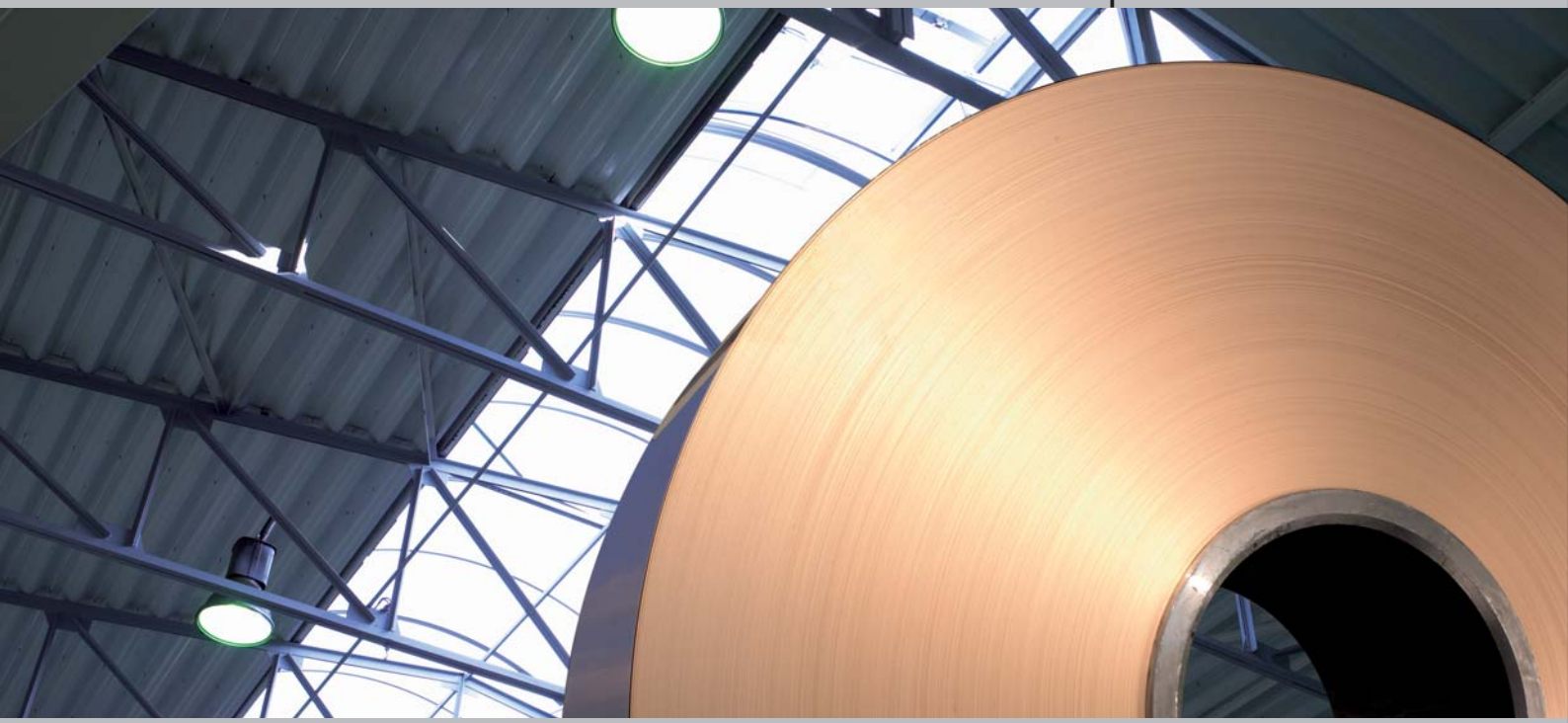

# KEMPER Special alloys

## KHP®105 and KHP®109

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## KEMPER High Performance Alloys KHP®105 and KHP®109

