

## IN100™

is a nickel-based superalloy known for its exceptional high-temperature performance, primarily achieved through strengthening by  $\gamma'$ -Ni<sub>3</sub>Al precipitation. The alloy is produced via vacuum casting, which ensures high purity and uniform properties. Its elevated aluminum and titanium content contributes to superior creep rupture strength up to 1050°C, offering a density advantage in weight-sensitive applications. Its high cobalt content lowers the stacking fault energy of the face-centered cubic (FCC) matrix, resulting in excellent stability at elevated temperatures.

IN100 is specifically engineered for applications requiring the ability to endure high loads and prolonged exposure to extreme temperatures. Its proven performance makes it a preferred material for turbine blades, vanes, and nozzles with complex geometries. Additionally, it serves as a durable die material for isothermal forging of titanium and other nickel-based superalloys.

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 5397 specification listed in Table.1.

**Table.1 - Composition (wt.%)**

Element	Nominal
Carbon	0.17
Manganese	<0.10
Silicon	<0.10
Phosphorus	<0.015
Sulfur	<0.015
Chromium	9.50
Cobalt	15.00
Molybdenum	3.00
Titanium	4.75
Aluminum	5.50
Boron	0.015
Vanadium	0.95
Zirconium	0.06
Iron	<1.00
Nickel	Bal.

\*Conforms to the AMS 5397 specification

## Physical Properties

Basic physical constants of IN100 alloy are listed in Table. 2. The values from the table will vary slightly due to the changing composition from each heat.

**Table. 2 – Physical Constants**

Density	7.75 g/cm <sup>3</sup>	
Melting range	°F	2318 - 2439
	°C	1270 - 1337

Linear Thermal Expansion Coefficient	$10^{-6}/^{\circ}\text{C}$
RT - 427°C	11.6
RT - 871°C	13.5
RT - 1093°C	15.4

The tensile test methods are in accordance with the ASTM E8/E8M specification. The data of IN100 tensile properties is listed in Table.3 and the temperature dependence of tensile properties is shown in Fig. 1.

## Mechanical Properties

The outstanding characteristic of IN100 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 IN100 alloy.

## Tensile Properties

IN100 possesses high tensile and yield strength at room temperature and exhibits its peak strength at around 800°C.

