

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/in³ 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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