

Material Designation	
EN	Cu-ETP
UNS*	C11000

\* Unified Numbering System (USA)

Chemical Composition (Reference)	
Cu	≥ 99.90 %
O	0.005–0.040 %

**Typical Applications**

- Main material for general electrical applications
- Stamped parts
- Transformer coils
- Cable strip
- Heat sinks

Physical Properties*		
Electrical Conductivity***	MS/m %IACS	58 100
Thermal Conductivity	W/(m·K)	390
Coefficient of Electrical Resistance**	10 <sup>-3</sup> /K	3.7
Coefficient of Thermal Expansion**	10 <sup>-6</sup> /K	17.7
Density	g/cm <sup>3</sup>	8.94
Modulus of Elasticity	GPa	127
Specific Heat	J/(g·K)	0.386
Poisson's Ratio		0.34

\* Reference values at room temperature

\*\* Between 0 and 300 °C

\*\*\* Minimum value in soft temper

Fabrication Properties	
Capacity for Being Cold Worked	excellent
Machinability	less suitable
Capacity for Being Electroplated	excellent
Capacity for Being Hot-Dip Tinned	excellent
Soft Soldering	excellent
Resistance Welding	less suitable
Gas Shielded Arc Welding*	less suitable
Laser Welding	less suitable

\* During heating in reducing atmosphere hydrogen embrittlement occurs

**Corrosion Resistance**

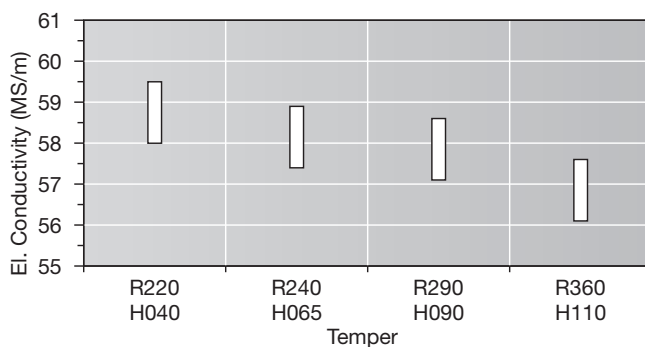
Resistant to: industrial atmosphere (formation of dark resp. green protective layers), industrial and drinking water (max. flow rate approx. 1.5 to 2 m/s), pure water vapour, non oxidizing acids, alkalis (except for ammonia and cyanide-containing compounds), neutral saline solutions.

Not resistant to: oxidizing acids, hydrous ammonia and halogenated gases, hydrogen sulfide, seawater, especially with high flow rates.

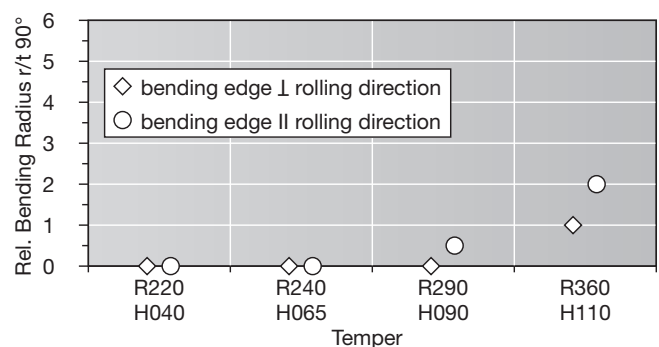
Mechanical Properties					
Temper		R220	R240	R290	R360
Tensile Strength R <sub>m</sub>	MPa	220–260	240–300	290–360	≥ 360
Yield Strength R <sub>p0.2</sub>	MPa	≤ 140	≥ 180	≥ 250	≥ 320
Elongation A <sub>50mm</sub>	%	≥ 33	≥ 8	≥ 4	≥ 2

Temper		H040	H065	H090	H110
Hardness HV		45–65	65–95	90–110	≥ 110

**Electrical Conductivity**



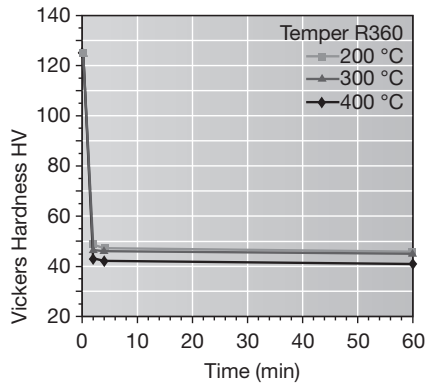
**Bendability (Strip Thickness t ≤ 0.5 mm)**



# Wieland-K32<sup>®</sup>

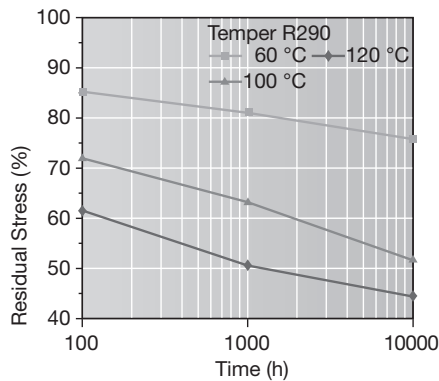
E-Cu58  
C11000

## Resistance to Softening



Vickers hardness  
after heat treatment  
(typical values)

## Stress Relaxation



Stress remaining as a function  
of service temperature and time.  
Measured on rolled-to-temper  
specimens parallel to rolling direction.  
Values extrapolated according to  
F. R. Larson, J. Miller, Trans ASME74  
(1952) 765-775.  
Total stress relaxation depends on  
the applied stress level.

## 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  $\frac{1}{3}$  of the tensile strength  $R_m$ .

## Types and Formats Available

- Standard coils with outside diameters up to 1400 mm
- Traverse-wound coils with drum weights up to 1.5 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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