

This page is mainly introduced the SAE J403 Datasheet, including chemical information, mechanical properties, physical properties, mechanical properties, heat treatment, and Micro structure, etc. It also contains the use of SAE J403, such as it is commonly used in bars, sheet, plates, steel coils, steel pipes, forged and other materials application.

Datasheet for Steel Grades Carbon Steel SAE J403

SAE J403 Standard Number:

ITEM	Standard Number	Descriptions
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SAE J403 Chemical composition (mass fraction) (wt.%)

Chemical			Min.(%)				Max.(%)		
C	Si	Mn	P	S	Cr	Ni	Mo	V	Ta
W	N	Cu	Co	Pb	B	Nb	Al	Ti	Other

Categories: Metal; Ferrous Metal; Carbon Steel; AISI 1000 Series Steel; Low Carbon steel

Material Notes: AISI 1005 Low Carbon steel

Key Words: UNS G10050, ASTM A29, ASTM A510, MIL SPEC MIL-S-11310 (CS1005), SAE J403, SAE J412

Physical Properties	Metric	English	Comments
Density	7.872 g/cc	0.2844 lb/in ³	Composition

			0.06% C, 0.38% Mn, 0.01% Si, annealed at 925°C
Mechanical Properties	Metric	English	Comments
Modulus of Elasticity	200 GPa	29000 ksi	Typical for steel
Bulk Modulus	140 GPa	20300 ksi	Typical for steel
Poissons Ratio	0.290	0.290	Typical For steel
Shear Modulus	80.0 GPa	11600 ksi	Typical for steel
Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000174 ohm-cm	0.0000174 ohm-cm	Typical steel
Thermal Properties	Metric	English	Comments
CTE, linear	12.6 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 100 °C	7.00 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 212 °F	
	13.1 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 200 °C	7.28 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 392 °F	
	13.5 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 300 °C	7.50 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 572 °F	
	13.7 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 400 °C	7.61 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 752 °F	
	13.7 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 1000 °C	7.61 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 1830 °F	
	14.2 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 500 °C	7.89 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 932 °F	

	14.6 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 600 $^{\circ}\text{C}$	8.11 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 1110 $^{\circ}\text{F}$	
	14.9 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 700 $^{\circ}\text{C}$	8.28 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 1290 $^{\circ}\text{F}$	
	16.6 $\mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ @Temperature 0.000 - 800 $^{\circ}\text{C}$	9.22 $\mu\text{in}/\text{in}\cdot^{\circ}\text{F}$ @Temperature 32.0 - 1470 $^{\circ}\text{F}$	
Specific Heat Capacity	0.481 $\text{J}/\text{g}\cdot^{\circ}\text{C}$	0.115 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$	50-100 $^{\circ}\text{C}$ (122-212 $^{\circ}\text{F}$)
	0.519 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 150 - 200 $^{\circ}\text{C}$	0.124 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 302 - 392 $^{\circ}\text{F}$	
	0.536 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 200 - 250 $^{\circ}\text{C}$	0.128 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 392 - 482 $^{\circ}\text{F}$	
	0.553 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 250 - 300 $^{\circ}\text{C}$	0.132 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 482 - 572 $^{\circ}\text{F}$	
	0.595 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 350 - 400 $^{\circ}\text{C}$	0.142 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 662 - 752 $^{\circ}\text{F}$	
	0.662 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 450 - 500 $^{\circ}\text{C}$	0.158 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 842 - 932 $^{\circ}\text{F}$	
	0.754 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 550 - 600 $^{\circ}\text{C}$	0.180 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 1020 - 1110 $^{\circ}\text{F}$	
	0.846 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 850 - 900 $^{\circ}\text{C}$	0.202 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 1560 - 1650 $^{\circ}\text{F}$	
	0.867 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 650 - 700 $^{\circ}\text{C}$	0.207 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 1200 - 1290 $^{\circ}\text{F}$	
	1.105 $\text{J}/\text{g}\cdot^{\circ}\text{C}$ @Temperature 700 - 750 $^{\circ}\text{C}$	0.2641 $\text{BTU}/\text{lb}\cdot^{\circ}\text{F}$ @Temperature 1290 - 1380 $^{\circ}\text{F}$	

Component Elements Properties	Metric	English	Comments
Carbon, C	<= 0.060 %	<= 0.060 %	
Iron, Fe	99.5 - 100 %	99.5 - 100 %	As remainder
Manganese, Mn	<= 0.35 %	<= 0.35 %	
Phosphorous, P	<= 0.040 %	<= 0.040 %	
Sulfur, S	<= 0.050 %	<= 0.050 %	

SAE J403 Physical Properties

Tensile strength	115-234	σ_b /MPa
Yield Strength	23	$\sigma_{0.2} \geq$ /MPa
Elongation	65	$\delta_5 \geq$ (%)
ψ	-	$\psi \geq$ (%)
Akv	-	$Akv \geq$ /J
HBS	123-321	-
HRC	30	-

SAE J403 Mechanical Properties

Tensile strength	231-231	σ_b /MPa
Yield Strength	154	$\sigma_{0.2} \geq$ /MPa
Elongation	56	$\delta_5 \geq$ (%)
ψ	-	$\psi \geq$ (%)
Akv	-	$Akv \geq$ /J
HBS	235-268	-
HRC	30	-

SAE J403 Heat Treatment Regime

Annealing	Quenching	Tempering	Normalizing	Q & T
√	√	√	√	√

SAE J403 Range of products

Product type	Products	Dimension	Processes	Deliver Status
Plates / Sheets	Plates / Sheets	0.08-200mm(T)*W*L	Forging, hot rolling and cold rolling	Annealed, Solution and Aging, Q+T, ACID-WASHED, Shot Blasting
Steel Bar	Round Bar, Flat Bar, Square Bar	Φ8-1200mm*L	Forging, hot rolling and cold rolling, Cast	Black, Rough Turning, Shot Blasting,
Coil / Strip	Steel Coil /Steel Strip	0.03-16.0x1200mm	Cold-Rolled & Hot-Rolled	Annealed, Solution and Aging, Q+T, ACID-WASHED, Shot Blasting
Pipes / Tubes	Seamless Pipes/Tubes, Welded Pipes/Tubes	OD:6-219mm x WT:0.5-20.0mm	Hot extrusion, Cold Drawn, Welded	Annealed, Solution and Aging, Q+T, ACID-WASHED

We can produce Carbon Steel the specifications follows: