René 41 is an age hardening nickel base superalloy with exceptional strength from room temperature through about 1600°F. The alloy is sensitive to strain age cracking during welding. Sound welds can be made by the resistance and electron beam methods. GTAW using DC straight polarity requires good joint fit-up and cooling by means of copper backup bars or water-cooled fixtures. René 41 should be in the fully solution treated condition prior to welding. After welding the assembly should be solution treated using rapid heating and cooling rates through the 1200-1600°F range, followed by aging.

Mechanical properties vary with the solution and aging treatments. Higher solution temperatures result in better room temperature ductility and elevated temperature creep-rupture strength. Lower solution temperatures give higher tensile strengths. Two commonly used heat treatments are:

1. Solution treat: 2150°F 4 hours, air cool. Age: Reheat 1650 °F 4 hours, air cool.
2. Solution treat: 1975 °F 4 hours, air cool. Age: Reheat 1400°F 16 hours, air cool.

Specifications

UNS: N07041 **W. Nr./EN:** 2.4973 **AMS:** 5545, 5712, 5713, 5800 **GE:** B50TF109, B50T59, B50TF76

Chemical Composition, %

	Cr	Ni	Mo	Co	Al	Ti	B	C	Fe	Mn	Si	S	Cu
MIN	18.0	–	9.0	10.0	1.4	3.0	0.003	–	–	–	–	–	–
MAX	20.0	balance	10.5	12.0	1.8	3.3	0.01	0.12	5.0	0.1	0.5	0.015	0.5

Features

- Exceptionally high strength
- Oxidation resistant through 1800°F

Applications

- Hot jet engine components
- Missile components
- Bolting
- Springs

Physical Properties

Density: 0.298 lb/in^3 **Melting Range:** 2385 - 2450°F

Temperature, °F	800	1000	1200	1400	1600	1800
Coefficient* of Thermal Expansion, in/in°F x 10^{-6}	7.4	7.6	8.0	8.4	8.6	9.3
Thermal Conductivity Btu • ft/ft^2 • hr • °F	9.7	10.8	12.0	13.2	14.4	–
Modulus of Elasticity Dynamic, psi x 10^6	29	28	26	125	24	22

70°F to indicated temperature.

Mechanical Properties

Representative Tensile Properties Heat Treated, Sheet

Temperature, °F	70	1200	1400	1600
Ultimate Tensile Strength, ksi	183	162	152	103
0.2% Yield Strength, ksi	119	111	109	84
Elongation, %	21	14	17	11
Hardness, Rockwell C	33 - 40	–	–	–

Typical Rupture Strength, Heat Treated, Sheet - Stress to Rupture at Indicated Time

Temperature, °F	1200	1400	1600
100 Hours, ksi	107	63	23
1,000 Hours, ksi	90	43	13

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