TI BETA 21 S (GRADE 21), UNS R58210
Strip, Coil, Foil, Wire, ASTM Grade 21, ASTM B265

Applications
High resistance to aircraft hydraulic fluids. Used in warm airframes or engine structures, honeycombs, fasteners, metal matrix composites, welded and seamless tubing.

Description
Titanium Beta 21 S (Grade 21) is a beta alloy developed as an oxidation-resistant aerospace material and as a matrix for metal-matrix composites. Titanium Beta 21 S offers the good formability and weldability of a beta alloy, but with greatly improved oxidation resistance and creep strength.

Chemistry Typical
Titanium: Balance
Molybdenum: 14.0-16.0
Niobium: 2.4-3.2
Aluminum: 2.5-3.5
Silicon: 0.15-0.25
Iron: 0.40 max
Oxygen: 0.11-0.17
Carbon: 0.05 max
Nitrogen: 0.05 max
Hydrogen: 0.015 max
Residuals each 0.10 max, total 0.40 max

Physical Properties
Density: 0.178 lbs/in³, 4.94 g/cm³
Mean Coefficient of Thermal Expansion: in/in/°F (mm/m/°C):
70 - 212 °F (20 - 100 °C) 3.93 x 10⁻⁶ (7.07)
Thermal Conductivity: BTU-in/hr-ft-°F (W/m-°K):
70 °F (21 °C): 52.7 (7.6)

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels & Special Metals, Inc., be liable for any damages arising from the use of the information included in this document or that it is suitable for the ‘applications’ noted. We believe the information and data provided to be accurate to the best of our knowledge but, all data is considered typical values only. It is intended for reference and general information and not recommended for specification, design or engineering purposes. Ulbrich assumes no implied or express warranty in regard to the creation or accuracy of the data provided in this document.
Copyright January 2014 Revision 06.01.2015. Ulbrich Stainless Steels & Special Metals, Inc. All rights reserved.
Modulus of Elasticity: ksi (MPa)
10.5 - 12 x 10³ (72 - 85 x 10³) in tension

Melting Point: 3034 °F (1668 °C)

Forms
Coil – Strip, Foil, Ribbon
Wire – Inquire with Ulbrich Shaped Wire

Mechanical Properties at Room Temperature

Properties: Annealed

(1550 °F)
Ultimate Tensile Strength: 155 KSI min (1068 MPa min)
Yield Strength (0.2% offset): 110 KSI min (758 MPa min)
Elongation: 12%

Aged Properties: Typical

Aging Temp/Time: 1000 °F / 8 HOURS
Ultimate Tensile Strength: 170 KSI min (1172 MPa min)
Yield Strength (0.2% offset): 160 KSI min (1103 MPa min)
Elongation: 4%

Aging Temp/Time: 1100 °F / 8 HOURS
Ultimate Tensile Strength: 150 KSI min (1034 MPa min)
Yield Strength (0.2% offset): 140 KSI min (965 MPa min)
Elongation: 6%

Aging Temp/Time: 1275 °F / 8 HOURS
Ultimate Tensile Strength: 125 KSI min (862 MPa min)
Yield Strength (0.2% offset): 115 KSI min (793 MPa min)
Elongation: 10%

Additional Properties

Corrosion Resistance
Refer to NACE (National Associate of Corrosion Engineers) for recommendations.
Finishes

#1 – Hot rolled annealed and descaled. It is available in strip, foil and ribbon. It is used for applications where a smooth decorative finish is not required.
#2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process.
#2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D.
#BA – Bright annealed cold rolled and bright annealed
#CBA – Course bright annealed cold rolled matte finish and bright anneal
#2 – Cold Rolled
#2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part.
Polished – Various grit finish for specific polish finished requirements.

*Not all finishes are available for all alloys – Contact Ulbrich Sales for more information.

Wire Finishes

Inquire with Ulbrich Wire for wire finishes.

Heat Treatment

Titanium Alloy Beta 21 S (Grade 21) can be hardened by aging.

Welding

For best results refer to: SSINA’s “Welding of Stainless Steels and Other Joining Methods”.