



# CarTech™ Ferrium® S53®

## **TYPICAL COMPOSITION**

С	Cr	Ni	Co	Mo	W	V
0.21	10.0	5.5	14.0	2.0	1.0	0.30

CarTech Ferrium S53 is an ultra high-strength steel for structural aerospace and other applications where 300M, 4340 are typically used. CarTech Ferrium S53 has mechanical properties on par with these conventional alloys, but with the added benefit of atmospheric corrosion resistance. This can eliminate the need for cadmium coating and the subsequent accompanying processing. In addition, CarTech Ferrium S53 has greatly improved resistance to stress-corrosion cracking (SCC) compared to 300M and 4340.

CarTech Ferrium S53 utilizes an efficient  $\rm M_2C$  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 corrosion resistant steel. CarTech Ferrium S53 uses a stable passive oxide film to provide corrosion resistance similar to 440C stainless steel. It also has high hardenability, permitting less severe quench conditions for a given section size and resulting in less distortion during heat treatment.

#### **APPLICATIONS**

Typical applications include aircraft landing gears, flap tracks, actuators, fasteners and other structural applications.

### **MECHANICAL PROPERTY DATA**

Orientation	Long.	Trans.
YS (ksi/MPa)	225/1551	225/1551
UTS (ksi/MPa)	288/1986	288/1986
% El (in 4D)	15	15
% RA	57	55
Impact Energy (ft-lbs/J)	18/24	18/24
Fracture Toughness (ksi√in/ MPa√m)	65/71	65/71
HRC	54	54

#### **BENEFITS**

- ► Ultra High-Strength
- ► Fatigue Resistance
- ► Corrosion Resistance
- ► High Hardenability

#### **SPECIFICATIONS**

AMS 5922 MMPDS-05 UNS S10500

US Patent Number 7,235,212 US Patent Number 7,160,399 US Patent Number 7,967,927



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#### **PHYSICAL PROPERTIES**

Density: 0.288 lb/in<sup>3</sup> (7.98 g/cm<sup>3</sup>) Modulus of Elasticity: 29.6 x 10<sup>6</sup>

Critical Temperatures: A<sub>c1</sub> 1364°F (740°C)

A<sub>C3</sub> 1436°F (780°C) Ms 212°F (100°C)

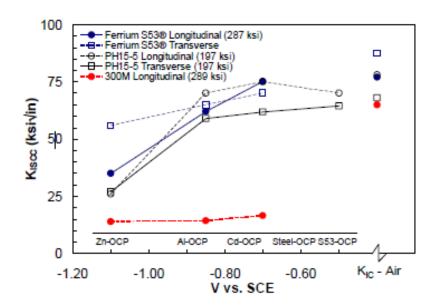
Mean Coefficient of Thermal Expansion

Temp	Range	in/in/F	mm/mm/ °C
°F	°C	$(x 10^{-6})$	$(x 10^{-6})$
75-220	24-104	5.86	10.53
75-400	24-204	5.89	10.59
75-600	24-316	6.00	10.79
75-800	24-427	6.13	11.02
75-1000	24-538	6.22	11.18
75-1100	24-593	6.19	11.13

#### **CORROSION RESISTANCE**

The general corrosion resistance of CarTech Ferrium S53 is similar to 440C stainless steel. Linear polarization testing measured an average corrosion rate of 0.40 mils per year versus a saturated Ag/AgCl reference electrode in 3.5% sodium chloride (NaCl) solution at ambient temperature. CarTech Ferrium S53 is rust resistant in 3.5% NaCl solution.

Stress Corrosion Cracking (per ASTM F1624 in 3.5% NaCl Solution)





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