INCOTHERM® alloy TD

INCOTHERM® alloy TD was specifically developed for thermocouple sheathing where high-temperature corrosion resistance and strength are required without the use of elements that may cause thermocouple degradation over time.

Alloy TD is a Ni-22% Cr alloy with the addition of 1.4% Si, 3.0% Mo and rare earth elements. Elements such as manganese and aluminum, which can diffuse through the thermocouple insulator and contaminate the thermo-element wires leading to emf drift over time, are controlled at very low levels thus giving excellent long term performance. In addition, the composition is similar to the thermo-element wires, which further reduces the potential for the diffusion of elements between the alloys. The alloy has outstanding static and cyclic oxidation resistance at temperatures up to 1250°C (2282°F) and possibly beyond.

INCOTHERM alloy TD is highly resistant to oxide spalling and can therefore be considered for applications where contamination needs to be controlled at low levels, such as in glass making and electronic component processing.

Table 1 - Nominal Chemical Composition. wt %

Chromium	22
Nickel	Balance*
Molybdenum	3
Silicon	1.4
Carbon	0.01 max.
Rare Earth Elements	

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

Table 2 - Physical Properties

Density, lb/in³	0.295
g/cm³	8.17
Melting Range, °F	2516-2552
°C	1380-1400
Electrical Resistivity, Ω•circ mil/ft	698
μΩ•cm	1.16

Coefficient of Thermal Expansion (From 21°C to temperature shown)

°C	°F	μm/m/°C	10^{6}in/in•°F
500	932	14.56	8.09
600	1112	14.98	8.32
700	1292	15.59	8.66
800	1472	16.15	8.97
900	1652	16.81	9.34
1000	1832	17.30	9.61

Mechanical Properties

Tensile Strength, Yield Strength, Elongation

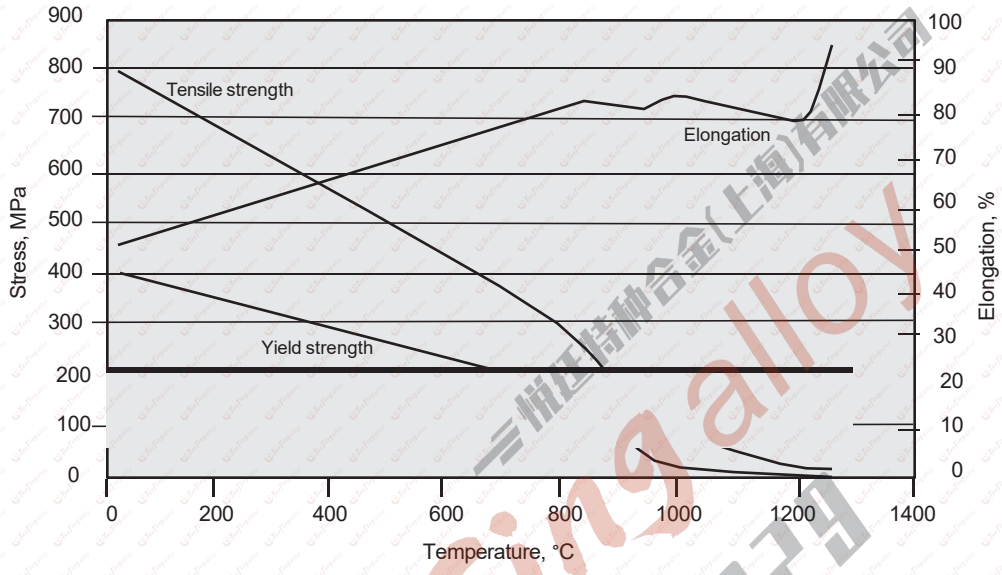

Figure 1. Tensile strength, yield strength and elongation of INCOTHERM alloy TD.

