

NIMONIC[®] alloy 86 has been developed to provide a material with good workability, ductility and weldability, high creep strength and exceptionally good cyclic oxidation resistance at 1050°C. The alloy is of the solid solution type and it is intended principally for use in high temperature applications such as gas turbine combustion chambers, afterburner parts and heat-treatment furnace equipment.

Table 1 - Chemical Composition, %

Carbon	0.05
Chromium	
Molybdenum	
Magnesium	0.015
Cerium	
Nickel	Balance*

*Reference to the balance of the alloy composition does not guarantee this is exclusively of the element mentioned but that it predominates and others are present only in minimal quantities.

Recommended Heat Treatments

Sheet		 	<i>,</i>			5-15	i min	/1150)°C/A	С
Bar	Stall Stal	 Ster.	Stall	Stat.	Stall .		2 - 4 h	/1150)°C/A	С

Physical Properties

Density*	8.54 Mg/m ³	at room	temperature
dr. dr. dr	0.309 lb/in ³	at room	temperature

*The exact density depends on compositional variation within the release specification.

Table 2 - Mean Coefficient of Linear Thermal Expansion*

Gr Gr	°C		10 ⁻⁶ /°C
Star Star	20-100		12.7
	20-200	att att att	12.8
	20-300	dellar della della	13.1
	20-400	tinger trades tools	13.5
	20-500	String Strington	13.9
	20-600	State State	J 14.1 J J J
	20-850	and and a	15.5
	20-1050		16.8

*These values are for fully heat-treated material. A variation of ±5% can be expected for compositional changes within the release specification, processing history and form.

Available Products

NIMONIC alloy 86 is available principally in sheet form. Bars and billets for forging, rods and bars for machining, extruded section or bar, plate and sheet, filler wire are also available.

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		200			State State	112	State St			201
		300				A State				195
		400			10	and the second				189
		500								183
		600	Color L		Stat	Staff				176
		850		Ser 3	Start State		10 0			155
		1050	1	and the second	103	500				138
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Table 3 - Dynamic Young's Modulus*

*These values were obtained on fully heat-treated cylindrical specimens from bar vibrated in the flexural mode.

Tensile Properties

temperatures) and 0.1/min thereafter.

The data given in Table 4 are for forged bar 12.5 mm diameter after the recommended heat treatment. The data given in Table 5 are for cold rolled sheet 0.7 to 2.0 mm thick after the recommended heat treatment. Strain rate 0.005/min to proof stress (at room temperature), 0.002/min to proof stress (at elevated

Table 4 - Tensile Properties of Bar Heat
treatment 4h/1150°C/AC

°C		0.2% Proof Stress, MPa	Tensile Strength, MPa	Elongation on 5 .65√So, %		
	300	251	692	49		
	500	243	661	54		
	700	239	557	56		
	850	173	319	69		

 Table 5 - Tensile Properties of Sheet

 Heat treatment 5-15 min/1150°C/AC

Steres	°C	0.2% Proof Stress, MPa	Tensile Strength, MPa	Elongation on 50 mm, %		
Stratus	20	438	873	45		
	750	250	502	74		
	850	184	310	83		
	900	125	237	66		
	1050	44	98	50		

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Cyclic Oxidation Resistance

Figures 1, 2 and 3 give comparative results for NIMONIC alloys 86, 75 and INCONEL® alloy HX. Test conditions were 1050°C ±10°C for 15 minutes followed by cooling in air for 5 minutes.

Creep Properties

Figure 4 gives creep rupture properties for sheet after the recommended heat treatment. Creep-rupture properties are also shown for NIMONIC alloys 75 and INCONEL alloy HX (AMS 5536) for comparison. Larson-Miller curves should not be used for extrapolation much outside the test results shown.

Fabrication

NIMONIC alloy 86 has good formability and is readily fabricated by standard techniques. The alloy has been shown to have good weldability. Joints made by the tungsten-inertgas process, using matching composition filler wire, exhibit properties which match those of the base material.

As with all the nickel-based alloys, material to be welded must be thoroughly cleaned. All foreign substances, such as shop dirt, oil, grease, marking crayon and paint, must be removed before welding is started.

Information on fabricating is available in the Special Metals publication "Fabricating" on the company website, www.yttzhj.com.

Dissimilar welds may be made using the standard range of INCONEL welding products.



Figure 3.

NIMONIC® alloy 86



Figure 4. Creep-rupture properties of NIMONIC alloy 86 sheet.