

|                                                                                                                                                                                                                                                      |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| <div>Datasheet:</div> <div>EN CuAl10Fe5Ni5 / CC333G</div> <div>Classic Bronze</div> <div>Bars &amp; Rods for general purposes</div> <div>Alumeco ApS</div> <div>02-04-2025</div>                                                                     |  |  |  |  | <div>Internal alloy name: CC333G</div> <div>Metal: Bronze</div> <div>Chemical Symbol: CuAl10Fe5Ni5</div> <div>EN: CuAl10Fe5Ni5-C</div> <div>UNS: C95800</div> <div>SIS: -</div> <div>GB: -</div> <div>JIS: -</div> <div>Also known as: Aluminium Bronze</div> <div>Alloy type: Classic bronze</div>                                                      |  |  |  |  |  |  |
| <div>Main usage:</div> <div><div><div>Bearings and sliding elements</div><div>Highly stressed components, e.g. worm and helical wheels/gears</div><div>Pump housing and components, fittings</div><div>Marine operation, propeller</div></div></div> |  |  |  |  | <div>Important norms and literature:</div> <div>General Standards</div> <div>EN 1982:2024: Copper and copper alloys – Ingots and castings</div> <div>Geometric Tolerance</div> <div>EN 12163:2024: Copper and copper alloys – Rod for general purposes</div> <div>EN 12167:2016: Copper and copper alloys – Profiles and bars for general purposes</div> |  |  |  |  |  |  |
| <div>Main properties:</div> <div><div><div>High strength</div><div>Good wear resistance</div><div>Good resistance to corrosion against air, water/seawater and some weak acids</div></div></div>                                                     |  |  |  |  |                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |

|                                         |            |           |          |           |           |           |           |           |          |          |           |
|-----------------------------------------|------------|-----------|----------|-----------|-----------|-----------|-----------|-----------|----------|----------|-----------|
| Chemical composition in %: EN 1982:2024 |            |           |          |           |           |           |           |           |          |          |           |
| Cu                                      | Al         | Fe        | Mn       | Ni        | Bi        | Cr        | Mg        | Pb        | Si       | Sn       | Zn        |
| 76 – 83                                 | 8,5 – 10,5 | 4,0 – 5,5 | Max. 3,0 | 4,0 – 6,0 | Max. 0,01 | Max. 0,05 | Max. 0,05 | Max. 0,03 | Max. 0,1 | Max. 0,1 | Max. 0,50 |

|                                     |  |                                                |                                                      |                           |                         |
|-------------------------------------|--|------------------------------------------------|------------------------------------------------------|---------------------------|-------------------------|
| Mechanical properties: EN 1982:2024 |  |                                                |                                                      |                           |                         |
| Casting process and designation     |  | Tensile Strength<br>R <sub>m</sub><br>MPa Min. | 0,2% proof strength<br>R <sub>p0,2</sub><br>MPa Min. | Elongation<br>A<br>% Min. | Hardness<br>HBW<br>Min. |
| Continuous GC                       |  | 650                                            | 280                                                  | 13                        | 150                     |
| Centrifugal GZ                      |  | 650                                            | 280                                                  | 13                        | 150                     |

\* Information values only;

|                                         |                            |                                  |                                          |                                                                          |                             |                                               |
|-----------------------------------------|----------------------------|----------------------------------|------------------------------------------|--------------------------------------------------------------------------|-----------------------------|-----------------------------------------------|
| Physical properties:                    |                            |                                  |                                          |                                                                          |                             |                                               |
| Density<br>(20 °C)<br>g/cm <sup>3</sup> | Solidification range<br>°C | Electrical conductivity<br>%IACS | Thermal conductivity<br>(20 °C)<br>W/m K | Thermal expansion<br>(20 - 300 °C)<br>µm m <sup>-1</sup> K <sup>-1</sup> | Annealing temperature<br>°C | E – modulus<br>(20 °C)<br>N / mm <sup>2</sup> |
| 7,64                                    | 1040 – 1060                | 7                                | 42                                       | 17                                                                       | -                           | 114000                                        |

|                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                          |                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Properties and information's (3 Excellent; 2 Good; 1 Poor/not recommendable)                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                          |                                                                                                                                                                        |
| <div>Machinability (Zerspanbarkeitsindex): 50*</div> <div>*(CuZn39Pb3 = 100)</div> <div>Forming Methods:</div> <div>Hot Formability: 1</div> <div>Cold Formability: 1</div> <div>Corrosion resistance:</div> <div>Atmosphere: 2-3</div> <div>Waters and alkaline: 2</div> <div>Acids, Ammonia, etc.: 1</div> | <div>Joining Methods:</div> <div>Soldering: 2</div> <div>Brazing: 1-2</div> <div>Oxy-acetylene welding: 1</div> <div>Gas-shielded arc welding: 2</div> <div>TIG welding: 2</div> <div>MIG welding: 2</div> <div>Gluing/adhesion: 2</div> | <div>Surface Treatment:</div> <div>Polishing:</div> <div>Mechanical: 1-2</div> <div>Electrolytic/chemical: 2</div> <div>Galvanizing: 2</div> <div>Hot Dipping: 2</div> |

