

CarTech™ Ferrium® M54®

TYPICAL COMPOSITION

C	Cr	Ni	Co	Mo	W	V
0.30	1.0	10.0	7.0	2.0	1.3	0.10

CarTech Ferrium M54 is an ultra high-strength steel for structural aerospace and other applications where 300M, 4340, and AMS 6532 are typically used. It is double-vacuum VIM/VAR processed by vacuum induction melting followed by vacuum arc remelting to provide optimum metallurgical quality and repeatability. CarTech Ferrium M54 has mechanical properties equivalent to the previously mentioned conventional alloys, but with the added benefit of very high toughness. This can be a major benefit in applications requiring high impact resistance or in flaw-tolerant designs. In addition, CarTech Ferrium M54 has greatly improved resistance to stress-corrosion cracking (SCC) compared to conventional ultra high-strength steels. It also has high hardenability, permitting less severe quench conditions for a given section size and resulting in less distortion during heat treatment.

CarTech Ferrium M54 utilizes an efficient M_2C strengthening dispersion precipitated through tempering while avoiding other carbides. This maximizes strength, wear resistance, and toughness resulting in a unique combination of mechanical properties for a very high strength/toughness combination.

APPLICATIONS

Typical applications include aircraft landing gears, arresting tailhooks, blast-resistant or impact containment devices, armor, flap tracks, actuators, drive shafts, sporting goods, fasteners, and other structural applications.

MECHANICAL PROPERTY DATA

Test Temperature	Room Temperature
YS (ksi/MPa)	250/1731
UTS (ksi/MPa)	293/2020
% El (in 1")	15
% RA	61
Fracture Toughness (ksi√in/ MPa√m)	115/127

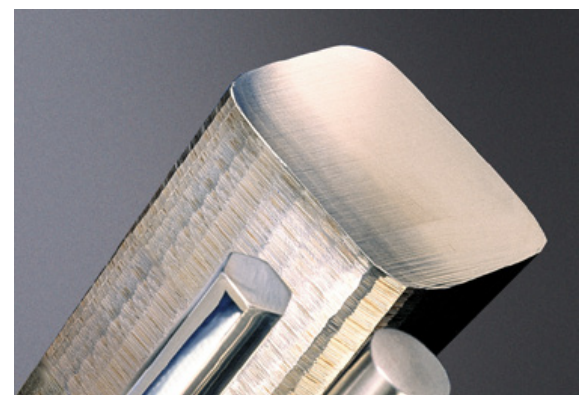
BENEFITS

- ▶ Ultra High-Strength
- ▶ High Fracture Toughness
- ▶ Fatigue Resistance
- ▶ High Resistance to SCC

SPECIFICATIONS

AMS 6516
MMPDS-09

US Patent Number 9,051,635



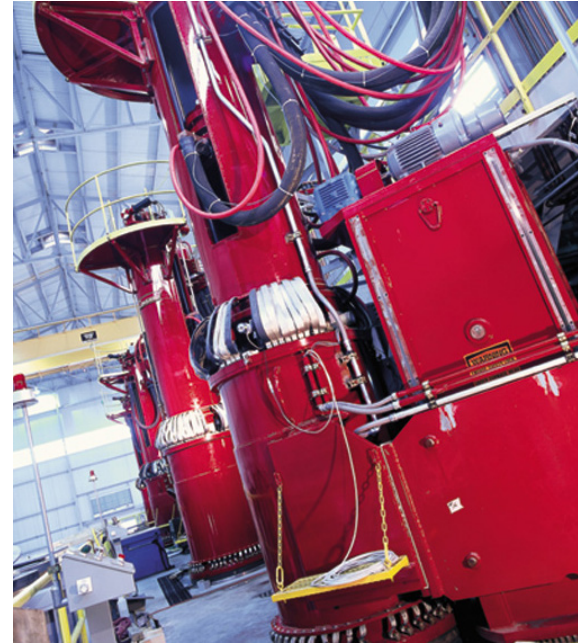
PHYSICAL PROPERTIES

Density: 0.288 lb/in³ (7.98 g/cm³)

Critical Temperatures: A_{c1} 1472°F (800°C)
 A_{c3} 1616°F (880°C)
 Ms 400°F (204°C)

Mean Coefficient of Thermal Expansion

Temp Range		in/in/°F (x 10 ⁻⁶)	mm/mm/°C (x 10 ⁻⁶)
°F	°C		
75-212	24-100	5.65	10.17
75-392	24-200	5.82	10.47
75-572	24-300	5.99	10.78
75-752	24-400	6.17	11.10
75-932	24-500	6.47	11.47
75-1004	24-540	6.47	11.64



CLEANLINESS REQUIREMENTS

CarTech Ferrium M54 VIM-VAR steel conforms to AMS 2300 magnetic particle cleanliness. The microcleanliness, rated according to ASTM E-45, typically satisfies the worst field ratings:

	A	B	C	D
Thin	1.5	1.5	1.5	1.5
Heavy	1.0	1.0	1.0	1.0

Contact:

Carpenter Technology Corporation
 P.O. Box 14662
 Reading, PA 19612-4662 USA

www.carttech.com
service@carttech.com

USA

TF: 800-654-6543
 Tel: 610-208-2000

Canada

TF: 800-268-4740

England

Tel: +44-1527-512200

Europe

Belgium
 Tel: +32-10-686-010

Mexico and

South America

Querétaro
 Tel: 52 (442) 29-09-04-001
 Palmas
 Tel: 52 (55) 50-03-02-33

Asia

Singapore
 Tel: 65-6738-2401
 China
 Tel: 86-021-2411 3500
 Fax: 86-021-2411 3555

Visit us at www.carttech.com

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