

**Table 8: Wrought Low-Alloyed Copper Alloys – Compositions, Uses, Typical Mechanical Properties, Relevant Standards and Approximate Electrical Conductivity**

| Material Designation                              |        | Composition, %, Range or max |         |         |         |             |         |                                   | Nearest Old BS Equivalent | Characteristics and Uses   | Typical Mechanical Properties   |                |             |                                  | Inclusion in the following EN Standards with Indicated Material Conditions (1) |         |                        |               |       |                           |                           |           | Approx. Conductivity % IACS |       |
|---|--------|------------------------------|---------|---------|---------|-------------|---------|-----------------------------------|---------------------------|--|---|----------------|-------------|----------------------------------|--|---------|------------------------|---------------|-------|---------------------------|---------------------------|-----------|-----------------------------|-------|
|   |        |                              |         |         |         |             |         |                                   |                           |  |   |                |             |                                  | 1652   | 1654    | 12163                  | 12164         | 12165 | 12166                     | 12167                     | 12168     |                             | 12449 |
| Symbol  | Number | Cu                           | Be      | Cr      | Ni      | P           | Si      | Others & Total Impurities         |                           | 0.2% Proof Strength (N/mm <sup>2</sup> )   | Tensile Strength (N/mm <sup>2</sup> )   | Elongation (%) | Hardness HV | Plate, Strip, Sheet, Circles (2) | Strip for Springs, Connectors  | Rod (2) | Rod for Free Machining | Forging Stock | Wire  | Profiles, Rectangular Bar | Free Machining Hollow Rod | Tubes (2) |                             |       |
| <b>Heat-treatable Alloys</b>                      |        |                              |         |         |         |             |         |                                   |                           |  |   |                |             |                                  |  |         |                        |               |       |                           |                           |           |                             |       |
| CuBe1.7   | CW100C | Rem.                         | 1.6-1.8 |         |         |             |         | 0.5                               | CB101                     | High strength beryllium coppers for springs and pressure sensitive devices. CW102C is the free machining version.  | 200-1100  | 410-1300       | 35-3        | 100-400                          |  | RHYB    |                        |               |       |                           |                           |           | 30                          |       |
| CuBe2   | CW101C | Rem.                         | 1.8-2.1 |         |         |             |         | 0.5                               | -                         |  | 200-1300  | 410-1400       | 20-2        | 100-420                          | RH   | RHYB    | MRH                    |               | MH    | MRH                       | MRH                       |           |                             | 30    |
| CuBe2Pb   | CW102C | Rem.                         | 1.8-2.0 |         |         |             |         | 0.2-0.6 Pb<br>0.5                 | -                         |  | 200-1300  | 410-1400       | 20-4        | 100-210                          |  |         |                        | MR            |       | MRH                       |                           |           |                             | 45    |
| CuCo1Ni1Be  | CW103C | Rem.                         | 0.4-0.7 |         | 0.8-1.3 |             |         | 0.8-1.3 Co<br>0.5                 | -                         | 135-760  | 250-800   | 25-3           | 100-230     | RH                               |  | MRH     |                        | MH            | MRH   | MRH                       |                           |           |                             |       |
| CuCo2Be   | CW104C | Rem.                         | 0.4-0.7 |         |         |             |         | 2.0-2.8 Co<br>0.5                 | C112                      | Beryllium containing alloys with lower strength and better conductivity and ductility than beryllium copper, also suitable for higher temperature service.                         | 135-900   | 240-800        | 25-3        | 90-230                           | RH   | RHY     | MRH                    |               | MH    | MRH                       | MRH                       |           |                             | 45    |
| CuNi2Be   | CW110C | Rem.                         | 0.2-0.6 |         | 1.4-2.4 |             |         | 0.5                               | -                         |  | 135-900   | 240-800        | 25-3        | 90-230                           | RH   | RHY     | MRH                    |               | MH    | MRH                       | MRH                       |           |                             |       |
| CuCr1   | CW105C | Rem.                         |         | 0.5-1.2 |         |             |         | 0.2                               | CC101                     |  | Resistance welding electrode materials. Good conductivity and strength at elevated temperatures. Zr in CW106C raises softening temperature. | 100-440        | 220-500     | 30-8                             | 70-185   |         |                        | MRH           |       | MH                        |                           | MRH       |                             |       |
| CuCr1Zr   | CW106C | Rem.                         |         | 0.5-1.2 |         |             |         | 0.03-0.3 Zr<br>0.2                | CC102                     | 100-440  |   | 220-540        | 35-5        | 55-175                           |  |         | MRH                    |               | MH    | MRH                       | MRH                       |           |                             | 75    |
| CuNiP   | CW108C | Rem.                         |         |         | 0.8-1.2 | 0.15-0.25   |         | 0.1                               | C113                      | As silicon is added and increased, strength and wear resistance increase and conductivity decreases. Electrode holders, seam welding wheel shafts, welding dies and bearing cages. | 140-730   | 250-800        | 30-5        | 80-240                           |  |         | MRH                    |               |       |                           |                           |           |                             | 50    |