## Tolerances for Bars of CC333G (Rods below)

Dimensions: EN 12167:2016\*

### Tolerances on width and thickness of bar

| Nominal thickness<br>t (mm) | Tolerance<br>on width | Tolerance on thickness for range of thickness (mm) |            |             |             |             |             |
|-----------------------------|-----------------------|----------------------------------------------------|------------|-------------|-------------|-------------|-------------|
|                             |                       | 3 < t ≤ 6                                          | 6 < t ≤ 10 | 10 < t ≤ 18 | 18 < t ≤ 30 | 30 < t ≤ 50 | 50 < t ≤ 60 |
| Class A tolerance           |                       |                                                    |            |             |             |             |             |
| 3 ≤ t ≤ 18                  | ± 0,27                | ± 0,18                                             | ± 0,22     | ± 0,27      | -           | -           | -           |
| 18 < t ≤ 30                 | ± 0,33                | ± 0,18                                             | ± 0,22     | ± 0,27      | ± 0,33      | -           | -           |
| 30 < t ≤ 50                 | ± 0,62                | ± 0,22                                             | ± 0,27     | ± 0,33      | ± 0,45      | ± 0,62      | -           |
| 50 < t ≤ 80                 | ± 1,20                | ± 0,27                                             | ± 0,33     | ± 0,45      | ± 0,52      | ± 0,74      | ± 1,00      |
| 80 < t ≤ 120                | ± 2,20                | ± 0,33                                             | ± 0,45     | ± 0,52      | ± 0,74      | ± 1,00      | ± 1,20      |
| Class B tolerance           |                       |                                                    |            |             |             |             |             |
| 3 ≤ t ≤ 18                  | ± 0,15                | ± 0,10                                             | ± 0,12     | ± 0,15      | -           | -           | -           |
| 18 < t ≤ 30                 | ± 0,22                | ± 0,10                                             | ± 0,12     | ± 0,15      | ± 0,22      | -           | -           |
| 30 < t ≤ 50                 | ± 0,30                | ± 0,13                                             | ± 0,15     | ± 0,18      | ± 0,22      | ± 0,30      | -           |
| 50 < t ≤ 80                 | ± 0,37                | ± 0,16                                             | ± 0,18     | ± 0,22      | ± 0,30      | ± 0,37      | -           |
| 80 < t ≤ 120                | ± 0,45                | ± 0,18                                             | ± 0,22     | ± 0,27      | ± 0,35      | ± 0,45      | -           |

\* Values are referred from Table 17 of EN 12167:2016

Dimensions: EN 12167:2016\*

### Tolerances on length of bar

| Nominal width $w$ (mm) | Preferred (available) lengths (mm) | Tolerance on length (mm) |
|------------------------|------------------------------------|--------------------------|
| $3 \leq w \leq 18$     | 3000, 4000                         | $\pm 50$                 |
| $18 < w \leq 30$       | 3000, 4000                         | $\pm 100$                |
| $30 < w \leq 50$       | 2000, 3000, 4000                   | $\pm 150$                |
| $50 < w \leq 80$       | 2000, 3000                         | $\pm 200$                |
| $80 < w \leq 120$      | 1000, 2000                         | $\pm 200$                |

\* Values are referred from Table 18 of EN 12167:2016

Dimensions: EN 12167:2016\*

### Tolerances on straightness of bar, for widths 10 mm and over

| Tolerance class | Maximum deviation from straightness (mm) |                                                        |
|-----------------|------------------------------------------|--------------------------------------------------------|
|                 | Localized over any 400 mm length         | Over whole length $L$ of bar in metres ( $L \geq 1m$ ) |
| A               | 2,4                                      | $6,0 * L$                                              |
| B               | 1,6                                      | $4,0 * L$                                              |
| C               | 0,8                                      | $2,0 * L$                                              |

\* Values are referred from Table 19 of EN 12167:2016

Dimensions: EN 12167:2016\*

### Maximum twist of bar

| Nominal width $w$ (mm) | Maximum permitted twist $V$ in any 1000 mm length of bar (See Figure 2 in EN 12167:2016) |         |         |
|------------------------|------------------------------------------------------------------------------------------|---------|---------|
|                        | Class A                                                                                  | Class B | Class C |
| $3 \leq w \leq 18$     | 2,0                                                                                      | 1,5     | 1,0     |
| $18 < w \leq 30$       | 3,0                                                                                      | 2,3     | 1,5     |
| $30 < w \leq 50$       | 4,0                                                                                      | 3,0     | 2,0     |
| $50 < w \leq 80$       | 6,0                                                                                      | 4,5     | 3,0     |
| $80 < w \leq 120$      | 9,0                                                                                      | 9,0     | 4,5     |

For bar of total length greater than 2000 mm, the permitted twist over the total length shall be twice the appropriate maximum given in the table for "in any 1000 mm".

