

# PNA 290

CuNiSi / C19010

Release 01\_2009\_E



PNA 290 is a Precipitation hardened copper based alloy. It combines high electrical conductivity with high strength and good relaxation behaviour. This is possible by the application of a special process consisting of cold working and heat treatment.

PNA 290 also has a high thermal conductivity and excellent spring properties. It shows good corrosion resistance in industrial atmospheres and is resistant against stress corrosion cracking.

## Chemical Composition (wt. %)

Cu	Remainder
Ni	0.80 – 1.80
Si	0.15 – 0.35
P	0.01 – 0.50

## Physical Properties

Density	g/cm <sup>3</sup>	8.94
Coefficient of Thermal Expansion	10 <sup>-6</sup> /K	16.80
Electrical Conductivity	MS/m	> 29
	%IACS	> 50
Thermal Conductivity	W/(mK)	258
Modulus of Elasticity	kN/mm <sup>2</sup>	127

## Material Designation

Aurubis	PNA 290
EN	-
UNS*	C19010
ISO	-
BS	-

\* Unified Numbering System

## Mechanical Properties (1)

		R 360	R 410	R 460	R 520	R 580
		H 100	H 130	H 140	H 150	H 170
Tensile Strength <i>R<sub>m</sub></i>	N/mm <sup>2</sup>	360 – 430	410 – 480	460 – 530	520 – 570	580 – 650
Yield Strength <i>R<sub>p0.2</sub></i>	N/mm <sup>2</sup>	> 250	> 360	> 430	> 490	> 540
Elongation <i>A<sub>50</sub></i>	%	> 12	> 10	> 8	> 6	> 7
Hardness <i>H<sub>v</sub></i>	-	100 – 130	130 – 150	140 – 160	150 – 170	170 – 200

## Bendability

	R 360	R 410	R 460	R 520	R 580	
<i>r = x · t (t ≤ 0.5mm)</i>	90° GW**	0	0	0.5	1	1
	90° BW	0	0.5	1	2	1
	180° GW	0	0.5	1.5	2.5	3
	180° BW	0.5	1	3	4	5

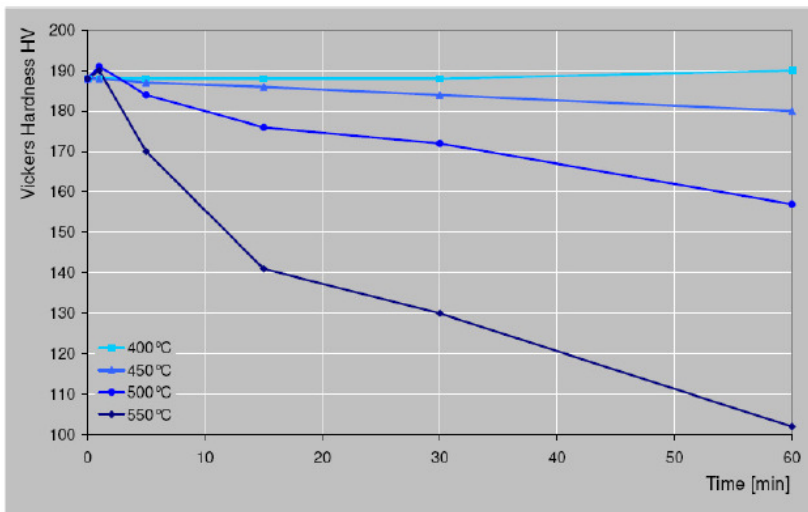
\*\* GW: bending edge ⊥ rolling direction, BW: bending edge || rolling direction.

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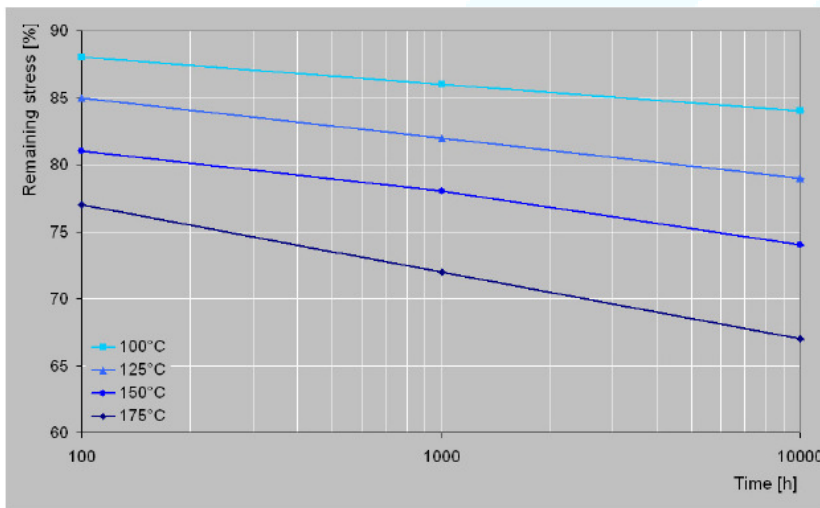
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## Softening Stability



Vickers hardness after heat treatment. (Temper R 580, typical values)

## Relaxation



Stress remaining as a function of temperature and time. Measured with Cantilever Bending Test (ASTM E 328 – 02).

Values above 1000 h calculated with Larson Miller Parameters. Initial Stress  $0.5 \cdot R_{p0.2}$  (Temper R 580)

## Fabrication Properties

Cold Formability	Good
Hot Formability	Excellent
Soldering	Good
Brazing	Good
Oxyacetylene Welding	Good
Gas Shield Arc Welding	Good

## Typical Applications

Components for Electrical Engineering  
Automotive, Terminals, Springs  
Bending and Stamping Components  
Connectors, Relays, Sockets  
Clips, Lead-frames, Pins

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