Rendering date: 2018-04-27 10:47:28 http://conductivity-app.org





CuSn0,15Te
UNS:C14420

EN:-

Manufactures list:

Luvata (http://www.luvata.com/) - LUVATA: SM0701

CuSn0,15 alloy is a tin bearing tellurium copper with higher than pure copper softening temperature and good thermal conductivity. The alloy permits good corrosion resistance and has no stress cracking corrosion. Material has good formability at medium strength and good thermal and electrical conductivity.

Basic properties

| Basic properties | Value | Comments |
|---|---------|----------|
| Density [g/cm³] | 8,9 | |
| Specific heat capacity [J/(kg*K)] | 385 | |
| Temperature coefficient of electrical resistance (0100°C) [10 ⁻³ /K] | 3,2-3,3 | |
| Electrical conductivity [T=20°C, (% IACS)] | 80-95 | |
| Thermal conductivity [W/(m*K)] | 390 | |
| Thermal expansion coefficient 20300°C [10 ⁻⁶ /K] | 17-18 | |
| [Ref: 105, 106, 108] | | |

Applications

Main applications

Main applications are connected with heat transfer in electro industry, electronics, automotive. Possible applications: heat exchangers, radiator fins, boiler pressure vessels, connectors. Literature: [Ref: 105, 106, 108]

Kinds of semi-finished products/final products

Rolled plates, sheets, strips and folis [Ref: 105, 107, 108]

Chemical composition

| Chemical composition | Value | Comments |
|----------------------|-------------|------------|
| Cu [wt.%] | 99,7-99,955 | Calculated |
| Sn [wt.%] | 0,04-0,15 | |
| Te [wt.%] | 0,005-0,05 | |
| Others [wt.%] | 0-0,1 | |
| [Ref: 106, 112] | | |

Mechanical properties

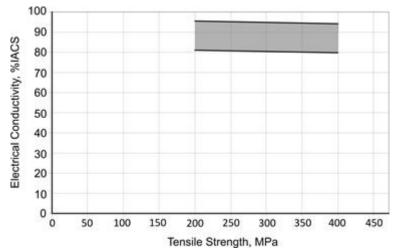
| Mechanical properties | Value | Comments |
|---------------------------|---------|----------|
| UTS [MPa] | 200-400 | |
| YS [MPa] | No data | |
| Elongation [%] | 2-30 | |
| Hardness | 50-140 | HV |
| Young's modulus [GPa] | 118 | |
| Kirchhoff's modulus [GPa] | 44 | |
| Poisson ratio | 0,34 | |
| [Ref: 105, 106, 108] | | |

Material's mechanical and electrical properties in different tempers

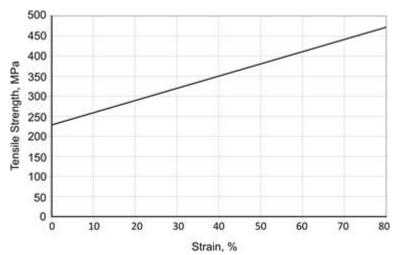
| Temper | Ultimate Tensile Strength UTS, [MPa] | Hardness [HRF] | Hardness superficial 30-THR | Hardness[HV] | Elongaton at break during tensile test A[%] | Literature |
|-----------------|---|-------------------|-----------------------------------|--------------|---|--------------------|
| 0 25 | 205-260 | max.65 | max. 31 | 50-70 | min.15 | |
| M25 | 205-260 | max. 75 | max. 41 | | | |
| 1/8H | 220-275 | 54-82 | max 49 | | | |
| 1/4H | 235-295 | 60-84 | 18-51 | 65-85 | min.9 | |
| 1/2H | 255-315 | 77-89 | 43-57 | | | [Dof: 10E |
| 3/4H | 285-345 | 82-91 | 47-59 | | | [Ref: 105, 108] |
| Н | 295-360 | 86-93 | 54-62 | | | 100] |
| EH | 325-385 | 88-95 | 56-64 | min.100 | | |
| Spring | 345-400 | 91-97 | 60-66 | | | |
| extra spring | min 360 | min.92 | min.61 | | | |

Material's grain sizes for different tempers

| Temper | Grain size [mm] | Hardness [HRF] | Literature |
|---------------------------|-----------------|----------------|------------|
| O60 (soft anneal) | max 0,50 | max 65 | |
| O68 (deep drawing anneal) | max 0,50 | 30-75 | [Ref: 105] |



Levels of electrical and mechanical properties of material in different tempers [Ref: 2]

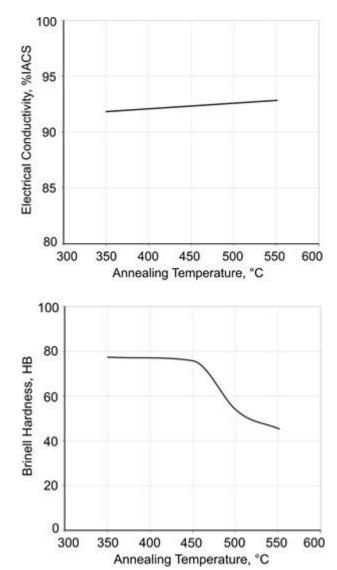


Ultimate tensile strength of material as a function of cold working strain calculated via formula based on approximation of different experimental data [Ref: 2]

Exploitation properties

Heat resistance

Mechanical and electrical properties vs temperatures



Variation of electrical conductivity and hardness with annealing temperature of material (conductivity and hardness tests at ambient temperature after heating) [Ref: 109]

Long-therm heat resistance, e.g. Arrhenius curve

NO DATA AVAILABLE

Half- softening temperature

Half softening temperature about 350-400°C [Ref: 106]

Corrosion resistance

Hydrogen embrittlement resistance

Material resistant to hydrogen embrittlement [Ref: 110]

Other kind of corrosion elements

| Type of corrosion | Suitability | Literature |
|-------------------------|-------------|------------|
| Atmospheric | no data | - |
| Marine environment | no data | - |
| Stress crack | Resistant | [Ref: 110] |
| Hydrogen embrittlement | Resistant | [Ref: 110] |
| Electrolytic | no data | - |
| Other - oxidising acids | no data | - |

Rheological resistance

Stress relaxation

NO DATA AVAILABLE

Creep

NO DATA AVAILABLE

Wear resistance

Friction resistance

NO DATA AVAILABLE

Fatigue resistance

Fatigue cracking

NO DATA AVAILABLE

Impact strength

NO DATA AVAILABLE

Fabrication properties

NO DATA AVAILABLE

Technological properties

| Technological properties | Value | Comments | Literature |
|-----------------------------|---------|----------|------------|
| Annealling temperature [°C] | 430-530 | | [Ref: 106] |

References:

- 2. **Properties of copper and copper alloys at cryogenic temperatures** Simon N. J., Drexler E.S., Reed R. P., NIST Monograph 177, National Institute of Standards and Technology, U.S. Department of Commerce, Washington, D.C., Feb 1992
- 105. Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar, B 152/B 152M 06a -
- 106. Data sheet Cuprofor -
- 107. Data sheet Copper and Alloys ThyssenKrupp Materials NA
- 108. Data sheet Detailed product description CuSn -
- 109. Influence of alloying elements on thermal conductivity and high temperature strength of copper based alloys K. T. Kim, W. J. Jung, and C. S. Choi, Materials Science and Technology April 2001 Vol. 17 455
- 110. **The Corrosion of Copper and I t s Alloys** Roger Francis, ISBN 978-1-57590-225-8
- 112. Application datasheet C10100-C12099 -