\* Values are referred from Table 20 of EN 12167:2016

Dimensions: EN 12167:2016\*

### Corner radii of bar

| Nominal thickness $t$ (mm) | Radii of corners |               |
|----------------------------|------------------|---------------|
|                            | Sharp max.       | Rounded range |
| $3 \leq t \leq 6$          | 0,3              | 0,3 – 0,5     |
| $6 < t \leq 10$            | 0,4              | 0,4 – 0,8     |
| $10 < t \leq 18$           | 0,5              | 0,5 – 1,2     |
| $18 < t \leq 30$           | 0,6              | 0,6 – 1,8     |
| $30 < t \leq 40$           | 0,7              | 0,7 – 2,8     |
| $40 < t \leq 60$           | 0,8              | 0,8 – 4,0     |

NOTE: A bar having rounded corners of radius greater than those covered by this table is considered to be a profile

\* Values are referred from Table 21 of EN 12167:2016

## Tolerances for Rods of CC333G

Dimensions: EN 12163:2024\*

### Dimensional tolerances for rod

| Nominal diameter or width across-flats | Tolerances |            |
|----------------------------------------|------------|------------|
|                                        | Class A    | Class B    |
| $1,6 \leq d/w \leq 3$                  | $\pm 0,10$ | $\pm 0,05$ |
| $3 < d/w \leq 6$                       | $\pm 0,15$ | $\pm 0,08$ |
| $6 < d/w \leq 10$                      | $\pm 0,20$ | $\pm 0,11$ |
| $10 < d/w \leq 18$                     | $\pm 0,25$ | $\pm 0,14$ |
| $18 < d/w \leq 30$                     | $\pm 0,30$ | $\pm 0,17$ |
| $30 < d/w \leq 50$                     | $\pm 0,60$ | $\pm 0,20$ |
| $50 < d/w \leq 80$                     | $\pm 0,70$ | $\pm 0,37$ |

\* Values are referred from Table 17 of EN 12163:2024

Dimensions: EN 12163:2024\*

### Tolerances on straightness of rod

| Nominal diameter or width across-flats | Maximum deviation from straightness (See Figure 1 in EN 12163:2024) |                                                       |
|----------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------|
|                                        | $h_2$<br>depth of arch in any length $l_2$ of 400 mm                | $h_1$<br>depth of arch in any length $l_1$ of 1000 mm |
| $10 \leq d/w \leq 50$                  | 2,5                                                                 | 6,0                                                   |

\* Values are referred from Table 18 of EN 12163:2024

Dimensions: EN 12163:2024\*

### Corner radii for square and polygonal rod

| Nominal width across-flats | Radii for sharp and rounded corners |               |
|----------------------------|-------------------------------------|---------------|
|                            | Sharp max.                          | Rounded range |
| $1,6 \leq w \leq 3$        | 0,2                                 | 0,2 – 0,3     |
| $3 < w \leq 6$             | 0,3                                 | 0,3 – 0,5     |
| $6 < w \leq 10$            | 0,4                                 | 0,4 – 0,8     |
| $10 < w \leq 18$           | 0,5                                 | 0,5 – 1,2     |
| $18 < w \leq 30$           | 0,6                                 | 0,6 – 1,8     |
| $30 < w \leq 50$           | 0,7                                 | 0,7 – 2,8     |
| $50 < w \leq 80$           | 0,8                                 | 0,8 – 4,0     |

\* Values are referred from Table 19 of EN 12163:2024

Dimensions: EN 12163:2024\*

### Maximum twist of square and polygonal rod

| Nominal width across-flats $w$ | Maximum permitted twist $V$ in any 1 m length of rod |
|--------------------------------|------------------------------------------------------|
| $10 \leq w \leq 18$            | 2,0                                                  |
| $18 < w \leq 30$               | 3,0                                                  |
| $30 < w \leq 60$               | 4,0                                                  |

\* Values are referred from Table 20 of EN 12163:2024

Dimensions: EN 12163:2024\*

### Sampling rate

| Nominal width across-flats $w$ (mm) | Mass of inspection lot for one test sample<br>kg |
|-------------------------------------|--------------------------------------------------|
| $w \leq 25$                         | $\leq 1000$                                      |
| $25 < w$                            | $\leq 2000$                                      |

\* Values are referred from Table 21 of EN 12163:2024