FINAL ADVANCED MATERIALS

**DATA SHEET**

Rev. N° 0 - 25.05.2023

# 7MG.018
# Copper

## Summary



Physical variables included in this documentation are provided by way of indication only and do not, under any circumstances, constitute a contractual undertaking. Please contact our technical service if you require any additional information.


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## Overview

Copper is an orange-coloured material with the chemical symbol Cu. It has a great variety of applications as it is ductile and malleable and has particularly high electrical and thermal conductive properties.

Copper is one of the most commonly used materials in the industrial sector, in particular in general mechanics. Its conductive properties and its technical and chemical characteristics make it a preferred material for the creation of a wide variety of parts. However, it has low mechanical resistance and can easily be deformed. It is therefore important to blend it with other materials to increase its resistance. Copper oxidises naturally in moisture and forms verdigris.

Machining it requires expertise and appropriate equipment to ensure satisfactory quality.

## Applications

- Construction: plumbing, plumbing fixtures, pipes, heating, roofs, lifts, fire systems
- Electrical and electronic equipment
- Telecommunications field
- Industry and equipment sectors
- Transport
- Renewable energies
- Musical instruments


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## Benefits (depending on grade)

- High thermal and electrical conductivity
- Low melting temperature
- A naturally antibacterial material
- Satisfactory ductility
- Recyclable
- Weldable
- Average mechanical strength

## Main characteristics

| Property | | Unit | CuA1/CuETP | CRM16/CuCrZr |
|---|---|---|---|---|
| Composition | Cu | Wt. % | ≥ 99.90 | 99.5 |
| | Bi | | ≤ 0.0005 | - |
| | O | | ≤ 0.04 | - |
| | Pb | | ≤ 0.03 | - |
| | Others | | ≤ 0.03 | < 0.02 |
| | Cr | | - | 0.5 - 1.2 |
| | Zr | | - | 0.03 - 0.25 |
| | Fe | | - | < 800 |
| | Si | | - | < 1 000 |
| Density (ρ) | | $kg/m^3$ | 8,900 | 8,900 |
| Electrical resistivity | | MS/m | < 1.72 | NC |
| Thermal conductivity (λ) | | $W.m^{-1}.K^{-1}$ | 394 | 320 |
| Elastic modulus (E) | | $kN/mm^2$ | 127 | 120 |
| Melting point | | °C | 1.084 | 1.080 |
| Coefficient of linear expansion | | $10^{-6}$ /°C | 17.7 from 20 to 300 °C | 17 from 20 to 300 °C |
| Thermal conductivity 20°C | | W/m °K | 394 | 330 |
| Specific electric resistance | | µΩ.m | 1.72 | NC |
| Typical electric conductivity | | MS/m | 58 | ≥ 50 |
| Typical electric conductivity | | % IACS | 100 | ≥ 86 |
| Specific heat | | J/(gK) | 0.386 | NC |
| Magnetic property | | | Non-magnetic | Magnetic permeability |
| Yield point ($Rp_{0,2}$) | | $N/mm^2$ | 180 | > 255 |
| Tensile strength | | $N/mm^2$ | 240 | > 370 |
| Elongation at break ($A_5$) | | % | > 15 | > 18 |
| Brinell hardness | | HB | > 65 | > 125 |

The compositions may vary for the same reference depending on the manufacturer. If different mechanical characteristics requiring heat treatment or strain hardening are required, please contact us.

# Machining capacities

**Specific capacity limits:**

Turning: Up to Ø90 mm and 600 mm in length
Loading of max. length 3,000 mm bar material

Milling: Up to a thickness of 200 mm (must be approved according to the plan)

Free-cutting: Up to Ø20 mm max.

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| Alloy | | Technological and usage properties | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Mechanical resistance | Machinability | Weldability | Cold malleability | Hot malleability | Corrosion resistance | Suitability for anodising |
| 1000 | Al | ★ | ★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ | ★★★★ |
| 2000 | Al Cu | ★★★★ | ★★★★ | - | ★ | ★★★ | ★ | ★★ |
| 3000 | Al Mn | ★★ | ★★★★ | ★★★★ | ★★★ | ★★★ | ★★★★ | ★★★ |
| 5000 | Al Mg | ★★★★ | ★★ | ★★★★ | ★★★ | ★ | ★★★★ | ★★★★ |
| 6000 | Al Si Mg | ★★ | ★ | ★★★ | ★★★ | ★★★★ | ★★★★ | ★★★★ |
| 7000 | AL Zn Mg Cu | ★★★★ | ★★★ | - | ★ | ★★ | ★ | ★★★ |