



E STEEL SDN BHD (891338-A)

NO 3, Lorong Sungai Puloh 7/KU 6,
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Tel : 03-3292 8686 / 32928666 / 32928777
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AISI 1050 Steel (UNS G10500)

Nearest Equivalent : S50C, 1.1730, ASSAB 760, 1191

AISI 1050 steel is a medium-carbon, cold rolled steel containing approximately 0.50% carbon that can be hardened by heat treatment to a maximum hardness of approximately Rockwell C 58. Soft annealed high carbon steel is intended for applications requiring moderate forming, while soft spheroidized annealed product is intended for applications requiring maximum cold forming. This grade of steel is used for the manufacture of blades, brackets, brake discs, clips, clutches, springs, washers and gears and for a wide range of applications that can make use of its good combination of mechanical properties.

Carbon steel 1050 Chemical Composition

Chemical Composition (wt%) limits of AISI 1050 carbon steel per ASTM A684*

Element	AISI 1050
Carbon	0.48-0.55
Manganese	0.60-0.90
Phosphorus	0.030
Sulfur	0.035

Steel 1050 Mechanical Properties

Properties	Metric	Imperial
Tensile strength	690 MPa	100000 psi
Yield strength	580 MPa	84100 psi
Shear modulus (typical for steel)	80 GPa	11600 ksi
Bulk modulus (typical for steel)	140 GPa	20300 ksi
Elastic modulus	190-210 GPa	27557-30458 ksi
Poisson's ratio	0.27-0.30	0.27-0.30
Elongation at break (in 50 mm)	10%	10%
Reduction of area	30%	30%
Hardness, Rockwell C (converted from Brinell hardness. Value below normal HRC range, for comparison purposes only)	13	-
Hardness, Brinell	197	197
Hardness, Knoop (converted from Brinell hardness)	219	219
Hardness, Rockwell B (converted from Brinell hardness)	92	92
Hardness, Rockwell C (converted from Brinell hardness. Value below normal HRC range, for comparison purposes only)	13	13
Hardness, Vickers (converted from Brinell hardness)	207	207



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HEAT TREATMENT ANNEALING

Full annealing of small C1050 forgings is carried out from 1450-1600°F (790-870°C) followed by furnace cooling at 50°F (28°C) per hour, to 1200°F (650°C) soaking and air cooling.

NORMALIZING

The normalizing temperature range for this grade is typically 1650-1700°F (900-925°C.) Normalizing is followed by cooling in still air. When forgings are normalized before hardening and tempering or other heat treatment, the upper range of the normalizing temperature is used. When normalizing is the final treatment, the lower temperature range is used.

HARDENING

Hardening of this grade is carried out from an austenitizing temperature of 1500-1600°F (820-870°C) followed by oil or water quenching. Flame and induction hardening may be carried out by heating quickly to the desired case depth and quenching in water or oil. This should be followed by a **tempering** treatment at 300-400°F (150-200°C) to reduce stresses in the case, without affecting its hardness. A surface hardness as high as Rc 61 may be obtained from C1050 by this treatment.

TEMPERING

Tempering after normal hardening and oil or water quenching is carried out at 750-1260° F (400-680°C) to give the required mechanical properties as determined by practical experience.

MACHINABILITY

Machinability of C1050 is good providing the full annealing cycle described above is used, A coarse lamellar pearlite to coarse spheroidite microstructure gives optimum machinability in C1050.

WELDABILITY

This grade is readily welded with the correct procedure. Welding in the through-hardened or flame or induction-hardened conditions is not recommended.

Low-hydrogen electrodes are recommended together with preheat at 300-800°F (150-430°C) to be maintained during welding, Cool slowly in sand or ashes and stress relieve where possible. It may be that in certain instances normalizing may be called for after welding.