 35          |
| Magnetic Permeability                                    | ~1.0001     |

## Round Bar Weight and Stock Sizes

| Diameter |       |      | Weight |       |       | Diameter |       |        | Weight |       |      |
|----------|-------|------|--------|-------|-------|----------|-------|--------|--------|-------|------|
| ins      | kg/ft | kg/m | ins    | kg/ft | kg/m  | ins      | kg/ft | kg/m   | ins    | kg/ft | kg/m |
| 4mm      | 0.04  | 0.11 | 1.000  | 1.38  | 4.53  | 2.500    | 8.60  | 28.22  |        |       |      |
| 0.188    | 0.05  | 0.16 | 1.125  | 1.74  | 5.71  | 65mm     | 8.93  | 29.30  |        |       |      |
| 0.250    | 0.08  | 0.27 | 1.250  | 2.15  | 7.05  | 3.000    | 12.38 | 40.62  |        |       |      |
| 0.375    | 0.19  | 0.61 | 1.375  | 2.60  | 8.53  | 3.250    | 14.53 | 47.67  |        |       |      |
| 10mm     | 0.21  | 0.69 | 35mm   | 2.59  | 8.50  | 3.500    | 16.82 | 55.19  |        |       |      |
| 0.500    | 0.34  | 1.11 | 1.500  | 3.09  | 10.14 | 90mm     | 17.12 | 56.17  |        |       |      |
| 0.563    | 0.43  | 1.42 | 1.625  | 3.63  | 11.91 | 4.000    | 21.87 | 71.75  |        |       |      |
| 0.625    | 0.54  | 1.77 | 1.750  | 4.16  | 13.65 | 4.250    | 24.84 | 81.50  |        |       |      |
| 0.688    | 0.66  | 2.15 | 1.875  | 4.83  | 15.85 | 5.000    | 34.40 | 112.87 |        |       |      |
| 0.750    | 0.77  | 2.53 | 2.000  | 5.50  | 18.04 | 5.500    | 41.60 | 136.49 |        |       |      |
| 0.875    | 1.00  | 3.29 | 2.250  | 6.96  | 22.83 | 6.000    | 49.52 | 162.47 |        |       |      |

## Hexagon

0.500" - 3.000" A/F  
in a comprehensive range

## Flat/Square Bar

Flat: wide range of sizes  
Square: 1.000" - 3.000"

NB Weight data for guidance only