Stress Rupture

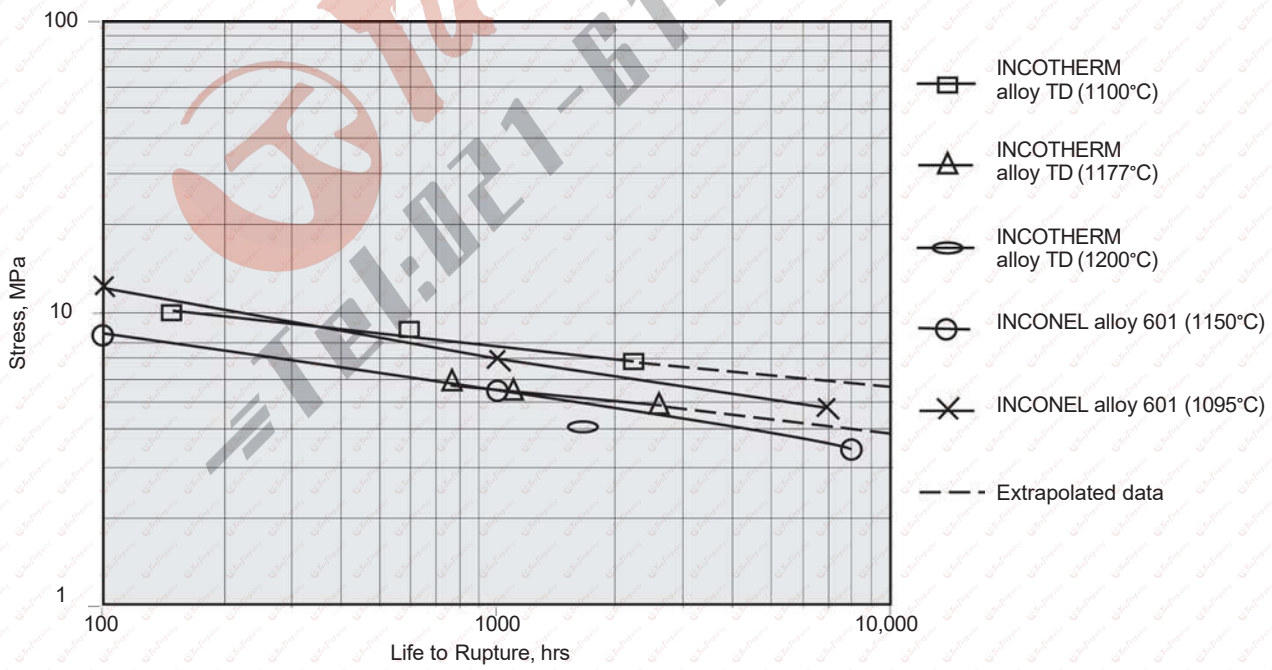

Figure 2. Stress rupture of INCOTHERM alloy TD.

Resistance to Oxidation and Nitridation

INCOTHERM alloy TD exhibits excellent resistance to nitridation, which greatly reduces the effects of embritlement that can cause failure in convetional thermocouple sheathing alloys.

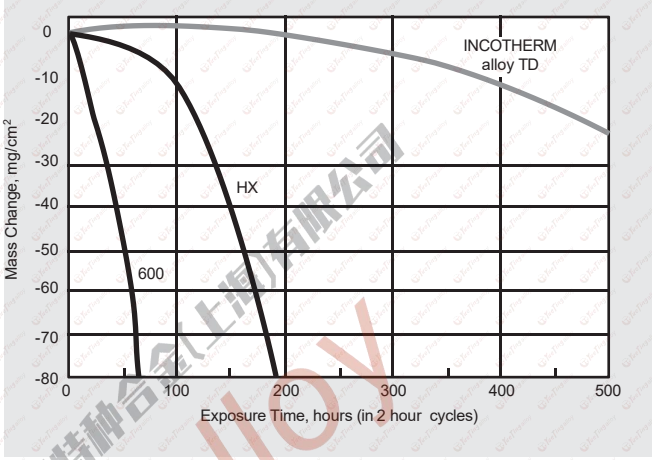

Figure 3. Mass Change after Cyclic Exposure (2 hour cycles) in O_2 at 1200°C (2192°F).

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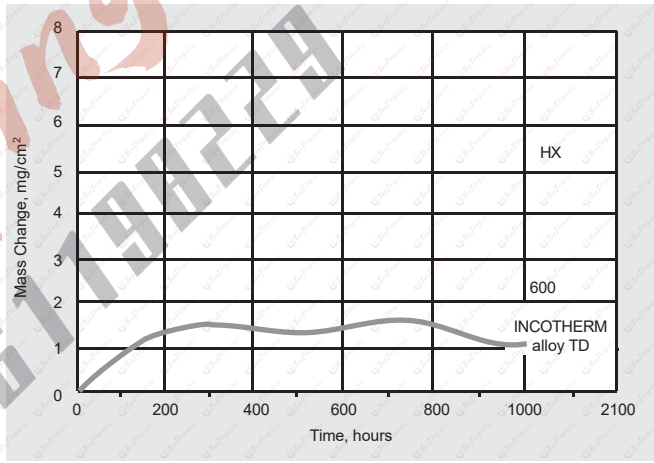

Figure 4. Mass Change after Exposure in N_2 + 5% H_2 at 1120°C (2050°F).

Available Products and Specifications

Contact Special Metals for information.

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