# ALLOY SPECIFICATION

## CuAl10Fe5Ni5-C (CC333G)  EN 1982

**CuAl10Fe5Ni5 Bronze: A High-Strength Alloy for Extreme Environments**

Bronze alloys are renowned for their exceptional mechanical properties, wear resistance, and versatility in demanding applications. Among these, **CuAl10Fe5Ni5 bronze** (also known as CC333G or C95500) stands out as a high-performance material, particularly for applications requiring high strength, wear resistance, and corrosion resistance in extreme environments. In this blog post, we'll explore the specifications, mechanical properties, international standards, and unique characteristics of CuAl10Fe5Ni5 bronze, highlighting why this alloy is a trusted choice for engineers and manufacturers.

## 1. - Requirements

**What is CuAl10Fe5Ni5 Bronze?**

CuAl10Fe5Ni5 is an aluminum bronze alloy composed primarily of copper (Cu), aluminum (Al), iron (Fe), and nickel (Ni), with small amounts of other elements to enhance its properties. Its chemical composition, as per the **EN 1982 standard**, is as follows:

| Chemical Composition (%) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Al | Cu | Fe | Mn | Ni | Bi | Cr | Mg | Pb | Si | Sn | Zn |
| Min. | 8,5 | 76,0 | 4,0 | - | 4,0 | - | - | - | - | - | - | - |
| Max. | 10,5 | 83,0 | 5,5 | 3,0 | 6,0 | 0,01 | 0,05 | 0,05 | 0,03 | 0,1 | 0,1 | 0,50 |

The addition of aluminum (Al), iron (Fe), and nickel (Ni) significantly enhances the alloy's strength, wear resistance, and corrosion resistance, making it ideal for extreme environments such as seawater and high-temperature applications.

**Mechanical Properties of CuAl10Fe5Ni5 Bronze**

CuAl10Fe5Ni5 bronze exhibits exceptional mechanical properties, which are consistent across different casting processes. Below are the minimum values as per the EN 1982 standard:

| Mechanical properties (Minimun values) | | | | |
|---|---|---|---|---|
| Casting process and designation | Tensile strength $R_m$ (MPa) | 0,2% proof strength $R_{p0,2}$ (MPa) | Elongation 5D A (%) | HBW (10-1000) |
| Continuous(GC) | 650 | 280 | 13 | 150 |
| Centrifugal (GZ) | 650 | 280 | 13 | 150 |

The specified mechanical property requirements are applicable to components with an external diameter of up to 300 mm. For continuous castings exceeding this size, the mechanical property criteria should be mutually agreed upon by the supplier and the purchaser.

## 2. - International Standards for CuAl10Fe5Ni5 Bronze

CuAl10Fe5Ni5 bronze is recognized and standardized across various global markets. Here's a quick overview of its closest international equivalents:

| Standard | | Alloy | Status |
|---|---|---|---|
| Europe | BS 1400<br>DIN 1714<br>NFA-53709 | AB2<br>CuAl10Ni<br>CuAl10Fe5Ni5 | Withdrawn |
| USA | ASTM B505<br>ASTM B271 | C95500 | Active |
| Australia | AS 1565 | C95810 | Active |
| Japan | JIS H5121<br>JIS H5120 | CAC703C<br>CAC703 | Active |
| ISO | 1338 | CuAl10Fe5Ni5 | Withdrawn |

## 3. - Optional Heat Treatments

To further enhance the performance of CuAl10Fe5Ni5 bronze components, manufacturers can apply optional heat treatments at the client's request. These include:

• **Stress Relieving**: Reduces internal stresses caused by machining or casting, improving dimensional stability and fatigue resistance.
• **Dealumination**: A specialized treatment to reduce aluminum content in specific areas, enhancing corrosion resistance in certain environments

These treatments allow for customization based on the operational demands of the component, ensuring optimal performance in even the most challenging environments.

## 4. - Technical Characteristics of CuAl10Fe5Ni5 Bronze

CuAl10Fe5Ni5 bronze is celebrated for its unique combination of technical characteristics, which include:

• **High Strength and Hardness**: Ideal for applications involving high static and dynamic loads.
• **Wear Resistance**: Excellent resistance to wear, making it suitable for high-stress environments.
• **Corrosion Resistance**: Highly resistant to corrosion, particularly in seawater environments.
• **High-Temperature Performance**: Suitable for working conditions up to **300°C (572°F)**, ensuring reliability in high-temperature environments.
• **Oxidation Resistance**: Resistant to oxidation at elevated temperatures, making it ideal for high-temperature applications.
• **Erosion and Cavitation Resistance**: Performs well in environments prone to erosion and cavitation, such as marine and hydraulic systems.
• **Challenging Machinability**: Due to its high strength and hardness, machining CuAl10Fe5Ni5 bronze can be challenging, but it is achievable with the right tools and techniques.

## 5. - Applications of CuAl10Fe5Ni5 Bronze

Thanks to its unique properties, CuAl10Fe5Ni5 bronze is widely used in various industries, including:

- **Marine Engineering**: Propeller shafts, pump components, and seawater valves.
- **Heavy Machinery**: Gears, bushings, and thrust washers.
- **Industrial Equipment**: Bearings and sliding surfaces for high-temperature and high-stress environments.
- **Hydraulic Systems**: Components resistant to erosion and cavitation.

## 6. - Conclusion

CuAl10Fe5Ni5 bronze (CC333G) is a high-performance alloy that delivers exceptional strength, wear resistance, and corrosion resistance in extreme environments. Its unique combination of properties makes it a preferred choice for engineers and manufacturers worldwide. Whether you're designing marine equipment, heavy machinery, CuAl10Fe5Ni5 bronze offers the reliability and performance you need.

If you're considering CuAl10Fe5Ni5 bronze for your next project, consult with your supplier about optional heat treatments to maximize its potential. With the right approach, CuAl10Fe5Ni5 bronze components can deliver unmatched performance and longevity.

**Have you used CuAl10Fe5Ni5 bronze in your projects? Share your experiences and insights in the comments below!**