SAE 1020

Component Wt. %

C 0.17 - 0.23
Fe 99.08 - 99.53
Mn 0.3 - 0.6
P Max 0.04
S Max 0.05

Material Notes:
1020 steel responds well to cold work and heat treating. Weldability is fair.

Applications: Shafts, lightly stressed gears, hard wearing surfaces, pins, chains and case hardened parts where core strength is not critical.

1020 is suitable for case hardened parts where core strength is not critical.

Physical Properties Metric English Comments

Density 7.87 g/cc 0.284 lb/in³

Mechanical Properties

Hardness, Brinell 121 121
Hardness, Knoop 140 140 Converted from Brinell hardness.
Hardness, Rockwell B 68 68 Converted from Brinell hardness.
Hardness, Vickers 126 126 Converted from Brinell hardness.
Tensile Strength, Ultimate 420 MPa 60900 psi
Tensile Strength, Yield 350 MPa 50800 psi
Elongation at Break 15 % 15 % In 50 mm
Reduction of Area 40 % 40 %
Modulus of Elasticity 205 GPa 29700 ksi Typical for steel
Bulk Modulus 140 GPa 20300 ksi Typical for steel
Poisson's Ratio 0.29 0.29
Machinability 65 % 65 % Based on AISI 1212 steel. as 100% machinability
Shear Modulus 80 GPa 11600 ksi Typical for steel

Electrical Properties

Electrical Resistivity 1.59e-005 ohm-cm 1.59e-005 ohm-cm condition unknown; 0°C (32°F)
Electrical Resistivity at Elevated Temperature 2.19e-005 ohm-cm 2.19e-005 ohm-cm condition unknown; 100°C (212°F)
Electrical Resistivity at Elevated Temperature 2.92e-005 ohm-cm 2.92e-005 ohm-cm condition unknown; 200°C (390°F)

Thermal Properties

CTE, linear 20°C 11.7 µm/m-°C 6.5 µin/in-°F 0-100ºC
CTE, linear 250°C 12.8 µm/m-°C 7.11 µin/in-°F 0-300°C (68-570°F)
CTE, linear 500°C 13.9 µm/m-°C 7.72 µin/in-°F 0-500°C (68-930°F)
Specific Heat Capacity 0.486 J/g-°C 0.116 BTU/lb-°F condition unknown; 50-100°C (122-212°F)
Specific Heat Capacity at Elevated Temperature 0.519 J/g-°C 0.124 BTU/lb-°F condition unknown; 150-200°C (302-390°F)
Specific Heat Capacity at Elevated Temperature 0.599 J/g-°C 0.143 BTU/lb-°F condition unknown; 350-400°C (662-752°F)
Thermal Conductivity 51.9 W/m-K 360 BTU-in/hr-ft²-°F Typical steel