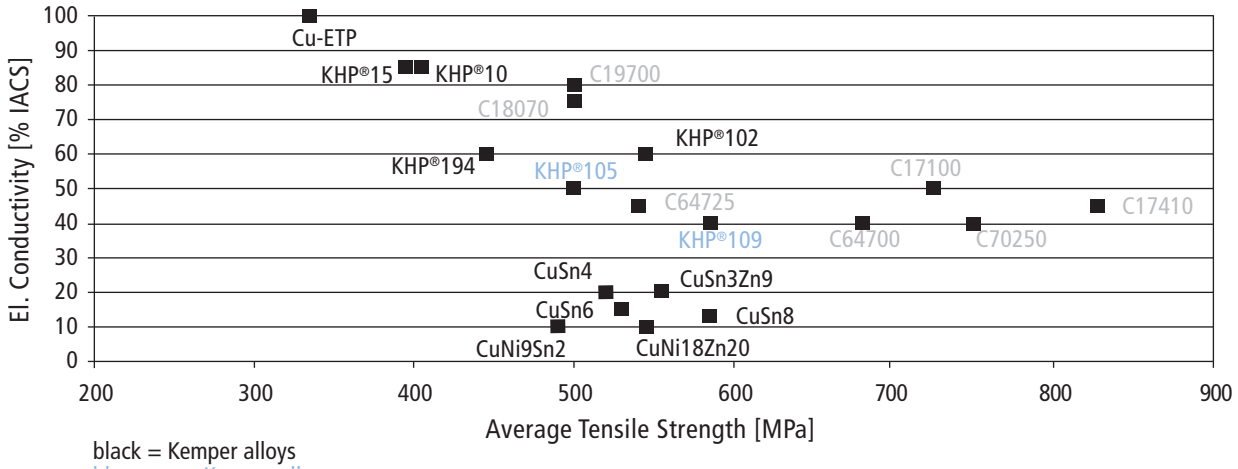
KEMPER has enlarged the production programme with two new materials: KHP®105 and KHP®109. They have been developed by the Japanese producer of special alloys DOWA Mining and named there NB-105 and NB-109.

The alloys are standardized in the USA under the UNS numbers C19020 and C19025. They belong to the CuNiSn family.

The global availability - in Asia, in the USA and now also in Europe - leads to a high security of supply.

The mechanical properties are comparable to those of phosphor bronze. The electrical conductivity is far higher and the stress relaxation is much lower. Thus the alloys are extremely well suitable for high temperature applications.

## Alloys for the Electrical and Electronics Industry




black = Kemper alloys
blue = new Kemper alloys

## Chemical Composition

| | Cu | Ni [%] | Sn [%] | P [%] |
|---|---|---|---|---|
| KHP®105 | Balance | 0,80-1,20 | 0,40-0,70 | ≤ 0,10 |
| KHP®109 | Balance | 0,80-1,20 | 0,70-1,10 | 0,03-0,07 |
| | | | | |

## Processing Information

| | KHP®105 | KHP®109 |
|---|---|---|
| Weldability | good | good |
| Solderability | good | good |
| Stress corrosion cracking | none | none |

## Physical Properties

| | KHP®105 | KHP®109 |
|---|---|---|
| Density | 8,9 g/cm³ | 8,9 g/cm³ |
| Electrical conductivity | 29 MS/m [c)] = 50% IACS [a)b)] | 23 MS/m [c)] = 40% IACS [a)b)] |
| Thermal conductivity | 197 W/mK | 161 W/mK |
| Coefficient of thermal expansion | 17,0 x $10^{-6}$/K | 17,0 x $10^{-6}$/K |
| Young Modulus | 130 GPa [d)] | 130 GPa [d)] |

[a)] IACS = International Annealed Copper Standard
[b)] reference values at room temperature 20 °C
[c)] MS/m = m/Ωmm²
[d)] GPa = 1 kN/mm²

