

SAE 1045

Component Wt. %

C 0.42 - 0.5

Fe 98.51 - 98.98

Mn 0.6 - 0.9

P Max 0.04

S Max 0.05

Material Notes:

Medium-carbon steel, can be hammer forged. Can be heat treated, flame or induction hardened, but not recommended for carburizing or cyaniding. AISI cross reference for JIS S45C and KS SM45C.

Physical Properties Metric English Comments

Density 7.85 g/cc 0.284 lb/in³

Mechanical Properties

Hardness, Brinell 179 179

Hardness, Knoop 200 200 Converted from Brinell hardness.

Hardness, Rockwell B 88 88 Converted from Brinell hardness.

Hardness, Vickers 188 188 Converted from Brinell hardness.

Tensile Strength, Ultimate 625 MPa 90600 psi

Tensile Strength, Yield 530 MPa 76900 psi

Elongation at Break 12 % 12 % In 50 mm

Reduction of Area 35 % 35 %

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 Typical For Steel

Machinability 55 % 55 % Based on AISI 1212 steel. as 100% machinability

Shear Modulus 80 GPa 11600 ksi Typical for steel

Electrical Properties

Electrical Resistivity 1.62e-005 ohm-cm 1.62e-005 ohm-cm annealed specimen; 0 °C (32 °F)

Electrical Resistivity at Elevated Temperature 2.23e-005 ohm-cm 2.23e-005 ohm-cm annealed specimen; 100 °C (212 °F)

Thermal Properties

CTE, linear 20°C 11.5 µm/m-°C 6.39 µin/in- °F 0-100°C

CTE, linear 250°C 13 µm/m-°C 7.22 µin/in- °F 0-300 °C (68-570 °F)

CTE, linear 500°C 14 µm/m-°C 7.78 µin/in- °F 0-500 °C (68-930 °F)

Specific Heat Capacity 0.486 J/g- °C 0.116 BTU/lb- °F annealed; 50-100 °C (122-212 °F)

Specific Heat Capacity at Elevated Temperature 0.519 J/g- °C 0.124 BTU/lb- °F annealed; 150-200 °C (302-392 °F)

Specific Heat Capacity at Elevated Temperature 0.586 J/g- °C 0.14 BTU/lb- °F annealed; 350-400 °C (662-752 °F)

Thermal Conductivity 49.8 W/m-K 346 BTU-in/hr-ft²- °F Typical steel

