# Wieland-K81

CuSn0.15 | C14415 | CW117C

CuSn0.15 is a micro-alloyed material belonging to the family of phosphor bronzes. Its tin content of 0.15 % results in modified product properties compared to pure coppers. Mechanical stability is increased while electrical and thermal conductivity remain very high. Formability is excellent. Furthermore, the thermal softening temperature is significantly increased. CuSn0.15 is considered to have excellent welding properties for arc welding processes, resistance welding as well as ultrasonic welding. Strip made of CuSn0.15 is very popular for components which carry high currents, such as high-current connector tabs and central electric units in conventional and electric vehicles.

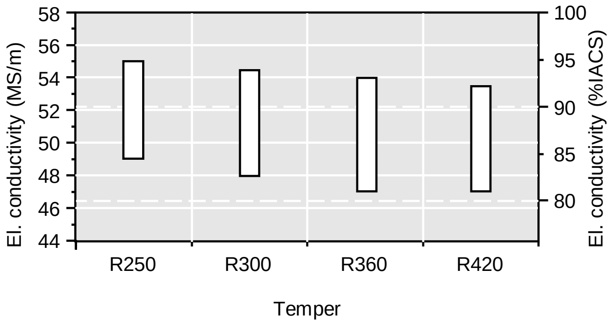
| **Chemical composition** (Reference) | |
|---|---|
| Sn | 0.1 % |
| Cu | remainder |

| **Physical properties** (Reference values at room temperature) | | | | |
|---|---|---|---|---|
| Electrical conductivity | 51 | MS/m | 88 | %IACS |
| Thermal conductivity | 350 | W/(m·K) | 202 | Btu·ft/(ft²·h·°F) |
| Coefficient of electrical resistance* | 3.2 | $10^{-3}$/K | 1.8 | $10^{-3}$/°F |
| Coefficient of thermal expansion* | 18.0 | $10^{-6}$/K | 10.0 | $10^{-6}$/°F |
| Density | 8.93 | g/cm³ | 0.323 | lb/in³ |
| Modulus of elasticity | 130 | GPa | 18,800 | ksi |
| Specific heat | 0.385 | J/(g·K) | 0.092 | Btu/(lb·°F) |
| Poisson´s ratio | 0.34 | | 0.34 | |

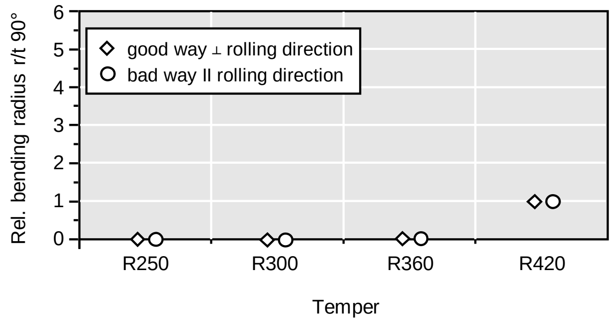
* Between 0 and 300 °C

| **Mechanical properties (values in brackets are for information only)** | | | | | | |
|---|---|---|---|---|---|---|
| **Temper** | **Tensile strength $R_m$** | | **Yield strength $R_{p0.2}$** | | **Elongation $A_{50}$** | **Hardness HV** |
| | **MPa** | **ksi** | **MPa** | **ksi** | **%** | |
| R250 | 250-320 | 36-46 | ≥ 200 | ≥ 29 | ≥ 9 | (60-90) |
| R300 | 300-370 | 44-54 | ≥ 250 | ≥ 36 | ≥ 4 | (85-110) |
| R360 | 360-430 | 52-62 | ≥ 300 | ≥ 44 | ≥ 3 | (105-130) |
| R420 | 420-490 | 61-71 | ≥ 350 | ≥ 51 | ≥ 2 | (120-140) |

**Electrical conductivity**




**Bendability (Strip thickness t ≤ 0.5 mm)**



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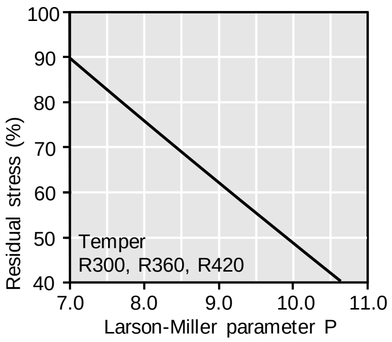
## Thermal stress relaxation

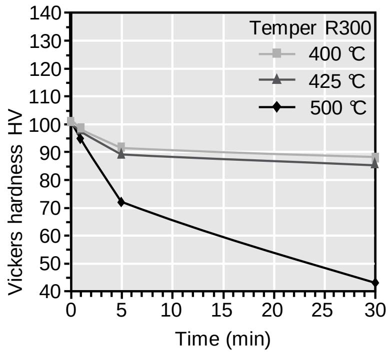


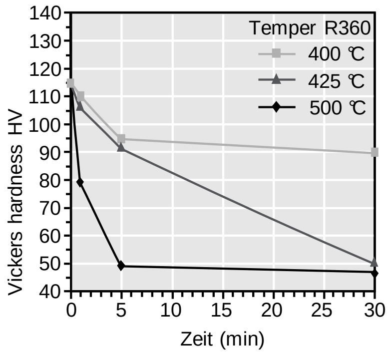

Stress remaining after thermal relaxation as a function of Larson-Miller parameter P
(F. R. Larson, J. Miller, Trans ASME74 (1952) 765–775) given by:
P = (20 + log(t))*(T + 273)*0.001.
Time t in hours, temperature T in ℃.
Example: P = 9 is equivalent to 1,000 h/118 ℃.
Measured on rolled to temper specimens parallel to rolling direction.
Total stress relaxation depends on the applied stress level.
Furthermore, it is increased to some extent by cold deformation.

## Fatigue strength

The fatigue strength is defined as the maximum bending stress amplitude which a material withstands for $10^7$ load cycles under symmetrical alternate load without breaking. It is dependent on the temper tested and is about 1/3 of the tensile strength $R_m$.

## Softening resistance




Vickers hardness after heat treatment (typical values)

## Types and formats available

- Standard coils with outside diameters up to 1,400 mm
- Traverse-wound coils with drum weights up to 1.5 t
- Multicoil up to 5 t
- Hot-dip tinned strip
- Contour-milled strip

## Dimensions available

- Strip thickness from 0.10 mm, thinner gauges on request
- Strip width from 3 mm, however min. 10 x strip thickness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06.21 | RP.TMA.UL/ Bm