

# TIMETAL<sup>®</sup> 230

## COLD FORMABLE MEDIUM-STRENGTH ALLOY

TIMETAL 230, a binary alloy containing 2.5% copper, combines the formability and weldability of unalloyed titanium with improved mechanical properties, particularly at elevated temperatures. The alloy can be used at temperatures up to 660°F (350°C), and is used in the annealed condition as sheet, forgings and extrusions for fabricating components such as bypass ducts of gas-turbine engines. Its use spread to the airframe industry, following the development of an ageing treatment which raises room-temperature tensile properties by about 25%, and nearly doubles the elevated temperature properties. Such a material is particularly attractive since it can be formed in the soft condition, thus lowering fabrication costs.

TABLE 1

### CHEMICAL COMPOSITION

ELEMENT	WEIGHT %	
	Minimum	Maximum
Copper	2.00	3.00
Iron	—	0.20
Oxygen	—	0.20
Carbon	—	0.08
Nitrogen	—	0.03
Hydrogen	—	0.01
Residual Elements, each	—	0.10
Residual Elements, total	—	0.40
Titanium	Remainder	

TABLE 2

### PHYSICAL PROPERTIES

PROPERTY	VALUE	
	English	SI
Density	0.165 lb in <sup>-3</sup>	4.56 g cm <sup>-3</sup>
Beta Transus	1640°F	890°C
Thermal Conductivity	7.50 Btu hr <sup>-1</sup> ft <sup>-1</sup> °F <sup>-1</sup>	12.97 W m <sup>-1</sup> K <sup>-1</sup>
Electrical Resistivity	26 μΩ·in	0.65 μΩ·m
Magnetic Permeability	Nonmagnetic	
Mean Coefficient of Thermal Expansion <sup>a</sup>	5.0 x 10 <sup>-6</sup> in in <sup>-1</sup> °F <sup>-1</sup>	9.0 x 10 <sup>-6</sup> m m <sup>-1</sup> °C <sup>-1</sup>
Elastic Modulus <sup>b</sup>	15.2-17.4 Msi	105-120 GPa

<sup>a</sup> Mean coefficient from room temperature to 212°F (100°C)

<sup>b</sup> Typical values at room temperature of about 68-78°F (20-25°C)

TABLE 3

### HEAT TREATMENT

Anneal	Solution Heat Treatment	Ageing Heat Treatment
1454°F (790°C) 1 hour / Air Cool	1481°F (805°C) 1 hour / Rapid Air Cool	752°F (400°C) 8-24 hours / Air Cool + 887°F (475°C) 8 hours / Air Cool

TABLE 4

### GUARANTEED MINIMUM MECHANICAL PROPERTIES

Condition	UTS ksi (MPa)	0.2% YS ksi (MPa)	Elongation %	Reduction in Area %	Bend Radius
Annealed	90 (620)	74 (510)	25	35	2.5T
STA	110 (760)	87 (600)	20	25	2.5T