| CuNi1Si   | CW109C | Rem.                         |         |         | 1.0-1.6 |             | 0.4-0.7 | 0.3                               | -                         |  | 100-570   | 300-590        | 30-5        | 80-220                           |  |         | MRH                    |               | MH    | MRH                       | MRH                       |           |                             |       |
| CuNi2Si   | CW111C | Rem.                         |         |         | 1.6-2.5 |             | 0.4-0.8 | 0.3                               | -                         |  | 100-620   | 300-700        | 35-5        | 80-220                           | RH   | RH      | MRH                    |               | MH    | MRH                       | MRH                       |           | MRH                         | 40    |
| CuNi3Si1  | CW112C | Rem.                         |         |         | 2.6-4.5 |             | 0.8-1.3 | 0.5                               | -                         |  | 120-780   | 320-800        | 30-5        | 80-230                           |  |         | MRH                    |               | MH    |                           |                           |           |                             |       |
| CuZr  | CW120C | Rem.                         |         |         |         |             |         | 0.1-0.2 Zr<br>0.1                 | -                         | Special applications at elevated temperatures.   | 40-350  | 180-350        | 30-14       | 40-135                           |  |         | MRH                    |               | MH    | MRH                       | MRH                       |           |                             | 85-90 |
| <b>Non Heat-treatable Alloys - Free Machining</b> |        |                              |         |         |         |             |         |                                   |                           |  |   |                |             |                                  |  |         |                        |               |       |                           |                           |           |                             |       |
| CuPb1P  | CW113C | Rem.                         |         |         |         | 0.003-0.012 |         | 0.7-1.5 Pb<br>0.1                 | -                         | Free machining high conductivity coppers with machinability index of about 80%.  | 200-320   | 250-360        | 7-2         | 90-110                           |  |         |                        |               | MR    |                           |                           |           |                             | 75    |
| CuSP  | CW114C | Rem.                         |         |         |         | 0.003-0.012 |         | 0.2-0.7 S<br>0.1                  | C111                      |  | 200-320   | 250-360        | 7-2         | 90-110                           |  |         |                        |               | MR    |                           |                           | MH        |                             | 93    |
| CuTeP   | CW118C | Rem.                         |         |         |         | 0.003-0.012 |         | 0.4-0.7 Te<br>0.1                 | C109                      |  | 200-320   | 250-360        | 7-2         | 90-110                           |  |         |                        |               | MR    |                           | MRH                       |           | MH                          |       |
| <b>Non Heat-treatable Alloys - Other</b>          |        |                              |         |         |         |             |         |                                   |                           |  |   |                |             |                                  |  |         |                        |               |       |                           |                           |           |                             |       |
| CuFe2P  | CW107C | Rem.                         |         |         |         | 0.005-0.015 |         | 2.1-2.6 Fe<br>0.05-0.20 Zn<br>0.2 | -                         | Special tube products and strip for lead frames (see EN 1758)  | 240-550   | 350-600        | 13-5        | 100-180                          |  | RH      |                        |               |       |                           |                           |           | MRH                         |       |
| CuSi1   | CW115C | Rem.                         |         |         |         |             | 0.8-2.0 | 0.5                               | -                         | Special wire products.   | 300-400   | 510-760        | 15-6        | 145-200                          |  |         |                        |               |       | MRHG                      |                           |           |                             |       |
| CuSi3Mn   | CW116C | Rem.                         |         |         |         |             | 2.7-3.2 | 0.7-1.3 Mn<br>0.5                 | CS101                     | Good corrosion resistance and strength. Nails, marine fixings, welding wire.   | 200-890   | 380-900        | 50-3        | 90-220                           |  |         | MRH                    |               |       | MRHG                      |                           |           |                             |       |
| CuSn0.15  | CW117C | Rem.                         |         |         |         |             |         | 0.10-0.15 Sn<br>0.1               | -                         | Strip for leadframes (see EN 1758)   |   | 250-490        | 9-2         | 60-140                           |  |         |                        |               |       |                           |                           |           |                             | 88    |
| CuZn0.5   | CW119C | Rem.                         |         |         |         |             |         | 0.1-1.0 Zn<br>0.1                 | -                         | Strip for radiator fins.   | 140-320   | 220-480        | 42-6        | 40-115                           | RH   |         |                        |               |       |                           |                           |           |                             | 80    |

**Notes:**

- (1) M - as manufactured
- R - mandatory tensile strength
- H - mandatory hardness
- G - mandatory grain size

- B - mandatory spring bending limit
- Y - mandatory 0.2% proof strength

(2) For general purposes