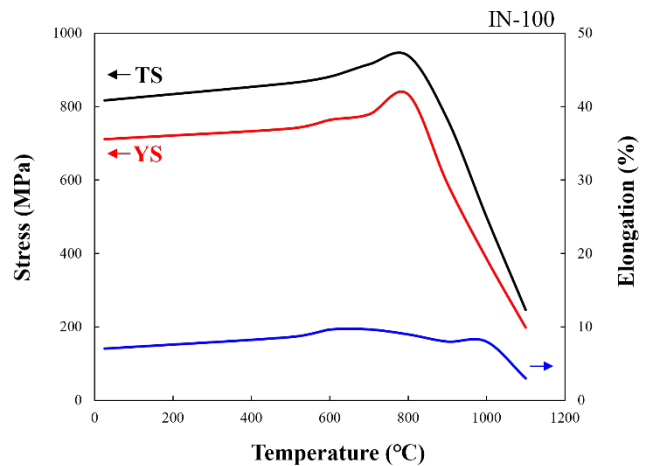


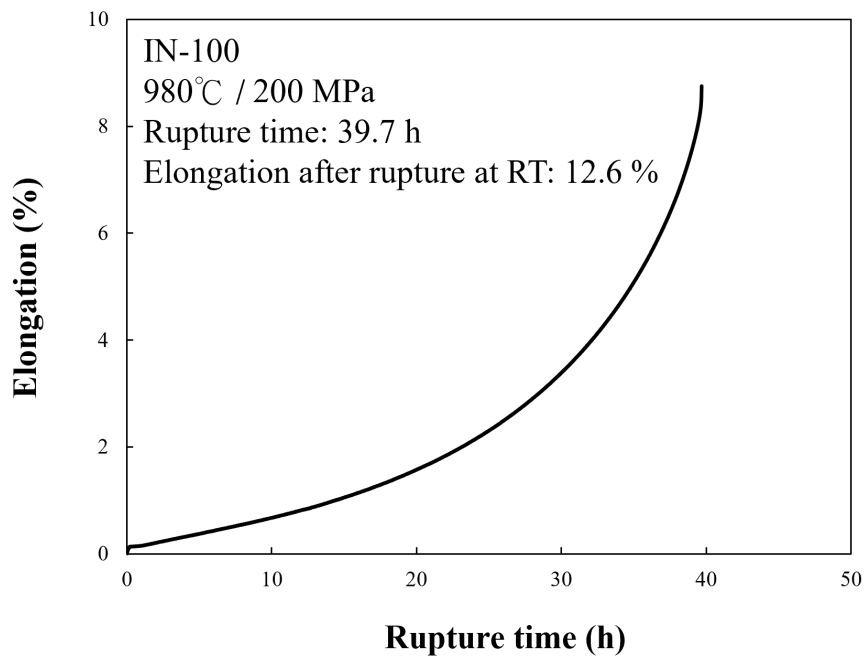
Fig. 1 The temperature dependence of Inconel IN-100 tensile properties

測試溫度 Temperature °C	測試溫度 Temperature °F	抗拉強度 Tensile strength MPa	降伏強度 Yield strength MPa	延伸率 Elongation %
25	77	816	711	7.0
500	932	864	740	8.6
600	1112	881	763	9.6
700	1292	915	778	9.6
800	1472	938	833	9.0
900	1652	765	590	8.0
1000	1832	499	386	8.0
1100	2012	246	198	3.0

## Stress-rupture Properties

The stress-rupture performance of the IN100 alloy is verified based on the AMS 5397 specification, which requires that specimens, maintained at 1800 °F ± 3 (982 °C ± 2) while a load sufficient to produce an initial axial stress of 29.0 ksi (200 MPa) or higher is applied continuously, shall not rupture in less than 23 hours.

The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than 4% in 4D. The Stress-rupture tests were conducted in accordance with the ASTM E139 specification. The data of IN-100 stress-rupture properties was shown in Fig. 2



**Fig. 2 Stress-rupture curve of as-cast Inconel IN-100**

# TCA

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意鑫合金工業股份有限公司

ISO 9001  
EN 9100  
BUREAU VERITAS  
Certification

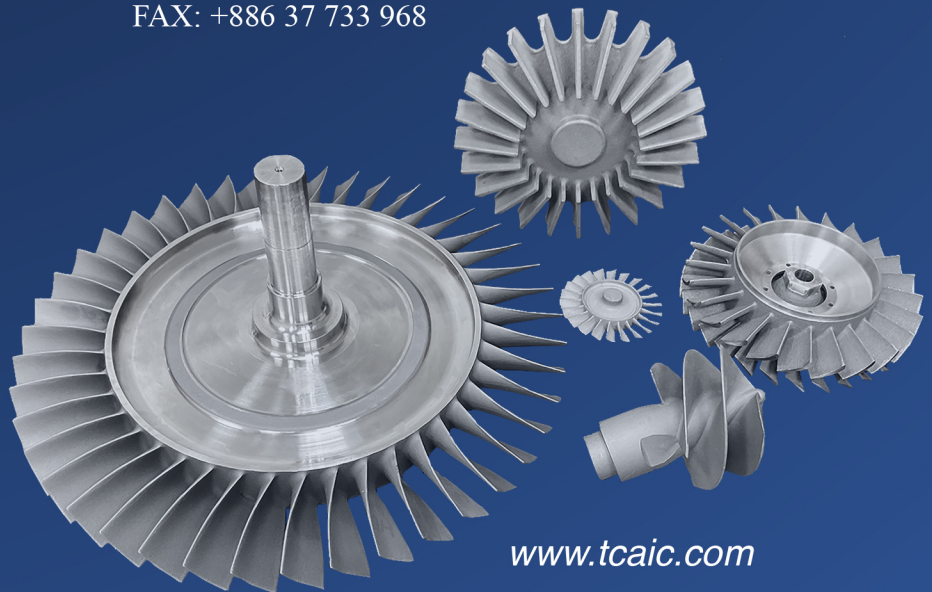


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