## Mechanical Properties

### KHP®105

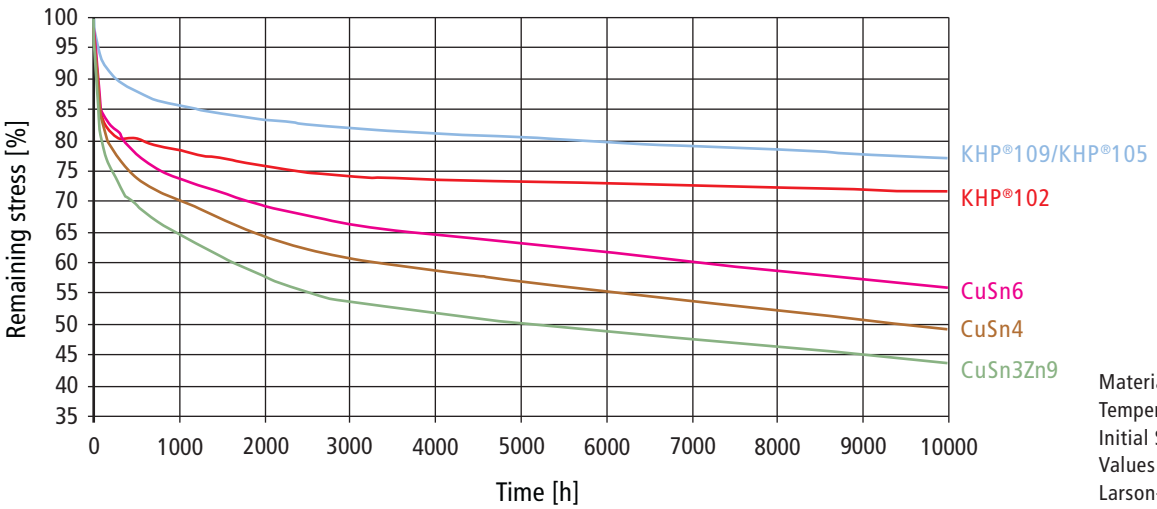
| Temper | Tensile Strength $R_m$ [MPa] [1] | Yield Strength $R_{p0,2}$ [MPa] [1] | Elongation $A_{50}$ [%] | Hardness HV | Bendability | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 90° r/t[2] | | 180° r/t[2] | |
| | | | | | GW[3] | BW[4] | GW[3] | BW[4] |
| R400 | 400-480 | min. 380 | min. 7 | 120-150 | 0 | 0,8 | 0 | 1 |
| R450 | 450-510 | min. 430 | min. 5 | 130-155 | 0,4 | 1 | 0,5 | 2 |
| R490[5] | 490-550 | min. 470 | min. 5 | 145-170 | 0,8 | 2 | 1,5 | 3 |
| R530[6] | min. 530 | min. 510 | min. 4 | min. 155 | 1 | 5 | 2 | - |

### KHP®109

| Temper | Tensile Strength $R_m$ [MPa] [1] | Yield Strength $R_{p0,2}$ [MPa] [1] | Elongation $A_{50}$ [%] | Hardness HV | Bendability | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 90° r/t[2] | | 180° r/t[2] | |
| | | | | | GW[3] | BW[4] | GW[3] | BW[4] |
| R335 | 335-470 | min. 315 | min. 15 | 120-155 | 0 | 0 | 0 | 0,5 |
| R440 | 440-520 | min. 420 | min. 9 | 135-170 | 0 | 0,8 | 0 | 1 |
| R500[5] | 500-570 | min. 480 | min. 5 | 155-180 | 0,4 | 1 | 0,5 | 2 |
| R540[5] | 540-610 | min. 520 | min. 4 | 160-195 | 0,8 | 2 | 1,5 | 3 |
| R580[6] | 580-650 | min. 560 | - | 175-210 | 1 | 5 | 2 | - |
| R630[6] | 630-730 | min. 610 | - | min. 190 | 1,2 | 8 | 3 | - |

[1] 1 MPa = 1 N/mm²
[2] r = bending radius, t = strip thickness
[3] GW = good way
[4] BW = bad way
[5] valid for a strip thickness of 0.6 mm max.
[6] valid for a strip thickness of 0.3 mm max.

