Inconel 713LC™

is a nickel-based superalloy engineered for high-temperature applications requiring excellent mechanical properties and resistance to oxidation. It is a modified version of Inconel 713C, offering improved ductility and low-cycle fatigue strength. The alloy's primary strengthening mechanism is γ'-Ni3(Al,Ti) precipitation, which ensures excellent creep and rupture resistance at elevated temperatures up to 980°C.

Due to its balanced properties, Inconel 713LC is widely used in components subjected to high thermal and mechanical stresses, such as turbine blades, vanes, and gas turbine engine parts. Its ability to maintain integrity under prolonged exposure to high temperatures makes it ideal for demanding aerospace and power-generation applications.

Vacuum cast is the method TCA adopts to manufacture Inconel 713LC products. TCA is able to provide near-shape Inconel 713LC investment casting and casting ingot with 75mm and 90mm in diameter. The chemical composition of the alloy conforms to AMS 5377 specification listed in Table.1.

Table.1 - Composition (wt.%)

Element	Nominal
Carbon	0.06
Manganese	0.25
Silicon	0.50
Phosphorus	<0.015
Sulfur	<0.015
Chromium	12.00
Molybdenum	4.50
Columbium+Tantalum	2.00
Titanium	0.70
Aluminum	6.00
Cobalt	1.00
Boron	0.010
Zirconium	0.10
Iron	0.50
Copper	0.50
Nickel	Bal.

*Conforms to the AMS 5377 specification

Physical Properties

Basic physical constants of Inconel 713LC alloy are listed in Table. 2. The values from the table will vary slightly due to the fluctuating composition from each heat.

Table. 2 – Physical Constants

Density		7.91 g/cm^3
Melting range		
	°F	2300 - 2488
	°C	1260 - 1364

Linear Thermal Expansion Coefficient	10^{-6} /°C
RT - 427°C	12.1
RT - 872°C	14.6
RT - 1097°C	17.1

Mechanical Properties

The outstanding characteristic of Inconel 713LC alloy is its excellent high-temperature mechanical properties including tensile and stress-rupture properties. The data of mechanical properties provided in the current document is determined with as-cast Inconel 713LC alloy.

Tensile Properties

Inconel 713LC exhibits high tensile and yield strength up to 950°C. Tensile test methods are in accordance with the ASTM E8/E8M specification. The data of Inconel 713LC tensile properties is listed in Table.3 and the temperature dependence of tensile properties is shown in Fig. 1.

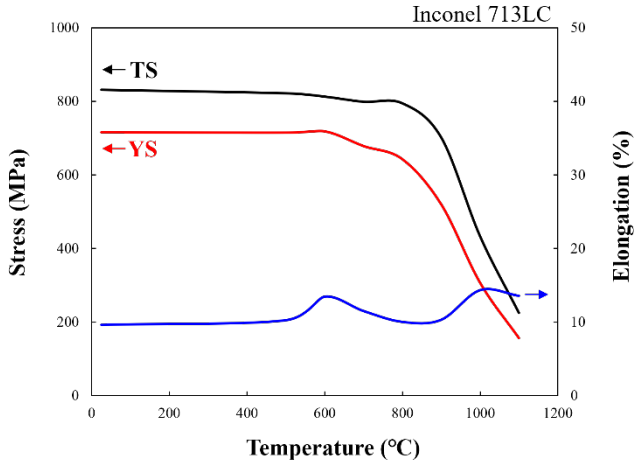

Fig. 1 The temperature dependence of Inconel 713LC tensile properties

Table. 3 – Tensile properties of as-cast Inconel 713LC

測試溫度 Temperature ℃	測試溫度 Temperature ℉	抗拉強度 Tensile stress MPa	降伏強度 Yield strength MPa	伸長率 Elongation %
RT	77	832	716	9.6
500	932	777	693	10.2
600	1112	813	719	13.5
700	1292	799	679	11.5
800	1472	795	643	8.6
900	1652	702	520	10.3
1000	1832	434	307	14.3

Stress-rupture Properties

The stress-rupture performance of the Inconel 713LC alloy is verified based on the AMS 5377 specification, which requires that specimens, maintained at 1800 °F ± 3 (980 °C ± 2) while a load sufficient to produce an initial axial stress of 22000 psi (150 MPa) or higher is applied continuously, shall not in less than 30 hours.

