

## High Carbon Steel

### ■ What are High Carbon Steels?

High carbon steels are steels with high carbon contents. Asia Industrial Metals supplies high carbon steels with carbon contents from 0.5% up to 1.25% in term of weight. And Asia Industrial Metals only supplies high carbon steels in form of strip (coiled narrow band).

Normally carbon steels can be classified as Low carbon, Medium carbon, High carbon, and Ultra-High carbon steels as following.

- Low-carbon steel: 0.05 to 0.25% carbon
- Medium-carbon steel: Approximately 0.3–0.5% carbon content.
- High-carbon steel: Approximately 0.6 to 1.0% carbon content.
- Ultra-high-carbon steel: Approximately 1.25–2.0% carbon content.

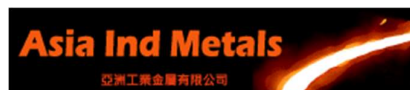
At Asia Industrial Metals, we focus on carbon steels with carbon contents from 0.5% up to 1.25%. And we just classify them as “High Carbon Steel” for convenience’s sake.

Common seen high carbon steel grades are:

- Japan JIS S50CM, S60CM, S65CM, S70CM, SK75, SK5/SK85, SK4/SK95, SK3/SK105, SK2/SK120, SK2+Cr4, etc.
- U.S. SAE 1050, 1060, 1065, 1070, 1075, 1080, 1086, 1090, 1095
- Europe EN W-Nr. C55S/1.1204, C60S/1.1211, C67S/1.1231, C75S/1.1248, C85S/1.1269, C90S/1.1217, C100S/1.1274, C125S/1.1224, C125Cr2/1.2002.

Most often supplied grades are S50CM/SAE1050, S75CM/SAE1075, SK85/SAE1086, SK95/SAE1095, and SK120(SK2/SK2+Cr4)/C125S.

#high carbon steel, #high yield strength, #high tensile strength, #high strength spring steel, #knife steel



## ■ Heat Treatment of High Carbon Steel

High carbon steels can be heat treated to improved mechanical properties. Heat treatment includes annealing, normalizing, precipitation hardening, quenching, and tempering. Annealing softens steel, helps release internal stress, and makes the steel easier to be formed or cold-worked.

Quenching and tempering are most popular processes of heat treatment for high carbon steels. Heat treatment requires a continuous furnace, instead of a batch furnace. Horizontal furnace is more popular than vertical one conducting heat treatment for high carbon steel.

Quenching and tempering are processes that strengthen and harden materials like steel and other iron-based alloys. The process of quenching or quench hardening involves heating the material and then rapidly cooling it to set the components into place as quickly as possible. The process is tightly controlled, with the heating temperature, cooling method, cooling substance and cooling speed all dependent upon the type of material being quenched and the desired hardness.

Quenching and tempering consist of a two-stage heat-treatment process. Stage one includes hardening, in which the steel is austenitized to approximately 900°C and then quickly cooled with water or oil, or liquid-lead, or else.

Stage two consists of tempering the material to obtain the desired material properties. Quenching and tempering achieve a fine-grained and homogeneous microstructure. Quenched and tempered steel is characterized by high strength and good ductility.

#tempered and quenched, #cooked, #uncooked,

## ■ Hardness of High Carbon Steel

High carbon steels may have different yield strength, tensile strength, and hardness value depending on their carbon contents, cold reduction ratio, and tempering conditions (heat treatment).

Annealed and skin-passed: HV180–HV220, or HRB92-95 or below.



Rolled hard: HV250-HV370

Quenched and tempered: HV480 – HV630, or HRC 50-63.

For example, after quenching and tempering, hardness of SK85/SAE1086 could be as high as HV670-720, or HRC 59-61.

Tensile strength of SK2Cr4 with quenched and tempered condition could be as high as 1,300MPa up to 2,100MPa,

### ■ Available size of High Carbon Steel Strips

Asia Industrial Metals supplies high carbon steel strips with the following dimensional range.

- Thickness: 0.1mm up to 0.8mm
- Width: 5mm up to 600mm
- In form of strip (coiled narrow band)



### ■ Applications of High Carbon Steel

High carbon steels, due to relative high strength and hardness, are usually used for manufacturing the following products.

measuring tape, razor blade, surgical blade, kitchen knife, box cutter, cutter knife, utility knife, coil spring, wood cutting tool, saw, shim stock, gasket, etc.

High carbon steels may have very high strength and hardness, but also relatively lower ductility. That means it is more brittle and might be easy to break by over-load force. Also, it is more difficult to weld due to higher carbon contents. Corrosion resistance is another concern and may need additional protective layer. Other than these, high carbon steel is a good low-cost choice for many applications where high strength and hardness require.