## Stress Relaxation

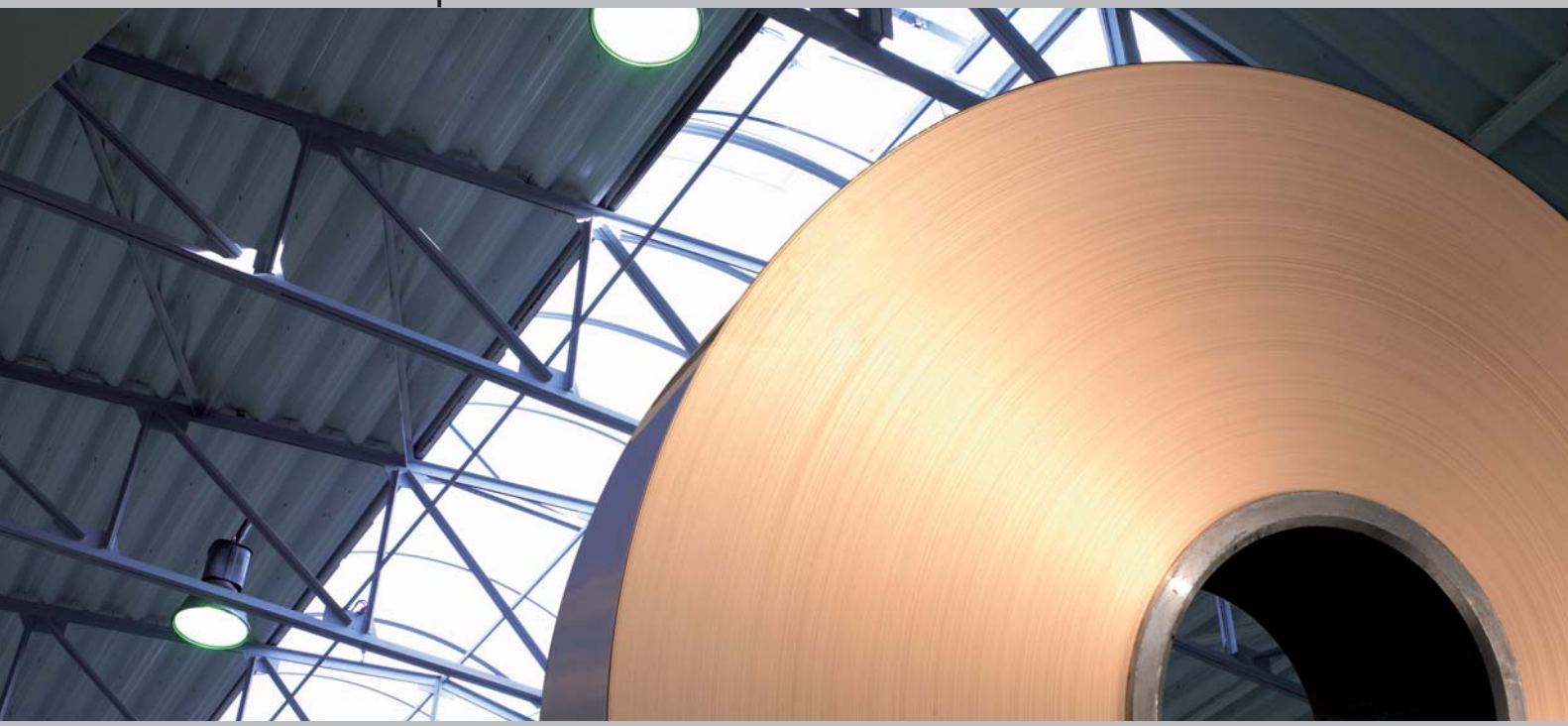



Material stress relieve annealed
Temperature 150 °C
Initial Stress 0,8 x $R_{p0,2}$
Values extrapolated according to Larson-Miller

## Applications

**KHP®105 –** Connector contacts, switches, relays, junction blocks, busbars, leadframes

**KHP®109 –** Connector springs, switches, relays, IC leadframes



Our products are tested, evaluated and subjected to stringend tests in every stage of our production process. KEMPER strips meet the highest technical requirements of the automotive, communications and electrical engineering industries worldwide. We ensure these requirements by our quality management system which is certified per ISO/TS 16949:2002 and DIN EN ISO 9001:2000. At KEMPER quality is an obligation for all our employees, resulting in products which you can lastingly rely on.

KEMPER

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