

# AISI 1075 Carbon Steel (UNS G10750)

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## Introduction

Carbon steels contain carbon as the chief alloying element. Residual elements such as copper, chromium, molybdenum, nickel, and aluminium are also present in traces. They also contain 1.2% of manganese and 0.4% of silicon. AISI 1075 carbon steel is more brittle than the lower carbon steels.

The following datasheet gives an overview of AISI 1075 carbon steel

## Chemical Composition

The chemical composition of AISI 1075 carbon steel is tabulated below.

Element	Content (%)
Iron, Fe	98

Carbon, C	0.70-0.80
Manganese, Mn	0.40-0.70
Sulfur, S	0.05 (max)
Phosphorous, P	0.04 (max)

## Physical Properties

The following table shows the physical properties of AISI 1075 carbon steel.

Properties	Metric	Imperial
Density	7.7-8.03 g/cm <sup>3</sup>	0.278- 0.290 lb/in <sup>3</sup>
Melting point	1515°C	2760°F

## Mechanical Properties

The mechanical properties of AISI 1075 carbon steel are outlined in the following table.

Properties	Metric	Imperial
Elastic modulus	190-210 GPa	27557-30458 ksi
Poisson's ratio	0.27-0.30	0.27-0.30

## Other Designations

Other designations that are equivalent to AISI 1075 carbon steel include:

- ASTM A29 (1075)
- ASTM A510 (1075)
- ASTM A713 (1075)
- SAE J403 (1075)
- SAE J412 (1075)

## Fabrication and Heat Treatment

### Machinability

The machinability rate of AISI 1075 carbon steel is 50.

### Forming

AISI 1075 carbon steel can be formed using conventional techniques.

## Welding

AISI 1075 carbon steel can be welded using all welding methods. It is pre-heated at 260 to 315°C (500 to 600°F) and post-heated at 649 to 788°C (1200 to 1450°F) to prevent cracking.

## Heat Treatment

AISI 1075 carbon steel can be hardened at 899°C (1650°F). It is then quenched in oil followed by tempering.

## Forging

AISI 1075 carbon steel can be forged at 927 to 1204°C (1700 to 2200°F) followed by annealing.

## Hot Working

AISI 1075 carbon steel can be hot worked at 94 to 483°C (200 to 900°F).

## Cold Working

Cold working of AISI 1075 carbon steel is performed using conventional methods in the annealed condition. It needs more force compared to low carbon steels to perform this process.

## Annealing

Annealing of AISI 1075 carbon steel can be done at 926°C (1700°F) followed by slowly cooling in the furnace.

## Tempering

AISI 1075 carbon steel is tempered at 371 to 705°C (700 to 1300°F) after heating and quenching. It is usually used in the hardened condition of Rockwell C 55.

## Hardening

AISI 1075 carbon steel is hardened by cold working, heating, and quenching.

## **Applications**

AISI 1075 carbon steel is mainly used in cutting tools, and springs.