

|                                                                                                                                                                                                                                                      |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|-----------|
| <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>                                                     |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| <div>Chemical composition in %: EN 1982:2024</div>                                                                                                                                                                                                   |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| 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 |
| <div>Mechanical properties: EN 1982:2024</div>                                                                                                                                                                                                       |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| Casting process and designation                                                                                                                                                                                                                      |                      | Tensile Strength<br>R <sub>m</sub> |                                 | 0,2% proof strength<br>R <sub>p0,2</sub>                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                          | Elongation<br>A        |           | Hardness<br>HBW                                                                                                                                                               |          |          |           |
|                                                                                                                                                                                                                                                      |                      | MPa Min.                           |                                 | MPa Min.                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                          | % Min.                 |           | Min.                                                                                                                                                                          |          |          |           |
| Continuous GC                                                                                                                                                                                                                                        |                      | 650                                |                                 | 280                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                          | 13                     |           | 150                                                                                                                                                                           |          |          |           |
| Centrifugal GZ                                                                                                                                                                                                                                       |                      | 650                                |                                 | 280                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                          | 13                     |           | 150                                                                                                                                                                           |          |          |           |
| <div>* Information values only;</div>                                                                                                                                                                                                                |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| <div>Physical properties:</div>                                                                                                                                                                                                                      |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| Density<br>(20 °C)                                                                                                                                                                                                                                   | Solidification range | Electrical conductivity            | Thermal conductivity<br>(20 °C) | Thermal expansion<br>(20 - 300 °C)                                                                                                                                                                                                            | Annealing temperature                                                                                                                                                                                                                                                                                                                                    | E – modulus<br>(20 °C) |           |                                                                                                                                                                               |          |          |           |
| g/cm <sup>3</sup>                                                                                                                                                                                                                                    | °C                   | %IACS                              | W/m K                           | µm m <sup>-1</sup> K <sup>-1</sup>                                                                                                                                                                                                            | °C                                                                                                                                                                                                                                                                                                                                                       | N / mm <sup>2</sup>    |           |                                                                                                                                                                               |          |          |           |
| 7,64                                                                                                                                                                                                                                                 | 1040 – 1060          | 7                                  | 42                              | 17                                                                                                                                                                                                                                            | -                                                                                                                                                                                                                                                                                                                                                        | 114000                 |           |                                                                                                                                                                               |          |          |           |
| <div>Properties and information's (3 Excellent; 2 Good; 1 Poor/not recommendable)</div>                                                                                                                                                              |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| <div>Machinability (Zerspanbarkeitsindex): 50*</div> <div>*(CuZn39Pb3 = 100)</div>                                                                                                                                                                   |                      |                                    |                                 | <div>Joining Methods:</div> <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> |                                                                                                                                                                                                                                                                                                                                                          |                        |           | <div>Surface Treatment:</div> <div><div>Polishing:</div><div>Mechanical: 1-2</div><div>Electrolytic/chemical: 2</div><div>Galvanizing: 2</div><div>Hot Dipping: 2</div></div> |          |          |           |
| <div>Forming Methods:</div> <div><div>Hot Formability: 1</div><div>Cold Formability: 1</div></div>                                                                                                                                                   |                      |                                    |                                 |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                          |                        |           |                                                                                                                                                                               |          |          |           |
| <div>Corrosion resistance:</div> <div><div>Atmosphere: 2-3</div><div>Waters and alkaline: 2</div><div>Acids, Ammonia, etc.: 1</div></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