PNA 211

Cu-ETP / C11000 Release 01_2009_E

PNA 211 is an electrolytically refined, oxygen free copper. Due to its conductivity, this material is suitable for all sectors of electrical engineering and electronics.

Also known as HC or high conductivity copper with a 100% IACS (International Annealed Copper Standard). It is the material of choice for conductors and electrical components except when the service environment is a reducing atmosphere.

It should be noted that when heated in a hydrogenous atmosphere, it becomes brittle, otherwise known as "hydrogen disease".

Chemical Composition (wt. %)	
Cu	Minimum 99.90
O	Maximum 0.040

Physical Properties		
Density	g/cm³	8.94
Coefficient of Thermal Expansion	10^{-6}/K	17.7
Electrical Conductivity	MS/m	58
	%IACS	100
Thermal Conductivity	W/(mK)	390
Modulus of Elasticity	kN/mm²	127

Material Designation	
Aurubis	PNA 211
EN	CW004A
UNS*	C11000
ISO	Cu-ETP
BS	C101

* Unified Numbering System

Mechanical Properties					
		R 220 H 040	R 240 H 065	R 290 H 090	R 360 H 110
Tensile Strength *Rm*	N/mm²	220 – 260	240 – 300	290 – 360	> 360
Yield Strength $Rp_{0.2}$	N/mm²	< 140	> 180	> 250	> 320
Elongation A_{50}	%	> 33	> 8	> 4	> 2
Hardness *Hv*	-	40 – 65	65 – 95	90 – 110	> 110

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Bendability

		R 220	R 240	R 290	R 360
r = x·t (t ≤ 0.5mm)	90° GW**	0	0	0	1
	90° BW	0	0	0.5	2

** GW: bending edge ⊥ rolling direction, BW: bending edge ∥ rolling direction.

Fabrication Properties

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

Typical Applications

Main Material in Electrical Industry
Automotive
Transformer Coils, Wire
Coolers, Contacts, Pressure Vessels
Heat Exchangers
General Engineering

Other Properties

Corrosion Resistance	Resistant to corrosion in most atmospheres including marine and industrial environments. Material corroded by oxidising acids, halogens, sulphides and ammonia based solutions.
Work Hardening	Work hardens relatively slowly during cold working and can be annealed in neutral or oxidising atmospheres. Annealing can be achieved by rapid cooling after heating (370°C to 650°C).

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