
Property Results

Chemistry Data : [top]

Carbon	0.17 - 0.23
Iron	Balance
Manganese	0.3 - 0.6
Phosphorus	0.04 max
Sulphur	0.05 max

Principal Design Features

1020 is one of the very commonly used plain carbon steels. It has a nominal carbon content of 0.20% with approximately 0.50% manganese. It is a good combination of strength and ductility and may be hardened or carburized.

Applications

1020 steel is used for simple structural application such as cold headed bolts. It is often used in the case hardened condition.

Machinability

Machinability is good at 65% compared to 1112 carbon steel as 100% baseline.

Forming

Formability is good by all conventional methods as the ductility of 1020 is good.

Welding

Readily weldable by all of the standard methods.

Heat Treatment

1020 may be hardened by heating to 1500 - 1600 F and then water quenching. It should then be tempered. More often it is used as case hardened by carburizing . The cost of doing any heat treatment to such a low carbon steel often precludes doing so for the modest return in mechanical properties obtained.

Forging

Forge at 2300 down to 1800 F.

1020 Carbon Steels Material Property Data Sheet

Hot Working	Hot work in the range of 900 to 1200 F.
Cold Working	1020 steel is readily cold worked by all conventional methods. A stress relief anneal may be needed after extensive cold work.
Annealing	A full anneal is done at 1600 to 1800 F followed by slow furnace cooling. This will give a tensile strength of about 65 ksi. A stress relief anneal may be done at 1000 F.
Aging	Not applicable.
Tempering	Temper, following heat treatment and quenching, at 600 to 1000 F depending upon strength level desired. A 1000 F temper gives a tensile strength of 90 ksi.
Hardening	1020 steel hardens by cold working and by heat treatment, quenching and tempering.

Physical Data : [top]

Density (lb / cu. in.)	0.284
Specific Gravity	7.86
Specific Heat (Btu/lb/Deg F - [32-212 Deg F])	0.107
Melting Point (Deg F)	2760
Poissons Ratio	0.3
Thermal Conductivity	360
Mean Coeff Thermal Expansion	6.7
Modulus of Elasticity Tension	30
Modulus of Elasticity Torsion	11

Mechanical Data : [top]

Form	Round Bar
Condition	Cold Drawn
Temper	68
Tensile Strength	64
Yield Strength	54
Elongation	24
Reduction of Area	54
Rockwell	B79
Brinnell	126
Form	Round Bar

Condition	Hot Rolled
Temper	68
Tensile Strength	55
Yield Strength	30
Elongation	25
Reduction of Area	50
Rockwell	B76
Brinnell	137

Videos :

MSO currently has no videos available for this grade.

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