The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than 5% in 4D. The Stress-rupture tests were conducted in accordance with the ASTM E139 specification. The data of Inconel 713LC stress-rupture properties was shown in Fig. 2

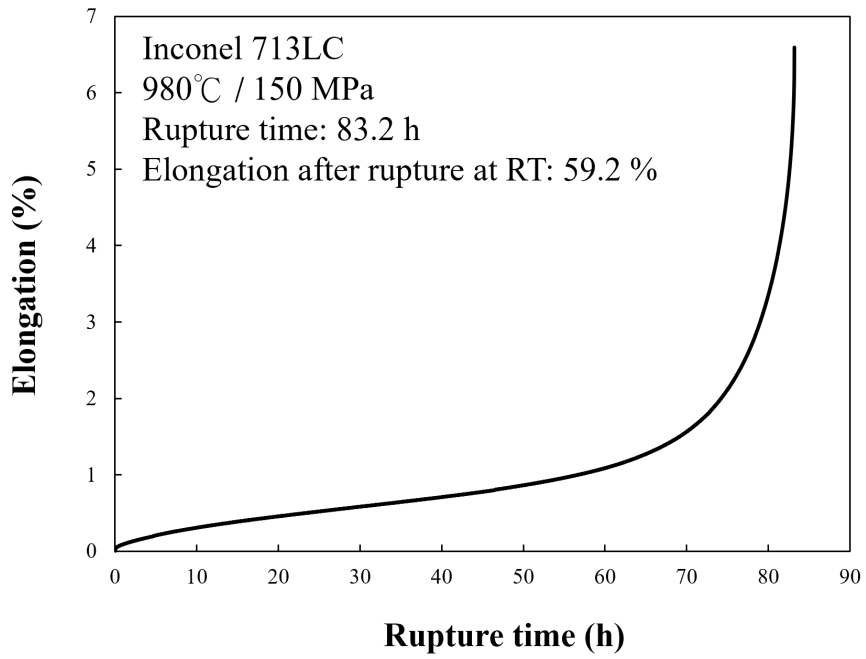

Fig. 2 Stress-rupture curve of as-cast Inconel 713LC

TCA

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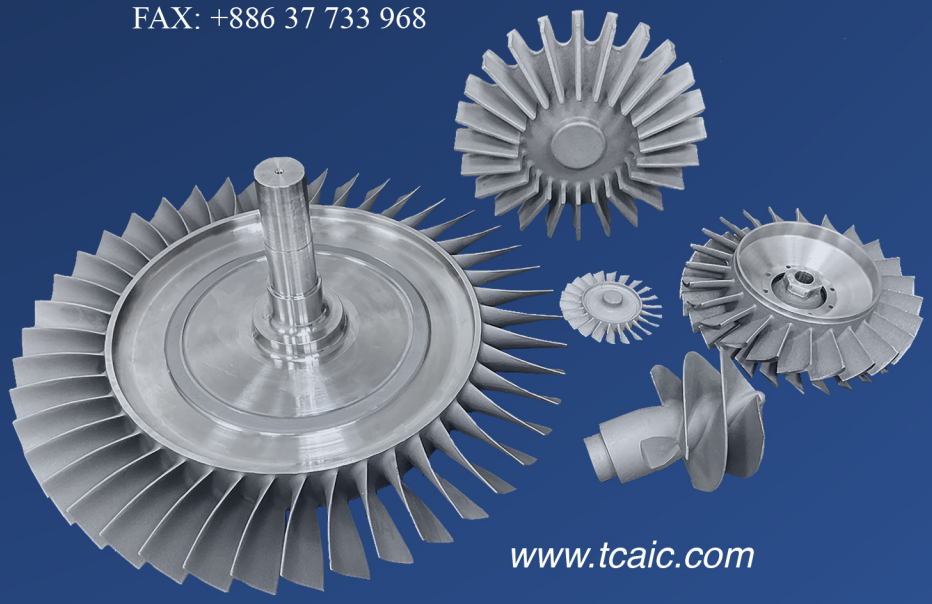

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