QuesTek® Innovations Ferrium® M54™ Ultrahigh-strength Steel for Structural Applications

Category : Metal , Ferrous Metal , Alloy Steel

Material Notes:

Description: Ferrium® M54™ is an ultra high-strength steel for structural applications. Ferrium® M54™ was designed to provide mechanical properties equal to, or better than ultrahigh-strength steels such as Aermet® 100. Ferrium® M54™ has high resistance to stress-corrosion cracking (SCC) over conventional ultra highstrength steels. Ferrium® M54™ utilizes an efficient M2C strengthening dispersion precipitated through tempering while avoiding other carbides. This maximizes strength, wear resistance, and toughness; resulting in a unique combination of mechanical properties. Ferrium® M54™ has high hardenability, permitting less severe quench conditions for a given section size and resulting in less distortion during heat treatment. M54™ should be considered for use in applications requiring high strength with high fracture toughness, and good resistance to stress corrosion cracking (per ASTM F1624). M54™ is supplied in a normalized and annealed condition.Typical Application: Aircraft landing gears, arresting tailhooks, blast-resistant or impact containment devices, armor, flap tracks, actuator, drive shafts, sporting goods, fasteners and other structural applications.Application Environment: Ferrium® M54™ is not considered corrosion resistant. Therefore, users should consider the specific environment when determining surface treatment.Workability:Fording: Forge at 2000°F (1093°C) followed by air cool, normalize, subzero treatment and anneal.Machinability: Annealed Ferrium® M54™ has machinability similar to AMS6532. Heat Treatment:Solution Treatment: 1940°F(1060°C) 60-90 minutes and oil quench or equivalent, water quenching is not recommended. Soak time must be closely monitored, load couples are recommended..Sub Zero Treatment: Following the solution treatment, -100°F(-73°C) 1-3 hours and air warm. Temper: At 975°F (524°C), 6 hours and air cool.Product Forms: Ferrium® M54™ may be manufactured in typical ingot, bar, and billet forms. Sheet and plate also available upon request.Ferrium is designed by Questek Innovations, LLC. and is manufactured by Latrobe Specialty Steel under license.

Order this product through the following link:
http://www.lookpolymers.com/polymer_QuesTek-Innovations-Ferrium-M54-Ultrahigh-strength-Steel-for-Structural-Applications.php

Physical Properties	Metric	English	Comments
Density	7.98 g/cc	0.288 lb/in³	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell C	54	54	
Tensile Strength, Ultimate	2020 MPa	293000 psi	
Tensile Strength, Yield	1730 MPa @Strain 0.200 %	251000 psi @Strain 0.200 %	
Elongation at Break	15 %	15 %	
Reduction of Area	64 %	64 %	
Fracture Toughness	130 MPa-m½	118 ksi-in½	
Charpy Impact	32.5 J	24.0 ft-lb	V-notch

Thermal Properties	Metric	English	Comments
CTE, linear	10.17 µm/m-°C @Temperature 24.0 - 100 °C	5.650 µin/in-°F @Temperature 75.2 - 212 °F	
	10.47 µm/m-°C @Temperature 24.0 - 200 °C	5.817 µin/in-°F @Temperature 75.2 - 392 °F	
	10.78 µm/m-°C @Temperature 24.0 - 300 °C	5.989 µin/in-°F @Temperature 75.2 - 572 °F	
	11.1 µm/m-°C @Temperature 24.0 - 400 °C	6.17 µin/in-°F @Temperature 75.2 - 752 °F	
	11.47 µm/m-°C @Temperature 24.0 - 500 °C	6.372 µin/in-°F @Temperature 75.2 - 932 °F	
	11.64 µm/m-°C @Temperature 24.0 - 540 °C	6.467 µin/in-°F @Temperature 75.2 - 1000 °F	
Specific Heat Capacity	0.448 J/g-°C @Temperature 22.8 °C	0.107 BTU/lb-°F @Temperature 73.0 °F	
	0.502 J/g-°C @Temperature 200 °C	0.120 BTU/lb-°F @Temperature 392 °F	
	0.569 J/g-°C @Temperature 400 °C	0.136 BTU/lb-°F @Temperature 752 °F	
	0.711 J/g-°C @Temperature 593 °C	0.170 BTU/lb-°F @Temperature 1100 °F	
Thermal Conductivity	26.3 W/m-K @Temperature 23.0 °C	183 BTU-in/hr-ft²-°F @Temperature 73.4 °F	
	27.9 W/m-K @Temperature 100 °C	194 BTU-in/hr-ft²-°F @Temperature 212 °F	
	29.8 W/m-K @Temperature 200 °C	207 BTU-in/hr-ft²-°F @Temperature 392 °F	
	31.2 W/m-K	217 BTU-in/hr-ft²-°F	

Thermal Properties	Metric	English	Comments
	@Temperature 300 °C	@Temperature 572 °F	
	32.2 W/m-K	223 BTU-in/hr-ft²-°F	
	@Temperature 400 °C	@Temperature 752 °F	
	33.0 W/m-K	229 BTU-in/hr-ft²-°F	
	@Temperature 500 °C	@Temperature 932 °F	
	33.9 W/m-K	235 BTU-in/hr-ft²-°F	
	@Temperature 594 °C	@Temperature 1100 °F	

Component Elements Properties	Metric	English	Comments
Carbon, C	0.30 %	0.30 %	
Chromium, Cr	1.0 %	1.0 %	
Cobalt, Co	7.0 %	7.0 %	
Iron, Fe	78.57 %	78.57 %	
Molybdenum, Mo	2.0 %	2.0 %	
Nickel, Ni	10 %	10 %	
Tungsten, W	1.3 %	1.3 %	
Vanadium, V	0.10 %	0.10 %	

Chemical Properties	Metric	English	Comments
Critical Temperature	204 °C	399 °F	Ms
	800 °C	1470 °F	Ac1
	880 °C	1620 °F	Ac2

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