Shropshire Stainless & Aluminium Ltd

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# C101 / CW004A - Copper

Electrolytic Tough Pitch Copper (ETP) C101 / CW004A is a commercially pure high conductivity grade of copper refined by electrolytic deposition which is then melted and oxidised to the "tough pitch" condition with a controlled low oxygen content. This is the most widely used of all the coppers because of its combination of electrical and thermal conductivity, corrosion resistance, workability and aesthetic beauty.
C101 / CW004A is the normal grade for general electrical use as busbar, motor and transformer components, windings and many other current carrying applications. It is also very popular with architects for applications where the corrosion resistance is required for building applications. Over time the C101 will also develop the weathered copper, green patina, appearance that offers additional corrosion resistance and a desirable look.
The use of this alloy in elevated temperature environments can be limited due to oxygen being present in the form of $Cu_2O$. This can cause the alloy to be susceptible to hydrogen embrittlement in reducing gasses or when welding or brazing using an oxy-fuel gas flame.

## Related Specifications

| | |
|---|---|
| C11000 ETP | BS13601 CW004A |
| BS1433 | Cu-ETP |
| DIN 2.0060 | |

## Chemical Composition

| | |
|---|---|
| Copper | 99.85% min |
| Oxygen | 0.013 – 0.050 % |
| Total Imps | 0.06% max |

## Key Features

- Very High Electrical Conductivity
- Excellent formability
- Very Good Thermal Conductivity
- Excellent Joining Characteristics

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## Typical Physical Properties

| | |
|---|---|
| Melting Point | 1083°C |
| Density | 8.92 g/cm³ |
| Specific heat | 385 J/Kg °K |
| Thermal conductivity | 393 W/m°C |
| Thermal expansion coefficient (20-200°C) | 17.3 x $10^{-6}$ °C |
| Electrical conductivity | 100 % IACS |
| Electrical resistivity | 0.0172 x$10^{-6}$ microhm /m |
| Modulus of elasticity | 118000 N/mm² |

## Fabrication Properties

| | |
|---|---|
| Hot Working Temperature Range | 750-950°C |
| Hot Formability | Good |
| Cold Formability | Excellent |
| Cold reduction between anneals | 90% max. |
| Machinability rating (free cutting brass = 100) | 20% |
| Annealing Temp. Range | 200-650°C |
| Stress Relieving Temp. Range | 150-200°C |

## Joining Methods

| | |
|---|---|
| Soldering | Excellent |
| Brazing | Good |
| Oxy-acetylene welding | Less Suitable |
| Gas-shielded arc welding | Fair |
| Resistance welding: Spot and Seam, Butt | Not Recomended, Good |

## Typical Uses:

- Electrical busbar
- Motor and transformer components
- Windings, electrical conductors, contacts, terminals and many other current carrying applications.
- Architectural metalwork
- Gutters, flashing & roofing
- Automotive and industrial radiators
- Vats, kettles and pans.